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An Economic Analysis of Tax Amnesties

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Abstract

Tax amnesties have frequently been justified as politically popular ways to generate increases in government revenue. This paper examines the circumstances under which amnesties are likely to have a beneficial impact on revenue collections. It concludes that, while in general it may be correct to impose a reduced penalty on individuals who voluntarily disclose tax evasion, short-lived amnesties of the type most frequently observed in practice are unlikely to generate significant revenue when judged against the potential danger of reducing future tax compliance.

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Summary

Tax amnesties have frequently been justified as a politically popular way to increase government revenue. This paper examines the circumstances under which amnesties are likely to have a beneficial impact on revenue collection. It concludes that, while in general it may be correct to impose a reduced penalty on individuals who voluntarily disclose tax evasion, short-lived amnesties of the type most frequently employed are unlikely to generate significant revenue when judged against the potential danger of reducing future tax compliance.

The success of temporary amnesties depends on a quick, convincing change in the revenue authority's behavior. The analysis demonstrates that, owing to the very nature of the tax enforcement problem, such a quick change in the public's beliefs would be difficult to bring about. The preconditions for an improvement in tax enforcement that existed in a number of U.S. states—particularly the existence of an efficient tax authority at the Federal level—are not present in most cases, particularly in developing countries. Consequently, in the majority of cases, a temporary amnesty would appear to offer little and to risk undermining the credibility of the revenue authority and reducing tax compliance.

I. Introduction

The United States has recently witnessed the widespread application of tax amnesties. According to Martin (1988), since 1982, 28 states in the United States have offered tax amnesties, and a federal amnesty is under discussion. 1/ Australia, Belgium, France, Ireland, and Italy have offered amnesties in the current decade, while Argentina, Bolivia, Colombia, Chile, Ecuador, Mexico, Panama, Peru, and the Philippines have all had tax moratoria or amnesties more than once in the recent past.

The primary motivation for most amnesties has been to raise revenue, either through the funds immediately collected or through an increase in the tax base. The latter may be achieved through additions to the tax rolls or through increased reporting of certain types of income. Another motivation--that of the French and Belgian amnesties-- has been the desire to facilitate the repatriation of capital illegally transferred abroad. Still other amnesties have been justified on moral grounds to allow individuals who did not pay taxes under previous regimes the chance to pay the current government without penalty, as in the recent Philippine amnesty.

Opinions vary widely as to the efficacy of amnesties. Jackson (1986) praises the experience of the U.S. states and argues strongly for a U.S. Federal amnesty. Lerman (1986), on the other hand, emphasizes the potential risks and downplays the size of the possible revenue gain for the U.S. Federal Government. Gonzalez (1986), when referring to the experience with Latin American amnesties, presents an even less sanguine picture.

While part of this divergence of positions is the result of differences in opinion, it must be borne in mind that the large number of amnesties have differed substantially with respect to coverage, type of tax, and perhaps most difficult of all to measure, in the credibility of the revenue authority and/or the government. In essence, amnesty programs have differed in their design and in the associated measures taken by the revenue authorities.

In their design, amnesties have differed in their immediate goals (revenue gain or repatriation of capital). They have differed in the types of taxes covered by amnesty, and the extent to which individuals undergoing a tax investigation qualify. Some amnesties have allowed those who were already under investigation or those with tax arrears to participate while others have not.

1/ Eleven bills proposing a one-time general income tax amnesty were introduced in the 99th Congress (see Ross (1986)); others were introduced in the 100th Congress.

Amnesties differ not only in their design, but also in the measures accompanying the offer of an amnesty. Governments often claim that tax enforcement is about to be strengthened after an amnesty. Enhanced enforcement will, in general, result in higher gross revenues. It may therefore be difficult to distinguish between the gain from promised increases in enforcement and that from the amnesty itself.

The discussion of amnesties in this paper will be limited to those covering the voluntary disclosure of tax evasion--that is to say, the analysis is not meant to be applied to cases where individuals who are already under investigation or who have identified tax arrears are offered amnesty. While this latter issue is discussed briefly later in the paper, there seems to be little rationale in allowing those who have already been found to be evading to escape the full penalty. Such a policy would clearly not improve tax compliance in the future and would serve to demonstrate that the apparatus for administering and collecting penalties is not functioning properly.

An important issue to note at the outset is the problematic nature of measuring the true yield from an amnesty. It is not equal to the revenue collected during the time the amnesty is in effect. To the extent amnesties reduce current penalty rates relative to future ones, they bring forward in time revenue that would have been collected in any event. For example, granting an amnesty to those already under investigation for tax evasion will surely generate revenue in the short run but, just as surely, revenue and penalties that would have been collected are forfeited. 1/

Virtually every amnesty can claim to have generated some revenue in the sense that the revenue authority received payments earlier than it otherwise would have. The important question, however, is to what extent amnesties generate increased revenue within a long-term intertemporal framework.

The general conclusion of the paper is that, except under fairly unusual circumstances, amnesties are unlikely to generate additional revenue when their effects over the long run are taken into account. Indeed, the risks inherent in granting amnesties are rather great in situations where voluntary tax compliance is good, as the expectation of future amnesties may erode future compliance with costs that would far outweigh a temporary influx of revenue. One must explicitly recognize the potential long-run harm an amnesty may cause.

1/ Mikesell (1986) and IRS (1987) point out, for example, that states where tax receivables were eligible for amnesty reported much higher "yields" than those where taxpayers already under investigation were not eligible. These yields should be adjusted downward for payments that would have been received in the absence of an amnesty.

II. Tax Evasion and Tax Enforcement

As tax amnesties presuppose prior tax evasion, it is only natural to view the subject of this paper in the context of the literature on tax evasion. The first generation of work on the economics of tax evasion was concerned primarily with the decision problem of the representative taxpayer, e.g., Allingham and Sandmo (1972), and Srinivasan (1973). Recently, the problem of the tax authorities has been analyzed, primarily from the perspective of devising efficient mechanisms to induce taxpayers to report their true income, e.g., Greenberg (1984), and Reinganum and Wilde (1986). The latter work may be thought of as research into determining the government's optimal audit strategy. Tax amnesties per se have received relatively little analytical attention. 1/

Theory suggests that tax evasion, and therefore tax collection, is an economic problem for governments because individual economic actors, although having voted collectively for a given level of public goods, will not generally voluntarily finance such a level. The reason for this is clear. The social benefit derived from the marginal expenditure on public goods is greater than anyone's individual private benefit. Therefore, at a societal optimum the individual will not be at a private optimum, unless an additional constraint is added, i.e., that the socially determined level of taxes be paid. The greater the divergence between the perceived individual benefit from public expenditure and the private cost, the greater is the incentive to evade and avoid taxes. By its very nature then, the financing of public goods has an element of coercion.

Exercising coercion, enforcing tax laws, and collecting revenue are costly, both from a political and economic perspective. Enforcement is politically costly for the same reason that it is necessary. Individuals, or subgroups in the population, feel that their marginal contribution to the provision of the public good is greater than their private benefit. It is costly in an economic sense, as taxes have distortionary effects on relative prices and because real resources must be expended to enforce tax laws.

1. Audit and penalty structures

As a consequence of the costly nature of enforcement, governments must devise ways to administer tax systems. At the same time, most tax systems implicitly have a notion of equity underlying not only the tax structure but also the structure of enforcement. This may constrain the choice of penalty structures, for example.

Enforcing tax laws requires penalties for noncompliance as well as auditing capability. Given an existing structure of tax laws and tax

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1/ For an exception, see Leonard and Zeckhauser (1987).

rates, 1/ the government determines an auditing and a penalty structure. Different combinations of audit rates and penalty structures have, as a general rule, different cost implications. Audits are usually costly--both in a fixed and variable cost sense--as is imprisonment, while monetary penalty rates can be changed with little real cost. Following this reasoning, Polinsky and Shavell (1984) point out, under certain assumptions, that it is efficient to raise monetary penalty levels as high as possible before increasing enforcement efforts. Such a solution, however, may be deemed unfair by society. 2/ The combination of audit rates and penalty levels that minimizes the cost of a given level of enforcement may appear optimal ex ante but, when the penalties are to be levied on convicted individuals, the punishment may seem arbitrarily harsh as the small fraction of the population that is audited and caught bears the burden of deterrence. For this reason, in the following analysis of the determination of the optimal audit rate, it will be assumed that the penalty rate is constrained by a ceiling. 3/ One point should be clear, however: if the penalty rates are not high enough to leave those who are caught worse off than if they had not cheated, then no audit rate will serve as a deterrent.

The deterrent effect of a given penalty depends on the expected probability of an audit. 4/ Tax compliance thus depends on the expected audit rate. 5/ From the government's point of view, audits are valuable not only in generating penalties and revenue, but also in influencing the expected future audit rate.

The benefit of auditing is the sum of the direct revenue gain from those audited, in terms of taxes and penalties collected, and the indirect gain from increased voluntary compliance from all taxpayers. This implies that if the revenue authority determines the audit rate by

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1/ This is not to imply that tax rates and compliance are independent.

2/ It would also entail expenditure to control the effects of the increased incentive for corruption. On this point, see Virmani (1987).

3/ The maximum "fair" penalty may not be independent of the audit rate. In a situation where the audit rate is very low and tax laws are not being enforced, it may be thought unfair to heavily penalize those who are caught. If a decision is then made to strictly enforce laws and raise the audit rate, the maximum "fair" penalty as judged by society might increase. Indeed, one plausible reason why amnesties are often introduced when enforcement is improved is that it is thought unfair to apply harsher penalties to evasion that took place under the previous weak administration.

4/ One can increase the complexity of the decision-making process by making the taxpayer uncertain as to whether the tax authority will bother to prosecute his/her evasion. See Reinganum and Wilde (1988).

5/ For empirical evidence on the relationship between audit rates and tax compliance, see Dubin, Graetz, and Wilde (1987), and Crane and Nourzad (1986).

setting the benefit minus the cost of the marginal audit equal to the cost of raising revenue by other methods, 1/ it will be auditing in situations where the net direct benefit does not justify the audit. Therefore, the government has an incentive to claim that it is auditing at the optimal rate, $\overset{*}{A}$, where total marginal benefit is equal to marginal cost, but actually only audit at A (A < $\overset{*}{A}$), where the net direct benefit is equal to marginal cost.

If it is difficult for the public to monitor the actual enforcement effort of the government, the opportunity for deception will generate uncertainty. In turn, this uncertainty will make government credibility quite important. The incentive for a government to surreptitiously lower the audit rate is illustrated in Figure 1. Two government audit functions are considered: one with low fixed cost but high marginal cost, HMC, and one with high fixed cost but low marginal cost, LMC. It is clear that the government with HMC has a greater incentive to be deceptive about its audit strategy, as the costs saved from a given reduction in the audit rate are much larger. In the following section, the importance of credibility will be developed further.

The important point to recognize is that audits have an impact not only on those actually audited but also on the rest of the population. This gives the government an incentive to exaggerate its audit rate and, on the other hand, it gives the general public a good reason to doubt the veracity of government claims.

III. Optimal Audit Rates, Incomplete Information, and Government Credibility

If individuals act to maximize expected utility, their optimal degree of tax evasion will depend on, among other factors, the probability of being detected and the penalty for evasion. It will be assumed in this section that if an individual is audited, evasion--if present--is always detected and penalties are always levied. That is, audits always reveal the true state of the world and adjudication is costless and always verifies the auditor's findings.

This section examines the determination of the optimal strategies of individuals attempting to maximize expected utility, and that of a government seeking to minimize the cost of revenue collection. The major questions of immediate interest are: how do individuals form expectations of audit rates, and how do governments determine the optimal audit rate?

1/ As noted by Smith (1986), the optimality condition for the government would entail choosing a level of enforcement that would equalize the cost of raising a dollar's worth of revenue through tax enforcement with the cost of raising revenue in other ways, taking into account the social value of deadweight loss.

The major factors in determining the optimal strategies are the technology and constraints facing each agent. More precisely, the technology determines the form of the auditing cost function as well as whether or not the government can bind itself in advance to a particular series of future audit rates. For the individual, the parameters of the utility function, the cost of evasion, and the expected gain from evasion will determine the degree of evasion.

1.   Determining optimal strategies in the one-period game

Most amnesties have several features in common. They are usually offered for a limited time period. They are often presented as "once-in-a-lifetime". They are frequently coupled with promises of future enhanced enforcement efforts and higher penalties.

As individuals must base their decision to participate in an amnesty on expected future policy, the credibility of policy announcements is quite important. The situation is analogous to the formation of the expected audit rate discussed above. The government would always gain in the short run by overstating its future enforcement efforts. But if individuals know this, they will take it into account when forming their expectations. The purpose of this section is to examine how expectations would change in response to an announced change in government policy. The presentation is first given in a one-period model. The analysis then shifts to a multiperiod context.

The tax game analyzed below involves a timed series of actions. 1/ At the beginning, the government announces the type of tax, the tax rates, due dates, penalty rates, and an audit structure. Taxpayers then calculate their tax liabilities in the current period, and either pay in full or evade a certain amount of taxes. Individuals evade taxes in this model by not declaring their true tax liabilities. The government then actually administers audits.

A flat tax rate with no exemptions is assumed. The tax base, which here may be taken to be the individual's taxable income, is fixed prior to the declaration. Thus, the individual has:
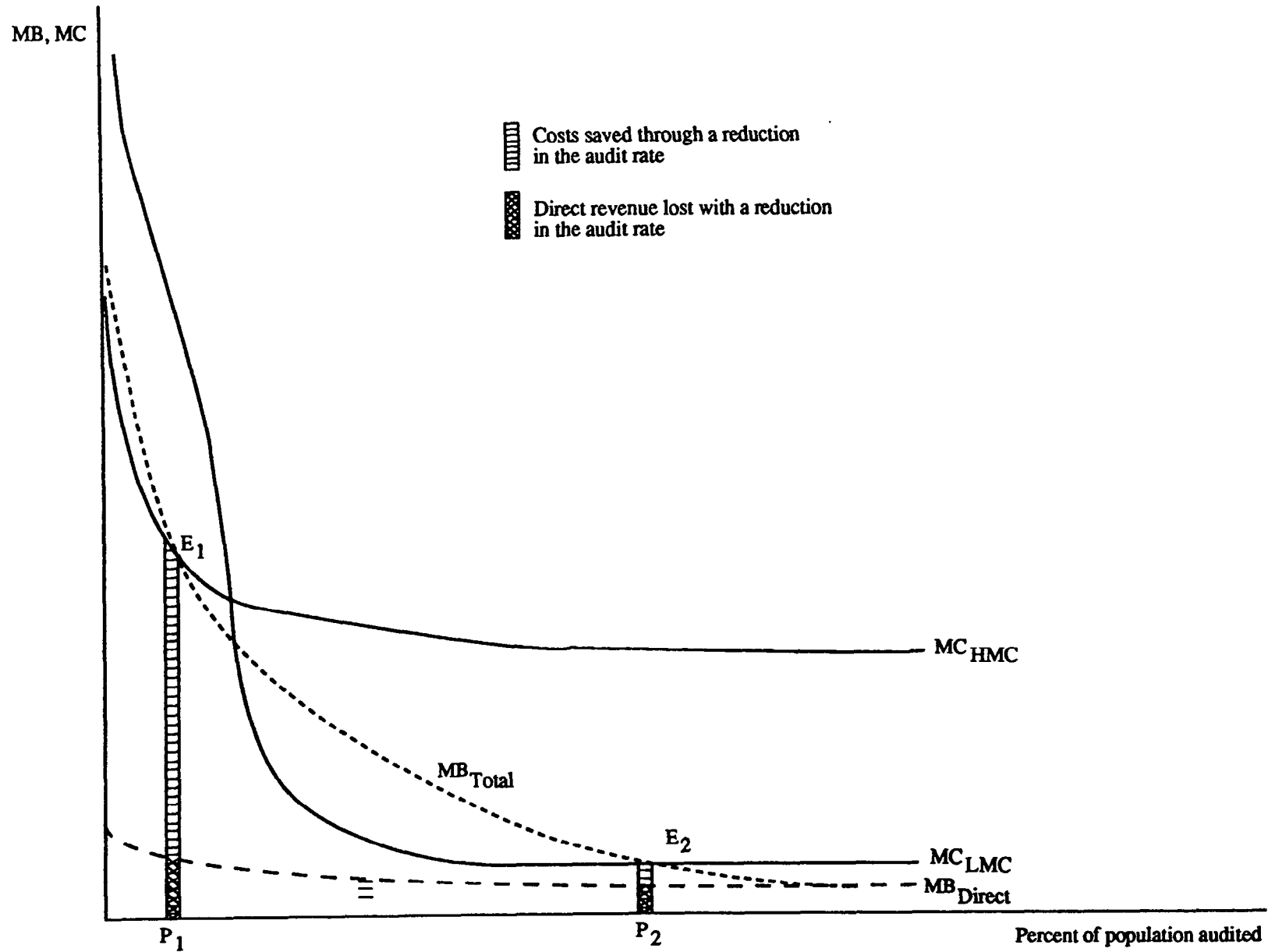
Y = current period income, equivalent to the tax base,

t = a constant proportional tax rate.

Individuals choose to report a fraction of the tax base to the government,

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1/ Many more sophisticated models of tax evasion have been constructed. The aim here is to present a simple model capable of being used to analyze the importance of expected audit rates and their formation.

Figure 1
Marginal Costs of Auditing Functions - Low-Cost and
High-Cost Government

MB, MC

Costs saved through a reduction
in the audit rate

Direct revenue lost with a reduction
in the audit rate

E_1

MC_{HMC}

MB_{Total}

E_2

MC_{LMC}

MB_{Direct}

P_1

P_2

Percent of population audited

$$0 \leq r \leq 1$$

where $r = 1$ implies full reporting and $r = 0$ implies reporting a zero tax base. Here it will be assumed that the revenue agency does not have any information on the distribution of income. It therefore cannot form a probabilistic assessment of r from the tax liability reported. As a consequence, the probability of being audited is equal across individuals. 1/ It is assumed that evasion is a costly activity, although reporting income is not.

On the government side, the revenue authority acts to minimize the cost of collecting a target level of revenue, given the tax rate and a penalty structure. It is assumed that all penalties are monetary. The target level of revenue comes from the chosen level of public goods and the cost structure of the various other means by which the government might finance its expenditures.

In an ideal world, governments would take into account all of the economic costs of collecting revenue when choosing the optimal level of public goods. Therefore, the form of the tax collection cost function would affect the calculation of the optimal level of public goods. Although, in practice, governments may not come close to this ideal, they may act to minimize the political and economic costs of collecting revenue through the management over time of the proportion of resources generated through the sale of bonds, foreign borrowing, money creation, and conventional taxation.

Here, however, it will be assumed that the selection of the level of spending on public goods is made without regard to the marginal efficiency of the taxation mechanism. The approach is consequently a partial equilibrium one. The gain from this assumption is that one may discuss changes in the tax-collecting technology without discussing changes in the optimal level of public goods.

The revenue collection cost function is assumed continuous and fully differentiable,

$$C(\alpha, x), \quad \frac{\partial C}{\partial \alpha} > 0, \quad \frac{\partial^2 C}{\partial \alpha^2} > 0$$

where α, the audit rate, is here used as a proxy for the underlying input mix necessary to produce an audit rate equal to α. x should be interpreted as a scalar determined by the technology adopted. While over certain ranges the second derivative of the cost function would be negative for most technologies, in order to guarantee an equilibrium, the assumption shown here is made. The attainment of a particular audit

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1/ In the discussion of the multiperiod model later in the paper, this assumption is relaxed.

rate is dependent on the application of inputs such as capital and labor. As an optimizing revenue agency should apply resources in those areas where their impact will be greatest, the marginal cost of generating higher audit rates—with a given technology—should rise along with the audit rate.

It is assumed that the penalty is proportional to the amount of tax evaded.

Individuals choose r to maximize expected utility in each period:

$$EU \equiv E[\alpha|\Omega]U(ATY|Audit)$$

$$+ (1 - E[\alpha|\Omega])U(ATY|No\ Audit) \qquad (1)$$

where

$ATY \equiv$ after-tax income,

$ATY|Audit = Y - rT - [1 - r]\ TP - D(r)$, and

$ATY|No\ audit = Y - rT - D(r)$.

Utility is assumed to depend only on after-tax income, T is defined as tY, P is one plus the penalty rate, and $E[I|\Omega]$ represents the expected value of I given the information set, Ω. $D(r)$ is the cost of evasion function with $D'(r) < 0$ assumed, that is, as the amount of evasion is reduced (r and evasion are inversely related), the cost of evading falls.

The usual restrictions on the utility function are assumed.

It is assumed that each individual views the government's audit strategy as independent of his/her own action, so that $\frac{\partial E(\alpha|\Omega)}{\partial r} = 0$;

therefore,

$$\frac{\partial EU}{\partial r} = E[\alpha|\Omega]\ \frac{\partial U(ATY|Audit)}{\partial ATY|Audit}\ \frac{\partial ATY|Audit}{\partial r}$$

$$+ (1 - E[\alpha|\Omega])\ \frac{\partial U(ATY|No\ Audit)}{\partial ATY|No\ Audit}\ \frac{\partial ATY|No\ Audit}{\partial r}\ [0 \leq r \leq 1] \quad (2)$$

Setting this equal to zero and rearranging terms yields

$$E[\alpha|\Omega] \; \frac{\partial U(ATY|\text{Audit})}{\partial ATY|\text{Audit}} \; (T(P - 1) - D'(r)) =$$

$$(1 - E[\alpha|\Omega]) \; \frac{\partial U(ATY|\text{No Audit})}{\partial ATY|\text{No Audit}} \; (T + D'(r)) \; \underline{1}/ \qquad (3)$$

With some trivial manipulation, it can be shown that equation (3) states the condition that the marginal rate of substitution between the two states must be equal to the marginal rate of transformation of income between the two states obtained by altering the amount of evasion.

The term on the left-hand side is the expected probability of an audit multiplied by the marginal utility of after-tax income in the audit state of the world, times the reduction in the penalty suffered in this state of the world owing to the marginal increase in reported income, plus the gain from reduced expenditure on evasion. The term on the right-hand side represents the marginal utility of after-tax income in the no-audit state of the world multiplied by the change in income in this state of the world reflected in an increase in voluntary taxes paid and in a reduction in expenditure on evasion, times the probability that the taxpayer will be in the no-audit state of the world.

Recalling that P is one plus the penalty rate, the reader will note that ATY|Audit is less than ATY|No Audit, unless r = 1 and that the difference between the two increases as r decreases. Therefore, if the individual is risk-averse, as evasion increases, the marginal utility from increased reporting grows relative to the gain from increased evasion.

It is useful to analyze the case of r = 1, full reporting, in order to determine under what conditions the individual will engage in at least some evasion. If the individual reports his true tax liability, he will be indifferent to an audit. After-tax income and, therefore, the marginal utility of income in both states of the world will be the same.

Taking the "left-hand" partial derivative ($\partial r < 0$) of (1) with respect to r, at r = 1, and rearranging terms, one arrives at

$$\frac{\partial U(ATY)}{\partial ATY} \; \left\{ (1 - E[\alpha|\Omega])T + D'(r) - E[\alpha|\Omega]T(P - 1) \right\} \qquad (4)$$

If expression (4) is greater than zero, then it pays to decrease r from r = 1. The first term in brackets may be interpreted as the gain in the no-audit state of the world. The second reflects the cost of evasion. The third is the penalty that would be paid in the audit state of the world.

<u>1</u>/ The fulfillment of the second order condition is ensured by concavity of the utility function.

It is evident in (4) that increasing the expected audit rate reduces the amount of evasion. It should also be noted that, in general, the optimal r will be a function of t, P, y, and D(r). 1/

In light of the optimizing strategy of taxpayers, the government acts to collect the target revenue in an efficient manner. The government is modeled as choosing the audit rate to minimize the net cost of collecting the target level of revenue, including revenue derived from penalties. In order to capture the fact that the government has other methods of raising revenue at its disposal, the government will choose both an audit rate, α, and an alternative instrument, d, that generates revenue as well as costs.

The problem of minimizing cost subject to a revenue target is represented in expression (5).

$$C(\alpha, d) + \lambda[\bar{R} - R(\alpha, d)] \tag{5}$$

The first-order conditions are the following:

$$\frac{\partial C}{\partial \alpha} - \lambda \frac{\partial R}{\partial \alpha} = 0 \tag{5a}$$

$$\frac{\partial C}{\partial d} - \lambda \frac{\partial R}{\partial d} = 0 \tag{5b}$$

$$\bar{R} - R(\alpha, d) = 0 \tag{5c}$$

Combining equation (5a) and equation (5b) yields:

$$\frac{\partial R}{\partial \alpha} \bigg/ \frac{\partial C}{\partial \alpha} = \frac{\partial R}{\partial d} \bigg/ \frac{\partial C}{\partial d} \tag{5d}$$

Equation (5d) expresses the condition that the marginal yield ratio of the two revenue sources should be equal.

If it is assumed that the cost and revenue functions are separable in α and d, the cost minimization problem for the revenue authority in terms of the audit rate may be written as

$$C(\alpha, x) - \lambda t Y r(E[\alpha|\Omega]) - \alpha \lambda t Y[1 - r(E[\alpha|\Omega])]P + \lambda \bar{R}$$

1/ One important factor in the real world is that penalty structures are often nonlinear. There is often a stigma or cost to being caught that is independent of the degree of evasion. This stigma probably deters a significant amount of evasion. Furthermore, the probability of being detected will, in most cases, rise with increasing evasion.

where the reader should be cautioned that $r(E[\alpha|\Omega])$ signifies that r is a function of the expected audit rate with $r'(\bullet) > 0$. The audit rate, α, is restricted to $0 \le \alpha \le 1$. For now, all individuals will be assumed identical and the population size is normalized at 1. The first-order condition (5a) may then be written as

$$\frac{\partial C}{\partial \alpha} - Tr'(\bullet) \frac{\partial E[\alpha|\Omega]}{\partial \alpha} - T[1 - r(\bullet)]P + \alpha Tr'(\bullet) \frac{\partial E[\alpha|\Omega]}{\partial \alpha} P = 0 \quad (6)$$

where λ, the Lagrangian multiplier, has been set equal to 1.

The net gain from increased auditing may be decomposed into the net direct and net indirect gain. The net direct gain is captured in the first and third terms on the left-hand side of (6). The first term is the marginal cost of increasing the audit rate. The third is the direct revenue obtained from the increase in taxes and penalties collected from those caught as the result of a marginal increase in the auditing rate. The second and fourth terms represent the net indirect benefit of raising the audit rate. The second term is the revenue gained from an increase in the rate of voluntary reporting. The fourth term is the decrease in the expected revenue from audit penalties resulting from the increased voluntary compliance rate.

The question that has not been addressed is the relation between changes in the audit rate and changes in the _expected_ audit rate. The net direct benefit depends on the actual audit rate, while the net indirect benefit depends on the expected audit rate.

It is clear from equation (6) that the indirect benefit is nonzero only if changes in the actual audit rate affect Ω, the information set. If α is "common knowledge", then α is in Ω, the revenue authority knows α is in Ω, agents know that the revenue authority knows α is in Ω, etc. (Readers interested in a formal definition of "common knowledge" are referred to Aumann (1976)). If α is not common knowledge, however, the formation of expectations becomes a nontrivial problem. Of course, an infinity of solutions can be found to this problem, e.g., individuals may believe that α is whatever the government says it is. If expectations were formed in this absurd way, the government's decision problem is trivially solved. The public's objective function would then depend on the announced α. The government's optimal solution would be to announce $\alpha = 1$ and actually implement $\alpha = 0$. 1/

1/ This presumes that full compliance would occur with $\alpha = 1$, and the government would not gain more revenue by enticing some individuals to evade and then trying to catch them. One interesting aspect of this incredible solution is that it minimizes the cost of tax enforcement.

The expectation formation process assumed here is that Ω contains the α that solves the revenue authority's decision problem, given all of the information available at the time the expectation is formed. Thus, $E[\alpha|\Omega]$ is formed by taking the conditional mathematical expectation of α using all currently available information.

The purpose of the remainder of this section is to illustrate in a simple one-period game a few important features of the model. In the next section, the analysis takes place within the framework of a repeated game with incomplete information (as in Kreps and Wilson (1982), for example).

A crucial question is whether the individual determines r before α is chosen, which, under the expectational process assumed here, is the same as before α is known. If individuals report their tax liabilities before they know the audit rate, then, going back to equation (6), $r'(\bullet)$ can be taken to be equal to zero at the time α is chosen. The optimal α will then be determined according to:

$$T[1 - r(\bullet)]P = \frac{\partial C}{\partial \alpha} \tag{7}$$

In calculating their __expectation__ of the optimal α, individuals will use the reaction function generated by (7). The resulting pair of r and α will be a Nash equilibrium 1/ if:

$$EU(\hat{r}|\hat{\alpha}) \geq EU(r|\hat{\alpha}) \quad \forall r, \ 0 \leq r \leq 1$$

and

$$EC(\hat{\alpha}|\hat{r}) \leq EC(\alpha|\hat{r}) \quad \forall \alpha, \ 0 \leq \alpha \leq 1$$

where $EU(\hat{r}|\hat{\alpha})$ is the expected utility resulting from choosing $\hat{r}$ given $\alpha = \hat{\alpha}$, and $EC(\hat{\alpha}|\hat{r})$ is the expected net cost from choosing $\hat{\alpha}$ given $r = \hat{r}$.

If the revenue authority __is__ able to fix α before taxpayers decide r, then (6) rather than (7) is the relevant marginal condition. As the indirect revenue effect of increased compliance is positive, the audit rate in this case is higher and the expected cost lower than in the case without precommitment.

1/ The Nash equilibrium is a set of individual strategies having the property that each player's strategy is optimal, given the equilibrium strategies of all other players. For this reason, it is sometimes referred to as a "no regret" equilibrium.

This result--that the revenue authority is better off being able to preset its audit rate--holds also in the following section when the more complex game is analyzed. This implies that governments may gain from investment in technology or a tax law that precommits the revenue authority to audit at a higher rate.

Although in general it is better to be able to preset the audit rate, this does not imply that $\hat{\alpha}_p$ (optimal audit rate with precommitment) is a Nash equilibrium, as it is not true, in general, that $\hat{\alpha}_p$ is optimal when r is set on the basis of $\hat{\alpha}_p$. That is, the optimal α is likely to be lower than $\hat{\alpha}_p$ if the public expects $\hat{\alpha}_p$.

The ability or lack thereof to precommit is part of the technology assumed for the game. 1/ Without the ability to fix the audit rate in advance, the government will be faced with a higher degree of noncompliance. To what extent this result depends on the game being played only once is examined in the next section.

The preceding analysis suggests several propositions. One is that revenue authorities have an incentive to claim that enforcement will be tougher than they actually intend. The second is that if taxpayers are aware of this, they will take it into account when forming their expectations. Therefore, government statements about future tax enforcement will have little impact if taxpayers do not believe that the underlying government objective or cost functions have changed. As a consequence, governments should take actions that clearly demonstrate that they will audit at higher rates.

2. Determining optimal strategies in the repeated game with incomplete information

The analysis in the previous section is somewhat artificial in that the game is played only once, whereas in real economies the revenue collection process is played out repeatedly. A second key question is the importance of the assumption that the public knows the exact parameters that enter into the government's optimization problem. These issues are addressed in this section.

Note that a mere finite repetition of the game, when the government's cost function is known with certainty by taxpayers, does not change the decision problem. To see this, consider the situation in the last play of such a game. In the last period, the government gains nothing by auditing at a rate higher than that indicated by

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1/ While it is difficult to think of an infallible way to precommit to a particular audit rate, governments may invest in technology that lowers the marginal cost of auditing and thereby raises the optimal audit rate and decreases the incentive to be deceptive about its audit rate.

equation (7), since there are no longer any expectations to influence; therefore, taxpayers know the α that will be chosen by the government. Going to the next-to-last period, it is clear that nothing can be gained here either by trying to change expectations, as beliefs about α in the following period are immutable. Thus, the government will be expected to choose according to equation (7). The same logic holds recursively for each period back to the first period of the game. Any strategy other than choosing α according to equation (7) will not be a Nash equilibrium.

Only if there were uncertainty about the objective function (here the cost technology) would the notions of reputation and credibility have meaning. Introducing the possibility of incomplete information allows for a richer analysis of the above game.

The type of incomplete information introduced will be that the public may not know with certainty the cost function of the revenue authority. Though this complicates the analysis, it is the only plausible assumption in situations following a technological change in the cost function (e.g., increased use of computerized file matching or a legal change that enhances the ability of the revenue authority to investigate evasion) or a change in political leadership. In such a situation, the public must make a judgment as to whether the technology has really changed (or the "political" cost of collection has fallen) in order to decide whether to change its tax compliance. While individuals may have subjective beliefs about the type of revenue authority in the form of a Bayesian prior, they will not typically be able to observe the underlying parameters.

Here, the term "reputation" is a summary statement about the public's subjective probability distribution over x^i, the audit cost function technology parameter, where, to simplify the analysis, it will be assumed that there are only two possible cost functions $c^1(\alpha, x^1)$ and $c^2(\alpha, x^2)$. The government with the higher cost function, c^1, will be denoted "weak", and that with the lower cost function, c^2, will be denoted "strong".

Since here there are only two possible x's, reputation can be summarized with a single parameter, p^1, representing the subjective probability that the revenue authority has a cost function containing x^1 (clearly, in this case, the probability that it contains x^2 is $1 - p^1$). "Credibility" is defined as the conditional probability of an event given the government's reputation. Statements have greater credibility the greater is the probability that the action is thought to be consistent with the government's underlying objective function.

The reason credibility is important is that the revenue authority, even if it is weak, i.e., it has a cost structure, $C^1(\bullet)$, will be better off if individuals believe it is strong, as this belief will lead to an increased rate of voluntary compliance. Therefore, a weak revenue authority may have an incentive to pretend it is strong. Consequently, individuals will not be able to immediately infer from a series of realizations of α the true unobservable cost function. 1/

The analysis of credibility is of more than academic interest as tax amnesties are quite often accompanied by government claims that the cost function has changed either for technological reasons (including reorganizations) or political reasons--e.g., a new resolve to increase enforcement despite potential political costs. Such claims are often greeted with some skepticism. Even though tax collection efforts may be observed over time, the underlying cost function is unobservable. Thus, taxpayers who realize that a revenue agency gains from increased voluntary reporting will adopt a very rational "wait-and-see" attitude.

The inference problem discussed above is illustrated in Figure 2. The two possible audit cost functions are shown as the two curves that are convex to the origin. $C_2(x)$ represents the function of the lower cost revenue authority since, for any given reporting rate, it will audit at a higher rate than the weak authority. The individual reaction function, R, shows the relation between the audit rate and the degree of reporting. If there were perfect information about the revenue authority cost function, then equilibrium would be at either E_1 or E_2. With incomplete information, individuals must choose a reporting level based on a subjective belief about the type of cost function they are facing.

The model consisting of equations (1)-(7) is now put into a repeated game framework. There will be n periods during which taxes accrue and audits are made. As introduced above, the revenue authority is known to have one of two cost functions, $C^1(\alpha, x^1)$ or $C^2(\alpha, x^2)$. It is assumed that Ω_t, the information set at time t, includes all of the parameters of the model with the exception of x, and all of the past realizations of α, i.e., agents have perfect recall. With the exception of x, it is assumed that the underlying parameters of the decision functions do not change over the period of the game. Therefore, the only piece of new information observed by the public is the value

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1/ The taxpayers' problem could be complicated by assuming that the audit rate is observed with an error and that the individual must solve a stochastic inference problem. An early treatment of this topic in a macroeconomic context with rational expectations is Taylor (1975). The assumption adopted here--that individuals are able to observe the audit rate, ex post, without any distortion--serves to highlight the fact that only a "little" incomplete information is sufficient to derive the results.

of α in each period. Note that it is assumed that α is observed without error.

In analyzing this game, it is necessary to describe the evolution of individuals' expectations. Since the cost functions can be of only two types, the individuals' inference problem is reduced to determining the equilibrium strategy (sequence of audit rates) for both types of cost functions, then determining from observed behavior what is the probability that the revenue authority is of each type, given the observed sequence of α's. As noted above, the reputation of the revenue authority is summarized in a single parameter, p^1, the probability that the government has a cost function, $c^1(\alpha, x^1)$.

Expectations are updated according to Bayes' rule:

$$P_t^1 = \frac{\text{prob}(\alpha = \alpha_{t-1}|c^1)P_{t-1}^1}{\text{prob}(\alpha = \alpha_{t-1}|c^1)P_{t-1}^1 + \text{prob}(\alpha = \alpha_{t-1}|c^2)P_{t-1}^2}$$

Bayes' rule gives the mathematical formula by which one should update one's prior beliefs as the result of new information. In this case, given the history of audit rates, the question is, what is the probability that government 1 would have audited at those rates?

Rather than analyze the problem using implicit functions, a specific form of the tax collection function will be adopted in order to derive the optimal strategies for both types of government. The reduced form is

$$c^1(\alpha_t, E\alpha_t) = (\beta_1/2)\alpha_t^2 - \beta_3 E\alpha_t - \beta_4\alpha_t \tag{8}$$

$$c^2(\alpha_t, E\alpha_t) = (\beta_2/2)\alpha_t^2 - \beta_3 E\alpha_t - \beta_4\alpha_t \tag{9}$$
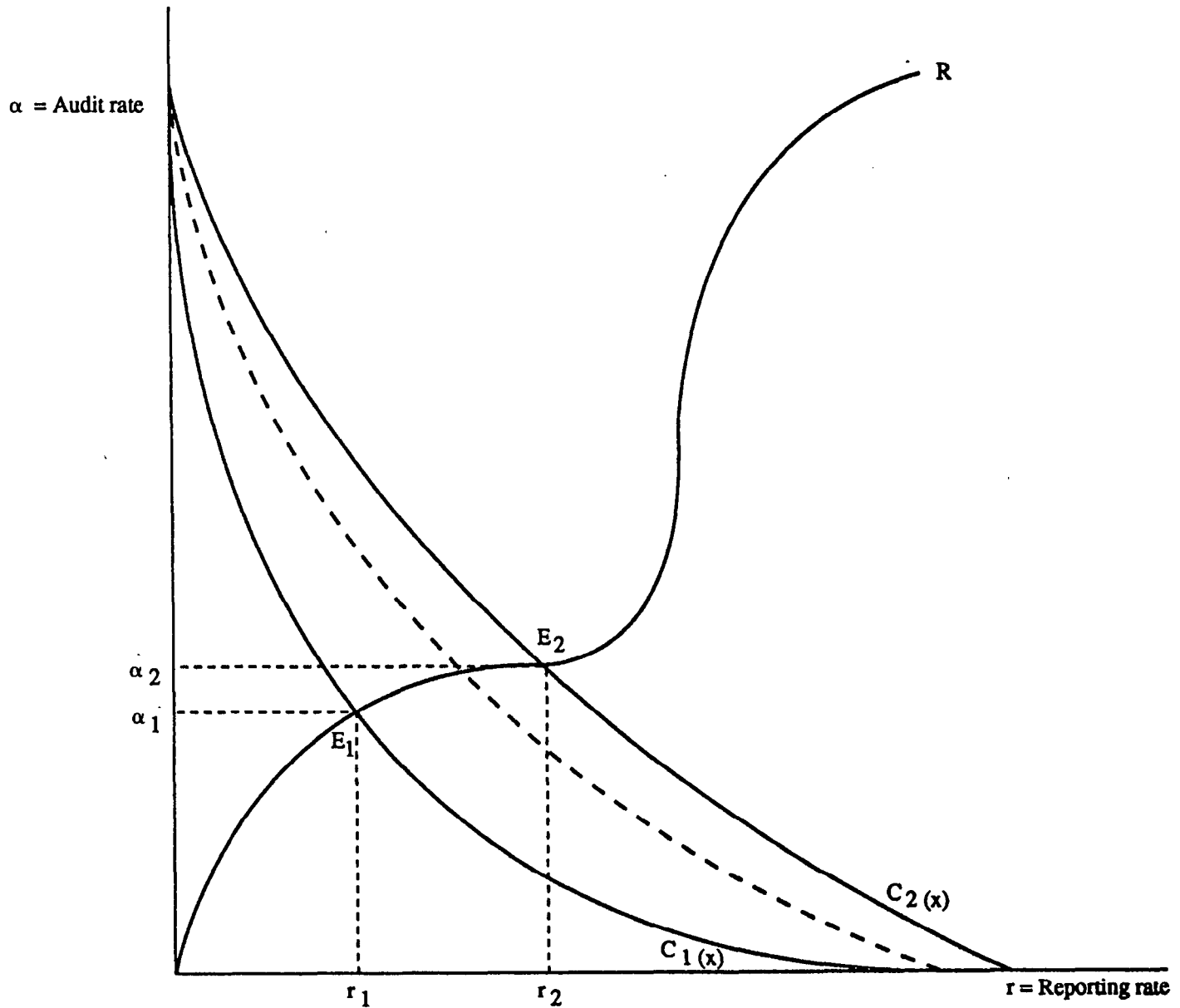
$$\beta_1 > \beta_2 > 0$$

where β_1 and β_2 reflect the different marginal cost functions. β_3 and β_4 are related to the marginal revenue gain from an increase in expected and actual audit rates, respectively.

Looking at c^1, it is clear that in a one-stage game or in the last stage of a multistage game, the government will act to minimize c^1 given the expected audit rate. The solution to this problem is

$$\hat{\alpha}^1 = \beta_4/\beta_1 \tag{10}$$

Figure 2
Auditing Reporting Equilibrium with Low-Cost and High-Cost Governments

C_i = A mapping from r to the optimal audit rate for the government with cost function i.

R = A mapping from α to the optimal level of reporting by agents.

E_i = Equilibrium with complete information and cost function i.

If precommitment were available, the audit rate that solves the maximization problem is

$$\hat{\alpha}^1 = \frac{\beta_3 + \beta_4}{\beta_1} \tag{11}$$

It is intuitive that the audit rate in equation (11) is greater than that in equation (10), as the revenue authority has the opportunity to influence expected audit rates in the latter but not the former.

It is easy to show that the audit rate in equation (11) is not a Nash equilibrium strategy. Substituting (10) into (8) yields

$$- \beta_4^2/2\beta_1 - \beta_3 E\alpha_t \tag{12}$$

while substituting (11) into (8) yields

$$- \beta_4^2/2\beta_1 - \beta_3 E\alpha_t + \frac{\beta_3^2}{2\beta_1} \tag{13}$$

Similarly, it is easy to show that, in the case of precommitment, strategy (11) dominates (10). To see this, compare costs when the condition $E\hat{\alpha}^1 = \hat{\alpha}^1$ is imposed, i.e., individuals know with certainty the audit rate. Substituting (10) into (8) and (11) into (8) yields

$$- \beta_4^2/2\beta_1 - \beta_4\beta_3/\beta_1 \tag{14}$$

$$- \beta_4^2/2\beta_1 - \beta_4\beta_3/\beta_1 - \beta_3^2/2\beta_1 \tag{15}$$

Expression (15) is less than expression (14), implying that the audit rate in equation (11) is superior to that in equation (10).

Looking now at the optimization problem of the strong government, the optimal α for it during the last period of the game is

$$\hat{\alpha}^2 = \beta_4/\beta_2 \tag{16}$$

The outcome with precommitment would be

$$\hat{\alpha}^2 = \frac{\beta_4 + \beta_3}{\beta_2} \tag{17}$$

In the one-period game, the individual finds out the type of government, ex post, when either (16) or (10) is observed. When the

game is extended to many periods, the strategies of the governments become more interesting. The major difference from the single-stage game is that the government has the opportunity to influence expected future audit rates by its current behavior. In the case at hand, the interesting question is whether the weak government, which would tend to audit at a lower rate, would benefit by playing the audit strategy of the strong government, at least for a while, in order not to reveal that it is weak so as to gain from increased compliance. In the parlance of game theory, such a strategy is called "nonrevealing." The same sort of logic would pertain to the strong government. If individuals are not sure it is strong, compliance rates will be lower. In this situation, the strong government would like to play a revealing strategy so that it will be known that it has a high optimal audit rate. Or, if there is a continuum of possible types, it might try to audit, for a time, at a higher rate. The important question from the standpoint of the game is whether or not an equilibrium exists that separates out the two types at the beginning of the game. This would occur if the strong government audited with such a high audit rate at the beginning of the game that everyone was convinced it could not be the weak one. This would reduce the game to one of complete information.

The strategy of the taxpayer--if the audit rate is not already known--is to assign subjective probability values to the two possible optimal audit rates and then choose his optimal degree of compliance.

An important issue in any Bayesian situation is the formation of the prior. In this particular case, what would motivate individuals to change their beliefs about the government's cost function? This question is crucial in the case of a temporary tax amnesty coupled with promises of future enhanced enforcement. If one rules out the possibility that the government was not optimizing in the past, then some underlying element of the cost function must have changed in order for its optimal audit rate to have changed. If there is little reason a priori to expect that such a change has taken place, there will be little incentive to participate in an amnesty. As will be spelled out below, governments may find changing individuals' priors a difficult task. This is why it is important, especially during an amnesty offered for a limited time only, to take significant visible steps to increase enforcement at the beginning of the change in policy.

There are a number of reasons why the equilibrium audit rate might change. There might be a change in the political regime that has a bearing on corruption. There may be a discrete change in the auditing technology adopted by the revenue collection authority. There may be a change in the optimal level of public goods that implies that revenue from all sources should be raised. Alternatively, it might be the case that the government deficit is perceived to be too large. Another possibility is that the ability of the government to raise revenue from other sources may have changed. For example, a large increase in the price of petroleum would imply a large inflow for a government deriving a large share of income from this sector. In turn, this would imply a

lessened need to rely on other types of taxation and could lead taxpayers to expect lessened tax enforcement pressure. 1/

Of the possible motivations mentioned in the previous paragraph for changing their beliefs about the optimal audit rate, individuals would probably find more compelling those that are most specifically related to the tax enforcement sphere. Justifications for increasing tax compliance that rely on the need to generate additional revenue immediately raise the question: why was tax enforcement not optimal before? As there are many ways a government can raise revenue, it is difficult to single out tax enforcement unless the underlying cost function has changed. If it has not changed, then why should anyone believe it is now optimal to raise the marginal revenue needed through enhanced enforcement rather than, for example, a tax increase that would generate the same inflow?

The model can be used to analyze the way expectations change when a tax authority announces a future increase in the audit rate but where individuals cannot be certain whether the cost function has changed. In order to simplify the analysis, it will be assumed that, were the government really to experience a shift from weak to strong, i.e., the cost function really had changed, it would not play strategically. In other words, it will not audit at a higher than optimal rate in order to convince the public that it really is strong. It will simply begin playing its optimal long-run strategy and set the same audit rate each period. Then the question is, would a weak government gain by mimicking the optimal strong strategy of equation (16)? That is, would it pay for a truly weak government to pretend it has experienced a conversion to the strong type?

Substituting $\hat{\alpha} = \beta_4/\beta_2 = E\hat{\alpha}$ into (8) yields

$$\beta_4{}^2/2\beta_1 \; [\frac{1-2z}{z^2}] - \frac{\beta_3\beta_4}{\beta_1} \; [\frac{1}{z}] \tag{18}$$

where $z \equiv \beta_2/\beta_1$ (note that the earlier assumptions imply $0 < z < 1$).

Assuming $\beta_3 \geq \beta_4$, i.e., that the indirect gain from an increase in the expected audit rate (holding the actual audit rate fixed) is at least as great as the direct revenue obtained from increasing the audit rate (holding the expected audit rate fixed), the cost to the weak government of playing the higher audit rate is lower than that obtained from playing the audit rate shown in equation (10), if $z > 1/3$.

1/ The correct decision in this case would no doubt be to eliminate or reduce distortionary taxes in the economy rather than reduce tax enforcement. Apart from equity considerations, which would tend to favor maintaining tax enforcement levels, it is quite difficult to reverse a deterioration in tax compliance, should such a reversal ever become necessary.

While this particular parameter value is an artifact of the particular functional form chosen, the general intuition is that if the alternative cost function represents too dramatic an improvement in efficiency and, therefore, a much higher audit rate, the weak government would be unwilling to mimic the strong one. From here on, it is assumed that $z > 1/3$.

Given the discussion above, any observation of an α less than that derived from (16) will lead people to believe that the government is weak with probability one. (For completeness, it is assumed that any α different from equation (16) will cause individuals to believe that the government is weak.)

While the strategy for the strong government is to play $\alpha = \beta_4/\beta_2$ every period, the decision for the weak government amounts to choosing between playing $\alpha = \beta_4/\beta_2$, which does not reveal the government to be weak, or to reveal itself and play its optimal one-stage strategy, i.e., $\alpha = \beta_4/\beta_1$.

In the last period of the game, it is clear that the weak government will set $\alpha = \beta_4/\beta_1$. In the next-to-last period, it faces the following payoff function where the first line represents the payoff in period N-1 and the second the payoff in period N.

$$(\beta_1/2)\alpha^2_{N-1} - \beta_3 E_{N-1}\alpha_{N-1} - \beta_4\alpha_{N-1}$$

$$- \delta[\beta_4^2/2\beta_1 + \beta_3 E_N\alpha_N]$$

where δ is the rate of discount.

The key question is how much is lost by the government by revealing itself to be weak, in terms of the lower expected audit rate that this will engender in the next period?

Note that in the last period the expected audit rate is

$$E_N\alpha_N = p_N^2\alpha^{T2} + (1 - p_N^2)\alpha_N^{T1} \tag{19}$$

and that, according to Bayes' rule,

$$p_N^2 = \frac{p(\alpha = \alpha^{T2}_{N-1}|T2)p^2_{N-1}}{p(\alpha = \alpha^{T2}_{N-1}|T2)p^2_{N-1} + p(\alpha = \alpha^{T2}_{N-1}|T1)(1-p^2_{N-1})} \tag{20}$$

where α^{Ti} is the optimal one-period audit rate of the type i government. Note that $p(\alpha = \alpha_{N-1}^{T2}|T2) = 1$, and that if $\alpha_{N-1} \neq \alpha_{N-1}^{T2}$, then $p_N^{T2} = 0$ and $E_N\alpha_N = \alpha_N^{T1} = \beta_4/\beta_1$.

Having derived (19) and (20), the two options may be compared. The payoff to going down the path initiated by playing $\alpha_{N-1} = \alpha^{T2}$ is $\beta_4^2/2\beta_1 [\frac{1 - 2z}{z^2}] - \beta_3 E\alpha_{N-1}$ in period N-1, and $\delta[-\beta_4^2/2\beta_1 - \beta_3 E\alpha_N]$ in N. The payoff obtained by going down the path initiated by playing $\alpha_{N-1} = \alpha^{T1}$ is $-\beta_4^2/2\beta_1 - \beta_3 E\alpha_{N-1}$ in N-1, and $\delta[-\beta_4^2/2\beta_1 - \frac{\beta_3\beta_4}{\beta_1}]$ in N. Comparing the two paths, the relevant condition is

$$\beta_4^2/2\beta_1[\frac{1 - 2z}{z^2}] - \delta\beta_3 E\alpha_N \lessgtr - \beta_4^2/2\beta_1 - \delta\frac{\beta_3\beta_4}{\beta_1} \tag{21}$$

where the left-hand side is the cost associated with playing $\alpha_{N-1} = \alpha^{T2}$ and the right-hand side is the cost associated with playing $\alpha_{N-1} = \alpha^{T1}$.

Utilizing equation (19) with the appropriate substitution,

$$E\alpha_N = p_N^2 \frac{\beta_4}{z\beta_1} + (1 - p_N^2) \frac{\beta_4}{\beta_1}$$

the expression (21) may be reduced to

$$p(\alpha = \alpha^{T2}|T1) \gtrless \frac{p_{N-1}^2}{1 - p_{N-1}^2} [\frac{1 - x}{x}] \tag{22}$$

where

$$x \equiv \frac{\beta_4}{2\delta\beta_3} [\frac{1 - z}{z}]$$

Expression (22) illustrates the important point that the benefit related to playing the high-audit strategy depends on the probability with which it is expected to be played. In other words, the greater the expectation on the part of the public that the government will audit at the high level, the less noteworthy is an observance of a high audit rate, i.e., α^{T2}, and the less they change their beliefs about the government's type. This has very important implications for the beginning of the game. At the beginning of the game, individuals would expect the weak government to engage in more audits in order not to reveal its true type, as the future is "long" and the gains are great for the government to encourage the public to believe it is a tough enforcer. Knowing this, individuals will be slow to change their beliefs about future tax enforcement efforts. This points out the importance to the government of establishing good priors or a good reputation. The more permanent and convincing the measures accompanying an amnesty, the more likely it is to induce a change in beliefs or be credible and generate revenue. As a truly strong government is also better off with rapidly changed expectations, it is always beneficial to have a good track record of credible policy changes.

Anything that raises the right-hand side of (22) increases the attractiveness of playing the nonrevealing strategy. There are several elements that increase the right-hand side:

(i) A decrease in β_4. β_4 is the parameter signifying the marginal revenue obtained from increasing the actual audit rate. The lower the government's ability to generate revenue from any given level of audits, the greater the gain to the increased voluntary compliance derived from pretending to be a tough government.

(ii) An increase in β_3. The greater the revenue obtained from any given increase in the expected audit rate, the greater the benefit to having a higher expected audit rate.

(iii) A higher δ. Since continuing with a higher audit rate trades off higher future revenue for higher current costs, the higher the value placed on future revenue relative to current revenue, the greater the gain in playing the nonrevealing strategy.

Over time, priors diminish in importance, and it may not be of much significance to the government whether taxpayers believe its claim at the very beginning of the new policy. That is unless it has offered a temporary amnesty, as in that case individuals' reactions will depend crucially on expectations about future enforcement, and in turn, on priors concerning the government's commitment. In addition, if priors are conditioned on previous experience in similar situations, the government's track record in keeping its promises will be important in determining the success of policies that depend heavily on rapid changes in private sector expectations. 1/ Therefore, as will be argued below,

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1/ This is often an important determinant of the success of anti-inflation plans.

it is important not to resort to amnesties as general revenue-raising measures when no improvement in enforcement is envisaged; rather, they should be used only in specific cases where they will enhance future tax compliance or eliminate roadblocks to significant tax administration reforms.

IV. Tax Amnesties as a Vehicle for Encouraging Increased Compliance

The intention of the previous sections was to introduce a simple model illustrating the importance of actual and expected audit rates, penalties, and uncertainty on tax compliance. The focus of the analysis was then narrowed to examine more closely the importance of the expected audit rate and the way in which rational individuals would change their expectations in response to an announced policy of enhanced tax enforcement. It was shown that the very nature of the taxpayer/revenue authority relationship implies that the government has an incentive to claim that tax enforcement is tougher than it is in reality. Individuals who are aware of the structure of the game will therefore not rely solely on government announcements in forming their expectations. As a result, individual beliefs will be slow to change, and expectations will evolve over time in accordance with the government's observed behavior. The time path of expectations adjustment has important implications for judging taxpayer response to a policy of enhanced tax enforcement.

Unless it is believed that taxpayers made errors in the past when they cheated, it is questionable that a tax amnesty will lead them to voluntary disclosure of evasion in the absence of the threat of enhanced enforcement. It has been argued that the immediate impact of a temporary amnesty may be rather slight, and if an amnesty implies more amnesties in the future--which it almost certainly does--it may result in a net revenue loss when viewed over the medium term.

All forms of amnesty should not be rejected outright, however. In this section, amnesties that may improve taxpayer compliance are discussed. One is an amnesty that allows individuals to improve their tax compliance without excessive risk of being penalized for past evasion. The second is designed to encourage voluntary compliance with tax laws.

a. Amnesty as a way to remove a barrier to improved compliance

Imagine a revenue authority that begins a convincing program to enhance tax enforcement. Tax evaders would like to begin reducing their evasion, but a key factor affecting the response to an unanticipated increase in enforcement is the attitude of the revenue authority toward individuals who show a marked change in their taxpaying behavior. If individuals who began paying more taxes when the enhanced enforcement is announced were immediately audited for suspected past evasion, then

those with long histories of evasion would be discouraged from changing their behavior. If they have been off the tax rolls, there will be a strong incentive to remain off. In the previous section it was assumed that the tax authority could not infer from a tax return the likelihood of evasion but, in reality, individuals are not identical, and the revenue authority is able to implement an audit strategy that differentiates among classes of taxpayers. 1/

One assumption that is probably made in any audit strategy is that evasion is positively serially correlated in a taxpayer's history, i.e., individuals who evade do so in several consecutive periods. 2/ This may be due to a number of factors. It could be that the underlying reasons for evasion are serially correlated, or the penalty structure might be nonlinear with decreasing marginal severity, implying that once one has started evading, the marginal risk falls. Alternatively, the auditing strategy of the authorities might lead individuals to attempt to avoid attracting attention by not changing markedly their behavior. 3/

If evasion is positively serially correlated, then a sensible rule of thumb is to follow a successful audit for any given year by audits for other years. What should be the rule of thumb with respect to individuals who voluntarily disclose tax evasion? Since they have been shown to evade, should they be audited with a greater probability? On the other hand, since they have voluntarily revealed evasion, should they be considered "honest" and removed from suspicion entirely? It is important to consider strategic behavior. If the latter were the policy followed by the authorities, then evaders would gain by filing false returns, admitting only a limited amount of evasion, in order to protect themselves against future audits. 4/

1/ Theoretical discussions of how a government should audit a heterogeneous population are found in Greenberg (1984) and Reinganum and Wilde (1986).

2/ While the discussion has been carried on as if there is only one tax in the economy, in practice, an individual will face several. If evasion of one type of tax is positively correlated with evasion of others, this may be an additional incentive to minimize behavior that might draw an audit.

3/ Perhaps the clearest example of this are the participants in the "underground" economy who may be quite reluctant to begin reporting income from sources that they previously had failed to report. For more information on the underground economy, see Tanzi (1982).

4/ In some of the U.S. states with amnesty programs, participants who filed amended declarations with payments were ensured they would not be audited for the corresponding years during which they had evaded taxes. This led some individuals to purchase "insurance" against tax investigations by filing "one-penny" returns—returns that disclosed trivial amounts of evasion. This points out the care with which amnesties must be designed.

The key factor from the standpoint of the evader is how the probability of being audited is related to a noticeable increase in taxes paid. This is particularly relevant for those with a long history of tax evasion. Even though they might be willing to pay taxes in full starting from the implementation of enhanced enforcement, the concern that they would be audited for past evasion might "lock them in" evasion.

A type of amnesty that protects individuals against prejudicial attention after an increase in tax compliance may play a useful role in tax administration. Such amnesties, forms of which have been or are in effect in Colombia, Mexico, and Peru, are closer to the classic meaning of the word "amnesty", which is derived from the Greek word for "forgetfulness". While past evasion is not forgiven, the "memory" of the revenue authority is not used to query the improvement in behavior.

While improvements in compliance should not be discouraged by a fear of generating an investigation, neither should it guarantee security from an audit for prior evasion. Such a guarantee would be viewed by evaders as an insurance policy that they could buy at low cost after a long career of evasion. Therefore, caution must be exercised in the design of such a program. Ideally, one would like to be able to offer a guarantee that a significant increase in declared tax liabilities will not increase the probability of the individual being audited for prior years.

2.   Permanent amnesties and voluntary disclosure

Section III pointed out that rational taxpayers will be slow to change their expectations when the government announces a policy of enhanced enforcement. Why then must the government offer only a temporary amnesty? Voluntary confessors of crimes are generally treated more leniently by the courts than those who attempt to evade detection until they are caught. This societal attitude is no doubt due in part to the expressions of remorse frequently accompanying such confessions. In addition, society may be rewarding criminals for sparing it the expense of detection and prosecution. In the same way, lenient treatment of voluntary reporters of tax evasion may be seen as a cost-effective way for the government to encourage individuals to come forward voluntarily. It may therefore make economic sense for the government to have a tiered system of penalties depending on the stage in which the taxpayer admits fault.

While the main focus of this paper has been the most frequently observed type of amnesty--a surprise temporary reduction in penalty rates--there exists another type of fairly common amnesty termed a "standing" amnesty. Such a policy, under which evaders not currently under investigation or prosecution may, at any time, voluntarily pay tax obligations with reduced penalty, was followed by the U.S. Internal

Revenue Service for a time. 1/ According to IRS (1987), a number of countries have standing amnesty policies including Denmark, the Federal Republic of Germany, Netherlands, Norway, and Sweden. The exact features vary from country to country but all provide for a more lenient treatment of voluntary disclosure. A discussion of permanent amnesties is important, as their existence weakens the traditional arguments in favor of temporary amnesties.

There are three different potential stages of paying overdue tax obligations that would allow different penalty treatments. The first is before the revenue authority is aware of the violation; the second is after an audit is initiated; and the third is following the audit investigation and litigation.

First, consider the additional penalty that should be suffered by those who pay only after the initiation of an audit, in contrast to those who pay late, but before being investigated. From a practical standpoint, voluntary disclosure prior to investigation is clearly to be encouraged. As such, it is only sensible that voluntary disclosure be encouraged with lower penalty rates. If everyone paid either on time or late with interest charges and penalty, then enforcement costs would be lower. The penalty on payment after detection must take into account both enforcement costs and the benefits that penalties have on compliance.

For those who pay only after a full audit and litigation, the surcharge--over the fine levied on individuals who pay voluntarily after evasion is detected--should take into account the cost to society of the adjudication and also the potential gain from discouraging others to engage in litigation when they are guilty. 2/

Returning now to voluntary disclosure, while a penalty rate of zero may be thought most natural for such individuals, 3/ it would imply that the only factor discouraging delayed payment would be the chance of being caught while evading. It seems unlikely that this cost by itself would generate an optimal amount of deterrence.

Viewed from one perspective, the policy of waiving all penalties for late voluntary disclosure is one where the government extends to the taxpayer an unsecured loan at an interest rate that is equal across

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1/ For details on the operation of this system, particularly the practical problems with implementation, see Angelini (1987) or Ross (1986). One interesting question debated at the time was whether a person should be permitted a voluntary payment if an associate was being investigated for tax evasion.

2/ Of course, with an imperfect legal system, such penalties would discourage those who are innocent from defending themselves out of fear of "type I" error--being found guilty when, in fact, they are not. (This analogy has been used by Kmenta (1971)).

3/ Here it is assumed that interest is always charged.

individuals. Some theoreticians might argue that the government should be indifferent <u>when</u> it receives tax payments as long as it also receives a rate of interest greater than it pays on its borrowing. Several objections could be made to this argument. One is that it is unlikely that the government would be a very good substitute for the private credit market. Another is that such an operation ought to be separate from the tax system. There also would clearly be problems of adverse selection. Borrowers unable to secure credit at market rates would be induced to take advantage of the implicit loan rate offered by the revenue authority (of course, included in the calculation of the rate would be the risk associated with being caught before voluntary disclosure). This would saddle the government with a bad "loan" portfolio. Furthermore, tax evasion for people who are intending to pay later is unlike a loan, in that when the evasion is reported, both the interest and principal become due. In effect, the lender is not aware of the existence of a loan. Ensuring repayment of such a loan is clearly difficult.

An important line of research in this respect, and in all areas involved with amnesty, is that of the importance of "framing" and decision-making. It has turned out, in a number of experimental situations, that the way a choice is presented or "framed" has an important bearing on what choice is made (see Tverksy and Kahneman (1986)). Therefore, although one might be able to put forward an argument based on rationality that suggests that an amnesty with a zero penalty is not qualitatively different from one with a positive penalty, in reality, there may be a significant difference. In this case, the danger is that, by charging only the interest on voluntary payments, taxpayers may be induced to frame their decision as one of whether or not to take a "loan" from the government, rather than to consider the activity as illegal and subject to penalty.

While a policy of no penalty for voluntary payment of arrears may be attractive on equity grounds, this depends on the degree of equity built into the tax code, e.g., does the tax code already allow those with good reason to delay or omit payment of taxes in the case of catastrophic events? The difference between a codified system and a standing amnesty is that in the codified system taxpayers are required to report their taxes due although not pay, while under the amnesty policy current reporting is not necessary. Therefore, codified systems, in that they require income to be reported, make it difficult for the taxpayer—without attracting the attention of the authorities—to revise taxes due downward. In a general amnesty, in contrast, the taxpayer (or potential taxpayer) is free to decide not to declare at all. On the other hand, it may be difficult to identify particular catastrophies that society would like to indemnify through the tax system. For this reason, proxies are often used, e.g., medical expenditure over a certain fraction of income or losses owing to theft are made tax deductible. Such refinements bring with them administrative costs. And, for some types of taxes, it may be easier to allow a standing amnesty, in the sense of reduced penalties for voluntary compliance, and allow the

judicial system to make a judgment as to any attenuating circumstances that may pertain to individuals who are caught evading.

A standing amnesty, while in principle a simple policy, has several drawbacks. A clear potential for corruption exists in that individuals who are about to be audited may receive inside information allowing them to pay freely under the amnesty. One advantage of short amnesty periods may be that they limit the opportunity for this type of corruption. A more subtle point is that a standing amnesty policy reduces the risk to tax evasion. Part of the evader's calculation must take into account the possibility that enforcement efforts will be increased unexpectedly in the future, i.e., it depends on the probability distribution of expected future enforcement efforts or audit rates. A standing amnesty gives evaders a less costly exit from a life of evasion if enhanced enforcement is undertaken. Note that, for the same reason, a standing amnesty reduces the revenue the government would gain from actually increasing enforcement and thereby makes an announcement of such a policy less credible. Temporary amnesties also suffer from this defect.

While institutionalizing a lower penalty rate for the voluntary disclosure of tax irregularities is a good policy, the rate should be significantly greater than zero. The optimal rate may change over time, just as the optimal tax rates and other penalty rates may change, but it seems unlikely that the optimal time path would imply temporary surprise changes. Once the government has established a proper penalty structure, it is more difficult to cogently argue for a "one-time" amnesty.

V. Conclusion

One reason why tax amnesties have been somewhat neglected in the literature is that they often appear in disequilibrium contexts. Although in some cases it could be argued that tax amnesties represent an optimal evolutionary response of penalty rates to changed exogenous forces, to model them as such would miss part of the essence of the phenomenon. Amnesties are typically introduced, often as surprises, during situations when the "rules of the game" are being changed. For example, in the case described in Argentina (1986), profound legal reforms were introduced by the National Congress that were intended to alter the traditional relationship between the taxpayer and the tax authorities in virtually all tax areas. Tax amnesties are typically offered during periods when a package of new laws and policies is being introduced, making it difficult for the researcher to isolate the impact of the amnesty alone. Sometimes they represent the outcome of political compromise rather than strict economic calculus. Given the analytical difficulties mentioned above and the wide variety of potential amnesties, individual amnesties must be considered on their own merits.

It has been argued here that one must analyze tax amnesties within an intertemporal framework. From this perspective, "temporary" amnesties can have a very adverse effect on tax compliance if they lower expected future tax enforcement and/or increase the public's subjective probability assessment of the likelihood of an amnesty in the future. However, there is a logic to a standing policy of allowing those who voluntarily disclose evasion to pay a lower penalty than those who are discovered evading through an audit.

A model was developed that emphasized the relationship between current tax compliance and expected future tax enforcement efforts. It was argued that an amnesty in the absence of an increase in expected future tax enforcement is unlikely to generate a significant positive impact on revenues. This finding is consistent with recent analyses of the results of the amnesties in U.S. states where it was found that a large fraction of the revenue collected came from those already under investigation for tax irregularities. If the tax collection system is functioning properly, collecting this latter type of revenue during an amnesty is not a net gain to the revenue authority, as it should have been collected in any event. The stylized fact that most amnesties are accompanied by publicity campaigns that emphasize that tax enforcement is about to be toughened also supports the idea that an amnesty alone would generate little response. This points out the need for a cautious analysis of the real factors underlying revenue "generated" under an amnesty coupled with an enhanced enforcement policy.

Once it is granted that expected future enforcement is important in the success of an amnesty, an analysis of the factors that lead to a credible increase in enforcement becomes of interest. It was argued that unless there are obvious reasons why the change in tax enforcement makes sense from the standpoint of economic efficiency, the public's beliefs will likely be slow to change, and this works against the success of a temporary amnesty policy.

While it may be true that temporary amnesties sometimes play a role facilitating a political comprise whereby a generation of tax evaders may be induced to allow passage of measures designed to enhance tax enforcement, the economic motives are less compelling.

In a situation where the government has in place a proper tax enforcement strategy, a temporary amnesty would appear to have little place. While a standing amnesty may form part of an optimal tax administration policy, the risks inherent in granting temporary amnesties appear to far outweigh the limited potential gains.

For a temporary amnesty to be truly successful, a convincing change in the revenue authority's behavior must take place, and this change must be expected to persist. The analysis demonstrated, however, that owing to the very nature of the tax enforcement problem, such a convincing change would be difficult to bring about. Therefore, a

serious short-run credibility problem exists for governments attempting to improve tax compliance. Under these circumstances, a temporary amnesty is unlikely to prove effective. At the same time, it seems wise to encourage voluntary disclosure of tax evasion, which can be accomplished through the application of reduced penalties on such individuals. If the administrative problems that exist with a standing amnesty can be overcome, the application of reduced--although greater than zero--penalties on voluntary reporters of evasion should obviate the need for temporary amnesties.

Recent experience with tax amnesties in the United States has rekindled interest in the topic in many quarters. In examining the usefulness of amnesties, two points should be stressed. First, the success of an amnesty cannot be measured by the amount of revenue collected during the amnesty, in part because serious tax compliance problems may arise later. Second, the opportunities for improving tax enforcement that existed in a number of the U.S. states prior to the amnesties were rather unique and are not likely to be found in many developing countries or at the central government level even in developed countries. In a number of the U.S. states, relatively low-cost ways of improving auditing and enforcement procedures were available--including cross-checking data with the Federal Government-- that were already in use with the same individuals at the Federal level. In addition, budgetary allocations were often made to improve the functioning of the tax service. Even in these cases, the value of the amnesty, per se, appears to have been slight. In situations where the preconditions for a successful improvement in tax enforcement are lacking, temporary amnesties would appear to have little to offer and risk damaging both the administration's credibility and future tax compliance.

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