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Corporate Tax Holidays and Investment

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Governments of developing countries commonly adopt tax holidays to encourage investment. This article evaluates the incentives provided by company income tax holidays and explains the importance of the timing of depreciation allowances in determining the effective tax rates and the cost of capital to firms considering additional investment during the holiday. If an asset is long-lived and depreciation allowances for tax purposes are accelerated, the tax holiday, by preventing depreciation deductions during periods of peak profits, may actually penalize a company for investing during the holiday. The closer the investment to the end of the holiday period, the more severe the penalty. If, instead, depreciation allowances may be deferred until after the holiday, this program of incentives is quite generous to the firm. How these sharply contrasting results may emerge is illustrated through estimation of effective tax rates and user costs of capital under tax holiday systems in Bangladesh, Côte d'Ivoire, Malaysia, Morocco, and Thailand.

A common form of tax incentive found in about half of developing countries is a "tax holiday" which permits a new company to operate for a given number of years before paying corporate income taxes. Companies may be required to meet certain conditions to qualify for a holiday. Most often, the tax holiday is an instrument used by a government to encourage investment in long-lived capital and to direct a country's long-term development.

The issue addressed here is how tax holidays affect the user cost of capital and thus a company's investment decisions. The user cost of capital is the sum of economic depreciation and financing costs, adjusted for taxes. The effective tax rate on capital is calculated as the difference between the value of the marginal product of capital (net of economic depreciation but before taxes) and the rate of return on capital that savers earn when investing in the firm's capital; the difference is divided by the pre- or post-tax marginal rate of return.

If a firm is exempt from income taxation during the holiday, what is the total effective tax rate on income? A first response might be that it is zero. This

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would be correct for short-term capital that fully depreciates before the end of the holiday. But the effective tax rate on assets which continue to generate income after the holiday depends crucially on the rules for tax depreciation. Assume, for example, that the entire capital stock must be depreciated for tax purposes in the first two years after purchase but has an economic life of five years. In years three to five, therefore, no tax depreciation allowances may be claimed against the earnings of the assets.

This does not imply that the tax holiday is of no value to the firm. Short-term investments and labor (compensated by profits) bear no tax during the holiday. It is only long-lived capital that may be penalized. This suggests that an appraisal of the full impact of the tax holiday on investment decisions requires explicit consideration of economic and tax-related rates of depreciation, depreciation deferral allowances, interest expense deductions, and related tax exemptions and liabilities.

The analysis here uses standard techniques developed in the tax literature on the user cost of capital (Jorgenson 1963; Boadway and Bruce 1979) and effective tax rates (King and Fullerton 1984; Boadway, Bruce, and Mintz 1984). The issues are similar to those addressed in earlier work on the cost of capital when company tax rates vary (King 1974) and when companies experience tax losses (Edwards and Keen 1985; Auerbach 1986; and Mayer 1986). The scant literature on tax holidays has primarily addressed why tax holidays may be used, rather than deriving the effective tax rate on capital during a holiday (Bond and Samuelson 1986; Doyle and van Wijnbergen 1984). While Agell (1982) and Bond (1981) do measure effective tax rates, they assume that the capital stock is constant over the tax holiday period, which is incorrect since the value of tax depreciation allowances is not constant during the holiday period.

The task here is to calculate a firm's marginal tax rate under the assumptions that the firm knows the length of the holiday and the tax regime that will exist after it. I also assume that it is the marginal rather than average returns to capital and marginal rather than average tax rates that affect investment decisions. As has been established by the literature, average tax rates are not good indicators of how the tax system may deter investments since the measure includes taxes imposed on intramarginal returns or rents earned by a firm. For example, a pure profit tax has no impact on investment decisions, yet the average tax rate is positive in value. It is for this reason that economists have concentrated on marginal tax rates instead.

The analysis is organized as follows: in section I examples are provided to explain how company tax holidays affect long-lived capital investment. A survey of tax law for five countries that use tax holiday incentives is given in section II. Derivation of the user cost of capital and effective tax rates is first explained in section III, and estimates of the rates for the five countries are presented in section IV. Section V concludes with a discussion of the relative

costs and benefits that arise from tax holidays. A technical appendix provides a mathematical derivation of the costs of capital under tax holidays.

I. How Company Tax Holidays Affect Investment: An Explanation and Illustrations

In this section, I first illustrate how company income taxes can affect incentives to investment in long-lived capital, and I then outline the relative incentives of a tax holiday.

Company Income Taxes

The company income tax paid is the product of the statutory tax rate multiplied by company profits, as defined by the tax authorities. In principle, taxable profits correspond to shareholder income: revenues net of labor, material, and capital costs (depreciation, inventory, and interest expenses). In practice, however, taxable profits rarely correspond to true shareholder profit for three reasons. First, capital goods are written off for tax purposes at a quicker rate than the true economic rate of depreciation. Second, imputed income, such as capital gains resulting from increases in the assessed value of land, structures, and other forms of capital, may be partly or fully exempt from tax. Third, in most tax systems adjustments for inflation are not made. Depreciation and inventory cost write-offs are based on original rather than replacement costs, and costs of borrowing, unadjusted for inflation, are fully deductible against taxable income. Without adjustments for inflation, depreciation and inventory costs are underestimated and interest expense is overestimated relative to inflation-adjusted measures.

Actual tax rates may also differ from the statutory rate. In Bangladesh and Malaysia, for example, statutory tax rates range from 40 to 45 percent, but depreciation allowances are generous, and interest, unadjusted for inflation, may be deducted from taxable profits. Thus, marginal investments in machinery and buildings are taxed at very low and often negative rates. In contrast, countries such as Morocco and Thailand do not allow accelerated depreciation, so that companies not qualifying for a tax holiday may be highly taxed.

The Company Income Tax Holiday

In most countries, tax holidays are granted to newly formed projects. If the activity is undertaken by an existing corporation, the project qualifying for the tax holiday must be maintained as a separate entity. The holiday lasts for a given number of years, after which the company begins paying taxes. Holiday status may permit foreign nationals to own land or domestic companies (otherwise prohibited) and provide full or partial relief from corporate income

taxes, business taxes, and import duties, and from withholding taxes and personal income taxes on dividends. Only the corporate income tax holiday is discussed here.

Although a company qualifying for a tax holiday must file an income tax form, the qualifying activity is taxed at a zero or lower-than-standard rate (nonholiday activities remain taxed). If the firm has a taxable loss, it may be allowed to carry it forward to apply to post-holiday income (although the loss is not carried forward at a rate of interest).

Investments made during the holiday may generate post-holiday tax liabilities, however. Consider, as an example, depreciation deductions. To reflect the physical deterioration of capital goods, during a tax holiday firms are allowed to deduct some portion of the value of those goods from taxable income each year after purchase until their full cost has been deducted. In the absence of a tax holiday, the value of depreciation allowances to the firm depends on the relative rates of economic and tax depreciation.

The value of the depreciation allowances is greatest when a company can write off capital immediately rather than taking the depreciation deduction over several years. When a company can write off depreciation for tax purposes quicker than depreciation for accounting purposes, the company's taxable income generated by the asset is smaller than economic income in early years and larger than economic income in later years. The company pays less tax up front and more taxes in later years. If there were no discounting of revenue streams, it would not matter that tax and economic depreciation are mismatched in this manner. With a positive discount rate, however, the company pays less in present-value terms if tax depreciation is faster than economic depreciation than it will if tax and economic depreciation are matched. The converse holds when tax depreciation is less than economic depreciation—a company pays more taxes in present value than in a situation in which tax and economic depreciation rates are perfectly matched.

The tax holiday complicates this picture somewhat. Because the holiday exempts a firm from income tax during the initial few years after purchase of an asset, depreciation allowances will be redundant during the holiday. If the asset is short-lived and does not generate income thereafter, this is not a loss—the asset was untaxed due to the holiday in any case. If the asset is long-lived, however, a firm would prefer to defer use of the depreciation deductions until after the holiday to take advantage of *both* the tax holiday and the depreciation allowances. Accelerated depreciation, which concentrates tax benefits in the first few years after purchase, will not benefit the firm during the holiday; the firm will find that its taxable income will be greater than economic income after the holiday is completed.

To illustrate, say that an asset that initially costs $100 produces output for four years, and depreciates at a rate of 25 percent each year according to straight-line depreciation methods. Under straight-line depreciation, an asset declines at a constant rate based on its original value. This can be contrasted

with declining-balance depreciation whereby an asset declines exponentially, based on the remaining value of the asset. For tax purposes, however, the asset is to be written off at a 50 percent (straight-line) rate each year. If the holiday ends two years after the asset is purchased, the income that it generates after the holiday will be taxed without depreciation deductions. If the asset produces a 60 percent rate of return (on the value of the asset after depreciation each year) and that income is taxed at a 50 percent rate, the total tax accumulated is $22.50 or, on a present-value basis (discounting by 10 percent), $18.02 (see table 1). In the absence of the holiday, the firm pays total taxes of $25, or $20.75 on a present-value basis. Thus, despite the holiday, investment in long-lived capital bears some company tax although it is less than the tax without the holiday.

Inflation, which is ignored in this example, reduces the value of the tax holiday to the firm. Inflation affects a company's tax burden by raising nominal (taxable) income, production costs, and replacement costs of capital goods. Inflation-indexed tax depreciation rates allow the company to increase the reported price of the asset by the rate of inflation when calculating depreciation allowances. Without inflation indexation, if capital is largely written off for tax purposes during the holiday but generates income thereafter, nominal income (which is assumed to rise with inflation) and thus tax liabilities rise, depreciation allowances do not, but production costs and actual replacement costs for capital do. In this case, the company may be very heavily taxed.

An alternative technique used for handling depreciation deductions during the tax holiday is deferral of deductions, which has the opposite effect. If a company can defer depreciation deductions until it accrues tax liabilities, this makes the tax holiday very generous, and assets could even be subsidized. Using the example above but assuming that depreciation deductions are deferred until the end of the holiday, the firm accumulates a negative tax liability of $27.50 (see table 2) after the holiday. If the company were able to write off tax losses against other forms of income, the holiday could lower the tax costs of other assets and thus also encourage related nonqualifying investment. Legal

Table 1. *Effect of Accelerated Tax Depreciation with and without a Tax Holiday*
(dollars)

Year	*Gross profit*	*Tax depreciation*	*Taxable income*	*Taxes paid*	
				Holiday	*No holiday*
1	60	50	10	0	5
2	45	50	−5	0	−2.5
3	30	0	30	15	15
4	15	0	15	7.5	7.5
Total				22.5	25

Note: Assumes asset costing $100, 25 percent annual economic depreciation (straight-line), 50 percent annual tax allowance depreciation, 50 percent tax rate, and two-year tax holiday.

Table 2. *Effect of Deferred Depreciation Deductions with a Tax Holiday*
(dollars)

Year	*Gross profit*	*Tax depreciation*	*Taxable income*	*Taxes paid (holiday)*
1	60	0	60	0
2	45	0	45	0
3	30	50	−20	−10
4	15	50	−35	−17.5
Total				−27.5

Note: Assumes asset costing $100, 25 percent annual economic depreciation (straight-line), 50 percent annual tax allowance depreciation deferred until after the holiday, two-year tax holiday, and 50 percent tax rate.

clauses which restrict the tax holiday to new and separate entities, however, would preclude this outcome if the entity remains separate after the holiday.

A similar result emerges when capital is financed by debt. Both principal repayments and interest deductions reduce taxable income during the initial period after purchase which coincides with the tax holiday. For a holiday firm, these interest deductions cannot be used to reduce the taxable income of the company over time. If the company is able to defer the interest expense deductions until after the holiday and after principal is repaid, once again the tax regime becomes quite generous. If interest costs are not adjusted for inflation, the deferral is even more valuable to the firm.

While the examples above give an indication of the importance of interest deductions and depreciation allowances in calculating the relative costs of capital under a holiday, the analysis becomes more complicated when assessing not just the initial holiday-qualifying investment, but also additional investments which the company may undertake throughout the holiday period. Because later investments will be exempt from income tax for a shorter period, mandatory accelerated depreciation without inflation adjustment will increase their overall tax liabilities substantially relative to investment undertaken in the first year of the holiday. This point emerges more sharply in the applied analysis in section IV below.

II. Tax Holidays in Five Countries

This section describes the company income tax law that is relevant to tax holidays used in five countries: Bangladesh, Côte d'Ivoire, Malaysia, Morocco, and Thailand. These countries were selected on the basis of providing a useful contrast of various tax laws interacting with inflation and interest rates. Table 3 provides a summary of the relevant tax provisions in each country; provisions other than company and dividend tax relief are ignored. Information was taken from the International Bureau of Fiscal Documentation and was provided by the Arthur Andersen accounting firm. It is possible that some features of the tax law may have been misinterpreted in my reading.

Table 3. *Tax Holiday Provisions for Industrial Enterprises*

Feature	*Bangladesh*	*Côte d'Ivoire*	*Malaysia*	*Morocco*	*Thailand*
Duration (years)	4–12	7–11[a]	6–10	10–14	3–8[a] plus 6 (optional)
Rate of income tax exemption (percent)	100	100 for 4, 6, or 8 years, depending on region. 75 third to last year, 50 second to last year, 25 last year	100	100 in zone IV[b] 50 in zone III	50 or 100 50 for five additional years
Depreciation (annual percentage rate)	First-year allowance: buildings, 10 machinery, 20 Declining balance: buildings, 15 machinery, 30	Straight-line: buildings, 5 machinery, 10–33	First-year allowance: buildings, 20 machinery, 20 Straight-line: buildings, 2 machinery, 12 (average)	Straight-line: conformity with book value	Straight-line: conformity with book value
Depreciation deductions deferral	Unused may be carried forward only when no profit is declared	All may be deferred indefinitely	All may be delayed until end of holiday	Unused may be carried forward only in loss periods	May not be deferred
Treatment of losses	May not be carried forward beyond holiday	May be carried forward three years	May be carried forward indefinitely	May be carried forward four years	Allowance aggregation of holiday and associated nonholiday income and loss
Other	5–30 percent of income must be invested in government bonds. Dividends of public firms are exempt from personal tax	National Investment Fund: 10 percent tax is fully recoverable at a rate that varies according to the type of investment	Dividends are exempt from personal tax		Dividends are exempt from personal tax

a. The duration varies by region to encourage investment in priority areas.

b. Zones to encourage decentralized investment: zone III includes Agadir, Fez, Tangier, and Marrakech; IV includes Oujda and El Jadida.

Source: International Bureau of Fiscal Documentation (1987, 1988) and Arthur Andersen correspondence.

Tax Holiday Provisions

In the five countries, tax holidays range from three to fourteen years, during which the firm generally is fully exempt from company income taxes. In Côte d'Ivoire the length of the holiday depends on the location of the firm and only part of income is exempted during the last three years of the holiday. In Morocco exemptions vary among and are restricted to set rural areas and are

designed to encourage investment out of the Rabat area. In each of the countries, firms must apply for holiday status and not all firms qualify. Bangladesh, Côte d'Ivoire, and Malaysia do not allow tax holiday firms to claim other tax incentives.

Provisions for deferral of depreciation vary considerably across countries. Morocco and Thailand require assets to be depreciated for tax purposes during the holiday, while Côte d'Ivoire and Malaysia permit the firm to fully depreciate assets after the holiday. The tax laws of Bangladesh require that depreciation deductions be claimed in the year accrued. If the firm earns taxable profits during the holiday, I interpret the rules to imply that depreciation deductions are fully used during those years and thus are not carried forward. Thus I assume that unused deductions may be carried forward only if a firm does not earn sufficient taxable profits during the holiday.

Some investment requirements may reduce the incentives of the tax holiday. In Bangladesh, 5 to 30 percent of income earned during the holiday (depending on the region) must be invested in government bonds. If the government bond rate is below the market rate, this imposes an implicit tax on the firm. In Côte d'Ivoire the National Investment Fund (NIF) is financed by a 10 percent company tax. The tax is recoverable (at a rate that varies by region) if the firm purchases government bonds or undertakes "sufficient" levels of investment. The firm is exempt from the NIF tax during the holiday so that the extent to which this affects the investment incentives offered by the tax holiday is unclear and is not considered in the following analysis.

Tax holidays may also encourage equity investment, as dividends paid to shareholders may be exempt from personal taxes during the holiday. Malaysia and Thailand fully exempt dividends while Bangladesh only exempts dividends of holiday firms listed on the stock exchange. (How dividend taxation affects the marginal investment decision of the holiday firm is discussed in Mintz 1989.)

The effect of tax holidays is complicated for cases in which capital is imported. Most capital-importing countries impose a withholding tax on earnings remitted from abroad (dividends, interest, and capital gains). Some capital-exporting countries, such as Japan, the United States, and the United Kingdom, impose taxes on remitted earnings from foreign sources but provide credits for withholding taxes paid abroad and for company taxes that a company claims were paid on income subsequently distributed as dividends.

For investment incentives such as tax holidays, an additional complication arises. When a capital-importing developing country provides a tax holiday to encourage investment, that incentive may be lost if the resulting profits are taxed by the government of the foreign investor. In the worst case, in which the investment project was only marginally profitable, it may not be undertaken at all. In the case of offsetting taxes by the parent government, at the least the developing country will lose potential tax revenue to the foreign government. In some countries, such as Japan, a capital exporter will grant "tax sparing"

whereby remitted earnings are not taxed in order to pass the tax incentive on to the firm. In the calculations reported below, it is assumed that tax sparing is provided. Otherwise the techniques developed would need to be substantially revised.

Post-Tax-Holiday Provisions

After the holiday, the firm must pay company income taxes according to the normal tax code (see table 4). The statutory tax rate imposed in the five countries in the late 1980s varied from 30 percent in Thailand to about 50 percent in Morocco. To encourage further investment after the holiday, Malaysia provides a 100 percent investment tax allowance, Bangladesh a 25 percent allowance, and Morocco an investment reserve protecting profits from taxation up to 30 percent of the value of the new investment. Tax depreciation rates on existing capital remain in effect after the holiday; accelerated depreciation for new investment by existing firms is allowed in three of the five countries. To simplify the empirical analysis below, however, I assume that post-holiday investments do not qualify for accelerated depreciation. This will only mean that the analysis below may overestimate the incentives to investing in short-lived assets provided by the tax holiday. As discussed above, firms investing in longer-lived assets may prefer that depreciation allowances be deferred rather than accelerated. Once again, the analysis is based on the written tax law, and in some cases I may have misinterpreted its meaning, or rates may vary from it in practice.

III. Defining the User Cost of Capital and Effective Tax Rates

The standard analysis of the impact of taxes on investment decisions is based on Jorgenson's work (1963) on the user cost of capital, which captures the financing, depreciation, and tax costs of capital investment. It is assumed that the firm wishes to maximize the present value of the stream of income accruing to its owners, and that the tax system, interest rates, and inflation do not change. The firm invests in capital until the marginal rate of return on capital is equal to its marginal cost.

Without taxes, the user cost of capital is the sum of financing and depreciation costs, adjusted for inflation. For investment financed by debt, the real per dollar cost of finance is defined as the nominal interest rate, i, less the rate of inflation, π. The cost of equity finance is equal to the shareholders' nominal opportunity cost of investing capital in the firm, denoted in per dollar terms as ρ, less the rate of inflation. Let δ be the (declining-balance) rate of economic depreciation, in which depreciation is defined as the replacement cost of the physical deterioration of the asset, net of real capital gains. If β is the proportion of capital financed by debt, the pre-tax per dollar cost of holding capital can be written as:

$$C = \beta i + (1 - \beta)\rho + \delta - \pi \tag{1}$$

Table 4. *Tax Provisions after the Tax Holiday*

Tax provision	*Bangladesh*	*Côte d'Ivoire*	*Malaysia*	*Morocco*	*Thailand*
Rate of company tax (percent)	40 for public firms; 45 for private firms	National Investment Fund tax	43 less 5 percent tax abatement for companies with income below $200,000	49.5	30 for public firms; 35 for private firms
Tax allowance depreciation rates	Same as holiday, or firms may accelerate at 100 percent (one year) or 80 and 20 percent over two years	Same as holiday, or firms may accelerate at twice the normal rate	Same as holiday, or firms may accelerate at 40 percent	Same as holiday	Same as holiday
Other tax incentives to investments	25 percent investment allowance (depreciation base not reduced by this)	None	100 percent investment tax allowance	Investment reserve: 20 percent of profits abated (up to 30 percent investment)	None

Source: International Bureau of Fiscal Documentation (1987, 1988) and Arthur Andersen correspondence.

The relationship between the cost of equity and debt finance depends on capital market equilibrium and is not derived here (see Mintz and Purvis 1987).

When taxes are introduced into the analysis, the user cost of capital is amended to reflect their cost, net of interest deductions and depreciation allowances. First, the cost of finance, r_f, is adjusted to account for the deductibility of nominal borrowing costs. If u is the corporate tax rate, the real cost of borrowed finance is $i(1 - u) - \pi$, while the cost of equity finance is unaffected by the corporate tax. Thus the real cost of finance, net of corporate taxes, is:

$$r_f = \beta i(1 - u) + (1 - \beta)\rho - \pi \tag{2}$$

The user cost of capital next is adjusted for tax depreciation allowances. The average per dollar present value of the depreciation allowances, A, is calculated based on the original purchase price of the asset and discounted at the nominal cost of finance, net of corporate taxes, $r_f + \pi$. Let u again denote the corporate tax rate, and let α be the (declining-balance) rate of depreciation for tax purposes, which changes each year. The present value of the tax depreciation allowance per dollar, A, is thus:

$$A = u\alpha + \frac{u\alpha(1 - \alpha)}{1 + r_f + \pi} + \frac{u\alpha(1 - \alpha)^2}{(1 + r_f + \pi)^2} = \frac{u\alpha\,(1 + r_f + \pi)}{\alpha + r_f + \pi} \tag{3}$$

Combining the interest deduction and depreciation allowance adjustments, the per dollar cost of holding capital is equal to depreciation and financing costs multiplied by the effective purchase price of capital: $(\delta + r_f)(1 - A)$. The user cost of capital adjusted for taxes is thus:

$$C_u = \frac{(\delta + r_f)\,(1 - A)}{(1 - u)} \tag{4}$$

The larger the present value of the depreciation allowance, A, the lower the user cost of capital; and the higher the corporate tax rate, u, the larger the user cost so long as the company is not too leveraged such that r_f declines substantially because of the deductibility of nominal borrowing costs.

The effective tax rate on capital is defined as the difference between the marginal pre- and post-tax rates of return on capital, as a percentage of the pre-tax rate of return, and is derived as follows. First, define the marginal before-tax rate of return on capital as the marginal value product of capital, which is equal to the user cost in equilibrium, net of economic depreciation: $C_u - \delta$. The after-tax rate of return to capital is the rate paid to the market, $r = \beta i + (1 - \beta)\rho - \pi$. The difference, $C_u - \delta - r$, is the effective tax on capital. Taking this difference as a proportion of the pre-tax marginal return to capital, the effective tax rate is $u^* = (C_u - \delta - r)/(C_u - \delta)$.

The above discussion applies to firms that are taxpaying. To account for a tax holiday, the analysis becomes more complicated, and in particular, it must reflect the time at which investments take place prior to the end of the holiday. This formulation is outlined in the appendix.

IV. Empirical Estimates of Cost of Capital and Effective Tax Rates

On the basis of the formulations developed above and in the appendix, the user cost of capital and effective tax rates for capital investment are estimated for the five countries: Bangladesh, Côte d'Ivoire, Malaysia, Morocco, and Thailand. These calculations are intended to be illustrative only, because the data needed for a more precise measurement of the user cost of capital were not available. The countries' tax codes indicate statutory rates for company income and dividend taxes and tax depreciation allowances and establish the length of tax holidays. No information was available, however, regarding the weighted marginal dividend tax rate, the distribution of machinery or building assets that is needed to calculate the average tax depreciation rate, or the number of times that a firm can claim a tax holiday. It is quite possible that the effective holidays may last longer than is indicated by the tax law statutes.

Estimates based on data from developed countries are used for physical depreciation rates for capital: the rate for buildings is 5 percent, and for machinery 15 percent on a declining-balance basis. For Côte d'Ivoire, however, I assume that machinery (including vehicles and office furniture) depreciates at a 30 percent rate on a declining-balance basis, because of the difference there in the types of assets eligible for tax depreciation. Straight-line physical depreciation rates are converted into declining-balance rates. Straight-line tax depreciation rates also are converted to the equivalent value declining-balance form. In the calculations, I assume that tax depreciation is deferred until after the tax holiday for firms operating in Côte d'Ivoire and Malaysia.

Effective tax rates and user costs of capital for tax holiday investments—assuming that capital is fully financed by equity (personal taxes are ignored)—are presented in table 5. In table 6, I assume that debt accounts for half of capital finance during the holiday and for 70 percent of capital afterward.[1]

Although effective tax rates on capital during a tax holiday are generally below those after the holiday (except for the final year), what is surprising is that they can be quite high (Bangladesh and zone 3 in Morocco). This is because tax depreciation deductions for investments made during the holiday cannot be deferred, and because of the higher inflation rate in those countries. Where firms are allowed to defer tax depreciation until after the holiday, capital is taxed at lower or negative effective rates.

Table 5 also indicates that effective tax rates at the end of the holiday are particularly high: income earned on new assets is fully taxed after the holiday is terminated. Even in those countries that allow depreciation to be deferred, the allowances do not accrue interest when they are carried forward. These extraordinarily high effective tax rates would be likely to induce firms to sell off their capital stock before the holiday is terminated and then repurchase

1. Bartholdy, Fisher, and Mintz (1987) estimate that a point increase in the corporate tax rate in Canada is associated with a three-quarter point increase in the debt-asset ratio.

Table 5. *Effective Tax Rates and User Costs of Capital for Holiday and Post-Holiday Investments, Assuming 100 Percent Equity Financing*
(percent)

	Bangladesh ($t^* = 7$)		*Côte d'Ivoire* ($t^* = 7$)		*Malaysia* ($t^* = 7$)		*Morocco* ($t^* = 10$) *Zone III*		*Morocco* ($t^* = 10$) *Zone IV*		*Thailand* ($t^* = 5$)	
Period	*Buildings*	*Machinery*	*Buildings*	*Machinery*	*Buildings*	*Machinery*	*Buildings*	*Machinery*	*Buildings*	*Machinery*	*Buildings*	*Machinery*
						Effective tax rate[a]						
During holiday												
$t = 0$	15.7	6.3	−1.1	−909.8[b]	−1.9	−44.1	28.0	28.8	1.4	0.8	0.4	0.4
$t = 3$	30.9	22.4	−1.5	−610.4[b]	−2.7	−76.3	28.3	29.2	2.5	2.1	0.7	1.0
$t = 5$	44.6	43.3	−1.8	−325.0[b]	−3.4	−119.9	28.7	29.8	3.6	3.7	n.a.	n.a.
$t = 8$	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	29.7	31.7	6.3	8.9	n.a.	n.a.
Last year of holiday	88.1	93.0	56.0	61.6	51.5	51.1	59.1	68.2	63.9	75.7	41.9	51.7
After holiday	44.6	46.7	45.2	34.9	36.9	8.4	53.0	54.3	53.0	54.3	34.6	32.9
						User cost of capital						
During holiday												
$t = 0$	8.6	18.2	10.1	30.5	13.0	20.6	16.5	26.7	13.4	23.4	21.2	31.2
$t = 3$	9.3	18.9	10.1	29.0	12.9	19.6	16.6	33.0	13.5	23.5	21.2	31.3
$t = 5$	10.4	20.3	10.1	27.7	12.9	18.7	16.7	26.8	13.6	23.6	n.a.	n.a.
$t = 8$	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	16.8	27.2	13.9	24.1	n.a.	n.a.
Last year of holiday	30.2	57.7	16.8	43.5	21.8	31.6	25.3	41.1	28.0	49.1	32.7	48.4
After holiday	10.4	20.6	14.5	38.0	17.9	23.9	22.7	33.2	22.7	33.2	29.6	39.2
Nominal interest rate	14.0		9.9		12.2		15.5				18.6	
Inflation rate	11.0		4.7		4.1		7.2				2.5	

n.a. Not applicable.

t = year following commencement of holiday.

t^* = first year after the holiday.

Note: Assumes 5 percent rate of depreciation on buildings and 15 percent on machinery on a declining balance basis, except for Côte d'Ivoire, in which the rates are 5 and 30 percent.

a. Estimated as the difference between the marginal pre- and post-tax rates of return on capital divided by the pre-tax rate of return.

b. User cost of capital net of depreciation actually negative in this case. This implies a negative value for the difference between pre- and post-tax rate of return on capital but a positive effective rate. A minus sign is included to indicate a negative tax.

Source: Author calculations, based on International Bureau of Fiscal Documentation (1987, 1988) and Arthur Andersen correspondence.

Table 6. *Effective Tax Rates and User Costs of Capital for Holiday and Post-Holiday Investments, Assuming 50 and 70 Percent Debt Financing*
(percent)

	Bangladesh (t^* = 7)		*Côte d'Ivoire (t^* = 7)*		*Malaysia (t^* = 7)*		*Morocco (t^* = 10)*				*Thailand (t^* = 5)*	
							Zone III		*Zone IV*			
Period	*Buildings*	*Machinery*	*Buildings*	*Machinery*	*Buildings*	*Machinery*	*Buildings*	*Machinery*	*Buildings*	*Machinery*	*Buildings*	*Machinery*
						Effective tax rate[a]						
During holiday												
$t = 0$	30.9	13.0	1.7	−532.8[b]	−2.1	−48.9	5.9	8.6	2.7	1.4	0.5	0.4
$t = 3$	51.0	38.3	−2.2	−269.4[b]	−3.0	−81.5	7.4	9.6	4.6	3.3	0.8	1.1
$t = 5$	64.6	61.6	−2.6	−212.8[b]	−3.7	−124.0	8.8	11.6	6.5	5.8	n.a.	n.a.
$t = 8$	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11.8	16.3	10.7	13.0	n.a.	n.a.
Last year of holiday	90.5	94.4	53.6	8.4	48.6	46.6	58.5	72.0	63.4	76.2	50.5	62.4
After holiday	−225.1	−301.0	−13.8	−34.7	−17.2	−114.6	−29.3	−7.5	−29.3	−7.5	4.6	2.8
						User cost of capital						
During holiday												
$t = 0$	7.3	16.8	9.1	29.0	11.8	19.6	12.2	22.4	11.9	21.8	19.3	29.3
$t = 3$	8.3	17.6	9.1	27.5	11.7	18.8	12.3	22.5	12.1	22.0	19.4	29.4
$t = 5$	9.5	19.2	9.1	26.3	11.7	18.1	12.4	22.6	12.2	22.4	n.a.	n.a.
$t = 8$	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12.7	23.1	12.6	22.8	n.a.	n.a.
Last year of holiday	29.1	56.2	15.1	41.3	19.7	29.1	23.2	41.8	25.6	46.7	35.7	55.4
After holiday	3.2	13.9	9.1	33.5	11.4	18.5	10.8	22.0	10.8	22.0	20.9	30.6

n.a. Not applicable.
t = year following commencement of holiday.
t^* = first year after holiday.
Note: Assumes 50 percent debt financing during the holiday and 70 percent thereafter. Assumes 5 percent rate of depreciation on buildings and 15 percent on machinery on a declining-balance basis, except for Côte d'Ivoire in which the rates are 5 and 30 percent.
a. Estimated as the difference between the marginal pre- and post-tax rates of return on capital divided by the pre-tax rate of return.
b. User cost of capital net of depreciation actually negative in this case. This implies a negative value for the difference between pre- and post-tax rate of return on capital but a positive effective rate. A minus sign is included to indicate a negative tax.
Source: Author calculations, based on International Bureau of Fiscal Documentation (1987, 1988) and Arthur Andersen correspondence.

capital afterward. (Unfortunately, there are no data available to the author on this issue.)

These results can be quite sensitive to the degree to which firms finance capital by equity. In table 6, I assume debt financing of 50 percent during the holiday and 70 percent thereafter. In Thailand, dividends are tax exempt during the holiday. Since this exemption may not be given to foreign investors, I am effectively assuming for these calculations that the cost of equity finance for the firm is affected by personal taxes on domestic investors. If equity financing was available from the international market, personal taxes on domestic savers would not affect the cost of finance faced by the company in world markets.

Because nominal interest costs are tax deductible, it is not surprising to find that user costs of capital and effective tax rates are much lower in table 6 in the post-holiday period for all countries. Interest deductions can be quite generous since they allow the firm to write off part of the real value of the debt. Debt finance also increases the tax rates during the holiday relative to those afterward. Since interest deductions are beneficial only after the holiday period, the effective tax rate may be higher during and at the end of the holiday than in the post-holiday period. As seen in table 6, effective tax rates on capital during the holiday are higher than those after the holiday in Bangladesh and Morocco overall, and in Malaysia and Côte d'Ivoire on buildings. End-of-holiday investments also bear a high tax liability for the reasons cited earlier.

V. Conclusions

The tax holiday provisions for investment in long-lived assets are not as generous to the firm as one might initially believe. Even if the firm is fully exempt during the holiday, its investment decisions may be significantly affected by tax liabilities that will occur after the holiday. If a firm must write off tax depreciation allowances during the holiday but its capital goods generate high income thereafter, without depreciation deductions, the firm may face relatively high effective tax rates. The closer to the end of the holiday, the higher the effective tax rates on new investment. Only when the firm is allowed to defer depreciation until after the holiday do effective tax rates become low or negative. In some cases, when deferral is allowed, the effective subsidy is so large that I suspect government officials would be taken aback by the generosity of the tax holiday.

A company tax holiday can be generous to labor if such labor is compensated by profit distributions that may be exempt at the individual level. Moreover, although it is generally disallowed, investors may try to shift taxable income earned by associated companies into the tax holiday firm.

In the rather simple analysis above, I have abstracted from a few technical issues that would require explicit attention in policy analysis for a particular country. The first is the impact of tax holidays on foreign investment which

may be taxed by both the capital-importing and capital-exporting countries. Further work is necessary to show how tax holiday provisions interact with foreign tax systems. The outline above also ignores imperfections in capital markets and the determination of financial policy of companies. The theory is based on equal net-of-tax rates of return on all assets, perfect markets, and companies minimizing their after-tax finance costs by borrowing for investment, independent of capital decisions. If, however, investors and companies are constrained in borrowing funds, as is common in some developing countries, the standard capital market equilibrium used in this literature does not apply. Finally, I do not address "recapture" rules that apply to the sale of assets by corporations. I assume here that the sale of an asset by a firm reduces the base used to calculate depreciation write-offs. In most tax systems, however, if a firm sells an asset, a "balancing charge" is imposed that may require the inclusion of the sale value of the asset (net of unclaimed tax depreciation) in the income of the corporation, an approach which is far less generous than merely writing down the undepreciated capital base. Since a firm may be expected to sell its capital, particularly at the end of the holiday, a more complete analysis must account for these balancing charges. This suggests that the effective tax rates calculated here are, if anything, underestimates relative to rates likely to emerge if recapture rules were modeled correctly.

Appendix. Models of Tax Holiday Incentives

The model examines company tax holidays first for mandatory deduction of depreciation allowances when they accrue, and then for their deferral.

Mandatory Depreciation

A competitive firm uses capital in each period to maximize the value of shareholders' equity. If the firm has no debt, the payment made to shareholders is equal to the cash flow of the firm: revenues net of expenditures on gross investment and corporate taxes. Labor inputs are ignored since wages are fully deductible from the company tax base.

In each year, the firm earns nominal revenues as a function of its capital stock, K_t, equal to $f(K_t)(1 + \pi)^t$ where π is the rate of inflation. Real revenues are output, which is derived as a strictly concave production function. The revenues are distributed as dividends to the shareholder or used for investment. Capital goods prices rise with the general inflation rate, and the price is equal to unity. Real gross investment in each period, I_t, is new investment plus a component to offset physical depreciation, δ (which is assumed to be of the declining-balance form):

$$I_t = \delta K_t + K_{t+1} - K_t \tag{A-1}$$

Let $t = 0$ be the time when the firm starts up and $t = t^*$ be the time at which the tax holiday ends and the firm becomes fully taxable. Prior to t^* ($t = 0 \ldots$

$t^* - 1$), the firm's taxable profits, revenues net of mandatory depreciation deductions, are taxed at the rate u_0 and, for $t \geq t^*$, at the rate u_1 with $u_1 > u_0$. The net-of-tax real revenues of the firm are thus equal to $(1 - u_0)f(K_t)$, and the real expenditure on gross investment, net of the present value of tax allowances, is equal to $I_t(1 - A_t)$. The tax value of depreciation allowances per dollar of gross investment (A_t) varies in each year of the holiday as shown subsequently.

When the firm invests in capital at time $t < t^*$, it writes off its gross investment at the initial allowance rate of γ. An annual depreciation allowance is also given based on the undepreciated capital cost base (UCC), which is increased at time t, in real terms, by the amount $(1 - c\gamma)I_t$, with c denoting the proportion of the initial allowance that is written off the UCC base. If there is full adjustment, $c = 1$, and if there is no adjustment, $c = 0$. At each point in time the annual allowance rate is α, which is assumed to be of the declining-balance form and based on the original purchase price of capital. At time $s \geq t$ ($s = t, t + 1, \ldots, t + \tau, \ldots$), the annual allowance deducted from profits is equal to $\alpha(1 - \alpha)^{s-t}(1 - c\gamma)(1 + \pi)^t$, in nominal terms. Prior to t^*, the initial and annual allowances are written off at the rate u_0, and after t^*, the remaining annual allowances on the investments made prior to the termination of the tax holiday are written off at the rate u_1. Since these tax depreciation write-offs are valued in nominal terms, they are discounted at the nominal cost of finance i. Deflating by the price index at time t, the real values of tax depreciation allowances, A_t, are computed as follows:

$$\text{(A-2)} \quad A_t = u_0\gamma + (1 - c\gamma)\left[\sum_{s=t}^{t^*-1} u_0\alpha\left(\frac{1 - \alpha}{1 + i}\right)^{s-t} + \sum_{s=t^*}^{\infty} u_1\alpha\left(\frac{1 - \alpha}{1 + i}\right)^{s-t}\right]$$

Equation A-2 yields a simpler expression for A_t:

$$\text{(A-3)} \qquad A_t = u_0\gamma + Z\left\{u_0 + (u_1 - u_0)\left[\frac{1 - \alpha}{1 + i}\right]^{t^*-t}\right\} \text{ for } t < t^*$$

where $Z = (1 - c\gamma)(1 + i)\alpha/(\alpha + i)$. As shown, the tax value of depreciation write-offs is equal to the value of the initial allowance ($u_0\gamma$) plus the present value of the annual allowances written off during and after the holiday. Given $u_1 > u_0$, the firm receives the additional tax benefit of the deduction of depreciation allowances after the holiday. However, the value of the deduction is lower the earlier that the investment takes place during the holiday, since $[(1 - \alpha)/(1 + i)]^{t^*-t}$ is lower in value as t is further from t^*.

For investments undertaken after the holiday, real revenues are equal to $f(K_t)(1 - u_1)$ and the real cost of investment expenditure is $I_t(1 - A_t)$ with

$$\text{(A-4)} \quad A_t = u_1\gamma + (1 - c\gamma)\left[\sum_{t}^{\infty} u_1\alpha\left(\frac{1 - \alpha}{1 + i}\right)^{s-t}\right] = u_1(\gamma + Z) \text{ for } t \geq t^*.$$

The present value of tax depreciation allowances is then time-invariant since γ

and Z are independent of t. This is the usual case found in the tax literature. (Note that if $\gamma = 0$, then $A_t = u_1\alpha(1 + i)/(\alpha + i) = A$ which is the present value of annual tax depreciation on a declining-balance basis).

The value maximization problem is formulated given the firm's real discount rate, $1 + r$, which is equal to $(1 + i)/(1 + \pi)$. Shareholders' equity, V, is the discounted value of real cash flows earned during and after the holiday period:

$$\text{(A-5)} \quad V = \sum_{t=0}^{\infty} \frac{1}{(1 + r)^t} [f(K_t)(1 - u_t) - (\delta K_t + K_{t+1} - K_t)(1 - A_t)]$$

with A_t defined by equations A-3 and A-4 and u_t denoting time-varying corporate tax rates. For convenience, let $A_t = A$ for $t \geq t^*$ since the present value of tax depreciation allowances on gross investment is shown to be time invariant after the tax holiday.

The firm maximizes shareholder equity, V, choosing K_t in each period. The first order condition for each period is:

$$\text{(A-6)} \quad \frac{\partial V}{\partial K_t} = \frac{1}{(1 + r)^t} [f_t' (1 - u_0) - (\delta - 1)(1 - A_t)] - \frac{1 - A_{t-1}}{(1 + r)^{t-1}} = 0$$

Investment during the holiday period. When $t < t^*$, the user cost obtained from equation A-6 is

$$\text{(A-7)} \quad f_t' = (1 - u_0)^{-1} [(\delta + r)(1 - A_t) + (1 + r)(A_t - A_{t-1})]$$

The user cost of capital during the tax holiday is adjusted to reflect the fact that marginal revenues (gross of depreciation costs δ) are taxed at the rate u_0, and for the cost of purchasing capital in period $t - 1$ rather than t. Since depreciation write-offs increase in value over time, the firm is better off waiting one period.

Substituting equation A-3 into A-7 and combining terms yields:

$$\text{(A-8)} \quad f_t' = (1 - u_0)^{-1} [(\delta + r)(1 - A_t) + (u_1 - u_0)(1 - c\gamma)\alpha(1 + r)] \left(\frac{1 - \alpha}{1 + i}\right)^{t^* - t}$$

This expression may be interpreted as the tax depreciation penalty of investing in assets during the holiday rather than after the holiday.

In most cases, 100 percent of the firm's profits are exempt from taxation during the holiday. This implies that $u_0 = 0$ and that the present value of tax depreciation allowances is based on write-offs made after the tax holiday: $A_t = u_1 Z[(1 - \alpha)/(1 + i)]^{t^* - t}$. The user cost of capital in equation A-8 becomes:

$$\text{(A-9)} \quad f_t' = (\delta + r) - [\delta(1 + \pi) - (\alpha + \pi)]\, u_1 A \left(\frac{1 - \alpha}{1 + i}\right)^{t^* - t} (1 + \pi)^{-1}$$

By investing in capital in period $t - 1$ (yielding income in period t), the firm

replaces δ units of capital in period t at the price $1 + \pi$. The replacement cost of depreciation is $\delta(1 + \pi)$, and this generates tax depreciation allowances per dollar of capital equal to $u_1 Z[(1 - \alpha)/(1 + i)]^{t^*-t}$ after the period. However, by investing in capital in period $t - 1$ rather than in t, the firm loses, in present-value terms, tax depreciation that would be based on higher capital goods prices. This is the term $\alpha + \pi$ multiplied by the present value of tax depreciation allowances later earned by the firm. Equation A-9 therefore indicates that if an asset's economic depreciation rate $\delta(1 + \pi)$ is equal to the tax depreciation rate plus inflation, the firm will be exempt from capital taxation during a tax holiday. If economic depreciation is more than tax depreciation plus inflation, capital during the holiday is subsidized; if it is less, capital is taxed. If the tax depreciation allowances were indexed for inflation, however, the inflation term would drop out and all that would matter would be the relationship between economic depreciation and tax depreciation.

Investment at the end of the holiday period. When $t = t^*$, the tax holiday ends and the firm becomes fully taxable. Its income is based on its capital stock determined by investment in the previous period (as determined by equation A-6). The cost of capital for this case is:

$$\text{(A-10)} \quad f'_{t^*} = \left(\frac{\delta + r}{1 - u_1}\right)(1 - A) + \frac{(1 + r)(u_1 - u_0)[\gamma + \alpha(1 - c\gamma)]}{1 - u_1}$$

where $A = u_1(\gamma + Z)$.

Intuitively, the user cost of capital stock for period t^* is equal to the cost of depreciation and finance, now adjusted for the post-holiday statutory tax rate, u_1, and for the loss in the tax value of initial and annual allowances arising from investing in period $t^* - 1$. This latter cost is captured by the second term of equation A-8.

Investment made after the tax holiday. When $t > t^*$, the firm is fully taxed both at the time of investment and when income is generated. In this case, the general formula for the user cost of capital is derived:

$$\text{(A-11)} \qquad f'_t = \frac{\delta + r(1 - A)}{1 - u_1} \text{ for } t > t^*$$

Deferral of Depreciation

When depreciation is deferred until after the holiday, the firm deducts the allowances from taxable income at the post-holiday corporate tax rate. This could cause the firm to be nontaxpaying for a lengthy time if unused holiday depreciation allowances are large relative to post-holiday net revenues. For convenience, it is assumed that the firm is taxpaying after the holiday so deductions are used immediately, beginning at time t^*.

If depreciation allowances may be deferred, the present value of tax depreciation allowances is calculated beginning in period t as follows. At time $s \geq t$,

where $s = t^*, t^* + 1, \ldots t^* + \tau \ldots$ (that is, when the holiday is over), the firm deducts the initial allowance at the value $u_1\gamma$ or in present-value terms at $u_1\gamma(1 + i)^{-(t^*-s)}$. Investment expenditure also adds $1 - c\gamma$ dollars of investment expenditure to the UCC base, which is used to calculate the annual allowance given at the rate α on a declining-balance basis.[2] The firm deducts an annual allowance only after the holiday is finished. The deduction for the annual allowance is equal to the nominal value $u_1\alpha(1 - \alpha)^{s-t^*}$ in each post-holiday period. In present-value terms, this is equal to $u_1\alpha(1 - \alpha)^{s-t^*}(1 + i)^{-(s-t^*)}$. The tax benefit of depreciation allowances is thus:

$$\text{(A-12)} \quad A_t = \left\{u_1\gamma + (1 - c\gamma)\left[\sum_{s=t^*}^{\infty} u_1\alpha\left(\frac{1-\alpha}{1+i}\right)^{s-t^*}\right]\right\}(1 + i)^{-(t^*-t)}$$
$$= u_1(\gamma + Z)(1 + i)^{-(t^*-t)} \text{ for } t \leq t^*$$

The three expressions for the user cost of capital, adjusted for depreciation allowance deferral, are, for the holiday period ($t < t^*$):

$$\text{(A-13)} \quad f_t' = \left(\frac{\delta + r}{1 - u_0}\right)[1 - u_1(\gamma + Z)(1 + i)^{t^*-t}] + \frac{u_1(\gamma + Z)(1 + i)^{-(t^*-t)}}{(1 - u_0)(1 + \pi)}$$

for the end of the holiday ($t = t^*$):

$$\text{(A-14)} \quad f_{t^*}' = \left(\frac{\delta + r}{1 - u_1}\right)[1 - u_1(\gamma + Z)] + \frac{iu_1(\gamma + Z)}{(1 - u_1)(1 + \pi)}$$

and for the post-holiday period ($t > t^*$):

$$\text{(A-15)} \quad f_t' = \frac{(\delta + r)(1 - A)}{1 - u_1}$$

Equations A-13 and A-14 are similar to A-8 and A-10 respectively except for the treatment of the value of tax depreciation allowances. The value of tax depreciation allowances for investments made during the holiday period is the discounted value of write-offs that begin after the holiday is completed. This is quite unlike the case in which the firm must write off capital during the holiday, and thus has only $(1 - \alpha)^{t^*-t}$ units of capital invested at time t to write off. The second terms in equations A-13 and A-14 are also similar in interpretation. They denote the tax penalty of investing in capital prior to the end of the holiday and taking depreciation allowances afterward. If the firm could accrue interest on the tax deductions that it carries forward, then this second term would disappear. Equations A-11 and A-15 are identical, as one would expect.

If the firm can defer depreciation allowances until after the holiday, capital investment may be subsidized, especially if $u_0 = 0$. For example, in the first term of equation A-13 the firm deducts depreciation allowances at the rate u_1,

2. In some cases, the total amount of depreciation undeclared during the holiday may be expensed at the end of the holiday rather than written off in the post-holiday period at the rate α. This practice does not seem to be followed in the countries that are dealt with in this paper.

which is higher than the tax on revenues, u_0. The only cost to the firm of investing in capital at time $t > t^*$ is the loss in the present value of tax depreciation allowances as captured by the second term in equations A-13 and A-14. Note that when $u_0 = 0$, the effective tax on capital is negative if $\delta + r < 1/(1 + \pi)$, in an equation corresponding to A-9. This implies that deferral in the presence of a tax holiday causes the effective tax rate to become negative unless inflation rates are sufficiently high. If inflation rates are high enough, the second term in A-13 dominates the first, implying capital under deferral during the holiday is taxed at a positive rather than negative rate.

In some countries, such as Côte d'Ivoire, the firm may choose whether to deduct or not its depreciation allowances during the holiday period. Under deferral, the present value of tax depreciation (denoted A_d) is equal to that shown in equation A-12; without deferral (A_{nd}) it is as shown in equation A-3. Deferral is preferred if $(\gamma + Z)[(u_1 - u_0(1 + i)^{t^*-t}] > (u_1 - u_0)(1 - \alpha)^{t^*-t}Z$. If $u_0 = 0$, deferral is preferred since $\gamma \geq 0$ and $(1 - \alpha) < 1$. If $u_0 > 0$, deferral is preferred only if $t^* - t$ is small enough such that claiming deductions early is less valuable than claiming deductions at a later time. These results are particularly useful for Côte d'Ivoire and Malaysia since companies would generally wish to defer depreciation.

For the treatment of debt and dividend taxes, see Mintz (1989).

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