International Studies Program

Working Paper 04-31
December 2004

Payroll Taxes and Contributions

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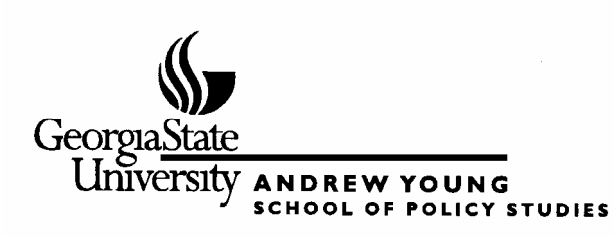

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Payroll Taxes and Contributions

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Abstract

This staff paper analyzes this "system" of payroll taxes and contributions, focusing mainly on the tax and contribution side rather than on the benefit aspects of the contribution programs. The administration of each of these payroll programs is discussed, and the effects of the entire system are also analyzed. Much of the analyses is based on microsimulation models developed in the course of this tax reform project.

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Executive Summary

The Government of Jamaica imposes a variety of taxes on the earnings of workers. Some of these taxes are more properly viewed as "contributions" because individuals are entitled to benefits whose size varies with the amount of the contributions. Some may also be seen as a way to force people to save for old age, for insurance against health problems and occupational injury, or for a home. Several are a surcharge on the individual income tax (IIT), and can be seen as an additional burden on income earners, mainly Pay-As-You-Earn (PAYE) workers. One of these taxes is used to finance government-provided job training programs. In total, these various payroll taxes generate significant amounts of revenues, and constitute a significant additional burden on labor, nearly one-half the burden of the individual income tax itself. There is a widespread belief that the additional burden of the payroll programs has had a substantial range of economic effects on such things as employment, savings, and labor supply. Because of this additional burden, many also believe that these payroll taxes and contributions are escaped via evasion and avoidance in significant amounts, in part by switching labor from the formal to the informal sectors of the Jamaican economy, by switching compensation from taxed to untaxed forms, and by outright evasion.

This staff paper analyzes this "system" of payroll taxes and contributions, focusing mainly on the tax and contribution side rather than on the benefit aspects of the contribution programs. The administration of each of these payroll programs is discussed, and the effects of the entire system are also analyzed. Much of the analyses is based on microsimulation models developed in the course of this tax reform project.

Several conclusions emerge from these analyses. The current system of wage-based taxes and contributions in Jamaica has some severe weaknesses:

- The bases of the programs have been substantially reduced by evasion, especially among the self-employed. This has lead to large, but largely unknown, revenue losses, maybe as much as two-thirds of the revenues actually collected. There are also revenue losses that arise because of the failure by employers to remit withheld taxes in a timely fashion to the government.

- The programs introduce substantial horizontal inequities, between public and private sector employees, between individuals who work in the formal sector and those who work in the informal sector, between those with a larger share of income in untaxed allowances and those with a smaller share, between PAYE and self-employed individuals, and between those who evade and those who do not.

- The programs introduce vertical inequities due to the somewhat regressive distribution of tax and contribution burdens.

- The tax rates that finance the social security system (the National Insurance Scheme or NIS) are lower than in most other comparable countries. However, the combined marginal tax rates of the various other payroll programs are high by international standards and especially high by Caribbean standards. In total, these programs add a significant extra tax burden, one felt mainly by PAYE workers.

- The programs create economic distortions, as individuals and employers adjust their behavior to avoid or evade paying the taxes and contributions. A particularly unnecessary distortion arises from the high tax rates on labor (in combination with subsidies and incentives to purchase capital), which discourage the hiring of labor and help contribute to the high unemployment rate in Jamaica. The effect of the programs on savings is uncertain.

- There is much in the separate administration of the programs that is wasteful and duplicative. Many of the same functions are performed by the respective government agencies that administer the programs, but there seems to be virtually no coordination among these agencies, especially in any efforts to reduce noncompliance.

- From the perspective of individuals and firms, there is also much that is costly and cumbersome to comply with in the payment of the taxes and contributions, due to the complexity of the programs and the burden on employers to collect nearly all revenues via employer source withholding.

- There are some payroll programs for which there is little apparent justification. The provision of social insurance via the NIS is common in most countries. However, an additional tax on wages like the Education Tax is difficult to justify.

> Although the existence of a training program like the Human Employment and Resource Training (HEART) Trust fund may well be understandable given the high unemployment rates in Jamaica, its funding via a separate payroll tax is also difficult to justify. Even the rationales for a forced insurance program like the Civil Service Family Benefits Scheme (CSFBS) or for a subsidized mortgage program like the National Housing Trust (NHT) are unclear. To our knowledge, there are few if any studies of the effectiveness of these programs in their service deliveries.

These findings suggest several avenues of reform, which mainly involve steps to rationalize this now disjoint "system" of taxes and contributions, to integrate each payroll tax or contribution with the others, to increase the collection efficiency and to decrease the administrative costs of the programs, to lessen the distorting effects of the high marginal tax rates, and to improve the horizontal and vertical equity of the system.

Reform Option 1: Consider eliminating the Education Tax and replacing its revenues with an addition to the flat rate in the IIT.

The Education Tax acts largely as a separate individual income tax. There is no obvious justification for this tax and none for an independent Education Tax collection machinery. The 5 percent Education Tax rate could be eliminated (along with the separate Education Tax administration), with the lost Education Tax revenues replaced by an increase in the flat rate in the IIT.

Elimination of the Education Tax collection administration would clearly generate administrative efficiencies. Further, there would be effects on the distribution of tax burdens if the revenues were replaced with an increase in the IIT rate. In Table 16, we use the PAYE Microsimulation Model to examine the distributional effects of this reform option relative to the current pattern of Education Tax burdens. Under the existing Education Tax, the average tax rate (ATR) is somewhat regressive but roughly proportional over most income classes. A revenue-neutral reform that eliminates the existing 5 percent Education Tax and replaces its revenues with additional IIT collections requires that an additional 5.1 percentage points be added to the 25 percent IIT flat rate.

Under this reform option, total collections would remain unchanged. Those individuals earning less than the J$120,432 threshold would gain under this reform because they would not pay any additional individual income taxes; those individuals earning above the threshold would pay slightly more in income taxes given the increased flat rate in the IIT. Overall, this reform would increase slightly the progressivity of the tax system.

Reform Option 2: Consider eliminating the employee share of the Education Tax and replacing its revenues with an addition to the flat rate in the IIT.

A variant on Reform Option 1 is to eliminate only the employee portion of the Education Tax. Under this reform option, the employee share of 2 percent would be moved into the individual income tax, but the employer share of 3 percent would remain as a separate tax. This reform option would require an additional 2 percentage points be added to the 25 percent IIT rate, which would increase slightly the progressivity of the tax system due to the IIT threshold. This reform option would not achieve many of the administrative savings of Reform Option 1 because the existing Education Tax collection mechanisms would remain.

Reform Option 3: Reconsider the CSFBS as a mandatory and government-provided life insurance program.

The CSFBS acts much like a forced whole-life insurance policy that provides benefits for the dependents of civil servants in "pensionable offices". There is little obvious rationale for such a forced insurance program. Indeed, the amounts actually collected from the CSFBS are far less than the amounts estimated using the *Emoluments Survey 2001* under the assumption that government employees paid all amounts implied by their gross emoluments. Further, the amounts collected (and paid into the consolidated fund) far exceed the amounts disbursed as benefits to survivors.

The CSFBS is both a mandatory life insurance program and mandatory through government provision. Neither of these characteristics – mandatory and government-provided – is essential. One reform option would be to make insurance purely optional for government employees. Even if a mandatory insurance scheme was thought to be desirable, another reform option would be to allow the insurance to be provided by private insurers.

Reform Option 4: Reconsider the HEART Trust fund tax.

The appropriate treatment of the HEART Trust fund tax is not clear-cut. It is certainly possible to retain the current system in which the 3 percent HEART tax liability is calculated by each firm on its gross monthly payroll above J$14,444. However, the HEART tax could also be eliminated, and its finance provided by monies from the consolidated fund.

In some sense, the choice depends upon "who" benefits from the HEART training programs. The unstated premise underlying the current method of finance is that workers and (possibly) employers in the private sector are the primary beneficiaries of the programs. Because each firm is reluctant to establish its own training program due to worker mobility, a compulsory tax on all potential participants is a way to ensure that training is provided. This premise is certainly defensible. However, a more defensible premise is that the main beneficiary of the training programs is Jamaican society, broadly viewed, through a better trained and more efficient labor force. In this perspective, finance of the training programs should come from all Jamaican taxpayers via the consolidated fund, and a separate HEART tax is then unnecessary.

The choice between these two options is not entirely clear-cut. The separate HEART tax maintains greater independence of HEART finances and provides greater assurance to HEART officials of continued revenues. Finance of training programs from the consolidated funds saves significant administrative and compliance costs. On balance, we believe that these considerations suggest that consideration be given to eliminating that HEART Trust fund tax as a separate tax. Because there is some justification for a government sponsored training program in the current economic environment of Jamaica, its funding could continue but could come from the consolidated fund rather than from a separate tax on wages.

A revenue-neutral reform that eliminates the existing 3 percent HEART Trust Fund tax and replaces its revenues with additional IIT collections requires that an additional 1.9 percentage points be added to the 25 percent IIT flat rate. Under this reform option, total collections would remain unchanged. As with Reform Option 1, those private sector individuals earning less than the J$120,432 threshold would gain under this reform because they would not pay any additional individual income taxes; those individuals earning above the threshold would pay slightly more in income taxes given the increased flat rate in the IIT, and individuals employed in the public sector (earning above the IIT threshold) would also pay more. To continue the existing incentive for firms to hire HEART trainees, the existing trainee credit could be retained as a credit against the company tax.

Reform Option 5: Consider expanding the bases of any remaining payroll programs.

There is much evidence, even if this evidence is not firm, that substantial amounts of payroll program revenues are not collected, due to illegal evasion of tax and contribution liabilities and legal avoidance of these liabilities. Accordingly, consideration should be given to broadening the bases of any of the remaining payroll programs by forcing those PAYE individuals already in the individual income tax net to pay the full legally due amount of each tax and contribution, by forcing firms to do the same, and by instituting a compliance program that reduces evasion by self-employed individuals. Of course, any expansion in the base of a contributory scheme should be accompanied by a change in the scheme's benefit formula, in order to ensure actuarial fairness. The bases could also be expanded by including some types of workers, sectors, or compensation types currently excluded from the relevant program. For example, there are several forms of allowances that are not taxable. Also, the HEART tax is not collected from public sector agencies, and the CSFBS is limited to pensionable officers in the GOJ. Either could be changed, even if the rationale for this type of base expansion is not strong.

Reform Option 6: With any base expansion, consider a corresponding reduction in tax and contribution rates.

Any expansion in bases should be accompanied by a corresponding reduction in tax and contribution rates. Such a rate reduction would lessen the distorting effects of the system of payroll programs. For example, the *Emoluments Survey 2001* indicates that total nontaxable allowances were J$8.5 billion relative to gross emoluments of J$164.8 billion (both as updated to 2003). Expanding the payroll program base to include these

allowances would allow the overall payroll program average tax rate to fall from 16 percent to 15 percent.

Reform Option 7: Consider consolidating administration of any remaining payroll programs.

The collection procedures of any of the remaining payroll programs could be consolidated by merging the administration of the payroll programs into a single agency. In all but one instance – the NHT and the NIS currently use the same collection form – there are separate collection machineries for each wage-based program. The systems are also largely independent of the individual income tax. To our knowledge, each program has its own compliance organization, and there is virtually no coordination and communication across these organizations. All of this occurs despite a common method of collection for the vast bulk of the revenues that are generated, or employer withholding on PAYE wage income.

A possible reform option is a consolidation of the various collection procedures, a consolidation that would affect both PAYE and self-employed individuals. For PAYE workers, a single form should be used to collect all payroll taxes and contributions, including the individual income tax. This form would have for each employee a separate entry for the individual income tax and for any other payroll tax or contribution withheld. Payments would be deposited with a single receiver (e.g., the Collector of Taxes) in accounts earmarked for each program. The use of a single form for PAYE workers would be facilitated by a common tax base, the retention of proportional tax rates, and likely the elimination of the NIS ceiling on taxable emoluments. For self-employed workers, a single form should also be used. The obvious form is the individual income

tax return (IT01), which would have to be altered to include payments to all programs that may remain after reform. The self-employed individual would pay all taxes and contributions at the same time that he or she pays the individual income tax. For both PAYE and self-employed workers, individual records of contributions would continue to be maintained. A single agency should be given the responsibility for enforcement and compliance.

Payroll Taxes and Contributions

Introduction

In addition to the individual income tax (IIT), the Government of Jamaica (GOJ) imposes a variety of taxes on the earnings of workers. Some of these taxes are more properly viewed as "contributions" because individuals are entitled to benefits whose size varies with the amount of the contributions. Some may also be seen as a way to force people to save for old age, for insurance against health problems and occupational injury, or for a home. Several are a surcharge on the individual income tax, and can be seen as an additional burden on income earners, mainly Pay-As-You-Earn (PAYE) workers. One of these taxes is used to finance government-provided job training programs. In total, these various payroll taxes generate significant amounts of revenue, and constitute a significant additional burden on labor, a burden that many believe has had a substantial range of economic effects on such things as employment, savings, and labor supply. Because of this additional burden, many also believe that these payroll taxes and contributions are escaped via evasion and avoidance in significant amounts, in part by switching labor from the formal to the informal sectors of the Jamaican economy, by switching compensation from taxed to untaxed forms, and by outright evasion.

This staff paper analyzes this "system" of payroll taxes and contributions, focusing mainly on the tax and contribution side rather than on the benefit aspects of the contribution programs. Various reform options of the system are suggested and analyzed.

In the next section we describe the structural and administrative features of each program. We then examine some of the economic effects of the programs. The final

section presents several options for reform, options that would simplify administration and likely reduce the harmful economic effects of the taxes and contributions.

The Major Taxes and Contributions on Payrolls and their Administration

There are five programs that use as a tax or contribution base some measure of the earnings of workers (or of the wage bill or payrolls of firms) and that are distinct from one another and from the individual income tax (IIT). These programs include:

- Civil Service Family Benefits Scheme (CSFBS)
- Education Tax
- Human Employment and Resource Training (HEART) Trust Fund
- National Housing Trust (NHT)
- National Insurance Scheme (NIS).

This section discusses the major structural features of each program, focusing on the tax and contribution component of the programs. In total, payments to these programs in the financial year ending March 31, 2003 were equivalent to about one-half of IIT collections, so that the payroll taxes and contributions constitute a significant additional burden on labor.

It is important to distinguish between a "tax", an "earmarked tax", and a "contribution". All are compulsory payments by an employee or an employer to government. However, a "contribution" entitles the individual to some form of benefit whose magnitude is based at least in part on the amount paid by the individual. In contrast, a "tax" does not entitle the individual to any benefits that are linked to the amount that the individual pays. An "earmarked tax" also does not entitle the individual

to benefits that are linked to the amount that the individual pays, but the revenues from an earmarked tax go a dedicated (or earmarked) fund.

The Education Tax is clearly classified as a tax. The HEART Trust Fund tax is more accurately seen as an earmarked tax because HEART revenues are earmarked for HEART training programs.[1] Payments to the CSFBS, the NHT, and the NIS are for the most part contributions because individuals receive benefits for their payments. However, to the extent that benefits received are less than contributions made, then these three programs also contain tax elements.

Table 1 shows the rates of payment for social security contributions and other payroll programs in selected Caribbean and Latin American countries, as documented in various issues of the *International Bulletin of Fiscal Documentation*; Table 2 gives similar information for OECD countries. These tables indicate that social security contributions in Jamaica (for the National Insurance Scheme) are relatively low by international standards. However, payroll tax rates other than for social security are significantly higher in Jamaica than in most other countries, especially those countries in the Caribbean and Latin America. Tables 3 and 4 show the revenues from social security contributions and payroll programs for selected Caribbean and Latin American countries (Table 3) and for OECD countries (Table 4). Tables 5 and 6 summarize the broad features of the payroll programs in Jamaica.

[1] Note that HEART payments finance training programs that provide benefits to those who receive the training. However, the individuals who benefit from the programs – the trainees – are not the same individuals (or firms) who are taxed.

Table 1: Tax Rates from Payroll Taxes and Social Security Contributions in Selected Caribbean and Latin American Countries (in percent)

Country	Total Tax Rate (A) = (B)+(C)	Payroll Tax Rate (Other than SSC) (B)	Total Social Security Contribution (SSC) Rates (C) = (D)+(E)	Social Security Charges to Employers (D)	Social Security Charges to Employees (E)
Argentina	38 - 42	0	38 – 42	21 - 25	17
Brazil	19.15 – 22.8	8.5	10.75 – 14.3	3.1 - 3.3	7.65 - 11
Colombia	36.5	9	27.50	20.125	7.375
Costa Rica	32	0	32	23	9
Chile	20.05 - 20.55	0.05	20.04 – 20.5	0.95	19.09 - 19.55
Ecuador	21.5	1	20.5	11.15	9.35
El Salvador	19	5.5	13.5	9.5	4
Guatemala	11.5 - 14.5	0	11.5 - 14.5	9 - 10	2.5 - 4.5
Honduras	15	1	14	7	3.5
Jamaica[a]	**18 - 22**	**13 – 17**	**5**	**2.5**	**2.5**
Mexico	42.29 - 44.92	6 - 8	36.92	30.19	6.73
Nicaragua	15.25 - 23.5	2	13.25 - 21.50	9 - 15	4.25 - 6.25
Panama	21.31 - 26.35	2.75	18.56 – 23.6	11.31 - 16.35	7.25
Peru	24.53 - 25.55	2	22.53 - 23.55	9.53 - 10.55	13
Venezuela	24.17 - 27.17	2.5 - 4.5	21.67 - 22.67	15.42 -16.17	6.25 - 6.5

Source: *International Bureau of Fiscal Documentation* (IBFD), various issues. All contributions are computed as a percentage of the employee's salary.

[a] Social Security Contributions are for the National Insurance Scheme. Payroll tax rates other than for Social Security Contributions include the Education Tax (5 percent combined employee and employer rates), the HEART Tax (3 percent), NHT contributions (5 percent combined employee and employer rates), and, for some government employees, contributions for the CSFBS (4 percent).

Table 2: Tax Rates from Payroll Taxes and Social Security Contributions in OECD Countries

(in percent)

Country	Total Tax Rate (A) = (B)+(C)	Payroll Tax Rate (Other than SSC) (B)	Total Social Security Contribution (SSC) Rates (C) = (D)+(E)	Social Security Charges to Employers (D)	Social Security Charges to Employees (E)
Australia	Up to 7	Up to 7	0	0	0
Austria	29.15 - 29.3	7.5	21.65 - 21.8	21.65 - 21.8	NA
Belgium	32.89 - 48.66	0	32.89 - 48.66	32.89 - 48.66	NA
Canada	Rate Varies	1 - 4.5	Rate Varies	Rate Varies	NA
Denmark	0	0	0	0	0
Finland	26.4 - 28.4	0	26.4 - 28.4	20.1 - 22.1	6.3
France	42.25 - 64.63	4.25 -13.60	38 - 51.03	38 - 51.03	NA
Germany	40.8	0	40.8	20.4	20.4
Greece	43.86 - 54.36	0	43.86 - 54.36	27.96 - 34.96	15.90 -19.40
Ireland	18	0	18	12	6
Italy	36 - 42	0	36 - 42	32% - 36	4 - 6
Mexico	42.92 - 44.92	6 – 8	36.92	30.19	6.73
Netherlands	25.31	0	25.31	18.66	6.65
Norway	26.6	0	26.6	26.6	NA
Portugal	23.75	0	23.75	23.75	0
Spain	37.15 – 37.2	0	37.15 - 37.2	30.8	6.35 - 6.4
Sweden	81.34	48.52	32.82	32.82	0
Switzerland	13.1	0	13.1	6.55	6.55
Turkey	55.5 - 61	0	55.5 – 61	32.5 – 38	23
United Kingdom	0 - 23.6	0	0 - 23.6	0 - 11.8	0 - 11.8
United States	15.3	0	15.3	7.65	7.65

Source: *International Bureau of Fiscal Documentation* (IBFD), various issues. All contributions are computed as a percentage of the employee's salary

Table 3: Revenues from Payroll Taxes and Social Security Contributions in Selected Caribbean and Latin American Countries, 2000

	Payroll Taxes and Social Security Contributions	
Country	As Percent of Central Government Total Tax Revenues	As Percent of Gross Domestic Product
Argentina	25.66	3.21
Bolivia	12.00	1.78
Brazil	46.35	6.06
Chile	8.02	1.29
Costa Rica	31.54	4.72
Dominican Republic	4.43	0.78
Jamaica (for 2002/2003)	15.52	4.15
Mexico	11.85	2.43
Nicaragua	17.75	4.97
Panama	29.57	5.32
Peru	8.74	1.10
Uruguay	33.42	8.16
Venezuela	5.28	1.09

Source: *Government Finance Statistics*, various issues; Ministry of Finance and Planning, Government of Jamaica.

Table 4: Revenues from Payroll Taxes and Social Security Contributions in OECD Countries, 2001/2002

	Payroll Taxes and Social Security Contributions	
Country	As Percent of Central Government Total Tax Revenues (in percent)	As Percent of Gross Domestic Product (in percent)
Australia	6.2	1.4
Austria	38.7	12.3
Belgium	31.3	10.1
Canada	16.9	5.8
Denmark	4.9	1.9
Finland	26.8	9.0
France	38.5	12.7
Germany	40.5	10.0
Greece	28.4	9.4
Ireland	14.8	3.9
Italy	29.2	10.8
Japan	36.8	7.3
Netherlands	35.9	10.8
New Zealand	0.8	0.2
Norway	20.5	8.7
Portugal	25.7	6.9
Spain	33.6	10.1
Sweden	34.1	13.5
Switzerland	34.5	8.6
United Kingdom	17.0	6.8
United States	23.3	7.4

Source: *Government Finance Statistics*, various issues.

Table 5: Tax Base and Tax/Contribution Rates in the Payroll Programs

	PAYE Worker			Self-employed Worker		
Program	Tax Base	Employee Rate (percent)	Employer Rate (percent)	Tax Base	Rate (percent)	Individual Benefits?
CSFBS Contribution	Gross emoluments of government employees in "pensionable" offices No ceiling	4	NA	NA	NA	Yes
Education Tax	Emoluments, net of NIS and CSFBS contributions No ceiling	2	3	Gross earnings No ceiling	2	No
HEART Tax	Total emoluments of any employer whose monthly payroll exceeds J$14,444	NA	3	NA	NA	No
NHT Contribution	Emoluments, net of NIS and CSFBS contributions No ceiling	2	3	Gross earnings No ceiling	3	Yes
NIS Contribution	Gross emoluments up to J$500,000	2.5	2.5	Gross earnings up to J$500,000	5	Yes

Table 6: Administration of the Payroll Programs

Program	What agency administers the program?	Is the tax base the same as the IIT?	Is employer withholding used to collect the tax from PAYE workers?	Are individual records kept?	Are there individual benefits?	When and where does the employer make payments?	Is there an independent compliance program?
CSFBS	Accountant General, Ministry of Finance and Planning	Yes[a]	Yes	Yes	Yes	Monthly payments to Accountant General	Yes
Education Tax	Ministry of Finance and Planning	Yes	Yes	Yes	No	Monthly payments to Collector of Taxes	
HEART Trust	HEART Trust, Ministry of Education, Youth, and Culture	Yes[b]	Yes	No	No	Monthly payments to Collector of Taxes	Yes
NHT	NHT, Ministry of Finance and Planning	Yes	Yes	Yes	Yes	Monthly payments to commercial banks	Yes
NIS	Ministry of Labour and Social Security	Yes[a,c]	Yes	Yes	Yes	Monthly payments to Collector of Taxes	Yes

[a] Contributions to the NIS and to the CSFBS are deducted from earnings before getting income subject to the individual income tax (IIT).
[b] The employer is allowed to deduct from its HEART Trust liability the amount paid to HEART trainees. An employer whose monthly payroll does not exceed J$14,444 is not required to pay the HEART tax.
[c] Gross earnings or emoluments above J$500,000 are not taxed

The widespread international use of payroll programs reflects several considerations. First, a tax (or contribution) on wages has traditionally been seen as a way of financing social insurance programs, going back to the example of Germany in the late 1800s. Second, given the earmarking characteristics of most payroll contribution programs, these programs can provide a clear link between the payment of contributions on wages while working and the receipt of benefits from pensions when retired. Third, a contribution base of wages is a readily identified base, which makes administration of a broad-based payroll program relatively straightforward and which allows the government to shift the cost of collection to employers via employer withholding. Fourth, there is substantial evidence, at least from developed countries, that the distorting effects of payroll programs – on labor supply, on savings, on compensation choice, and so on – are often much lower than comparable taxes on other bases. Finally, the programs can be used to ensure that all individuals have a minimally adequate pension upon retirement (e.g., the goal of "social adequacy") by redistribution from higher-income contributors to lower-income contributors. Of course, these considerations apply mainly to the use of **contributions** based upon payroll, and not to the use of **taxes** on payrolls. Taxes on payrolls seem motivated largely because such taxes can readily collect large amounts of revenues at low cost to government. International practices largely reflect these considerations.

Civil Service Family Benefits Scheme (CSFBS)

The oldest of the payroll programs is the Civil Service Family Benefits Scheme, called the "Civil Service Widows and Orphans Fund" until December 1977. This program was established as a forced insurance program for the dependents of civil servants in "pensionable offices", essentially annual paid positions, and acts much like a whole-life insurance policy. All persons in pensionable offices must pay 4 percent of

their salary into the life insurance program.[2] In the event of the death of a contributor, the spouse and children of the officer are then entitled to an annual payment whose size depends upon the number of contributory years and the final salary of the officer. Originally, only male civil servants were required to contribute. The insurance program was extended by the 1977 *Pensions Act* to all persons, male and female, appointed to a pensionable office after January 1, 1976, with some transition rules for those who had or had not paid into the previous scheme.

Each contributor pays 4 percent of gross emoluments, including taxable allowances.[3] (Note that CSFBS contributions are deducted from earnings before calculating income subject to the individual income tax.) Payments must be made either for a period of 35 years or until age 65 is reached, whichever comes earlier. Contributions are deducted by the relevant government agency, and then remitted to the Accountant General; contributions are not earmarked but instead go fully into the consolidated fund. A record of contributions is supposed to be maintained for each contributor, although the reliability of these records has been questioned by officials in the Ministry of Finance and Planning.

Benefits are paid to surviving family members in the event of the death of the officer. The surviving spouse receives 1 percent of the final salary for each contributory year of service.[4] The full annual payment to survivors is based on a minimum of 10 years of service and a maximum of 35 years; if an officer leaves before full vesting (e.g., 10 years of service), then he or she gets 50 percent of the contributions returned. The

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[2] Contract officers are not required to participate, and school teachers are also outside the system.

[3] "Emoluments" are defined in the Income Tax Act as "…all salaries, fees, wages, all provision or payment…in respect of living or other accommodation, entertainment, utilities, domestic or other services and other benefits, perquisites and facilities whatsoever;…all sums paid to any person by an employer in respect of expenses whether reimbursable or not; all annuities, pensions, superannuation or other allowances payable in respect of past services". Emoluments do not include certain forms of allowances in specified occupations or sectors, such as some types of payments made for laundry or uniform allowances, for meal allowances outside normal working hours, for living quarters or residences, for motor vehicles, for telephones, and for credit cards.

[4] A "contributory year" is a period longer than six months. If an officer contributes for a period less than six months in any given year, then this period is not counted toward the annual payment to survivors.

surviving spouse receives the basic benefit. Children also receive an annual payment, depending on the number of children and their ages. The amount paid to children is 40 percent of the basic benefit for one child, 60 percent for two, 80 percent for three, and 100 percent of the basic benefit for four or more children; the amount is split among the children, and is paid until the child reaches the age of 19 (or until the age of 23 if in higher education). If there are no survivors, the annual payment is paid to the estate of the officer.

The quantity and quality of information about the CSFBS are limited. For example, there is no agreement about the exact number of individuals who are active contributors, and estimates range widely between 20,000 and 60,000. According to officials, there is no recent study on the actuarial fairness of the program. The amounts of contributions and benefit payments are given in Table 7, which indicates that contributions made greatly exceed benefits paid. As discussed later, there is suggestive evidence that actual collections are considerably less than potential collections.

Table 7: CSFBS Contributions and Benefits
(in J$)

	Contributions				
Financial Year	For Widows and Orphans	From Members of the Legislature	From Other Government Authorities for Seconded Officers	Total	Benefits: Widows and Orphans Refunds
1993/1994	38,326,822	2,459,012	240,124	41,025,958	NA
1994/1995[a]	80,000,000	2,500,000	240,000	82,740,000	NA
1995/1996	49,330,751	2,149,090	323,955	51,803,796	30,500,000
1996/1997	98,285,223	3,978,139	912,008	103,175,370	44,715,000
1997/1998	143,217,581	3,294,114	4,408,999	150,020,694	42,500,000
1998/1999	431,895,760	10,991,236	14,727,461	457,614,457	60,134,000
1999/2000	347,898,925	10,461,964	6,015,360	364,376,249	59,522,000
2000/2001	363,339,020	1,567,411	1,314,484	366,220,915	69,469,000
2001/2002	287,297,451	969,780	7,755,702	296,022,933	90,644,000
2002/2003	365,166,299	13,765,925	4,939,156	383,871,380	93,938,000
2003/2004	380,646,984	7,382,567	2,792,096	390,821,647	98,382,000
2004/2005[a]	386,197,139	11,100,000	2,680,553	399,977,692	15,700,000

Source: CSFBS.
[a] Contributions are an estimated amount

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Education Tax

The Education Tax was established in July 1983 by the *Education Tax Act*, and various provisions were changed in April 1984 by the *Provisional Collection of Tax (Education Tax) Order*. Its stated purpose is to advance broadly defined educational goals, including such things as increasing teachers' salaries and constructing and maintaining buildings. However, the revenues from the Education Tax go into the consolidated fund, and are not earmarked for specific education programs.

The base of the Education Tax is identical to that of the individual income tax. For a PAYE worker, the base is gross emoluments (net of contributions to the NIS and the CSFBS); for a self-employed individual the base is total income; domestic workers and their employers are also required by law to pay the Education Tax, based on a fixed amount per week. Allowances subject to the individual income tax are by law taxable under the Education Tax. All earnings are taxed; that is, there is no standard deduction and no ceiling above which earnings are not taxed. PAYE workers under the age of 18 or over the age of 65 are not subject to the tax; there are no age restrictions for the self-employed. GOJ ministries and departments are exempt from the employer's share of the Education Tax unless officially required to pay by the Minister. As specified in the *Education Tax Act*, certain other employers are also exempt from the tax, including a statutory body or authority, parish councils, a company registered under the *Companies Act* for which a government or government agency owns at least 51 percent of the shares of the company, the Kingston and St. Andrew Corporation, and the University of the West Indies. The rationale for these exemptions is not readily evident.

A PAYE worker faces an employee tax rate of 2 percent and an employer tax rate of 3 percent. The combined employee and employer tax is withheld by the employer, following the same procedures as with PAYE withholding under the individual income tax. The employer has a tax deduction card for each employee on which the employer must list the tax withheld for the worker. At the end of each month the employer then sends to the Collector of Taxes the total taxes withheld for all employees, as indicated on a monthly remittance card. (Payment must be made within 15 days of the end of the month.) At the end of each year the employer sends to the Collector all employee deduction cards, all monthly records, and an Annual Return that lists for each employee the combined employee and employer contributions for the year. The records are kept on file at the district offices of the collectorates. Inland Revenue is responsible for the administration of the Education Tax.

Self-employed individuals are taxed at a rate of 2 percent on their total income, as long as they earn more than the minimum wage. Domestic workers and their employers are each required to pay J$.20 per week.

Collections from the Education Tax are given in Table 8. Revenues have grown steadily over time, and in the last decade the trend largely mirrors that of the individual income tax. For example, the ratio of Education Tax revenues to individual income tax revenues has been fairly stable at 20 percent since the mid-1990s. Officials believe that employer tax compliance is not a serious problem. They also believe that compliance by the self-employed and by domestic workers is very low, although information that would document this is not available. For example, there is no information available on the number of self-employed individuals or domestic workers who currently pay the tax.

Table 8: Education Tax Revenues

Financial Year	Education Tax Revenues (in millions J$)	Education Tax Revenues as Percent of Individual Income Tax Revenues (in percent)
1988/1989	65.6	4.6
1989/1990	207.6	11.1
1990/1991	304.7	12.9
1991/1992	428.2	13.1
1992/1993	666.1	17.9
1993/1994	1,052.6	20.5
1994/1995	1,540.7	20.9
1995/1996	2,046.0	20.8
1996/1997	2,653.9	21.2
1997/1998	3,119.8	22.4
1998/1999	3,365.5	21.2
1999/2000	3,541.5	23.5
2000/2001	3,820.7	21.9
2001/2002	4,234.3	21.4
2002/2003	4,872.2	---

Source: Ministry of Finance and Planning.

Human Employment and Resource Training (HEART) Trust Fund

The Human Employment and Resource Training (HEART) Trust is Jamaica's national job training agency, established in 1982 to provide technical and vocational education and training programs. The *HEART Act* states the functions of the Trust are, among other things, "…to develop, encourage, monitor and provide finance for training schemes for employment of trainers; to provide employment opportunities for trainees; to direct or assist in the placement of persons seeking employment in Jamaica; to promote employment projects; to ensure that there is in the Island an adequate number of persons trained for employment in the technical and vocational fields; to co-operate with other organizations and bodies in matters relating to technical and vocational education and training; to certify persons as instructors in the field of technical and vocational education and training; … [and] to approve and accredit institutions offering technical and

vocational education and training…". The program is now located in the Ministry of Education, Youth, and Culture.

To perform these functions, employers whose monthly payroll exceeds J$14,444 are required to pay a 3 percent tax on the total gross monthly payments of emoluments paid to employees.[5] HEART trainees are typically paid at a prescribed rate of J$150 per week, although employers can pay more than this if they wish.[6] Any amounts paid to HEART trainees employed by the firm are not included in the gross monthly wage bill, and the employer is allowed to credit against the HEART tax liability any payments made to HEART trainees, up to a maximum of J$150 per week per trainee.[7] This credit of HEART trainee wages against HEART tax liability effectively reduces the cost of a trainee, often to zero. For example, an employer with a monthly payroll of J$21,666 would face an annual HEART tax liability of J$7,800. However, if the employer hired one HEART trainee and paid this trainee J$150 per week, the total amount paid to the HEART trainee over the entire year would be J$7,800. Hiring one trainee would therefore reduce the employer's HEART tax liability to zero.

There are also company tax benefits to an employer who retains a HEART trainee continuously for two or three years. If a company employs a trainee for a second and/or third year, then the company can claim as a business expense an amount equal to 75 (80) percent of a male (female) trainee's remuneration during the second and/or the third year.

Note that an employer with a monthly payroll of J$14,443 faces no HEART tax liability; if the payroll increases by J$1, then the HEART tax liability increases from J$0

[5] The original threshold was J$7,222, and was raised to the current level on March 7, 1994.
[6] The HEART trainee wage was initially J$50 per week, and has increased over time.
[7] Any payments to HEART trainees above J$150 per week are deductible in computing the company tax.

to J$433.32, for an effective marginal tax rate of 43,332 percent. Note also that trainees and their employers are subject to NIS, NHT, and Education Tax payments.

Employers exempt from the HEART tax include GOJ ministries and departments, parish councils, the Kingston and St. Andrew Corporation, and a company registered under the *Companies Act* for which a government or government agency owns at least 51 percent of the shares of the company.

These taxes are paid monthly by the employer to the Collector of Taxes in the relevant collectorate, at which point the monies are deposited in an account earmarked for the HEART Trust. The employer fills out a remittance form, and takes the form and the payment to the Collector of Taxes by the 14th of the following month. The Collectorate deposits the taxes into a local bank account maintained by the HEART Trust with the Scotia Bank. Late payments are subject to a 20 percent per annum interest charge; nonpayments may be subject to a fine up to J$5,000, a fine three times the amount of payments outstanding (where applicable), and even imprisonment up to 12 months.

The HEART Trust has its own monitoring division, established in 1991. Currently, there are 21 individuals in the division. Activities include verifying that employers remit the appropriate amount of HEART tax and attempting to add new employers to the HEART list; auditors can also perform up to six years in back audits of firm records. Overall, the HEART Trust employs 1,200 full-time employees.

The revenues generated from the HEART tax are given in Table 9. For the financial year ending in March 2003, revenues were J$2.26 billion, collected from 8,126 firms (including 1,059 firms added to the HEART employer tax roll since the previous financial year); these revenues are equivalent to 10 percent of the revenues from the

individual income, a percentage that has remained constant since the mid-1990s. Audits identified 896 companies in arrears that totaled J$134.08 million, and these audits generated J$99.98 million in additional collections. HEART Trust officials estimate that there are roughly 4,000 firms that should pay the HEART tax but that do not.

Table 9: HEART Trust Collections

Financial Year	HEART Collections (in thousands J$)	HEART Collections as Percent of Individual Income Tax Revenues (in percent)
1991/1992	174,985	5.4
1992/1993	323,133	8.7
1993/1994	483,737	9.4
1994/1995	720,398	9.8
1995/1996	1,007,900	10.2
1996/1997	1,275,263	10.2
1997/1998	1,478,863	10.6
1998/1999	1,609,291	10.1
1999/2000	1,706,772	11.3
2000/2001	1,838,569	10.5
2001/2002	2,053,325	10.4
2002/2003	2,262,801	---

Source: HEART Trust Fund.

The training programs occur in several areas and institutions: vocational training centers; HEART academies and institutes; the school leavers training opportunities program; the workforce improvement program; special programs; the vocational training development institute; the national council on technical, vocational, education, and training; and technical high schools development project. At these institutions, training programs are targeted toward multiple sectors: agricultural skills, apparel and sewn product skills, art and craft skills, beauty care services skills, building and construction skills, cabinet making skills, commercial skills, hospitality skills, information and communication technology skills, machine and appliance maintenance/repair skills,

transportation/automotive trade skills, and pre-vocational/continuing education programs. In total, there were over 34,000 individuals who received some form of HEART training in 2002-2003. The goal of HEART officials is to increase the annual number of trainees to 100,000 over the next several years.

National Housing Trust (NHT)

The National Housing Trust (NHT) was established in 1975, and the current features of the NHT are governed by the *National Housing Trust Act* of 1979. The NHT is located in the Ministry of Housing. It was established to increase and to improve the existing stock of housing, largely by using tax revenues financed by a payroll contribution to fund various housing programs. NHT revenues are shown in Table 10, and the number and amounts of mortgage loans and of cash grants are given in Table 11.

Table 10: NHT Contributions

Financial Year	Employee Contributions (in thousands J$)	Employer Contributions (in thousands J$)	Total (in thousands J$)	NHT Contributions as Percent of Individual Income Tax Revenues (in percent)
1992/1993	327,661	379,975	707,636	19.0
1993/1994	526,280	582,511	1,108,791	21.6
1994/1995	742,768	838,195	1,580,963	21.5
1995/1996	1,035,282	1,153,011	2,188,293	22.2
1996/1997	1,409,773	1,437,804	2,847,577	22.7
1997/1998	1,633,606	2,163,272	3,796,878	27.3
1998/1999	1,873,126	1,838,755	3,711,881	23.4
1999/2000	1,961,862	1,983,666	3,945,528	26.2
2000/2001	2,101,866	2,232,575	4,334,441	24.9
2001/2002	2,446,842	2,488,742	4,935,584	25.0
2002/2003	3,233,780	2,227,430	5,461,210	---

Source: National Housing Trust.

Notes: In principle, the employer contributions should be 1.5 times the employee contributions, but this is not the case, in part because self-employed contributions are included under employee contributions. Also, the amounts reported are as per payment vouchers prepared by contributors when making payments; as a result, on many occasions the payments made to the NHT represent only the amounts deducted from employees salaries, and the collection of the matching employer portion then becomes an issue for follow-up by the compliance unit. All collections are on a cash basis.

Table 11: NHT Mortgage Loans and Cash Grants

Financial Year	Number of Loans Granted	Loans Disbursed (in thousands of J$)	Cash Grants (in thousands of J$)
1992/1993	3,270	876,713	13,272
1993/1994	3,290	1,156,462	28,368
1994/1995	3,867	1,361,000	11,120
1995/1996	6,118	3,299,600	45,646
1996/1997	5,343	3,960,000	42,994
1997/1998	6,972	4,783,000	54,418
1998/1999	4,781	4,197,000	91,614
1999/2000	5,913	5,051,643	110,701
2000/2001	4,904	4,841,873	192,082
2001/2002	7,117	5,773,356	446,083

Source: NHT Annual Reports (website www.nht.gov.jm).

The NHT contribution is imposed on largely the same tax base as the individual income tax. For an employed individual, the base is gross emoluments. The employee pays 2 percent of gross emoluments, and the employer pays 3 percent, with the employer's share treated as an expense in computing the company tax. Self-employed individuals pay 3 percent of total income, and domestic workers pay 2 percent of gross earnings. Taxable allowances are included in gross emoluments. As with the Education Tax, contributions to the NIS and the CSFBS are deducted from income before calculating the base subject to the NHT contribution. In principle, individuals may make voluntary contributions to the NHT in order to qualify for NHT benefits, but in practice such voluntary contributions are rare. An individual whose income is less than the minimum wage is legally exempt from the NHT contribution.

NHT payments are made monthly through employer deposits at commercial banks. Each employer withholds the employee and the employer contributions, using a form that lists the combined gross wages of all employees, the employees' NHT contributions, and the employer's contributions. At the end of the calendar year, the

employer must file an "Employer's Annual Return: Declaration and Certificate" with the Ministry of Labor and Social Security. The annual return lists for each employee the employee's National Insurance number, the employee's taxpayer registration number, the employee's gross emoluments, the employee's NHT contribution, and the employer's NHT contribution; the same form is still used to record the employee and employer NIS contributions. NHT auditors compare information on the annual return with information on the monthly returns, and then enter the information on computers. At the same time, the employer sends to the Ministry an individual deduction card that contains for the employee the monthly NHT (and NIS) contributions that the employer deducted over the course of the year. These procedures are apparently not always followed by employers.

Self-employed individuals and domestic workers may also make monthly deposits at commercial banks. NHT officials believe that compliance among these groups is very low.

The NHT has its own inspection force with the authority to audit company records and to require certain types of information from companies. The effectiveness of this inspection force is not known.

An individual's contributions entitle him or her to several types of benefits, most of which relate to mortgage loans of various types (Table 11). One benefit is a cash refund of the individual's contributions. An individual is entitled to a cash refund of his or her contributions, after a period of at least seven years. For example, an individual is entitled to claim a refund in 2004 of contributions made in 1996. Contributions are returned along with interest. Contributions held for seven years are refunded in the eighth year at a 3 percent interest rate; contributions held for more than seven years are

refunded at 8 percent. The interest rate on these refunds is well below market interest rates, so that there is clearly a tax element to the NHT refund program. An additional factor that creates a tax element is that the individual may only receive his or her own contributions, and not the employer's contributions, so that only the individual's own contributions are vested with the individual.

In addition to the cash refunds, the individual can apply for several loan types: build-on-own-land loans, home owner loans, house lot loans, open market loans, serviced lot loans, and scheme loans. The maximum amount on the loan varies by the type of loan, and the interest rate on the loan varies with the income of the applicant; the period of loan repayment also varies with the type of loan.[8] Applicants must have at least 52 weekly contributions to their credit, of which at least 13 must have been made within 26 weeks prior to application. Originally, a lottery (or random selection process) was used to allocate loans. This system was replaced with a "point" system in which individuals received more points and so a higher loan allocation probability for contributing over a longer time, for having a lower income, or for reinvesting the annual contribution in a mortgage bond; however, the point system is now only used for scheme loans. Through March 2004, the NHT was projected to have made mortgage loans totaling J$39.1 billion.

National Insurance Scheme (NIS)

The National Insurance Scheme (NIS) was established in 1965 by the *National Insurance Act* (No. 38 of 1965). It is a funded social security system now administered by the Ministry of Labour and Social Security that is intended to protect individuals

[8] For example, a single applicant can apply for a J$400,000 home owner's loan, a J$1,000,000 build-on-own-land loan, or a J$450,000 house lot loan. Also, an individual whose weekly income is between

against the loss of income that arises from such events as old age, injury, sickness, or death of a spouse. Individuals are taxed on their incomes, and contributors are then entitled to a variety of benefits the magnitudes of which are based in part on past contributions. In 2002/2003, total contributions were J$2.982 billion, over 120,000 individuals received some form of NIS award, benefits of J$1.910 billion were paid in awards, and the NIS trust fund had assets valued at J$25.041 billion. By law, benefits paid to beneficiaries may not reduce the size of the trust fund. The NIS therefore acts much like a private, fully funded pension and insurance program.

Any employed person above the age of 18 and under the retirement age is required to register for and contribute to the NIS. Voluntary contributions may also be made. The contribution rates were largely unchanged from 1965 to 1990, but were significantly altered on April 1, 1990. Current contribution rates vary depending upon the individual's employment classification. Individuals who are employed as a domestic worker or as a member of the Jamaica Defence Force pay J$10 per week, and their employer also pays J$10 per week. Any other employed individual must pay 2.5 percent of his or her emoluments up to a maximum level of emoluments of J$500,000, with the employer matching this payment of 2.5 percent of emoluments; any income above this ceiling is not subject to the NIS contribution rate. [9] Individuals who are self-employed must pay 5 percent of their yearly emoluments. Voluntary contributors pay J$20 per week. NIS officials estimate that there may be as many as 450,000 contributors, although no precise estimates are available.

J$2,000 and J$3,000 receives a 2 percent loan; an individual whose weekly income exceeds J$10,000 receives a 9 percent loan.

[9] The ceiling rate was originally J$40. It has been raised fairly regularly over time, most recently on October 2003 when it was increased from J$250,000 to its current level.

The *National Insurance Act* defines the tax base as gross emoluments including taxable allowances.[10] NIS contributions are deductible from income when computing the individual income tax. According to NIS officials, nearly all revenues (over 98 percent) from NIS contributions are generated from employer withholding of the contributions. The process here is largely the same as for the PAYE individual income tax, the Education Tax, and the NHT contribution. The employer withholds for each employee both the employee and the employer portion of the monthly NIS contributions, and then remits to the Collector of Taxes the total contributions for all employees by the 14th of the following month; electronic transfer of payments is also now possible. The Collector deposits these contributions in an NIS commercial bank account. The employer also keeps a deduction card for each employee, upon which the employer records gross emoluments and the employee and employer contributions. (This same deduction card is used for NHT contributions.) At the end of the calendar year, all deduction cards are sent to the Ministry of Labour and Social Security along with the Employer's Annual Return, which contains an employee-by-employee listing of the same information on the deduction cards. Information on the Employer's Annual Return and on the individual's deduction card is supposed to be recorded on each individual's life record, which in principle contains a yearly record of the individual's total NIS contributions. Individuals are also supposed to receive an annual form (Form C-7) that lists their total contributions

[10] More precisely, the Act defines the PAYE tax base as "…any emoluments assessable to income tax pursuant to paragraph (c) of section 5 of the Income Tax Act (other than annuities, pensions, superannuation or other allowances payable in respect of past services in any office or employment of profit and such other categories of emoluments as may be prescribed) being emoluments from which income tax is deductible pursuant to the Income Tax (Employments) Regulations, whether or not in fact tax in fact fails to be deducted therefrom". The self-employed tax base is defined as "…the statutory income computed pursuant to the Income Tax Act as being the statutory income of that person for that year modified to such extent as may be prescribed by regulations…"

during the year. Since 1998, much of the individual contributor's information has been entered on computers. NIS contributions since 1985/1986 are given in Table 12.

Table 12: NIS Contributions

Financial Year	Total NIS Contributions (in J$)	Total NIS Contributions as Percent of Individual Income Tax Revenues (in percent)
1985/1986	81,927,098	13.0
1986/1987	92,502,342	9.9
1987/1988	96,442,349	7.8
1988/1989	94,654,526	6.6
1989/1990	101,677,570	5.4
1990/1991	158,310,610	6.7
1991/1992	192,837,501	5.9
1992/1993	237,441,142	6.4
1993/1994	314,510,708	6.1
1994/1995	228,306,000	3.1
1995/1996	340,087,000	3.5
1996/1997	1,928,564,000	15.4
1997/1998	2,337,139,000	16.8
1998/1999	2,459,367,000	15.5
1999/2000	2,531,818,000	16.8
2000/2001	2,640,702,000	15.1
2001/2002	2,654,358,000	13.4
2002/2003	2,981,516,000	---

Source: National Insurance Scheme.

Compliance with the NIS payment process is widely thought by NIS officials to be very poor, although there is little detailed information on the extent of noncompliance. One indicator is that over 98 percent of all NIS contributions comes from employer withholding; the amounts collected from the self-employed and from domestic workers are virtually zero. NIS officials also believe that employer nonremittance of withheld contributions is a significant problem. For example, over the course of an entire year an employer may withhold NIS contributions from employees' wages but not remit these revenues to the government, thereby retaining these funds for the firm's use; at the end of the year, the employer may then file an Employer's Annual Return, at which time full

payment of the withheld contributions is made. The employer therefore receives an interest-free loan from the NIS during the period of non-remittance, in part because penalties for late payment are not imposed. The extent of this practice is unknown.

The NIS has its own compliance division with 60 inspectors whose functions include ensuring registration of employers, making sure that firms know their responsibilities, verifying the accuracy of employer reports, and instituting proceedings in the event that fraud is suspected. However, there is no information on additional assessments or collections from any audits that have occurred. There is also no coordination between the NIS compliance division and those of other payroll programs. Officials stated that one problem that complicated NIS compliance efforts was the existence but somewhat erratic use by firms both of an NIS reference number and of the taxpayer registration number.

NIS contributions fund a variety of employee benefits: for old age, invalidity, widow's and widower's, orphan's, special child's, employment injury or disease, funeral, and maternity benefits. A new National Health Fund for NIS pensioners was added on October 1, 2003, financed by 0.5 percentage points of both the employee's and the employer's 2.5 percent contributions. A typical pension plan is the old age pension, and consists of a "flat rate benefit" and a "wage related benefit".[11] Other pensions are calculated in a similar way to the old age pension.

[11] To illustrate, the flat rate benefit of the old age pension is calculated in several steps.

- Calculate the number of years the claimant has been in the NIS.
- Calculate the total amount of weekly contributions made by the claimant during his or her lifetime.
- Use these numbers to calculate the average number of weekly contributions made by the claimant during his or her lifetime.
- Based on the average number of weekly contributions, determine the weekly flat rate benefit. For example, an individual with an average of 39 or more receives the full flat rate benefit; an

In 2002/2003, there were 122,391 beneficiaries of NIS pensions. Roughly two-thirds of the beneficiaries (or 83,205 beneficiaries in total) received old age pensions, a proportion of total beneficiaries that has not changed much over time. The other main categories of beneficiaries were those receiving widows pensions (24,059 beneficiaries), invalidity pensions (8,207 beneficiaries), and employment injury/disability pensions (3,112 beneficiaries). It is difficult to judge the actuarial fairness of the various benefit programs. According to NIS officials, there are no recent actuarial reviews of the NIS.

Some Effects of the Payroll Taxes and Contributions

This section examines some of the main effects of the payroll taxes.

Base Erosion of the Programs

It is widely suspected that the existence of the payroll taxes gives both an incentive and an opportunity for individuals to escape the payment of taxes. There are several avenues that are available to individuals. One avenue is to move from the formal sector to the largely untaxed, informal sector of the Jamaican economy to escape payment of the taxes.[12] A legal method of avoidance is to change the nature of compensation from taxable forms (e.g., wages) to tax-exempt forms (e.g., nontaxable allowances). Still another avenue is outright evasion of the legally due payroll tax liability; indeed, there is a widespread perception that compliance with the payroll programs, especially by the

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individual with an average of 26 to 38 receives ¾ of the flat rate benefit; and so on. At present the full weekly flat rate benefit is J$900.

The wage related benefit is calculated in a different manner:

- Calculate the total contributions made to the NIS, and credit J$.06 for every J$13.00 contributed; that is, the wage related benefit equals (Contributions/13) * .06.

(An individual may also be eligible for a dependent spouse allowance.) The total weekly benefit is the sum of the weekly flat rate benefit and the weekly wage related benefit. For example, consider an individual who worked every week over a 37 year working lifetime and contributed J$101,010 in total. He has average weekly contributions of 52 and so qualifies for a full weekly flat rate benefit of J$900. His weekly wage related benefit is (J$101,010/13) * .06, or J$466.20. The total weekly benefit is J$1,666.20.

[12] See Bird (1992) for an analysis of the impact of labor taxes on employment in the formal and informal sectors.

self-employed, is very low. Measuring the extent of this erosion via avoidance and evasion is obviously quite difficult. There is little if any systematic information by which this notion can be tested.

Accordingly, we have approached this issue indirectly. A starting point is to ask who is in the payroll tax net. In principle, the main types of potential taxpayers or contributors include PAYE workers and self-employed individuals. Domestic workers represent in total a large number of individuals in Jamaica, but, given their low wages, they are not thought to have much revenue potential.

The PAYE group comprises much the largest segment of the Jamaican workforce. However, it has long been recognized that there are many people employed in the underground, or informal, economy in Jamaica. Estimates of the size of the underground economy as a percent of the size of the formal economy range widely, and can exceed 40 percent.[13] We generate estimates of the number of individuals who work in the informal sector, and the subsequent payroll revenue loss, in several steps, using information from the *Emoluments Survey 2001* (Ministry of Finance and Planning, 2004) and several other official sources.

As we document elsewhere (Wallace and Alm, 2004), the Ministry of Finance and Planning estimates that there were approximately 350,000 PAYE individuals in the tax net in 2001. Further, according to the Planning Institute of Jamaica, the total number of individuals who were employed in Jamaica in 2001 was 940,000, of which roughly one-half (or 470,000) were believed to be self-employed individuals and one-half were PAYE workers. These calculations suggest that there were in 2001 approximately 120,000 PAYE workers (or 470,000 – 350,000) who were outside the PAYE tax net. Put differently, the proportion of PAYE individuals who are outside the current PAYE individual income tax system, and by assumption also outside current PAYE payroll

[13] For example, Schneider and Enste (2002) estimate the Jamaican underground economy to be 36.4 percent of the formal economy in 2000. In the "Informal Sector Study for Jamaica" (2002), the estimates range from 39 to 46 percent. All such estimates are subject to much imprecision.

programs, is roughly one-third of the number who are included. This estimate is broadly similar to estimates of the size of the underground economy as a proportion of the official economy.

If we assume that the PAYE individuals outside the tax net are similar to those in the tax net, then we can estimate that evasion of the payroll programs by PAYE individuals cost the GOJ roughly one-third of the actual payroll revenues. In 2002/2003, total revenues from the payroll programs were J$15.9 billion. PAYE evasion therefore generated a revenue loss of J$5.3 billion. Note that this estimate is likely to be an underestimate because of the existence of a threshold in the individual income tax.

The self-employed are even more difficult to quantify. Indeed, there are no official estimates of the extent to which the self-employed escape payroll (or income) taxes. The only available evidence comes from studies conducted for the Jamaica Tax Structure Examination Project in the 1980s. These studies estimated that the percentages of professionals and other types of self-employed individuals who were in the individual income tax net in 1983 varied somewhat by occupation, but that these percentages were always quite low, often in the 10 to 20 percent range (Alm and Bahl, 1985; Alm, Bahl, and Murray, 1991a; Alm, Bahl, and Murray, 1991b; Bahl and Murray, 1986); that is, in 1983 on average only 1 in 5 self-employed "professionals" (e.g., accountants, architects, attorneys, and doctors) filed an individual income tax return, and only about 1 in 10 self-employed individuals in other occupations like service stations, auto repair, hair care, and transport filed a tax return. In total, Alm and Bahl (1985) and Alm, Bahl, and Murray (1991a) estimated that unreported income by these self-employed individuals was 27 percent of PAYE reported income in 1983, and that the loss in individual income tax

revenues from this nonfiling was even larger, at 39 percent of actual tax revenues in 1983, because these individuals tended to be higher income individuals.

Updating this latter estimate based on payroll revenues of J$15.9 billion in 2002/2003 suggests that nonfiling by the self-employed cost the GOJ $6.2 billion in payroll taxes and contributions. The total payroll program revenue loss was therefore J$11.5 billion, or about two-thirds of the actual collections from the payroll programs.

Of course, these estimates must be treated with much caution. Still, it seems likely that these estimates are, if anything, conservative. For example, the relative importance of PAYE taxpayers in the individual income tax is larger now, and that of self-employed taxpayers is correspondingly lower now, than in the 1980s, which suggests that the loss in revenues from failure to tax the self-employed is greater than our $6.2 billion estimate. Further, other methods generate broadly similar, indeed often much larger, measures of the revenue loss. Anecdotal evidence based on interviews with individuals at the Taxpayer Audit and Assessments Department, Inland Revenue, and the Tax Reform Committee suggests unofficial estimates of non-reporting by the self-employed between 70 and 90 percent. Also, the *Emoluments Survey 2001* (Ministry of Finance and Planning, 2003) can be used to estimate the total amount of revenues that could be collected if PAYE individuals known to be in the individual income tax net paid all of the various payroll taxes and contributions. Recall that **actual** payroll revenues in 2002/2003 totaled J$15.9 billion, an amount generated almost exclusively from PAYE workers. Our estimate from this *Survey* of the **potential** revenues that could be collected if the PAYE workers already in the tax net paid the full amount of the payroll programs are J$26.6 billion; that is, the current system collects only 60 percent of the potential

payroll revenues from PAYE workers already paying individual income taxes. The revenue loss from the self-employed is an additional loss.

Jamaica is far from alone in losing revenues from those outside the tax net. Johnson et al. (1999) find that 68 percent of wages in transition economies were "hidden" from official statistics. Alm and Lopez-Castano (2004) estimate that only one-third of all workers in the Colombian economy are employed in firms paying income and payroll taxes, with the remainder working in firms in the informal sector. Alm, Martinez-Vazquez, and Schneider (2004) report that developing countries lose on average one-quarter of their potential revenues due to evasion by the "hard-to-tax".

In sum, the revenue loss due to evasion of the payroll programs seems likely to be at least two-thirds of the actual collections from the programs. These massive amounts of tax evasion compromise many dimensions of the fiscal system of Jamaica. Most obviously, evasion leads to a loss in revenues, thereby affecting taxes that compliant taxpayers face and public services that citizens receive. Evasion creates misallocations in resource use when individuals and firms alter their behavior to cheat on their taxes and contributions. Its presence requires that government expend resources to deter noncompliance, to detect its magnitude, and to penalize its practitioners, even though these government enforcement activities seem infrequent and ineffective in Jamaica. Evasion alters the vertical and horizontal equity of taxation in unpredictable ways. Individuals with the same "true" level of income may pay very different amounts in taxes if some evade and others do not; individuals with different levels of "true" income may pay similar amounts of taxes even though their abilities to pay may differ greatly; and unless tax evaders are caught, evaders pay fewer taxes than honest taxpayers. Evasion

may contribute to feelings of unfair treatment and disrespect for the law, creating a self-generating cycle that feeds upon itself and leads to even more evasion. All of these results represent costs to the fiscal system of Jamaica..

The Incidence of the Programs

As noted above, the payroll programs generate substantial revenues. Because these revenues must ultimately be paid by someone, they have a significant impact on the distribution of income. This subsection analyzes the "incidence", or the distributional effects, of the programs, and attempts to answer the basic question: "Who bears the burden of the taxes and contributions?" It should be emphasized that it is only the incidence of taxes and contributions that is considered. Any benefits that may be received by individuals are ignored, in large part because of the absence of information on benefits.

Economists have devoted much attention to the question of tax incidence.[14] 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 observations on tax incidence should be kept in mind in the discussion that follows.

First, only individuals can bear the burden of a tax (or a contribution). The employer's share of a payroll tax is clearly not borne by the legal entity of the firm, but instead must ultimately be borne by its stockholders via a lower return, by its workers via lower wages, by its suppliers via lower input prices, or by the consumers of its product

[14] 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 higher product prices. Tax incidence attempts to find ways to assign the burden of a tax to these individuals.

Second and relatedly, there is a difference between who is legally responsible for paying a tax – its "statutory" incidence – and who ultimately bears the true burden of the tax – its "economic" incidence. For example, most people recognize that an excise tax on cigarettes collected by retail stores is unlikely to be actually borne by the owners of the retail stores. Instead, the stores are likely to shift at least some of the tax to consumers. The relevance to the payroll programs is clear: employers who are legally responsible for collecting the taxes may not bear the true economic burden of the taxes and contributions.

Third, when a tax is imposed, individuals will adjust their behavior to reduce their tax liabilities, and those who are better able to adjust their behavior are better able to shift the tax burden to others. Workers may reduce their work effort or shift their labor to untaxed sectors to reduce their payroll tax burdens, they may attempt to change their compensation to forms that are not subject to taxation, firms may cut back on their hiring to decrease their payroll tax liabilities, and so on.

So who bears the burden of payroll taxes and contributions?

There are two main issues here. The first is whether the incidence of a tax or contribution depends upon how it is collected, whether from the employer or the employee. 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.[15] However, when markets are not competitive because of, for example,

[15] The Appendix has an algebraic example that demonstrates this equivalence.

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. 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. 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.[16]

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 sector. This movement will affect the wage of labor, the return to other factors of production, and the prices of consumer products.[17]

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[16] 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 present 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.

[17] See the Appendix for a discussion of a simple general equilibrium model.

The crucial issue here 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 programs. 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 any payroll tax. However, estimates of the labor supply elasticity in developing countries suggest that labor supply is not completely inelastic.[18] One possible channel of labor supply response is migration. Of greater importance in Jamaica is the fact that only labor in certain 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. These avenues of escape suggest that labor may be able to shift some of the payroll burden to other groups, even though the precise magnitude of the shifting is unknown.

Because of these considerations, and also because of the absence of much information needed to examine fully the incidence of the programs, the incidence of the payroll programs is estimated under alternative assumptions about the incidence of the taxes and contributions. Throughout this analysis it should be remembered that we look only at the incidence of the tax and contribution component of the payroll programs. 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 CSFBS, the NHT, and the NIS. Even so, we examine only tax incidence. In the absence of any actuarial studies of these programs, it is not possible to evaluate their

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

actuarial fairness. Anecdotal evidence suggests that it is unlikely that benefits equal contributions.

Statutory Incidence. We examine first the statutory incidence of the programs, looking simply at the ways in which the statutory tax rates vary with income. We make two alternative assumptions about the statutory incidence of the programs. Under the first assumption, individuals are assumed to bear the burden only of the employee's share of the taxes and contributions. Under the second assumption, labor is assumed to bear the full burden of both the employee's and the employer's share of the tax or contribution, so that there is no shifting of the tax burden from labor.

Table 13 shows the statutory incidence of the payroll programs. Considering only the employee portions of the programs, the programs add an extra 6.5 percent to the marginal tax rate of a private sector PAYE worker earning less than J$500,000 and an extra 4 percent for one making above J$500,000. When the employee and the employer portions of the taxes are considered, the burden is substantially increased for this worker: the added marginal tax rate is increased by 18 (13) percentage points for an individual making less (more) than J$500,000. The burden on public sector PAYE workers is even greater because of the 4 percent marginal tax rate of the CSFBS (assuming that this government PAYE worker is in a "pensionable office"). In all cases, the average tax rate falls above J$500,000 because of the ceiling on NIS contributions at J$500,000. The extra marginal tax rate burden on the self-employed is not as large, but is still significant. Note that the payroll programs introduce horizontal inequities into the system because individuals at the same level of income face very different tax burdens depending upon the sector in which they work (e.g., a PAYE worker in the private sector, a PAYE worker in the government sector, a self-employed individual).

Table 13: Statutory Tax Incidence of the Payroll Taxes and Contributions: Combined Marginal Tax Rates

	PAYE-Private Sector Worker				PAYE-Public Sector Worker					
	Employee Share Only		Employee Plus Employer Share		Employee Share Only		Employee Plus Employer Share		Self-employed Individual	
Income (in J$)	Marginal Tax Rate	Average Tax Rate	Marginal Tax Rate	Average Tax Rate	Marginal Tax Rate	Average Tax Rate	Marginal Tax Rate	Average Tax Rate	Marginal Tax Rate	Average Tax Rate
50,000	0.065	0.065	0.18	0.18	0.105	0.105	0.22	0.22	0.10	0.10
100,000	0.065	0.065	0.18	0.18	0.105	0.105	0.22	0.22	0.10	0.10
200,000	0.065	0.065	0.18	0.18	0.105	0.105	0.22	0.22	0.10	0.10
300,000	0.065	0.065	0.18	0.18	0.105	0.105	0.22	0.22	0.10	0.10
400,000	0.065	0.065	0.18	0.18	0.105	0.105	0.22	0.22	0.10	0.10
500,000	0.065	0.065	0.18	0.18	0.105	0.105	0.22	0.22	0.10	0.10
600,000	0.04	0.061	0.13	0.172	0.08	0.101	0.17	0.212	0.05	0.092
700,000	0.04	0.058	0.13	0.166	0.08	0.098	0.17	0.206	0.05	0.087
800,000	0.04	0.056	0.13	0.161	0.08	0.096	0.17	0.201	0.05	0.081
900,000	0.04	0.054	0.13	0.158	0.08	0.094	0.17	0.198	0.05	0.078
1,000,000	0.04	0.053	0.13	0.155	0.08	0.093	0.17	0.195	0.05	0.075

Economic Incidence. We also examine the incidence of the tax and contribution component of the payroll programs using the *Emoluments Survey 2001* (Ministry of Finance and Planning 2003). Here we use the actual distribution of emoluments, as updated to 2003 (Wallace and Alm, 2004). We also estimate the economic incidence if individuals bear the full burden of the employee plus the employer shares of the taxes and contributions, and if they bear only the burden of the employee share of the taxes and contributions.[19]

We also examine the incidence under two different assumptions about the magnitude of taxes and contributions paid: that the PAYE individuals already in the individual income tax net pay the full **potential** amounts of legally due payroll taxes and contributions, and that they pay only the **actual** amounts collected in 2002/2003. In the first case, we calculate the payroll tax and contribution for each individual based upon the gross emoluments as reported in the *Emoluments Survey 2001*; here we assume that each individual pays fully any payroll tax or contribution as based upon his or her reported emoluments (the *All Potential Taxes and Contributions Fully Paid* scenario). In total, the amount paid under this scenario is J$26.6 billion In the second case, we require that the revenues collected for each program equal the actual amounts collected for each program (or J$15.9 billion in total); we also assume that the pattern of nonpayment is the same across income groups. This scenario is called the *Actual Taxes and Contributions Paid* scenario. In either case, we do not consider evasion by PAYE individuals or by the self-employed.

[19] Note that the scenario under which we examine the incidence of only the employee shares of the taxes and contributions is incomplete because it ignores who bears the burden of the employer shares. A full incidence analysis is being undertaken by the Jamaica Tax Reform Project that will consider the incidence of the full range of Jamaican taxes and contributions across individuals.

Table 14 gives the resulting patterns of average taxes and average tax rates (ATRs) for the combined system of payroll taxes and contributions for 2002/2003, where the ATRs are computed as taxes as a proportion of gross emoluments. Under all scenarios, the overall tax incidence is largely proportional, at least up until the NIS ceiling of J$500,000. For example, under the *Actual Taxes and Contributions Paid* scenario, the ATR is roughly constant at 5 percent for the employee share only and at 11 percent for the combined employee and employer share, at income levels below J$500,000. However, above J$500,000 the incidence becomes somewhat regressive under all scenarios, with ATRs falling significantly at income levels above J$500,000. As expected, the average taxes and the average tax rates of the *Actual Taxes and Contributions Paid* scenario are much lower than those calculated under the *All Potential Taxes and Contributions Fully Paid* scenario because collections under the former scenario are only 60 percent of the collections in the latter scenario. In sum, the overall pattern of incidence is broadly proportional across most income classes, with a clear tendency for regressivity as ATRS fall above the NIS ceiling of J$500,000.

Table 14: Economic Incidence of the Payroll Taxes and Contributions on PAYE Workers

	All Potential Taxes and Contributions Fully Paid				Actual Taxes and Contributions Paid			
	Employee Share Only		Employee Plus Employer Share		Employee Share Only		Employee Plus Employer Share	
Income Class (in J$)	Average Tax (in J$)	Average Tax Rate	Average Tax (in J$)	Average Tax Rate	Average Tax (in J$)	Average Tax Rate	Average Tax (in J$)	Average Tax Rate
Less than 50,000	2,935	0.097	5,423	0.178	1,445	0.047	3,260	0.107
50,000-100,000	7,550	0.095	14,169	0.178	3,761	0.047	8,518	0.107
100,000-120,432	10,571	0.097	19,497	0.178	5,194	0.048	11,723	0.107
120,432-150,000	13,635	0.099	24,569	0.179	6,578	0.048	14,773	0.107
150,000-250,000	19,856	0.099	35,594	0.179	9,563	0.048	21,403	0.107
250,000-500,000	37,070	0.103	64,490	0.179	17,448	0.049	38,782	0.108
500,000-1,000,000	71,597	0.102	117,073	0.167	31,625	0.045	70,394	0.100
1,000,000-5,000,000	172,067	0.095	265,634	0.147	70,808	0.039	159,638	0.088
Greater than 5,000,000	586,451	0.085	936,133	0.136	243,034	0.035	562,276	0.082
Total	45,777	0.098	75,041	0.161	20,128	0.043	45,112	0.097

Source: Computed by authors from the PAYE Microsimulation Model.

Table 15 conducts a similar incidence analysis for those self-employed taxpayers who actually filed tax returns in 2001. In the absence of actual collections from the self-employed, we assume that the self-employed fully pay any payroll tax and contribution liabilities. Because we have no information on self-employed individuals who do not file any tax returns, this analysis considers only self-employed taxpayers who filed a return. The resulting pattern of incidence is again slightly regressive due to the NIS ceiling.

Table 15: Economic Incidence of the Payroll Taxes and Contributions on Self-employed Individuals, 2001

Income Class (in J$)	Average Tax (in J$)	Average Tax Rate
Less than 0	0	0
0-25,000	1,255	0.098
25,000-50,000	3,789	0.098
50,000-75,000	6,305	0.097
75,000-100,000	8,788	0.098
100,000-200,000	13,692	0.097
200,000-500,000	30,023	0.097
500,000-750,000	55,040	0.091
750,000-1,500,000	77,198	0.074
Greater than 1,500,000	197,877	0.057
Total	21,092	0.083

Source: Computed by authors from the Self-employed Microsimulation Model.

It should be remembered that the average tax rates in Tables 13, 14, and 15 are computed in relation to gross emoluments, as reported in the *Emoluments Survey 2001*. When a broader measure of income is used, one that includes all forms of income (e.g., income underreported by self-employed individuals who file tax returns, income of self-

employed individuals who do not even file a tax return, income paid in untaxed allowances, income received by PAYE individuals who are outside the tax system), there is little question that the distributions of tax burdens would be even more regressive than the ones calculated. As documented by Alm and Bahl (1985) and by Alm, Bahl, and Murray (1991a), income tax evasion was much more prevalent among higher income classes prior to the 1986 tax reform. If the same patterns of tax evasion are present now as in 1983, and if a broader notion of "income" that incorporates estimates of evasion is used to measure average tax rates, then it is certain that the pattern of incidence would be significantly more regressive that indicated in Tables 13, 14, and 15. Evidence of consumption patterns by income group is also consistent with the conclusion that consumption is distributed more regressively than income; that is, the shares of lower income groups in total consumption tend to be lower than their shares of income.

In sum, the payroll programs add a large, somewhat regressive, and horizontally inequitable component to the Jamaican tax system.

Sectoral, Occupational, and Employment Effects of the Payroll Programs

The assumption that only PAYE or self-employed workers in the formal sector of the Jamaican economy bear the burden of the payroll taxes does not allow for any shifting of the burden of payroll taxes via adjustments in wages and other prices. The existence of a sector to which resources may move to avoid the payroll taxes means that these taxes drive a wedge between the returns to factors of production in the different sectors. As noted earlier, if labor is mobile between the formal and the informal sectors of the economy, then labor will respond to an increased payroll tax by moving between these sectors until the net-of-tax return in the formal sector equals the untaxed return in

the informal sector. This movement will affect the wages of labor in both sectors, raising wages in the formal sector as labor flows from this sector and reducing wages in the informal sector as labor moves into this sector. There will also be an impact on the returns to other factors and on product prices, as well as an impact on the overall unemployment rate in the economy.

Fully identifying the impact of this factor movement requires a general equilibrium model of the Jamaican economy. For example, Alm and Lopez-Castano (2004) demonstrate, using a general equilibrium model of Colombia, that the high rates of payroll taxation lead to an overall increase in the number of unemployed workers, but also to an increase in employment in the informal sector. They also find that maintaining the level of expenditures of the programs financed by the payroll taxes but changing the method of their finance to alternative revenues sources (e.g., deficit finance, company taxation) increases overall employment and formal sector employment.[20]

There is also little question that the movement of labor from the formal to the informal sector generates an inefficient resource allocation (in addition to its contribution to the vertical and horizontal inequities of the payroll programs). Although the **net-of-tax** return to labor is equalized across the two sectors, it is the **gross-of-tax** return to labor in the formal sector that measures the social productivity to labor, and this gross-of-tax is higher in the formal sector by the amount of the tax. The tax therefore encourages overallocation of resources to untaxed activities and so generates an inefficiency, or excess burden. Again, quantifying the extent of the resource movement and the magnitude of the inefficiency requires a general equilibrium model.

[20] A similar general equilibrium model will be utilized in the Jamaica Tax Reform Project.

It is of some importance that the high rates of taxation on labor from payroll programs (and the individual income tax), in combination with the various incentives to investment that are present in the corporate income tax, combine to generate significant disincentives for the employment of labor. There is little rationale for subsidizing capital and taxing labor in an economy with high rates of unemployment.

The Impact of the Payroll Programs on Savings

One purpose of the payroll programs is to increase the amount of public and private savings generated in the Jamaican economy, given the relatively low total savings rate in Jamaica over the last several decades.

There are two general areas in which the payroll programs may affect total (public plus private) savings. The first is through payroll **taxation**, such as the Education Tax and the HEART tax. A more obvious channel is via payroll **contributions**, or the CSFBS, the NHT, and the NIS contributions.

As for the effect through **taxation**, an accepted tenet in development economics in the last several decades has been that increased taxation is one way to mobilize savings. The reasoning behind this conclusion is straightforward (Heller, 1975). Suppose that government increases payroll taxes by, say, J$100, an action that reduces personal income by the same amount. With less income, individuals must reduce their private consumption and their private savings, and suppose that they choose to reduce consumption by J$90 and private savings by J$10. Because taxes have risen by J$100, the net effect on savings – or taxes less (unchanged) government expenditure plus private savings – is to increase total savings by (J$100-J$10), or J$90. In this simple analysis, taxation adds to total savings because private savings fall with higher taxation but only by

a fraction of the tax increase, while public savings rises by the full amount of the tax increase. In this view, increased payroll taxes are one way to mobilize increased saving.

However, this approach is open to several criticisms. First, it assumes that the government's "propensity to consume" out of increased tax revenues is zero. However, there is much evidence that government may simply spend all or nearly all of any increased revenues (Please, 1967), in which case more taxation may lead to less total savings. Empirical evidence on this issue is somewhat mixed (Mikesell and Zinser, 1983). However, its potential relevance is widely accepted. In a country like Jamaica, with its large fiscal deficit, a plausible case can be made that additional revenues will in fact be spent.

Second, this approach implicitly assumes that income is unchanged by the increase in taxation. However, in virtually all current macroeconomic models of income determination the reduced private consumption expenditures caused by increased taxes generate "multiplier effects" that lead eventually to lower income. The multiplier effects occur because less consumption by taxpayers in the first round reduces the income received by others in the economy in the second round; with lower income, these second round individuals must in turn cut back their spending, and so one. However, as income falls, private savings must also fall, and, if taxes are positively related to income, then taxes also decline. When these secondary effects are considered, a common conclusion from income determination models is that total savings may be unchanged after a tax increase: the attempt to mobilize savings via more taxation may have a zero effect on total savings because increased public savings is exactly offset by reduced private savings.

There are therefore good reasons for believing that greater payroll taxes in Jamaica have had a small, perhaps negligible effect on the amount of total savings. Instead, their main effect (if any) has more likely been to change slightly the composition of savings, toward more public and less private savings.

For several of the payroll programs, **contributions** entitle the individual to future benefits of some type. The CSFBS acts like a forced whole-life insurance plan for some GOJ employees. The NIS also has some insurance aspects to its programs; however, its largest benefit program is its old age pension, which provides a pension to contributors in their retirement years. Benefits of the NHT are of a different nature. Contributors are entitled to their benefits, either at retirement or after an effective eight-year waiting period; they may also receive subsidized mortgage loans of various types. At the risk of some oversimplification, it is the pension, or "social security", aspects of the contributory programs that are emphasized here.

The literature on the effects of social security on private and public savings is immense and controversial, and no brief summary can hope to do it justice.[21] Neither the theoretical nor the empirical studies reach a firm conclusion about the impact of social security on saving. On a theoretical level, a key and unresolved issue is the length of the individual's "planning horizon". Some economists claim that the planning horizon for most individuals is only a short period ahead. For such "short horizon" individuals, contributory schemes whose main effects will not be felt for many years have little or no current impact on private savings. At the opposite extreme is the "infinite horizon model" in which the planning horizons of individuals are thought to be longer even than their own life cycle; that is, the existence of intergenerational transfers suggests that the

[21] For excellent surveys of the theoretical and empirical debates, see Aaron (1982), Sandmo (1985), Atkinson (1985), Bernheim (2002), and Feldstein and Liebman (2002).

current generation of individuals cares about the welfare of future generations. In this view, a common result is that a social security program has no effect on total private savings. If the establishment of the scheme increases the wealth of the current generation at the expense of future generations, then a current generation that "cares" about future generations will alter its bequests to its heirs in such a way as to leave total saving unaffected; if the scheme hurts the current generation and helps future generations, then bequests are changed in the opposite direction, again leaving total savings unaffected. In short, government policies are "neutral" and are exactly offset by private sector adjustments.[22]

The most frequently used model is the "life cycle" model. Here most individuals are assumed to base their economic decisions on what they perceive to be their own lifetime. The impact of a funded social security system now depends upon the relative magnitudes of contributions and benefits, where both are expressed in present value terms over the lifetime of the individual. Three cases may be distinguished. When benefits equal contributions – or the case of an actuarially fair system – the social security system forces the individual to save via contributions when young; however, because lifetime wealth is unaffected by the program, consumption (and savings) in each period is unaffected. Consequently, as long as contributions do not exceed the amount that the individual would make voluntarily, private savings falls by the amount of the contributions; however, with a funded system public savings rises by an equal amount, leaving total savings unaffected. In essence, each dollar of public savings displaces each dollar of private savings in a funded system.

The other two cases pertain to actuarially unfair systems. When benefits exceed contributions, an individual's wealth is increased, and he or she will most likely respond

[22] See Barro (1974) for a rigorous analysis of this infinite horizon, overlapping generations model.

by increasing consumption and so decreasing private savings. Total savings therefore declines. In contrast, when contributions exceed benefits – and according to most discussions with GOJ officials, this is the likely situation in Jamaica – total savings increases because an individual will respond to the decline in wealth by attempting to replenish wealth via greater private savings.

The empirical literature is even more clouded (Seater, 1993). A variety of conflicting results have been obtained, regardless of whether the specific approach has used aggregate time series methods, international cross-section methods, household cross-section methods, or even numerical simulation methods.

One can argue plausibly that the Jamaican payroll contributions in their entirety have increased total savings due to the funded nature of the NIS programs, the (likely) existence of benefits that are less than contributions, and the (likely) existence of many individuals who would choose voluntarily to save less than the amount that they are forced to contribute. Still, it is hard to avoid the conclusion that the evidence to date is largely inconclusive, and is likely to remain so.

Conclusions: Problems and Reform Options

The current system of wage-based taxes and contributions in Jamaica has some severe weaknesses:

- The bases of the programs have been substantially reduced by evasion, especially among the self-employed. This has lead to large, but largely unknown, revenue losses, maybe as much as two-thirds of the revenues actually collected. There are also revenue losses that arise because of the failure by employers to remit withheld taxes in a timely fashion to the government.

- The programs introduce substantial horizontal inequities, between public and private sector employees, between individuals who work in the formal sector and those who work in the informal sector, between those with a larger share of income in untaxed allowances and those with a smaller share, between PAYE and self-employed individuals, and between those who evade and those who do not.

- The programs introduce vertical inequities due to the somewhat regressive distribution of tax and contribution burdens.

- The tax rates that finance the social security system (NIS) are lower than in most other comparable countries. However, the combined marginal tax rates of the various other payroll programs are high by international standards and especially high by Caribbean standards. In total, these programs add a significant extra tax burden, one felt mainly by PAYE workers.

- The programs create economic distortions, as individuals and employers adjust their behavior to avoid or evade paying the taxes and contributions. A particularly unnecessary distortion arises from the high tax rates on labor (in combination with subsidies and incentives to purchase capital), which discourage the hiring of labor and help contribute to the high unemployment rate in Jamaica. The effect of the programs on savings is uncertain.

- There is much in the separate administration of the programs that is wasteful and duplicative. Many of the same functions are performed by the respective government agencies that administer the programs, but there seems to be virtually no coordination among these agencies, especially in any efforts to reduce noncompliance.

- From the perspective of individuals and firms, there is also much that is costly and cumbersome to comply with in the payment of the taxes and contributions, due to the complexity of the programs and the burden on employers to collect nearly all revenues via employer source withholding.

- There are some payroll programs for which there is little apparent justification. The provision of social insurance via the NIS is common in most countries. However, an additional tax on wages like the Education Tax is difficult to justify. Although the existence of a training program like the HEART Trust fund may well be understandable given the high unemployment rates in Jamaica, its funding via a separate payroll tax is also difficult to justify. Even the rationales for a forced insurance program like the CSFBS or for a subsidized mortgage program like the NHT are unclear. To our knowledge, there are few if any studies of the effectiveness of these programs in their service deliveries.

These findings are not novel, and in previous years there have been numerous calls for reform (Alm, 1985; Alm and Wasylenko, 1991; Bahl, et al. 1992). There are several obvious avenues of reform, which mainly involve steps to rationalize this now disjoint "system" of taxes and contributions, to integrate each payroll tax or contribution with the others, to increase the collection efficiency and decrease the administrative costs of the programs, to lessen the distorting effects of the high marginal tax rates, and to improve the horizontal and vertical equity of the system.

Reform Option 1: Consider eliminating the Education Tax and replacing its revenues with an addition to the flat rate in the IIT.

The Education Tax acts largely as a separate individual income tax. There is no obvious justification for this tax and none for an independent Education Tax collection machinery. The 5 percent Education Tax rate could be eliminated (along with the separate Education Tax administration), with the lost Education Tax revenues replaced by an increase in the flat rate in the IIT.

Elimination of the Education Tax collection administration would clearly generate administrative efficiencies. Further, there would be effects on the distribution of tax burdens if the revenues were replaced with an increase in the IIT rate. In Table 16, we use the PAYE Microsimulation Model to examine the distributional effects of this reform option relative to the current pattern of Education Tax burdens. Under the existing

Education Tax, the average tax rate (ATR) is somewhat regressive but roughly proportional over most income classes. A revenue-neutral reform that eliminates the existing 5 percent Education Tax and replaces its revenues with additional IIT collections requires that an additional 5.1 percentage points be added to the 25 percent IIT flat rate.[23] Under this reform option, total collections would remain unchanged. Those individuals earning less than the J$120,432 threshold would gain under this reform because they would not pay any additional individual income taxes; those individuals earning above the threshold would pay slightly more in income taxes given the increased flat rate in the IIT. Overall, this reform would increase slightly the progressivity of the tax system.

Table 16: Reform Option – Education Tax Reform

	Existing Education Tax		Elimination of Education Tax/Addition of Revenue-neutral Tax Rate in IIT	
Income Class (in J$)	Average Taxes (in J$)	ATR	Average Additional IIT Taxes (in J$)	Additional ATR in IIT
Less than 50,000	1,483	0.049	0	0
50,000-100,000	3,870	0.049	0	0
100,000-120,432	5,321	0.049	0	0
120,432-150,000	6,641	0.048	6,946	0.051
150,000-250,000	9,620	0.048	10,059	0.051
250,000-500,000	17,267	0.048	18,164	0.051
500,000-1,000,000	33,759	0.048	35,399	0.051
1,000,000-5,000,000	87,413	0.048	91,358	0.051
Greater than 5,000,000	335,818	0.049	346,917	0.051
Total	22,460	0.048	22,460	0.051

Source: Calculated by authors from PAYE Microsimulation Model.

[23] The additional income tax rate of 5.1 percent slightly exceeds the Education Tax rate of 5.0 percent because of the J$120,432 threshold.

Reform Option 2: Consider eliminating the employee share of the Education Tax and replacing its revenues with an addition to the flat rate in the IIT.

A variant on Reform Option 1 is to eliminate only the employee portion of the Education Tax. Under this reform option, the employee share of 2 percent would be moved into the individual income tax, but the employer share of 3 percent would remain as a separate tax. This reform option would require an additional 2 percentage points be added to the 25 percent IIT rate, which would increase slightly the progressivity of the tax system due to the IIT threshold. This reform option would not achieve many of the administrative savings of Reform Option 1 because the existing Education Tax collection mechanisms would remain.

Reform Option 3: Reconsider the CSFBS as a mandatory and government-provided life insurance program.

As discussed earlier, the CSFBS acts as much like a forced whole-life insurance policy that provides benefits for the dependents of civil servants in "pensionable offices". There is little obvious rationale for such a forced insurance program. Indeed, the amounts actually collected from the CSFBS are far less than the amounts estimated using by the *Emoluments Survey 2001* under the assumption that government employees paid all amounts implied by their gross emoluments. Further, the amounts collected (and paid into the consolidated fund) far exceed the amounts disbursed as benefits to survivors.

Recall that the CSFBS is both a mandatory life insurance program and mandatory through government provision. Neither of these characteristics – mandatory and government-provided – is essential. One reform option would be to make insurance purely optional for government employees. Even if a mandatory insurance scheme was thought to be desirable, another reform option would be to allow the insurance to be provided by private insurers.

Reform Option 4: Reconsider the HEART Trust fund tax.

The appropriate treatment of the HEART Trust fund tax is not clear-cut. It is certainly possible to retain the current system in which the 3 percent HEART tax liability is calculated by each firm on its gross monthly payroll above J$14,444. However, the HEART tax could also be eliminated, and its finance provided by monies from the consolidated fund.

In some sense, the choice depends upon "who" benefits from the HEART training programs. The unstated premise underlying the current method of finance is that workers and (possibly) employers in the private sector are the primary beneficiaries of the programs. Because each firm is reluctant to establish its own training program due to worker mobility, a compulsory tax on all potential participants is a way to ensure that training is provided. This premise is certainly defensible. However, a more defensible premise is that the main beneficiary of the training programs is Jamaican society, broadly viewed, through a better trained and more efficient labor force. In this perspective, finance of the training programs should come from all Jamaican taxpayers via the consolidated fund, and a separate HEART tax is then unnecessary.

The choice between these two options is not clear-cut. The separate HEART tax maintains greater independence of HEART finances and provides greater assurance to HEART officials of continued revenues. Finance of training programs from the consolidated funds saves significant administrative and compliance costs. On balance, we believe that these considerations suggest that consideration be given to eliminating that HEART Trust fund tax as a separate tax. Because there is some justification for a government sponsored training program in the current economic environment of Jamaica,

its funding could continue but could come from the consolidated fund rather than from a separate tax on wages.

An even more focused reform would be to replace the HEART revenues with an additional surcharge to the individual income tax. In Table 17, we use the PAYE Microsimulation Model to examine the distributional effects of a reform option that increases the individual income tax to replace the current practice of HEART Trust fund tax burdens. For the existing 3 percent HEART tax, we calculate the tax burdens on private sector employees only; we present the average taxes and the average tax rates relative to all workers (public and private sector) and to private sector workers only.[24] A revenue-neutral reform that eliminates the existing 3 percent HEART Trust fund tax and replaces its revenues with additional IIT collections requires that an additional 1.9 percentage points be added to the 25 percent IIT flat rate.[25] Under this reform option, total collections would remain unchanged. As with Reform Option 1, those (private sector) individuals earning less than the J$120,432 threshold would gain under this reform because they would not pay any additional individual income taxes; those individuals earning above the threshold would pay slightly more in income taxes given the increased flat rate in the IIT, and individuals employed in the public sector (earning

[24] More precisely, we calculate the HEART tax liabilities by income group using the gross emoluments of private sector workers only because most government employees are exempt from the HEART tax. We then present these tax liabilities using two different "comparison" groups: the combined public and private sectors, and the private sector only. For example, when we calculate average taxes and average tax rates for private sector workers only, we use the number of private sector employees and their gross emoluments, excluding public sector workers. These calculations give information on the tax burdens on those who actually pay the current HEART tax (e.g., private sector workers). When we calculate average taxes and average tax rates for private and public sector workers, we use the total number of public and private sector employees and their combined gross emoluments. These calculations allow comparisons to be made more easily to the reform option in which the HEART tax is eliminated and replaced with an additional tax rate in the IIT.

[25] The additional income tax rate of 1.9 percent is significantly lower than the current 3 percent HEART tax because of the inclusion of public sector workers in the IIT base and also because of the elimination of he J$14,444 threshold.

above the IIT threshold) would also pay more. To continue the existing incentive for firms to hire HEART trainees, the existing trainee credit could be retained as a credit against the company tax.

Table 17: Reform Option – HEART Trust Fund Tax Reform

		Existing HEART Tax				Elimination of HEART Trust Tax/Addition of Revenue-neutral Tax Rate in IIT	
Income (in J$)	Class	Average Taxes, All Workers (in J$)	ATR, All Workers	Average Taxes, Private Sector Workers Only (in J$)	ATR, Private Sector Workers Only	Average Additional IIT Taxes (in J$)	Additional ATR in IIT
Less than 50,000		847	0.029	898	0.3	0	0
50,000-100,000		2,313	0.029	2,408	0.3	0	0
100,000-120,432		3,019	0.028	3,283	0.3	0	0
120,432-150,000		3,516	0.026	4,104	0.3	2,692	0.020
150,000-250,000		5,057	0.025	5,980	0.3	3,898	0.020
250,000-500,000		8,147	0.023	10,614	0.3	7,040	0.020
500,000-1,000,000		12,608	0.018	21,079	0.3	13,720	0.020
1,000,000-5,000,000		27,332	0.015	48,745	0.3	35,408	0.020
Greater than 5,000,000		128,637	0.017	228,718	0.3	134,455	0.020
Total		8,705	0.019	11,071	0.3	8,705	0.020

Source: Calculated by authors from PAYE Microsimulation Model.

Reform Option 5: Consider expanding the bases of any remaining payroll programs.

There is much evidence, even if this evidence is not firm, that substantial amounts of payroll program revenues are not collected, due to illegal evasion of tax and contribution liabilities and legal avoidance of these liabilities. Accordingly, consideration should be given to broadening the bases of any of the remaining payroll programs by forcing those PAYE individuals already in the individual income tax net to pay the full legally due amount of each tax and contribution, by forcing firms to do the same, and by instituting a compliance program that reduces evasion by self-employed individuals. Of course, any expansion in the base of a contributory scheme should be accompanied by a change in the scheme's benefit formula, in order to ensure actuarial fairness. The bases could also be expanded by including some types of workers, sectors, or compensation types currently excluded from the relevant program. For example, there are several forms of allowances that are not taxable. Also, the HEART tax is not collected from public sector agencies, and the CSFBS is limited to pensionable officers in the GOJ. Either could be changed, even if the rationale for this type of base expansion is not strong.

Reform Option 6: With any base expansion, consider a corresponding reduction in tax and contribution rates.

Any expansion in bases should be accompanied by a corresponding reduction in tax and contribution rates. Such a rate reduction would lessen the distorting effects of the system of payroll programs. For example, the *Emoluments Survey 2001* indicates that total nontaxable allowances were J$8.5 billion relative to gross emoluments of J$164.8 billion (both as updated to 2003). Expanding the payroll program base to include these

allowances would allow the overall payroll program average tax rate to fall from 16 percent (Table 14) to 15 percent.

Reform Option 7: Consider consolidating administration of any remaining payroll programs.

The collection procedures of any of the remaining payroll programs could be consolidated by merging the administration of the payroll programs into a single agency. In all but one instance – the NHT and the NIS currently use the same collection form – there are separate collection machineries for each wage-based program. The systems are also largely independent of the individual income tax. To our knowledge, each program has its own compliance organization, and there is virtually no coordination and communication across these organizations. All of this occurs despite a common method of collection for the vast bulk of the revenues that are generated, or employer withholding on PAYE wage income.

A possible reform option is a consolidation of the various collection procedures, a consolidation that would affect both PAYE and self-employed individuals. For PAYE workers, a single form should be used to collect all payroll taxes and contributions, including the individual income tax. This form would have for each employee a separate entry for the individual income tax and for any other payroll tax or contribution withheld. Payments would be deposited with a single receiver (e.g., the Collector of Taxes) in accounts earmarked for each program. The use of a single form for PAYE workers would be facilitated by a common tax base, the retention of proportional tax rates, and likely the elimination of the NIS ceiling on taxable emoluments. For self-employed workers, a single form should also be used. The obvious form is the individual income

tax return (IT01), which would have to be altered to include payments to all programs that may remain after reform. The self-employed individual would pay all taxes and contributions at the same time that he or she pays the individual income tax. For both PAYE and self-employed workers, individual records of contributions would continue to be maintained. A single agency should be given the responsibility for enforcement and compliance.

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Appendix

A. The Equivalence between a Tax on Employers and a Tax on Employees

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 **a**, **b**, **c**, and **d** are positive constants, **W** is the wage, and **L** is the number of individuals employed. The equilibrium levels of the wage and of the employment are given by

(A1) $L = (a-c)/(b+d)$

(A2) $W = (ad+bc)/(b+d)$.

Note that these equations can be interpreted as demand and supply curves. The demand curve for labor has a price-intercept of **a** and a slope of **-b**, while the supply curve of labor has a price-intercept of **c** and a slope of **d**.

Now suppose that a unit wage tax **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 **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 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 $[W_n+T=a-bL]$, or equivalently to $[W_n=a-bL-T]$; that is, the employer wage tax effectively shifts the demand curve down by the amount of the tax. The supply curve is unchanged at $[W_n=c+dL]$. Solving these new equations gives

(A3) $L = (a-c-T)/(b+d)$

(A4) $W_n = (ad+bc-dT)/(b+d)$

(A5) $W_g = W_n + T = (ad+bc+bT)/(b+d)$,

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 **b** and **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

[W_g=c+dL+T], and the demand for labor is unchanged at [W_g=a-bL]. Solving these equations gives

(A6) $L = (a-c-T)/(b+d)$

(A7) $W_g = (ad+bc+bT)/(b+d)$

(A8) $W_n = W_g - T = (ad+bc-dT)/(b+d)$.

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

B. A Simple General Equilibrium Model

Consider a world in which there are two sectors (**X** and **Y**), which correspond to the formal (or taxed) sector and the informal, untaxed sector. There is one "representative" consumer whose utility depends upon consumption of the outputs of the two sectors. There are two factors of production, labor **L** and capital **K**, and both goods require the use of two factors of production. Both factors of production can move freely between the sectors. The commodities are produced competitively and at constant returns to scale. The prices of the sectors are $\mathbf{P_X}$ and $\mathbf{P_Y}$, while labor earns **W** and capital receives **R**. The only tax in this world is a tax **T** on labor.

As shown initially by Harberger (1962), the basic equations of this general equilibrium model can be represented in differential form as (where **d** denotes a differential):

(B1) $dX/X = -E(dP_X - dP_Y)$, where E is the elasticity of demand

(B2) $dX/X = f_K\, dK_X/K_X + f_L\, dL_X/L_X$, where f_K (f_L) is the share of K (L) in the cost of X

(B3) $dK_X/K_X - dL_X/L_X = -S_X(dR - dW - T)$, where S_X is the elasticity of substitution between capital and labor in X

(B4) $dK_Y/K_Y - dL_Y/L_Y = -S_Y(dR - dW)$), where S_Y is the elasticity of substitution between capital and labor in Y

(B5) $dP_X = f_K\, dR + f_L(dW + T_L)$

(B6) $dP_Y = g_K\, dR + g_L dW$, where g_K (g_L) is the share of K (L) in the cost of Y

(B7) $dK_X + dK_Y = 0$

(B8) $dL_X + dL_Y = 0$

(B9) $dP_Y = 0$

Equation (B1) expresses the percentage change in the (compensated) demand for good X as a function of the elasticity of demand for X and the percentage changes in the relatives prices of X and Y. Equation (B2) describes the change in output of X that results from changes in factor usage in the sector. Equations (B3) and (B4) relate the change in factor usage in the two sectors to changes in relative factor prices via the elasticity of substitution in production. Equations (B5) and (B6) show the relationships between changes in factor prices (including the tax on labor in X) and the resulting changes in product prices. Equations (B7) and (B8) reflect the assumption that factor supplies to the economy (though not to each sector) are fixed. Equation (9) defines good Y as the numeraire. This simple general equilibrium model has 9 equations and 9 unknowns.

It is possible to show that in general the incidence of the tax T falls on labor via a reduced W, on capital via a reduced R, and on consumers via increased prices of the products of the two sectors. However, this general conclusion is modified significantly as some of the underlying assumptions change to reflect the Jamaican economy. For example, as the supply of capital to the economy becomes more elastic – reflective of Jamaica as a small open economy – then labor will tend to bear more of the burden of the tax. Further, as the elasticity of supply of labor between the sectors declines, then the burden on labor in the taxed sector will increase; indeed, if labor is unable to move out of sector X in response to the tax on labor in that sector, then labor will bear the full burden of the tax. Overall, it is possible to generate reasonable scenarios in which labor bears most or all of the burden of the tax on labor, as reflected in a wage that falls by the full amount of the tax. See Alm (1985) and Alm and Buckley (1999) for further discussion of general equilibrium modeling and its applications.