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The Laffer Curve in Developing Countries: The Cases of Jamaica and India

Prepared by Liam P. Ebrill 1/

Approved by Ved P. Gandhi

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Abstract

This paper is one of a series evaluating the applicability of the tax reform proposals advocated by the so-called supply-side approach to economic policy in developing countries. The particular focus is on the Laffer curve itself; that is, on the highly publicized proposition that it is possible for nominal tax revenue to increase when tax rates are reduced.

The plausibility of the Laffer curve hypothesis is examined in the light of data drawn from Jamaica and India. These countries were selected since both have recently reduced their top marginal income tax rates. Although there is some evidence of tax revenue buoyancy in Jamaica, the opposite is found in India. However, more importantly, the data are poor. As a result, the testing techniques used depend on a number of critical assumptions and lack discriminatory power. This makes any evaluation of the Laffer curve hypothesis particularly difficult. It is also argued that questions concerning the Laffer curve should be viewed as being separate from the broader question of whether reductions in top marginal income tax rates will result in large efficiency gains.

I. Introduction

This paper is one of a series evaluating the applicability of the tax reform proposals advocated by the so-called supply-side approach to economic policy in developing countries. The particular focus here is on the Laffer curve itself; that is, on the highly publicized proposition that it is possible for nominal tax revenue to increase when tax rates are reduced. The analysis attempts to determine whether examples of the Laffer curve exist in developing countries.

The organization of the paper is as follows. Section II begins with a summary of the more important tenets of the supply-side approach as they apply to tax reform, followed by a discussion of those instances in which supply-side policies are held to have been successfully applied in developing countries. It is argued that some of the claims of the supply-side approach have yet to be demonstrated. In Section III, the paper takes up in greater detail the cases of Jamaica and India, developing countries in which, for whatever reason, tax changes (including some reforms) of relevance to the Laffer curve proposition have been implemented. An attempt is made to evaluate these tax changes. Finally, in Section IV, it is argued that, given the limited nature of the data available, the empirical tests lack sufficient discriminatory power to permit a definitive resolution of whether any given set of observations is consistent with the Laffer curve. If, as is likely, the quality of the data available for the two cases examined is typical of that for developing countries, the most important conclusion must be that assertions concerning the existence or nonexistence of Laffer curves in developing countries should be treated with caution. That is not to say that pronounced supply-side effects do not exist in developing economies. As has been demonstrated in other papers in this series (for example, Gandhi (1985)), supply-side effects may well be important.

II. The Supply-Side Approach

The literature on the supply-side approach to economic policy is by now voluminous. It is not the intent to summarize here the content of that literature and its relationship to the traditional public finance literature, since that has already been done elsewhere. 1/ Rather, attention here is focused on those elements of the supply-side approach which bear most directly on the issue of the Laffer curve.

1/ See Gandhi (1985). Readers interested in examining some of the original sources are referred to Bartlett (1982), Canto, Joines, and Laffer (1983), Federal Reserve Bank of Atlanta (1982), Fink (1982), Hallstones (1982 a, 1982 b), Meyer (1981), Raboy (1982), Roberts (1984), and Wanniski (1983).

1. Summary of theoretical discussion

Simply stated, the proposition of the Laffer curve takes as its starting point the simple notion that tax revenue is zero if the tax rate is either zero or 100 percent, with a smooth relationship between tax rates and tax revenues connecting these two polar points. 1/ The existence of such a relationship suggests that if tax rates are sufficiently high--that is, if tax rates are in what the supply-siders refer to as the "prohibitive range"--then a reduction in tax rates could lead to an increase in tax revenues.

On what does the existence of the Laffer curve depend? Borrowing from Blinder (1981), consider the specific example of a proportional tax on labor income. If w is the gross wage rate and w(1 - t) the net tax wage rate, if S(w(1 - t)) is the supply of labor function, with S(0) = 0 by assumption, and if D(w) is the demand function for labor, it can be shown that, for G(t) continuous and differentiable, revenue responds to variation in the marginal tax rate as

$$\frac{dG}{dt} = wS(.)\left[1 + \frac{t}{1+t} \cdot \frac{\eta_S(1-\eta_D)}{\eta_S - \eta_D}\right],$$
(1)

where G is revenue and η_i, i = S, D, refers to the relevant elasticities of labor supply and demand. Given the assumptions, equation (1) yields the Laffer curve. It follows that the revenue-maximizing tax rate t* can be found by setting equation (1) equal to zero, yielding

$$t* = \frac{\eta_S - \eta_D}{-\eta_D(1+\eta_S)},$$
(2)

where $\eta_D < 0$. As pointed out by Blinder, even if both elasticities are as high as 2, t* is still as high as two thirds.

Proponents of the supply-side approach believe that the relevant elasticity values are very high. There is considerable variation among the supply-siders, however, when it comes to defining the economic environment, and hence the relevant elasticities, in which the tax reduction is set.

Some establish a traditional neoclassical framework of a closed general equilibrium framework with flexible prices and full employment. They implicitly conduct a balanced-budget incidence exercise--whatever

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1/ We leave aside here the issue of whether this concept should be credited to Laffer. Current conventional wisdom maintains that the basic concept has many antecedents. Bartlett (1982) accords the honor of first discovery of the Laffer curve to Ibu Khaldun, a fourteenth century Moslem philosopher.

tax revenue is raised is reinjected back into the economic system via government expenditures. In such an environment, aggregate income effects can only occur if the pattern of government expenditures differs substantially from the pattern of expenditures that would have resulted in the absence of government intervention. Even then, the income effects are not likely to be large. The appropriate focus of tax policy analysis then becomes the examination of the magnitude of the substitution effects that are the inevitable outcome of the relative price movements induced by tax changes. These supply-siders presumably interpret the elasticities above in compensated terms and feel that their absolute value is sufficiently high to make the Laffer curve a relevant phenomenon. They conclude that many of the tax rates currently in force in many countries are so high that a reduction in those rates would lead to an increase in tax revenue: even though a reduction in tax rates leads to a reduction in revenue per unit, the concomitant reduction in price (increase in net wages) leads to such an increase in the demand for the commodity (supply of labor) as to imply an increase in tax yield in the aggregate. An excellent example of work founded on such neoclassical microeconomic grounds is Canto, Joines, and Laffer (1983).

Some supply-siders have argued for higher elasticity values by implicitly changing the base for the tax. This change is to counter the criticism of those who argue that the large elasticities required to generate Laffer-type effects are most unlikely to exist for broadly based taxes. For example, Blinder (1981) argues that it would be much better to apply supply-side analysis to narrowly based taxes. 1/ In response, some supply-siders have emphasized the role of tax evasion. Thus it may be the case that, although labor supply in the aggregate is not very elastic, the supply of labor to the official market economy (as opposed to the underground economy) is much larger. This is precisely one of the effects advanced by Bartlett (1982) in support of tax rate reductions: marginal tax rate reductions provide an incentive for labor to exit from the underground economy, thereby increasing tax revenue.

This last argument is perfectly consistent with a neoclassical framework. Some, though by no means all, supply-side economists rely in addition on short-run macroeconomic considerations. Specifically,

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1/ An example of a Laffer-type effect is the case of New Hampshire liquor taxes. It is argued that a reduction in that state's liquor tax rate could well lead to an increase in tax revenue because an incentive would then be provided to consumers to come in from out of state, notably from Massachusetts, to purchase alcohol. The essence of this argument is that New Hampshire alcohol and out-of-state alcohol are close substitutes, implying highly elastic behavior on the part of purchasers.

if an economy is experiencing excess unemployment, tax cuts stimulate
the economy--presumably by the way they influence consumer expectations
and liquidity--so much that revenues increase. This appears to be the
characterization of the Laffer curve contained, for example, in Roberts
(1984, p. 27). Note that income effects again play a role where here,
they are due to changes in aggregate demand, changes that are precluded
in a neoclassical framework. 1/ The nature of the elasticities implied
by this analysis is markedly different from that envisaged by other
authors. 2/

Irrespective of the precise mechanism underlying the Laffer curve,
there is a consensus among the supply-side economists as to the appro-
priate direction of tax reform. Since reductions in tax rates lead to
revenue increases only if tax rates are very high, the preferred reform
involves reductions in the highest marginal tax rates on income (see,
for example, Wanniski (1983) and Canto, Joines, and Laffer (1981)).

Although it is clearly a supply-side concept, there is no sense in
which the Laffer curve encompasses the entirety of the supply-side
approach. If it did, it would imply that increasing government revenue
is an important objective of supply-side economists. That objective
would obviously run counter to other goals of the supply-side program,

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1/ A similar, though more neoclassical, characterization of the
Laffer curve can be found in Bartlett (1982). With reference to the
economy of Hong Kong, he argues that a reduction in tax rates led to
an acceleration in growth rates and, thus, to revenue increases (an
income effect).

2/ A further potential short-run macroeconomic effect has been
pointed out to me. To the extent that a tax cut stimulates economic
activity, the resultant increase in the transactions demand for money
could allow the government to finance some of its expenditures through
money creation. As an aside, one might also note a particular supply-
side perspective that applies to those at lower income levels. It is
argued that the various unemployment and social security compensation
schemes in many developed countries have tended to make it unprofitable
for the unemployed to seek work. At the microeconomic level, accord-
ingly, this line of reasoning says that the discrete decision to work
or not to work is influenced by tax- or unemployment-compensation-
induced income effects. Given the low level, both relative and abso-
lute, of social welfare payments in most developing countries, however,
it is unlikely that these effects would be important in the context of
this paper. They are therefore not treated in what follows.

most notably a reduction in the size of the government sector. From this more general perspective, it is clear that supply-siders are concerned with improving the production efficiency of economic systems. 1/

In essence, then, the primary concern of supply-siders is to ensure that, whatever the degree of government intervention in the workings of private markets, that government intervention should occur in the most efficient manner possible. The Laffer curve is important since, if Laffer effects do exist in any given economy, they are extreme examples of inefficient intervention.

2. Summary of empirical evidence

The bulk of the empirical evidence advanced by supply-siders to support their position is concerned with economic policy in the United States (for a summary of this and related material, see the Appendix). Empirical analysis considering developing countries is scarcer and such results as exist are superficial, frequently based on a simple correlation between some change in a country's tax structure and the subsequent economic performance of that country. A supply-side writer who has devoted considerable attention to circumstances in developing countries is Wanniski (1983). He argues that many developing countries have adopted extremely progressive income tax structures where this is presumably a source of major disincentives. Leaving aside the question of how one can interpret the effective progressivity of a nominal tax structure given the plethora of deductions and exemptions as well as the low monetary income levels in many developing countries, consider how Wanniski utilizes the income tax information. In particular, consider his discussion of the effects of tax policy changes in India (Wanniski (1983, p. 258, et seq.)). He ascribes the "extraordinary quiescence" that descended on India, after a period of political turmoil, to the tax changes introduced by Finance Minister Subramanian in 1975. These tax changes were very much in the supplyside mode in that they involved reductions in the highest marginal income tax rates (cut to 77 percent from 85 percent), corporate tax rates, and wealth tax rates. Further rate reductions and bracket changes were made in

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1/ To quote Wanniski from evidence he presented before the U.S. Congress Task Force on Tax Policy (U.S. Congress (1981), p. 41),

> "To the supply-sider, the producer is the active partici-
> pant.... [The government] regulates the market place in
> the interests of all producers....The supply-sider is not per
> se a tax cutter. If the supply-sider believes the efficiency
> of production will be enhanced over time by more public roads
> ....he will urge that they be financed by borrowing or taxing
> away a greater share of the producer's production."

April 1976 as a result of unexpected revenue buoyancy. These in turn, it is argued, stimulated even more dramatic economic growth. As implied above, the trouble with this type of reasoning is that it is suggestive but simplistic. To argue that the Indian electorate had clung to democracy for 30 years, "waiting for a politician who would understand the Laffer curve" (Wanniski 1983, p. 261) seems extreme.

Kwon (1984) has examined the case of the Republic of Korea. Working at an aggregate level, he concluded that the behavior of tax revenues over time as tax rates were increased is not inconsistent with the existence of a Laffer curve. However, he also concluded that Korean income tax rates do not appear to be such as to have placed Korea over the Laffer "hill."

In the remainder of this paper a few examples of tax changes in developing countries--changes of the supply-side type--are examined. Specifically, the next section considers the effects of reductions in top marginal income tax rates on income tax revenues in Jamaica and India.

III. Supply-Side Effects and the Personal Income Tax

An obvious problem with any empirical test of the existence of Laffer curve effects in developing countries is the paucity of the data available. What are the minimal requirements that such data should satisfy, given that the approach being used here is to consider countries on a case-by-case basis?

1. Empirical methodology

First, and trivially, the examples selected for study should be of cases in which top marginal tax rates have been reduced. The tax changes undertaken by Jamaica and India satisfy this criterion. Second, because attention is focused on the behavior of those facing the highest marginal tax rates, a breakdown of taxable income and taxes paid by income level both before and after the tax change is required. Data of this type are available for India, but for Jamaica all that is available is a breakdown of the number of pay-as-you-earn (PAYE) taxpayers by income level for the relevant years. Third, it is essential that any exercise of this type control for other factors that might influence the outcome. This requirement exposes the greatest weakness of the study. With the exception of the influence of inflation and growth, it proved impossible to control for these other factors. For the case of inflation, over time, as nominal incomes increase, there is a tendency for tax revenues to increase more than proportionately

because of the progressive nominal structure of most income taxes (including those of Jamaica and India). This effect should be netted out of any revenue change consequent on a marginal tax change.

The significance of the interaction of inflation with the tax system depends on the underlying distribution of income. In the absence of detailed data on this distribution, it is assumed here that incomes are distributed in the form of the Pareto distribution, as given by

$$F(w) = 1 - (\frac{w}{w^*})^{-\alpha} , \qquad w > w^* > 0, \qquad (3)$$

where F refers to the cumulative, w refers to income level, and w* represents the lowest value of w for which this distribution is relevant. The exponent is typically assumed to be greater than or equal to 2 (Atkinson (1973)). The shape of the distribution can be found in Figure 1. Although not representative of the whole distribution of income, this distribution may be an accurate representation of the upper tail of the earnings distribution. Such an argument is made by Lydall (1968). Clearly, the upper tail of the income distribution is of great concern to this study. A positive rate of inflation implies, other things being equal, that the whole distribution shifts to the right. 1/ What does this imply about the number of taxpayers in each given nominal income tranche? Given that the distribution is not uniform, there will be a tendency for the number of taxpayers in each income tranche to increase at a more rapid rate than the rate of inflation.

To refine this statement somewhat, note that an alternative way to measure the effect of inflation is to hold the distribution constant and to reduce the nominal income values. Thus, the elasticity of the number of taxpayers in any given income slice to the rate of inflation is the same as the elasticity of the area to the left of any given income level (say, w_1) to a reduction in that income level (to, say, w_2). Given the specification of the cumulative, that area, A(w), is

$$A(w) = w^{*\alpha} \ w^{-\alpha}, \qquad (4)$$

whence

$$\frac{w}{A} \cdot \frac{dA}{dw} = - \alpha \cdot \qquad (5)$$

1/ The analysis could as easily consider the case of real growth. Note that the implicit assumption is being made at this stage that, whatever the source of nominal income growth, it is affecting all income levels uniformly. This assumption is dictated by data inadequacies.

Equation (5) is the elasticity of the relevant area for increases in w. Hence, if $\alpha = 2.5$, a 10 percent increase in the rate of inflation will, other things being equal, cause a 25 percent increase in the number of taxpayers in each income slice in the upper tail. (The choice of α cannot be confirmed empirically.) A similar line of reasoning can be used to describe the changes in taxpayer numbers as a result of economic growth.

The importance of this result is that, for a given tax system, α is also the elasticity of tax revenues; that is, the elasticity of both the number of taxpayers and of tax revenue in response to uniform increases in nominal income is, for a given tax structure, equal. The analysis draws on Hutton and Lambert (1979).

To see this relationship, define Y to be total income and R(Y) to be total tax revenue. The definition of the tax elasticity is then given by $\eta = Y \cdot R'(Y)/R(Y)$. Let t(w) be the tax payable on income level w, with ($o < w < \infty$), and let f(w) be the frequency density of that income for a population level P. Then the elasticity can be re-expressed as

$$\eta = \frac{\int_0^\infty wt'(w)f(w)dw}{\int_0^\infty t(w)f(w)dw}. \tag{6}$$

With substitution for the Pareto distribution, it follows from equation (4) that

$$f(w|w>w^*) = \alpha w^{*\alpha} w^{-\alpha-1},$$

whence

$$\eta = \frac{\int_{w^*}^\infty wt'(w) \alpha w^{*\alpha}w^{-\alpha-1} dw}{\int_{w^*}^\infty t(w) \alpha w^{*\alpha} w^{-\alpha-1} dw}$$

$$= \frac{\int_{w^*}^\infty t'(w)w^{-\alpha} dw}{\int_{w^*}^\infty t(w)w^{-\alpha-1}dw} \tag{7}$$

From integrating the numerator by parts, it follows that

$$\eta = \alpha \tag{8}$$

which is also the elasticity of the number of taxpayers. Hence, for $\alpha = 2.5$, a 10 percent increase in the rate of inflation will, other things being equal, yield a 25 percent increase in tax revenue in each

Figure 1

PARETO DISTRIBUTION OF EARNINGS
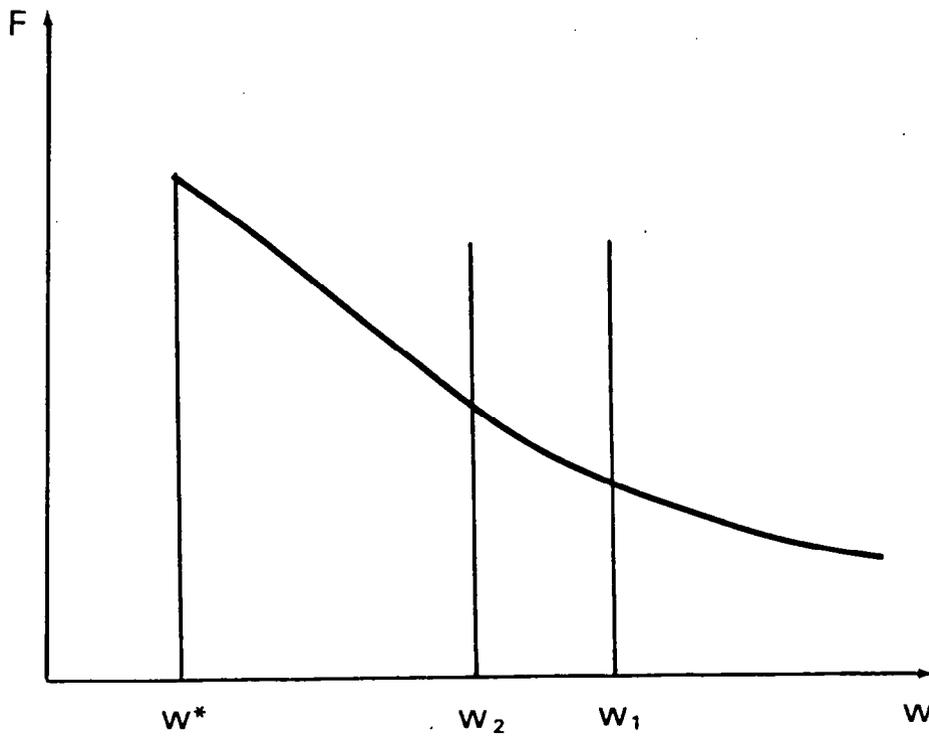
income slice in the upper tail of the distribution. Discrepancies are, of course, possible. In particular, as pointed out earlier, nominal incomes for the relevant income groups might not rise in line with inflation. Finally, note that this result greatly alleviates any problems that might arise because the distribution data available for Jamaica are in numbers of taxpayers.

The value of α is determined by the distribution of income based on cross-section data. Presumably, this value, therefore, already reflects the decisions of income earners in response to the given tax structure. On the assumption that all individuals have the same preferences concerning the work-leisure trade-off, the value of α then incorporates the disincentive effects that individual taxpayers face as they move into higher tax brackets in response to nominal increases in income.

The analysis has to be modified to account for the fact that the tax structure has changed. In particular, top marginal tax rates have been reduced. One way of accommodating this reduction is to interpret α as the elasticity of the tax base. The product of the change in the tax base and the average change in tax rates can then be used to calculate the approximate change in tax revenue and, hence, to evaluate the Laffer curve hypothesis.

With the preceding subsection as background, proceed to consider the specifics of the two cases selected.

2. Jamaica

The structure of the Jamaican personal income tax is presented in Table 1. The structure is clearly progressive. Further, there have been a number of changes where these changes can be classified into two types. First, the Jamaican authorities made some attempt to adjust the income tranches for inflation--this was the primary motivation for the changes that became effective January 1, 1975. It is clear, however, that the effects of inflation were not fully accommodated by these changes. Thus, nominal per capita gross domestic product (GDP) increased from J$626 in 1970 to J$2,195 in 1980, a period of negligible real growth which indicates a high rate of nominal income growth. Second, the highest marginal tax on incomes was increased from 60 percent to 80 percent. This presumably represents a deliberate attempt to increase tax revenues by raising the tax rates faced by wealthier individuals in Jamaica.

The above is purely descriptive. Before examining the disincentive effects implied by this tax structure, or indeed whether this tax system might imply that Jamaica is operating in the prohibitive region of its Laffer curve, it is important to determine the effective tax rates implied by Table 1.

Table 1. Rates of Income Taxation in Jamaica

Before January 1, 1975		On January 1, 1975		Before January 1, 1980		After January 1, 1980	
Taxable income (In J$)	Tax rate (In percent)	Taxable income (In J$)	Tax rate (In percent)	Taxable income (In J$)	Tax rate (In percent)	Taxable income (In J$)	Tax rate (In percent)
1- 500	15						
501- 1,000	20	1- 1,000	20				
1,001- 1,500	26	1,001- 2,000	25				
1,501- 3,500	32 1/2	2,001- 3,500	30				
3,501- 4,500	35	3,501- 5,500	35	0- 5,000	30		
4,501- 7,000	37 1/2-45	5,501- 7,500	42 1/2	5,001- 7,000	35	0- 7,000	30
7,001- 8,000	50	7,501- 9,500	50	7,001-10,000	40	7,001-10,000	40
8,001-11,000	56 1/2	9,501-12,500	57 1/2	10,001-12,000	45 1/2	10,001-12,000	45
Above 11,000	60	Above 12,500	60	12,001-14,000	57	12,001-14,000	50
				14,001-20,000	60	Above 14,000	57 1/2
				20,001-30,000	70		
				Above 30,000	80		

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To do so, one first might ask what is the economic incidence of an income tax on earned income. This paper adopts the traditional assumption that the tax is borne by labor, a view consistent with the incidence analysis of a general factor tax in a closed economy framework with fixed aggregate supplies. Use of this assumption, however, may not be entirely appropriate. It is not correct if aggregate factor supplies are endogenous, as they would be in the long run (Feldstein, 1974 a, 1974 b) or if the economy is open. The latter consideration could be important for Jamaica and should, therefore, be kept in mind. For example, if the net impact of a progressive income tax is for skilled labor to emigrate, some of the burden of the tax may well be shifted to other factors. (This might be particularly true if labor is heterogeneous with specific skills and if some of the commodities consumed in the country are nontraded commodities. For example, consider the impact of the emigration of doctors on the quality of the health care of those who remain.)

The issue of the effective burden of an income tax raises some practical questions as well. For example, how burdensome is a tax system such as that delineated above, given that per capita GDP in 1980 was only J$2,195 (at an official exchange rate of J$1.7814 per U.S. dollar this equals US$1,232). Further, the tax schedule applies only to reported income after deductions, exemptions, and allowances. Given that it is generally conceded that tax evasion is widespread and that, further, tax administration has been weak in Jamaica, the disincentive effects are by that token substantially altered. 1/ This is a topic that will be discussed further below.

The Jamaican personal income tax system is of particular interest to this study because of the tax reforms that became effective January 1, 1980. As can be seen from Table 1, the highest marginal tax rates were significantly reduced, from 80 percent to 57 1/2 percent. This reduction is precisely the type of rate realignment recommended by supply-siders. Did it have the predicted supply-side effect, namely, an increase in tax revenues? Consider Table 2, which presents the data for the partial test outlined in the previous section. The table documents the recent trend in the number of PAYE taxpayers by income

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1/ As evidence of the extent of the tax administration problem, the Report of the Commissioner of Income Tax for 1981 and 1982 notes that the prospects for remedying the tax evasion situation were unlikely to improve as long as resources for the task continued to be inadequate and sanctions against evasion remained weak.

Table 2. PAYE Employees in Jamaica Classified by Income Groups

Income Groups (In J$)	Number of PAYE Employees 1979	Number of PAYE Employees 1980	Percentage Change	Number of PAYE Employees 1981	Percentage Change
2,300- 2,500	4,588	3,384	-26	2,535	-25
2,501- 3,500	22,602	20,399	-10	12,040	-41
3,501- 5,000	26,799	31,409	17	24,326	-23
5,001- 7,000	23,557	26,008	10	41,057	56
7,001- 9,000	15,109	16,896	12	16,291	-4
9,001-11,000	8,869	9,830	11	10,041	2
11,001-12,000	2,920	3,094	6	3,214	4
12,001-16,000	6,193	7,175	16	7,541	5
16,001-20,000	1,956	3,043	56	3,495	15
20,001-30,000	917	1,682	83	2,003	19
30,001-50,000	212	387	83	376	-3
Above 50,001	43	117	272	93	-21
Total	113,765	123,424	9	123,012	0

class. 1/ While this does not provide direct evidence on income tax
revenue, the analytical results presented above suggest that the trends
in the number of taxpayers in each income class can be illuminating.

To draw on the earlier analysis, any evaluation of the relevance
of the Laffer curve to Jamaican circumstances, which are characterized
on the basis of trends in the numbers of taxpayers, depends on the in-
teraction of a number of factors; the underlying rates of inflation and
real growth, the underlying distribution of incomes, and the changes in
tax rates. Inflation, in Jamaica, as measured by changes in the con-
sumer price index, was 27 percent in 1980 and 12.5 percent in 1981
(calendar years). The corresponding growth rates in real GDP were
-5.4 percent and 2.0 percent, respectively. 2/

The actual income categories for which the Laffer curve hypothesis
can be most readily evaluated are those in which income exceeds J$20,000.
Thus, for incomes in the range of J$16,000-J$20,000, marginal tax rates
were reduced by 2 1/2 percentage points, whereas for the income ranges
J$20,000-J$30,000 and above J$30,000, the reductions were 12 1/2 and
22 1/2 percentage points, respectively. If the hypothesis is correct,
a significant proportion of the increase in the number of taxpayers
(hence in the tax base) earning above J$20,000 may be credited to the
income tax changes, which presumably provided a sufficient incentive to
induce a sharp increase in the supply of work effort to the organized
market. For the Laffer curve to apply, however, this increase would
have to exceed the increase that would normally be expected because of
fiscal drag. For incomes in excess of J$20,000, it can be calculated
that the tax base increased by 87 percent between 1979 and 1980. 3/
This increase, however, has to be seen in light of an inflation rate of
27 percent in that year. If nominal incomes in those income categories
increased by a like amount, and if the Pareto distribution is a correct

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1/ PAYE data are easy to use because tax collections and tax liabil-
ities tend to be contemporaneous. Further, for Jamaica, they are a
pre-eminent source of individual income tax revenue. The Report of
the Commissioner of Income Tax for 1981 and 1982 notes that in 1982
PAYE was responsible for 92 percent of gross individual income tax
receipts.
2/ These estimates were obtained from International Monetary Fund,
International Financial Statistics Yearbook (Washington, 1983).
3/ Note that there are absolute decreases in the number of taxpayers
in the lowest income classes in both years. This confirms the view
that inflation and/or growth combined with changes in basic allowances,
tends to shift the whole distribution. Of course, the Pareto distribu-
tion cannot be applied to the whole income distribution. For that
task, a log-normal distribution would be more appropriate.

characterization of the underlying income distribution, then a value of α = 2.5 would result in an increase in the tax base of 67.5 percent owing solely to the effects of fiscal drag. 1/

The evidence to this point suggests that the Jamaican tax base responded buoyantly to the tax rate reductions. For α = 2.5, the base grew by approximately 29 percent more than would have been anticipated. Further, this occurred in a year of negative GDP growth. What happened to tax revenue, the primary concern of the Laffer curve? Using 1979 weights, the average reduction in marginal tax rates for the relevant income groups was approximately 20 percent, indicating that tax revenue did increase relative to what collections would have been had the tax system remained unchanged and tax revenues had increased only as a result of the effects of fiscal drag.

Although these data are consistent with the existence of a Laffer curve in Jamaica, the reservations about such an interpretation should be kept in mind. It is based on little evidence and on just one year's observation. Indeed, referring back to Table 2, it is clear that the buoyancy of the tax base in the following year, a year of 12 1/2 percent inflation, fell below what would have been predicted by the framework developed here. More important, the exercise above is cast as if the tax reductions occurred in a vacuum, which, of course, was not the case. The increase in the number of taxpayers in the target year may have been due to other factors, such as a simultaneous drive to enhance tax administration. The 1980 Economic and Social Survey, itself notes that a significant part of the larger than expected tax collections from individuals on the PAYE system represented payments of arrears in income tax (Jamaica (1980)).

A further reason for caution in interpreting these results as evidence of the Laffer curve is that PAYE taxpayers are not the most suitable group to consider when looking for Laffer curve effects. Thus, as pointed out earlier, the significant factor may not be the aggregate elasticity of labor supply but rather the elasticity of labor supply to organized markets. Elaborating, reductions in marginal tax rates might not result in increased work effort. Instead, they might yield increased tax revenue because of reduced tax evasion. This effect, which enhances the observed elasticity of labor supply to organized markets, is less likely to be relevant in the case of PAYE taxpayers. Those paying income taxes under PAYE schemes typically have little control either over the income they report or over the hours they work. As a

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1/ Ideally, one would test the validity of assuming that the upper tail of the income distribution conforms to the Pareto distribution by using a χ^2 test. Unfortunately, there are insufficient observations for such a test. Note also that lack of data precludes an independent verification of the magnitude of α for Jamaica.

result, Laffer-type effects exist in Jamaica, these effects are more likely to be observed when other taxpayers are included. As noted in the <u>Report of the Commissioner of Income Tax for 1981 and 1982</u> (Kingston: Government Publications, 1982, p. 18), delinquency and tax evasion are so extensive that in excess of 80 percent of the self-employed are assumed to be "dodging their responsibilities."

3. <u>India</u>

Because the case of India was cited by Wanniski (1983), it is appropriate to consider the example of the marginal income tax reductions introduced in that country in 1975. As rationalized in the budget speech for 1974-75, the reductions in marginal income tax rates were a response to recommendations made by the Direct Taxes Enquiry Committee. The existing high rates were held to be a major cause of tax evasion. The magnitude of the reductions can be gauged by referring to Table 3. As for the revenue loss implied by these reductions, the Minister for Finance argued

> The reduction in the rates of income tax on personal income would ordinarily have resulted in a loss of about Rs 60 crores in a full year and Rs 36 crores in the financial year 1974-75. I am, however, not taking any loss into account for budgetary purposes as I expect that the reduction in the rates of taxes will lead to better tax compliance and full disclosures of incomes by all taxpayers. 1/

At face value, the Minister's optimism appears to have been justified—the yield of the income and corporation taxes was later revised from Rs 1,370 crores to Rs 1,460 crores (India, 1976, p.5). This upward revision is only evidence, however, of buoyancy at the aggregate level. As was the case with Jamaica, a more disaggregated approach is necessary. Such a breakdown of income tax receipts by income class for 1972/73 and 1975/76 (unfortunately, these were the only two years for which data were available) is presented in Table 4. Applying the framework developed above for Jamaica, nominal national income (a proxy for the tax base) increased 55 percent between fiscal 1972/73 and fiscal 1975/76. During the same period, as can be seen from Table 4, total income assessed increased by 30 percent, whereas the tax payable increased by only 27 percent. At this level, it would appear that the supply-side view was not vindicated.

1/ See India (1975, p. 188). A crore is a unit of 10 million. There are some discrepancies between Wanniski's account and the measures proposed by the budget speech. Specifically, Wanniski refers to reductions in annual taxes on large holdings, whereas the Minister proposed wealth tax increases in general.

Table 3. Rates of Income Taxation in India,
1973/74 and 1974/75

1973/74		1974/75	
Income (In Rs)	Tax rate	Income (In Rs)	Tax rate
< 5,000	0	< 6,000	0
5,001- 10,000	11.00	6,001-10,000	13.2
10,001- 15,000	18.70	10,001-15,000	16.5
15,001- 20,000	26.15	15,001-20,000	22.0
20,001- 25,000	34.50	20,001-25,000	33.0
25,001- 30,000	46.00	25,001-30,000	44.0
30,001- 40,000	57.50	30,001-50,000	55.0
40,001- 60,000	69.00	50,001-70,000	66.0
60,001- 80,000	80.50	> 70,000	77.0
80,001-100,000	86.26		
100,001-200,000	92.00		
> 200,000	97.75		

Sources: Data for 1973/74 were obtained from Gupta (1978); data for 1974/75 were obtained from Khanna (1974). The surcharge has been included.

Table 4. Classification of the Tax Payable in India by Assessees According to Income Class

Income (In Rs)	Assessees (Number) 1972/73	1975/76	Percentage Change	Total Income Assessed (In thousands of Rs) 1972/73	1975/76	Percentage Change	Total Tax Payable (In thousands of Rs) 1972/73	1975/76	Percentage Change
< 5,000	193,547	55,144	-72	838,614	188,990	-77	14,172	13,652	-4
5,001- 7,500	775,715	661,569	-15	4,723,772	4,206,137	-11	128,274	95,920	-25
7,501- 10,000	368,500	529,829	44	3,172,975	4,547,482	43	185,861	192,894	4
10,001- 15,000	367,666	514,001	40	4,458,580	6,236,169	40	370,121	437,440	18
15,001- 20,000	158,879	237,186	49	2,730,230	4,075,961	49	303,047	426,495	41
20,001- 25,000	87,227	127,322	46	1,913,090	2,835,629	48	262,710	371,179	41
25,001- 30,000	52,844	74,094	40	1,439,533	2,026,970	41	246,417	319,770	30
30,001- 40,000	57,489	81,957	43	1,979,265	2,817,788	42	373,008	531,798	43
40,001- 50,000	30,621	44,381	45	1,364,970	1,979,749	45	284,655	408,822	44
50,001- 60,000	17,403	25,507	47	949,898	1,394,372	47	210,898	308,592	46
60,001- 70,000	11,668	16,999	46	753,310	1,097,824	46	176,365	249,842	42
70,001-100,000	18,109	27,094	50	1,498,032	2,245,859	50	378,420	535,446	41
100,001-200,000	13,057	22,685	74	1,752,792	3,030,834	73	526,964	843,829	60
> 200,000	6,245	8,554	37	8,506,048	10,351,019	22	4,673,453	5,608,908	20
Total	2,158,970	2,426,322	12	36,111,110	47,061,783	30	8,134,365	10,344,587	27

Source: India, Central Statistics Organization, Statistical Abstract (New Delhi, various issues).

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When one considers the breakdown in greater detail, a clearer picture emerges. First, a sharp drop in tax revenue occurred in the lowest income classes where this may be ascribed to the increase in the basic exemption. Second, the increase in the basic exemption also implies tax revenue reductions in the higher gross income tranches. Note that this may well be an inframarginal tax reduction for many tax-payers--taxpayers may find their taxes reduced and yet face the same marginal tax rates. (This is not to deny that there are grounds, based on equity considerations, for introducing this type of tax reduction-- grounds that are all the more persuasive in an inflationary environ-ment.)

Third, as can be seen from Table 5, which presents summary data based on Table 4, the increase in total tax payable tends to decline as income levels increase. More important, average assessed income per assessee and average tax payable per assessee both decline in absolute terms for incomes in excess of Rs 50,000. These declines were even more pronounced for incomes in excess of Rs 100,000. A comparison of Tables 4 and 5 reveals the source of this behavior: income and revenue growth rates of the highest income group (those with incomes above Rs 200,000) were sluggish, both in comparison with the analogous growth rates registered in most other income classes and with the underlying growth in national income. If in addition it is assumed that income is Pareto distributed, with $\alpha = 2.5$, one would expect above-average in-creases in these categories.

The data on India, at least for the years selected, therefore, do not support the Laffer curve hypothesis. 1/ The "revenue performance" of the highest income group was quite poor. This is, of course, the income group that might be expected to exhibit the most pronounced Laffer-type effects because taxpayers in this bracket experienced the greatest reduction in marginal tax rates (20.75 percentage points).

Just as caution was required in interpreting the data for Jamaica, so it is required in this case. For example, the low income growth registered by the highest income group might be due to income and price (for example, rent control) policies. This possibility raises the ob-vious point that, for the Laffer curve to exist, individuals must be able to earn more income. Nonetheless, the conclusion of this section

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1/ This assessment receives support in Acharaya, et al. (1985). Their report cites work by Bagchi and Rao (Economic and Political Weekly (Bombay, September 4, 1982) in which they concluded that the tax compliance effects of rate reductions were much lower than had been presumed in the Budgets (see above). Bagchi and Rao's methodology relies on obtaining independent estimates of assessable income in years after tax reduction and their results further belie the optimism gener-ated by the aggregate data discussed earlier.

Table 5. Trends in Indian Tax Base and Taxes Paid,
1972/73 and 1975/76

(In thousands of Rupees, unless otherwise stated)

	Assessees		Total Income Assessed	Total Tax Payable	Average Assessed Income/ Assessee	Average Tax/ Assessee
	Number (In thousands)	Percent total				
All income levels						
1972/73	2,159	100.0	36,111	8,134	16.8	3.76
1975/76	2,426	100.0	47,061	10,345	19.4	4.26
Percentage change	12.4	--	30.3	27.2	15.5	13.40
Income levels > 50,000						
1972/73	66	3.0	13,460	5,966	203.9	90.4
1975/76	100	4.1	18,120	7,547	181.2	74.6
Percentage change	52.0	--	34.6	26.5	-11.1	-17.5
Income levels > 100,000						
1972/73	19	0.9	10,259	5,200	539.9	273.7
1975/76	31	1.3	13,382	6,453	431.7	208.2
Percentage change	63.1	--	30.4	24.1	-20.0	-23.9

Source: Table 4.

must be that strong supply-side effects are not readily observable in
India. Again, one should remember that such a conclusion concentrates
on the revenue implications of cuts in marginal tax rates to the exclu-
sion of any consideration of efficiency or equity effects.

IV. Overview and Conclusions

This paper represents an attempt to evaluate empirically whether
Laffer curve effects are to be found in developing countries. Jamaica
and India, which have recently reduced their top marginal tax rates,
were selected for the exercise. Empirical tests rarely afford defini-
tive resolutions of intellectual disputes, but the prospects of their
doing so in this instance appear particularly poor. The data are
hardly adequate. Although there was some evidence of tax revenue buoy-
ancy in Jamaica, the opposite was found in India. Because the testing
techniques used depended on a number of critical assumptions and lacked
discriminatory power, however, in both cases the results could easily
be rationalized using non-Laffer curve explanations. For Jamaica, one
could appeal to the possibility of a once-and-for-all gain from improved
tax administration; for India, the existence of other market imperfec-
tions might have played a role.

A paper such as this, which considers the Laffer curve as it ap-
plies to marginal income tax reductions, focuses on a narrow aspect of
supply-side economics. Taking a broader perspective, the supply-side
approach is concerned with the disincentive effects of tax distortions
irrespective of their source. This broader concern was touched on when
it was argued that the effects of the marginal tax rate reductions ex-
tend beyond the revenue effects. Even if Laffer-type effects are not
in evidence, tax distortions may nonetheless induce significant supply
responses.

Moreover, although the reduction of top marginal tax rates may
yield some revenue increase or, at least, a negligible revenue decline,
the real significance of the result most likely lies in its implica-
tions for economic efficiency and equity. Thus, for Jamaica, the
387 taxpayers in the income group of J$30,000-J$50,000 (Table 2) might
have been expected to pay approximately J$7 million in taxes in fiscal
1980/81. This amount must be seen in the context of total individual
income tax payments in the year of J$924 million (Jamaica, 1981). The
J$7 million refers to total revenue which implies that any change in
revenue associated with marginal tax changes will be correspondingly
smaller. (A caveat is that the revenue implications for the highest
income group cannot be derived because of the open-ended nature of the
income levels in that group; although this group is certain to have
"outliers," particularly if the analysis is extended to non-PAYE tax-
payers, the force of the point in this paragraph is unlikely to be
altered.)

Summary of Empirical Evidence: Developed Countries

The bulk of the empirical evidence advanced by supply-side econo-
mists to support their position is concerned with economic policy in
the United States. Much of this work concerns the revenue effects
associated with the Kennedy tax cuts implemented in 1962 and 1964.
These tax cuts are felt to be particularly suitable as a test of the
supply-side approach, since they involved reductions in the highest
marginal tax rates on earned income as well as reductions in the corpo-
rate profits tax. Much of the evidence cited in support of the supply-
side position is anecdotal. Most argue that the tax cut was stimula-
tive and that the resultant surge in economic activity resulted in sig-
nificant revenue buoyancy. 1/ However, to the extent that the revenue
increase was due to a surge in macroeconomic activity it does not nec-
essarily sustain the argument that the Kennedy tax cuts led to the
large gains in microeconomic efficiency sought by some supply-side
economists. 2/

There have been more rigorous attempts to evaluate the Kennedy tax
cuts. Consider, for example, the research by Canto, Joines, and Laffer
(1981). On the assumption that the exogenous policy variables bear a
constant relationship to the endogenous variables and that the struc-
ture of the complete model is stable, they used univariate time-series
analysis to identify the stochastic process generating, for example,
the income tax revenue series. The forecast errors that result when
these univariate models are applied to the post-sample period (that is,
the period after the Kennedy tax cuts became effective) may then be re-
garded as estimates of the revenue changes resulting from those tax
cuts. There are a number of conclusions. In particular, the authors
found that their time-series estimates showed smaller revenue losses
than those predicted at the time by the U.S. Treasury. This result is
of interest since, given that the Treasury utilized a Keynesian frame-
work for its revenue loss projections, the time-series discrepancy may
be due to relative price effects. However, this interpretation is
predicated on the Treasury model having exhaustively captured all
effects associated with the tax cuts other than the relative price
changes. 3/

1/ For a summary of the opinions of various authorities on the im-
pact of the Kennedy tax cuts, see Bartlett (1982).

2/ An important related point is that the nature of the income tax
change was such that it resulted in an increase in the elasticity of
that tax. This point is discussed further in Tanzi and Hart (1972).

3/ The interpretation is also predicated on the accuracy of the
assumptions required for the application of the univariate time-series
analysis.

Taking an alternative approach to the evaluation of actual tax
changes such as the Kennedy tax cuts, Fullerton (1982) used an empir-
ical U.S. general equilibrium model to plot the Laffer curve for var-
ious elasticity values of factor supply in the United States. He con-
cluded that, although Laffer effects were conceivable in the context of
the U.S. income tax system, they were unlikely given the conventional
wisdom concerning the relevant elasticities of labor supply. Mackenzie
(1983) has modeled the effects of a tax reduction on aggregate supply
within the context of a simple macroeconomic model and found the aggre-
gate demand effects to be more pronounced than the aggregate supply
effects. Grieson and others (1977) reported a more positive result.
They found the possibility of an inverse relationship between tax rates
and tax revenue for local government in New York. This finding lends
support to the hypothesis that Laffer effects are likely to be most
pronounced where the tax base is narrowly defined, and substitution
possibilities are thus increased. As a final example of research on
the extent of Laffer effects in developed countries, consider Stuart's
(1981) study of Sweden. Using a two-sector model with parameter values
to fit Sweden, he found that the peak of the Laffer curve occurs at a
marginal tax rate of approximately 70 percent. This result can be con-
trasted with actual marginal tax rates in force in Sweden--rates as
high as 80 percent--and he concluded that tax rate reductions were in
order. (A weakness of this latter study is that the parameterization
was done within a Cobb-Douglas framework. This not only imposes the
strong restriction that labor-supply elasticities be constant, but it
may also imply larger labor-supply elasticities than actually occur.)

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