

A Tax Amnesty in the Context of a Developing Economy

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Abstract

We are examining an aspect which has not been considered before: How does a change in economic conditions affect the success of a tax amnesty? We show that a successful amnesty may be determined by economic changes such as liberalization and/or technological progress. The legal sector may become more attractive, providing incentives for tax evaders to become honest. Moreover, the tax authority may gain in terms of revenue and compliance rates from the amnesty, given that progress is relevant enough, but within a certain range. If gains from liberalization exceed a certain value for a large number of agents however, an amnesty may reduce overall revenue collected (taxes and fines). So, if a tax authority acts solely as a revenue maximizing entity, it may not declare an amnesty, even though it would improve overall social welfare by increasing the number of agents in the legal (and more productive) sector. Persecuting delinquents may then generate more revenue for the regulator. Finally, an unanticipated liberalization makes an amnesty more successful as agents are more likely to cheat in the pre-amnesty period.

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1. Introduction

Governments all over the world have often taken recourse to declaring periods of tax amnesty on the supposition that such an amnesty encourages voluntary disclosure of previously undeclared income and the payback of the evaded taxes.³ However, examining past tax amnesties reveals that many programs failed to accomplish their ambitious goals. Successful amnesties on the other hand are also yet to be fully explained – let alone to be predicted in advance. Thus, the tax amnesty puzzle prevails in the sense that nobody is really sure why one amnesty produces successful results whereas another amnesty does not. The literature has identified a range of factors that may make it a successful policy instrument.⁴ Most papers agree that an unanticipated one-time amnesty, accompanied by a change in the general tax system, seems to have promising chances of success – where success is mostly measured in generated revenue and/or compliance rates, in the short run as well as in the long run.⁵ However, these broad aspects appear to be more of a necessary condition, rather than the main determining factor. In order to find possible explanations, other papers examine several angles of the puzzle. For instance, Malik and Schwab (1991) analyze behavioral aspects of the delinquent taxpayer, trying to understand why somebody would decide not to pay taxes – but reverse this decision in a future period. Although those and other considerations may account for some people's decision, it appears that this may not be the single one determining factor. Further, regarding governments contemplating the declaration of an amnesty, it may be hard to use these results in a prescriptive way. Namely, how would a government know whether an amnesty will be successful or not?

Put differently, what triggers a person to participate in a tax amnesty if the optimal decision in the past was not to pay taxes? Our explanation is that conditions changed, making a previously optimal action inefficient and therefore leading the person to make a different decision in the present. More precisely, economic conditions may have changed such that a perfectly rational person has now an incentive to repay her tax debt in order to engage in business opportunities which may not have been available before. In reality, countries – developed as well as developing – experience times of economic transition very frequently. Liberalization, technological advancements, economic prosperity in general, as well as economic shocks are modifying the business environment constantly. Our model shows that a tax amnesty will be successful if timed correctly, but will also generate less revenue than the alternative case of no amnesty when economic prosperity is very substantial. In fact, reality supports our theory as countries with successful amnesties show signs of major observable changes in economic

³ European (Belgium, Denmark, France, Germany, Ireland, Italy, the Netherlands, Norway, Sweden, Switzerland) as well as South American countries (Argentina, Colombia, Ecuador, and Peru among others) India, and the majority of US states have used tax amnesties of some form to increase tax revenue.

⁴ For a more in-depth review, please see for instance Andreoni et. Al (1998), who – although a bit dated – provide a good overview regarding tax compliance in general.

⁵ For instance, Uchitelle (1989), Alm et. al (1990), Graetz et. al (1993), and Macho-Stadler (1999) emphasize the importance of enhanced enforcement activities as a complement to a tax amnesty. In terms of anticipation, Andreoni (1990) is a notable exception as he shows that an amnesty may be able to increase efficiency and equity of the tax system, even if anticipated.

conditions right around the amnesty time. In particular, the literature recognizes five amnesties as being successful. Uchitelle (1989) summarizes Ireland 1988, Colombia 1988, and France 1986 as the most successful amnesties during the 1980s. All these countries exhibit large fluctuations in key economic data exactly around their amnesty year. Ireland shows steady growth in terms of GDP during their amnesty time and also big surpluses in their trade balance in the two years before the amnesty.⁶ Colombia records rapid growth in terms of imports skyrocketing from \$ 814 billion in 1986 to almost \$ 4,500 billion in 1991. Further, Goldberg and Pavcnik (2003 and 2004) point out that Colombia experienced drastic trade liberalization in the late 1980's and early 1990's.⁷ The country experienced a drastic reduction in tariff rates between 1984 and 1994 – exactly the time period in which the amnesty occurred. In the 4 years after the French tax amnesty in 1986, imports surge by 25 percent, which constitutes a rapid growth considering an industrialized country.⁶ Economic growth picked up in the year 1987, naming the “advanced economic integration into the European community as a major force affecting the fortunes of the various economic sectors”.⁸ In other words, liberalization towards fellow European countries led to economic growth. In addition, Das-Gupta et. al (1995) examine Indian tax amnesties, and conclude the only successful one in 1975. From 1975 to 1976 India improved its trade balance from -286 Million to +787 Million US-Dollars, showing a drastic change in economic conditions.⁶ Finally, the Indian amnesty of 1997 was largely considered a success. The Voluntary Disclosure of Income Scheme (VDIS '97) accounted for about 20 percent of the annual gross direct tax revenues.⁹ At the same time, “Production, trade, and investment reforms since 1991 have provided new opportunities for Indian businesspersons...”⁸ All the above tax amnesties have one thing in common: economic conditions changed to provide new opportunities.

In order to explain this link between tax amnesties and times of economic transition in a theoretical framework, it may be useful to distinguish between the “black market” where untaxed money circulates and the “white market” where taxed money circulates. Das-Gupta and Mookherjee (1996) use these terms to point out that an amnesty may provide the only opportunity to launder black money to the legal sector. Similarly, we distinguish between the legal sector (the equivalent of the white market) and the illegal sector (black market). Note that illegal here simply stands for the avoidance of taxes, as opposed to illegal criminal activities, which we do not consider.

In the following section we first present our model which examines an unanticipated tax amnesty. Then, we turn to the regulators' decision whether to declare an amnesty, consider general welfare effects, and provide a brief numerical example. After that, we analyze the taxpayers' decision in anticipation of an amnesty. Finally, we are concluding with a brief

⁶ Data from the International Monetary Fund (IMF), IFS.

⁷ Colombia had not participated in the tariff-reducing GATT/WTO rounds prior to the reforms because of the exemption in article XVIII of GATT, they used tariffs as one of the primary policy tools

⁸ Information taken from the CIA factbook.

⁹According to India's Ministry of Finance. In particular, <http://indiabudget.nic.in/es97-98/chap22.pdf> gives an overview for the VDIS '97.

discussion of our results. To simplify reading we will mostly use the term liberalization to denote economic prosperity, technological progress, and changes in the business environment in general.

2. An Unanticipated Amnesty in the Time of Changing Economic Conditions

2.1 Tax Compliance without Amnesty

Consider risk-neutral agents, each with an identical project that has a two period life, and yields the net income Y in each period.¹⁰ An agent chooses either to register her business (operate in the formal sector) or to remain unregistered and operate in the informal sector. She also faces the choice of either paying the income tax at the proportional rate t or hiding her income. We assume, reasonably, that compliance with the requirements of the Tax Authority (TA) automatically ensures registration, but that the converse is not necessarily true: a business that is registered may choose to evade taxes. However, non-compliance by a registered project is easier to detect due to its greater visibility; projects in the informal sector are more difficult to trace and monitor. Let m be the exogenous probability of detection of a tax evader in the informal sector and μ the corresponding probability in the formal sector.¹¹ The sectoral difference in the ease of detection implies that $m < \mu$. For ease of exposition, we assume the tax and the fine to be proportional to Y . If caught, an agent is forced to pay the fine fY in addition to her outstanding taxes, tY . Furthermore, detection of non-compliance in period 1 forces the agent, as part of the detection process, to be visible (or registered) in period 2.

As discussed in the previous section, our benchmark case is the situation where, in the absence of the tax amnesty, the equilibrium of the two period model is one where the agent initially (i.e. in period 1) chooses to be non-compliant. Against this background, we examine the difference that the introduction of a tax amnesty may implement. Accordingly, we introduce assumptions that are necessary for our benchmark outcomes.

Assumption (A.1):
$$0 < \frac{t}{t+f} < \mu \leq 1$$

¹⁰ We avoid incorporating risk aversion, or other psychological/behavioral aspects, such as feelings of guilt, so as not to confuse our analysis with factors that earlier papers have demonstrated to have positive effects on the success of a tax amnesty.

¹¹ It may be argued that being caught operating in the illegal sector will incorporate an additional fine for operating an unlicensed business. This amounts to assuming a higher expected penalty, which, in this paper, is the result of a higher m .

As will be subsequently demonstrated, (A.1) ensures compliance of all formal sector projects. We also assume that an agent can only be fined up to the amount she earned in the given period, so as to make our analysis robust to the constraint of limited liability.¹²

Assumption (A.2):
$$t + f \leq 1$$

Now suppose that an agent has been non-compliant in period 1. If detected in the same period, the project is registered. Non-compliance in period 2 then results in $Y - \mu(t + f)Y$ as her expected payoff, while her compliance payoff is $(1 - t)Y$. If she remains undetected in period 1, her corresponding expected payoff is $Y - m(1 + \mu)(t + f)Y$. That is, the unregistered project may be detected with probability m and penalized. If detected, its details are “visible”, including past records, in which case the probability that her period 1 non-compliance is also detected is the same as the higher probability μ . If she decides to be compliant in period 2, her expected payoff is, following the same course of reasoning, $(1 - t)Y - \mu(t + f)Y$.

Comparing the above payoffs, it is easy to see that, given (A.1), detection of non-compliance in period 1 is followed by compliance in period 2. If the agent has been undetected in period 2, she will not comply in period 2 if

$$m < \frac{(1+\mu)t+\mu f}{(1+\mu)(t+f)} \quad (1)$$

What is the optimal decision in period 1? If the agent chooses to comply, her two period payoff is $2(1 - t)Y$. If she is non-compliant, then, with probability m she is audited, and is subsequently compliant in period 2. With probability $(1 - m)$ she avoids detection in period 1, and is also non-compliant in period 2. Thus, she will choose to be non-compliant in period 1 if

$$Y + m[-(t + f)Y - (1 - t)Y] + (1 - m)[Y - m(1 + \mu)(t + f)Y] \geq 2(1 - t)Y \quad (2)$$

For the satisfaction of (2), we need the following assumption

Assumption (A.3):
$$0 < m < \frac{t(1-\mu)}{t(1-\mu)+f}$$

Note that $\frac{(1+\mu)t+\mu f}{(1+\mu)(t+f)} > \frac{t}{t+f} > \frac{t(1-\mu)}{t(1-\mu)+f}$. Thus, (A.3) also implies the satisfaction of (1), and the assumption that $\mu > m$. The consequence of (A.1) and (A.3) is an SPNE where an agent chooses to be a tax evader in the informal sector, and remains so if undetected. That tax evasion is predominantly the characteristic feature of the informal (or illegal) sector, and that the purpose of the amnesty is to encourage businesses to register and emerge out of the underground economy,

¹² This also eliminates inessential adjustments to non-negative expressions in the payoff functions, and reduces algebra.

is an observable fact abundantly borne out by journalistic and anecdotal observations. The above assumptions enable us to focus our model to the examination of this case.

Proposition 1: *Given (A.1) – (A.3), the absence of a tax amnesty implies that, in period 1, agents choose to be in the informal sector (or the underground economy) in order to avoid paying taxes, and, if undetected, remain so and non-compliant in period 2. Agents are compliant and registered in period 2 only if detected and penalized in period 1.*

Proof: Follows from the above analysis.

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2.2 Tax Amnesty in times of Prosperity

We now consider the effect of a tax amnesty that is declared concomitant with the onset of economic prosperity, or significant jumps in productivity and incomes. As discussed, such improvements may result from policy changes, such as liberalization, which open up the economy to international markets, encourage exports, and allow inflow of improved technology and foreign direct investments. We assume that the effect of these changes positively affects an agent's productivity in period 2 and increases her income to $Y + \theta$. Thus, θ can be taken to represent the impact of liberalization in our model. Later in this section, we consider the possibility of liberalization having different effects on different agents by allowing θ to be heterogeneous.

We furthermore suppose that the benefits of liberalization are available only in the formal or legal sector of the economy. That is, an agent can earn the additional income θ only if she is operating a legally registered business in period 2. Imports, purchase of new technology, or access to improved infrastructure may only be possible through legal and visible channels. Foreign direct investments may not want to operate in the informal sector because of problems of enforceability of contracts. The increment θ is, for now, assumed to be completely unanticipated (or unexpected) in period 1. We also assume that, at the beginning of period 2, the government declares a full amnesty on the penalty (fY) on period 1 tax evasion if an agent declares and pays her past taxes (and in the process, becomes a registered enterprise in the formal sector).¹³ This amnesty is also – for now – unanticipated by all agents. In summary, the sequence of actions goes as follows:

1. The agent decides about her action in period 1. In the given setup she will decide to cheat on her tax report and pay no taxes.

¹³ In reality, there are different forms of amnesties; some forgive all fines plus parts of the indebted taxes (Das-Gupta et. al call these sales), others forgive only parts of the owed fines etc. For simplicity, we focus on an amnesty where all eventual fines are waived, but the initial tax debt must be paid. Our model could be extended towards amnesties which are 'sales' or other combinations of forgiving fines and/or taxes owed. Qualitative results remain the same, but may change quantitatively.

2. Liberalization / technological progress θ occurs at the beginning of period 2.
3. Simultaneously, the regulator declares an amnesty by waiving eventual fines. People who take the amnesty only need to pay outstanding taxes.
4. The agent decides whether to take the amnesty (and benefit from θ) or to remain in the illegal sector.

It is easy to see that, in the absence of non-linearities, partial compliance is never optimal in our model. Therefore, the agent will either pay no taxes at all or pay them in full. With complete lack of anticipation of either the impact of liberalization on productivity of her project, or of the amnesty, the agent's period 1 decision is the same as in the absence of θ -- she decides to pay no taxes.¹⁴ In period 2, realization of the possibility of higher income and the knowledge of the amnesty, however, may change her equilibrium decisions.

Recall that, if apprehended for non-payment in period 1, the agent is no longer able to operate in the informal sector. Such an agent will earn $Y + \theta$ in period 2, and pay her taxes if

$$(1 - t)(Y + \theta) > Y + \theta - \mu(t + f)(Y + \theta) \quad (4)$$

Given (A.1), compliance is the optimal action here. In case the agent has not been apprehended for non-payment of taxes in period 1, her optimal decision in period 2 depends on the relative magnitudes of two alternative payoffs¹⁵

Accepting the amnesty earns

$$(1 - t)(Y + \theta_i) - tY \quad (5)$$

If, instead, the agent remains in the informal sector, and is non-compliant, her payoff is

$$Y - m(1 + \mu)(t + f)Y \quad (6)$$

Comparing (5) to (6) we see that the agent strictly prefers the amnesty if $\theta > \theta_1$, where

$$\theta_1 = Y \frac{2t - m(1 + \mu)(t + f)}{1 - t} \quad (7a)^{16}$$

Notice that (7a) can be rewritten as

¹⁴ Non-anticipation essentially implies that the agent regards period 2 in exactly the same way as in section 2.1.

¹⁵ There is also the option of operating in the legal sector (and taking advantage of θ_i), but not taking the amnesty. In this case, the agent runs the risk of being caught in the legal sector. His payoff would be smaller than taking the amnesty as $(1 - t)(Y + \theta_i) - tY > (1 - t)(Y + \theta_i) - \mu(t + f)Y$. Hence, the case of operating legally without accepting the amnesty is ruled out by a rational agent.

¹⁶ (7a) > 0 as $2t > m(1 + \mu)(t + f)$ for every m and μ satisfying (A.3) and (A.1) respectively.

$$\frac{\theta_1}{Y} = \frac{2t - m(1+\mu)(t+f)}{1-t} \quad (7b)$$

i.e. the proportional (or percentage) gain in the agent's income must exceed a critical value for the amnesty to be effective.

As (7a) shows, the availability of new and enhanced opportunities in the formal sector must be significant enough to make a tax amnesty viable. Otherwise, the agent remains non-compliant in the informal sector, and policies promoting liberalization and technological development may have a significantly reduced effect.

Note, from (7a), that $\frac{\partial \theta_1}{\partial m} < 0$ and also $\frac{\partial \theta_1}{\partial f} < 0$ which confirms earlier findings in the literature (Uchitelle 1989; Alm, McKee, and Beck 1990, among others) about the effect of higher fines and stricter enforcement methods. The threshold for a viable amnesty is lower if the amnesty is accompanied by higher fines and stricter methods of enforcement.

Proposition 2: *If the agent has no prior anticipation of the amnesty, or her gains from liberalization, she will not find it optimal to accept the amnesty offered unless liberalization has a significant impact on her income.*

Proof: Follows from the above analysis.

2.3 *Amnesty and the Regulator's Revenue*

From the TA's point of view, an amnesty is desirable if it generates more revenue than the alternative case of no amnesty. Consider the situation where, in period 2, no amnesty is offered, even though liberalization increases the agent's income to $Y + \theta$. If the agent pays her taxes in the second period, and earns the higher income, without paying her past taxes, her payoff is

$$(Y + \theta_1)(1 - t) - \mu(t + f)Y \quad (8)$$

The first term measures the gains from the current period, whereas the second term captures the expected penalty from the detection of previous tax evasion. As the agent operates in the legal sector now, her probability of detection is μ . Comparing this option with the choice of remaining in the illegal sector, as given by (6), we see that the agent will chose to pay taxes in period 2, even without an amnesty, if $\theta > \theta_2$, where

$$\theta_2 = Y \frac{t+\mu(t+f)-m(1+\mu)(t+f)}{1-t} \quad (9)$$

Given (A.1), θ_2 is strictly greater than θ_1 .

Now suppose that there are two types of agents, differentiated by their gains from liberalization.¹⁷ One type, θ_L , enjoys a lower gain in income from liberalization; the other type, θ_H , enjoys a higher gain.¹⁸ Specifically, we assume that n_i is the number of the type i agent, with $i = L$ or H , and that

$$(A.4) \quad \theta_1 < \theta_L < \theta_2 < \theta_H$$

An amnesty increases the regulator's expected revenue from a low type agent. As already shown, if such an agent is apprehended for non-payment of taxes in period 1, she is compliant in period 2, and declaration of an amnesty makes no difference to the revenue collected from her; if she avoids detection in period 1, she accepts the amnesty if offered, otherwise, she stays non-compliant in the informal sector. Since, by (A.4), $\theta_L > \theta_1$, from (7a), we derive

$$2tY + t\theta_L > m(1 + \mu)(t + f)Y \quad (10)$$

The LHS represents the payoff from a low-type-agent who accepts the amnesty, whereas the RHS is the expected penalty collected from the same agent in the absence of the amnesty (when she remains non-compliant in the informal sector). Thus, (10) shows that, for the low-type agent, the regulator's revenue from an amnesty exceeds the potential revenue from not declaring an amnesty.

But, what about the high-type agent? She will move to the legal sector in both cases: whether an amnesty is offered or not. For this agent, it is easy to see that, given (A.1)

$$2tY + t\theta_H < (Y + \theta_H)t + \mu(t + f)Y \quad (11)$$

and the regulator's revenue is greater when no amnesty is declared. The LHS represents the regulator's payoff from the high-type agent when an amnesty is offered. The RHS describes the regulator's payoff from a high-type agent when no amnesty is offered. In this case, she pays her current taxes $(Y + \theta_H)t$ and in addition faces the probability μ of being penalized for past tax evasion (as she operates in the legal sector now).

For an amnesty to result in higher revenue to the TA, the following condition must hold:

¹⁷ In reality, there would be a variety of agents. The distribution could either assumed to be uniform or normal. Our example simply tries to capture the general idea of a comparison of the regulator's revenue in both with and without an amnesty declared in times of liberalization.

¹⁸ The case of $\theta < \theta_1$ becomes trivial as the agent will always find it optimal to remain in the illegal sector. Thus, the regulator's payoff from this agent is the same whether an amnesty is offered or not.

$$n_L[2tY + t\theta_L] + n_H[2tY + t\theta_H] \geq n_L m(1 + \mu)(t + f)Y + n_H[\mu(t + f)Y + (Y + \theta_H)t] \quad (12a)$$

The LHS states potential revenue from both types in case an amnesty is declared, whereas the RHS summarizes revenue in the case of no amnesty being declared. (12a) leads to a necessary ratio of low- to high-type agents for a successful amnesty:

$$\frac{n_L}{n_H} \geq \frac{\mu(t+f)-t}{t[2+\frac{\theta_L}{Y}]-m(1+\mu)(t+f)} \quad (12b)$$

Proposition 3: *From the TA's point of view, an amnesty is successful (i.e. results in higher revenue) only if the proportion of low type agents (those who benefit moderately from liberalization) is high enough, relative to the high type agents (those who gain substantially from liberalization), so as to satisfy condition (12b).*

The proof is obvious from the previous analysis. Intuitively, if the benefits from liberalization exceed θ_2 for most agents, they will move to the legal sector even though they may be detected for previous tax evasion. This happens even in the absence of a tax amnesty. Consequently, the TA gains more by persecuting tax evaders than by offering an amnesty.

2.4 Welfare Implications of an Amnesty

Concluding our basic model, we are now turning to the general welfare effects of an unanticipated tax amnesty. From the agent's perspective – both the high- and low-type – a tax amnesty gives her an additional option without constraining her initial possibilities. Therefore, the amnesty cannot make the agent worse off in our given setup.¹⁹ From the regulator's perspective offering an amnesty may not always be the optimal choice, as we have shown in the previous section. The ratio of low- to high-type agents plays a crucial role. Namely, if there are relatively few low-type agents in society, revenue from monitoring and catching tax evaders will exceed revenue from an eventual amnesty. Does this result hold for overall welfare effects? To answer this question, we compare gains and losses from both the TA, low-type, and high-type agents when an amnesty is offered vs. no amnesty. For simplicity, assume $n_L + n_H = 1$ in the following analysis. Namely, if

$$2tY + n_L t\theta_L + n_H t\theta_H + n_L[(Y + \theta_L)(1 - t) - tY] + n_H[(Y + \theta_H)(1 - t) - tY] \geq n_L m(1 + \mu)(t + f)Y + n_H[t(Y + \theta_H) + \mu(t + f)Y] + n_L[Y - m(1 + \mu)(t + f)Y] + n_H[(Y + \theta_H)(1 - t) - \mu(t + f)Y] \quad (13a)$$

¹⁹ If the amnesty was accompanied by stronger enforcement methods or higher fines however, this argument may not hold. Also, moral costs may play a role in case somebody neglects the amnesty and gets caught in a later period.

then the amnesty improves overall societal welfare.

The LHS summarizes society's gains from offering an amnesty. The first three terms constitute the TA's revenue, whereas the last two terms states the after-tax revenue for the agents accepting the amnesty. The RHS of (13a) collects society's gains without an amnesty being offered. The first two terms sum up the TA's revenue, and finally the last two terms of the inequality represent the agent's revenue.

Inequality (13a) eventually simplifies to a welfare improvement of an amnesty if

$$n_L \geq 0 \tag{13b}$$

Proposition 4: *If there exists at least one low-type agent in society, a tax amnesty will have positive welfare effects. By not declaring an amnesty, society will be deprived of $n_L \theta_L$ as the transition to the legal sector will not be beneficial for the low-type agent.*

Proof: Follows from the above analysis.

Note that the TA may not have an incentive to offer a tax amnesty, given that the proportion of low-type agents is not high enough to fulfill (12b), even though the amnesty would be beneficial regarding overall societal welfare.

3. A Numerical Example

To conclude our basic model, we want to provide an example of the above results. As mentioned earlier, our focus lies more on developing economies. Hence, imagine a country with a per-capita GDP of \$ 10,000 with a tax rate t of 25 percent. Also, imagine the probability of catching tax evaders in the legal sector, μ , to be 60 percent – as opposed to the probability of detecting tax evaders in the illegal sector, m , being 30 percent. As mentioned above, legal sector businesses are easier to monitor, thus $m < \mu$. Finally, assume the fine for tax evasion, f , to take on a value of 40 percent of income Y . In summary:

- $f = 0.4$
- $t = 0.25$
- $m = 0.3$
- $\mu = 0.6$

This scenario satisfies our initial assumptions (A.1) and (A.2) and assures non-compliance in our basic setup (equation (2) is satisfied). (7a) then gives a necessary minimum value of

approximately \$ 2,500 for θ_i . In relation to our presumed Y, this would mean an increase of possible income in the legal sector by 25 %, which appears to be attainable, especially in developing countries. Remember that we only require θ_i to occur on an individual level. Most likely, some industries or geographic areas may experience these chances of progress, but not the entire economy.

Regarding the regulator's revenue, the main question is whether an amnesty may be beneficial as opposed to not offering an amnesty and pursuing tax evaders. Looking at (9), if liberalization exceeds a value of \$ 4,373 (or 43 percent of the initial Y), the option of monitoring and convicting tax evaders dominates offering an amnesty in terms of revenue.²⁰ This decision will then be governed by how many people fall under the definition of a low-type agent ($\$ 2,500 < \theta < \$ 4,373$) as opposed to the fraction of society falling under the high-type category ($\theta > \$ 4,373$). Namely, equation (12b), the relationship between low- and high-type agents in our economy, plays a crucial role. As θ_L is bounded by (A.4), we can calculate a range of 0.47 to 0.559 for $\frac{n_L}{n_H}$ to guarantee a successful amnesty. Hence, a successful amnesty requires approximately one third of the population to fall under the category of a low-type agent. In other words, for at least one out of three agents, liberalization has to have an effect of increasing income by 25 to 43 percent to make an amnesty lucrative for the regulator. If more than two thirds of the population experiences a growth in income of over 43 percent, not offering an amnesty generates more revenue than an amnesty would. Remember that we only consider tax evaders – consequently, our ‘population’ represents tax evaders only.

4. The Role of Anticipation

Previous literature has mostly recognized a higher likelihood of an upcoming tax amnesty to have a weakening effect on its success. As mentioned in our introductory section, anticipation may have negative effects in terms of compliance and revenue – before and after the amnesty is declared. One can think of several intuitive reasons for this, two of them could be summarized as follows:

- i) The TA's credibility may be degraded. By perceiving the probability of an amnesty coming up, taxpayers may think that enforcement mechanisms are not as strong as initially thought to be.

²⁰ Note that we are not considering the effects of post-amnesty periods here. Various assumptions would have to be made as to how liberalization affects future periods and also whether an amnesty may be beneficial to offer in a future period. This concern remains to be addressed by future research.

- ii) Morally, tax evasion may become a ‘gentleman’s crime’. People may think that if the TA will offer an amnesty, tax evasion is fairly common and not as outlawed as initially thought.

Both reasons would lead to more tax evasion in a pre-amnesty period. Now, since in our present model it is optimal for the agent to cheat on her tax report in period 1, this analysis would be redundant. However, if agents can perceive a certain probability of a future tax amnesty – then the probability of an upcoming liberalization is likely to be perceivable as well. Hence, we analyze the agent’s decision whether to cheat or not in period 1, combining (perceived) probabilities of an upcoming amnesty and liberalization.

Facing the options whether to comply or cheat on taxes in period 1, people assign a probability p to a tax amnesty being declared in period 2. Further, we assign a probability σ to technological progress θ_i occurring in the second period. Both p and σ are perceptions shared by all citizens. Here, people are assumed to only be heterogeneous in terms of θ_i , their individual prospect of progress.²¹ We suppose that both probabilities have no direct correlation with each other, e.g. a high σ does not imply a high p , or vice versa. Notice that we recover our basic model of no anticipation by setting $p = \sigma = 0$. Consequently, there will be no amnesty with probability $1-p$ and, independently of p , there will be no progress with probability $1-\sigma$. In order to simplify presentation, we introduce two parameters:

$$a = Y - m(1 + \mu)(t + f)Y \quad (13)$$

and

$$b = (Y + \theta_i)(1 - t) - tY. \quad (14)$$

where a represents the payoff from remaining in the illegal sector. B describes the payoff from accepting the amnesty.

4.1 *The low-type agent*

A low-type agent faces the following problem in period 1, where the LHS summarizes the expected payoffs from cheating vs. the payoffs from being honest on the RHS. If

$$Y + m[-(t + f)Y + \sigma(Y + \theta_L)(1 - t) + (1 - \sigma)(1 - t)Y] + (1 - m)[\sigma pb + (1 - \sigma p)a] \geq 2Y(1 - t) + \sigma\theta_L(1 - t) \quad (15a)$$

²¹ This artificial generalization simplifies our analysis. However, one can think of the realized p and σ as means of a normal or uniform distribution.

then she will decide to cheat in period 1. The agent first receives her income Y and does not pay taxes. With probability m she will get caught and has to pay $(t+f)Y$, her outstanding taxes plus her fine for cheating. The convicted tax evader stays in the legal sector, liberalization occurs with probability σ , and she earns the payoff $(Y + \theta_L)(1 - t)$ in the second period. Alternatively, she gains $(1 - t)Y$ with probability $(1 - \sigma)$ if no liberalization occurs.

With probability $(1 - m)$, the agent's tax evasion is not detected and she has several options in period 2. If both the amnesty and liberalization set in with probability σp she finds it optimal to move to the legal sector, accept the amnesty, and repay her hidden taxes (payoff b from (14)). However, in every other scenario – noted by $(1 - \sigma p)$ – it is optimal for her to remain in the illegal sector and receive the payoff a (as stated in (13)).

The RHS of inequality (15a) specifies the agent's payoff from operating in the legal sector from the very beginning. She then receives $Y(1-t)$ in both periods and in addition with probability σ , assuming liberalization sets in, $\theta_L(1 - t)$ in period 2.

The decision of cheating in period 1 is equivalent to running the risk of not being able to profit from θ_L if both the progress occurs (with σ) and there is no amnesty (with $1-p$). (15a) leads to a direct relationship of p and σ described by

$$p \geq \frac{\frac{mY(t+f)-tY}{1-m} + (Y + \sigma\theta_L)(1-t) - a}{\sigma(b-a)} \quad (15b)$$

If (15b) holds, it is optimal for the low-type agent to cheat on taxes in period 1.

4.2. *The high-type agent*

The decision in period 1 whether to cheat or not will be different for the high-type agent compared to the low-type. First, the respective payoff obviously changes from θ_L to θ_H . Consider the scenario of realized liberalization, but no amnesty is declared: the high-type will move to the legal sector, accepting the risk of being caught for earlier tax evasion – as opposed to the low-type for whom this decision is not profitable (as shown above). Therefore, the high-type's profit comparison can be expressed as

$$Y + m[-(t + f)Y + \sigma(Y + \theta_H)(1 - t) + (1 - \sigma)(1 - t)Y] + (1 - m)\{\sigma pb + (1 - \sigma)a + \sigma(1 - p)[(Y + \theta_H)(1 - t) - \mu(t + f)Y]\} \geq 2Y(1 - t) + \sigma\theta_H(1 - t) \quad (16a)$$

where the LHS represents payoffs from cheating in period 1 vs. the RHS, which outlines payoffs from being an honest taxpayer. Hence, the high-type agent will decide to cheat in the first period if

$$p \geq \frac{(1-\sigma)(1+\mu)(t+f)m + \sigma[t+\mu(t+f)] - 2t + \frac{mf}{1-m}}{\sigma[\mu(t+f) - t]} \quad (16b)$$

The relationship of p and σ for both agents can be depicted as in Figure 1.

Insert Figure 1 here

In general, it can be seen that honesty increases if the belief in upcoming liberalization (σ) is high. Alternatively, if σ is relatively low, i.e. people place a low probability of an event such as liberalization/progress occurring in period 2, then more people cheat in period 1. Now, imagine the progress does occur – a tax amnesty in that very period will turn out to be successful in terms of revenue and compliance as cheating was the optimal action in period 1. Conversely, if liberalization is highly anticipated more people will decide to pay taxes in the first place, leaving no or few tax evaders as a target for an amnesty.

Proposition 3.

Generally, a tax amnesty is more successful if liberalization (or technological progress) is unanticipated.

Since the functions for both types intersect, we can see that the agents react in a different way to various amnesty probabilities. In particular, the following 2 scenarios are interesting to consider:

- i) Low σ ($A < \sigma < B$) / low p : The high-type is honest, whereas the low-type will find it profitable to cheat.
- ii) High σ ($C < \sigma < D$) / high p : The high-type cheats, but the low-type will be honest.

There is a combination of σ and p where the low-type cheats, but the high-type finds it optimal to file her taxes honestly (case i)). Interestingly, those reactions reverse using another combination of σ and p (case ii)). Hence, we cannot claim that one agent is more inclined to cheat in general – it will depend on the combination of σ and p .

In general, the high-type agent seems to be more elastic towards changes in the perception of an upcoming amnesty. In other words, the probability of an amnesty being declared in the future plays a larger role if the effect of a possible liberalization, θ , is considerable enough.

Proposition 4.

Anticipation of an amnesty plays a larger role if the expected liberalization effect θ is high. Namely, if taking advantage of new possibilities – established by liberalization – without paying previous taxes is superior to remaining in the illegal sector, then the agent is more sensitive with respect to the probability of an upcoming amnesty, p .

The intuitive reason for Proposition 4 is the following: when considering whether to cheat or not in the first period, both agents face the eventuality of liberalization occurring, but no amnesty being offered. In that case, the low-type will not be able to take advantage of the liberalization, as switching to the legal sector without paying previous taxes is inferior to remaining in the illegal sector. The high-type on the other hand will still be able to profit from θ as her payoff from switching to the legal sector without paying previous taxes is superior to remaining illegal. When considering the various possible scenarios, she can choose from three options as opposed to two available options for the low-type. Therefore, the high-type's decision is more complex and more sensitive with respect to changes in the amnesty probability. For high σ 's she is more inclined to cheat than the low-type agent, whereas for low σ 's she tends to comply more.

5. CONCLUSION

This paper examines tax amnesties in the light of changing economic conditions. What if, during the time of the amnesty, liberalization and/or technological improvement (θ) occurs? We assume that citizens can only take advantage of this possibility by operating in the legal sector. For instance, in order to profit from liberalization it may be necessary to be registered or to acquire a license. First, we show that if θ is above a critical value, which may vary for each individual, an unanticipated amnesty will be accepted. Second, an amnesty is likely to generate higher revenues for the TA than monitoring and fining convicted tax evaders, given a specific range of θ_i . However, if θ_i exceeds a certain level (a very profitable effect of liberalization) for a high portion of agents, it may be beneficial in terms of revenue to refrain from the option of offering an amnesty. Then, persecuting tax evaders generates more revenue than an amnesty would. Third, a tax amnesty improves social welfare as long as there exists one agent whose gains from liberalization are high enough to accept the amnesty – but not high enough to move to the legal sector in the event of no amnesty being declared (the threat of the higher fine in the legal sector deters her). Combining the previous two arguments, there exists a case of no amnesty being declared, even though it would improve overall social welfare. Note that a crucial assumption of this model is the possibility for the agent to move to the legal sector without paying her previous taxes. She then runs a higher risk of being detected than in the illegal sector, but is still able to take advantage of the liberalization effects. If acquisition of the new

technology (e.g. taking advantage of liberalization) required a rigorous disclosure of previous business activities for instance, this effect would not be possible. Fourth, the success of an amnesty is likely to be higher if the amnesty occurs unanticipated (confirming earlier findings in the literature such as Malik and Schwab, 1991, Alm et. al 1990). Anticipation may lead agents to cheat in the pre-amnesty period – this could be described as a ‘wait-and-see’ policy in the illegal sector if θ_i really sets in. Fifth and final, the regulator’s revenue is higher when liberalization is unanticipated. In that case, agents will find it beneficial to cheat on their taxes in the pre-amnesty period, not expecting the new chances in period 2. A tax amnesty would then ease their transition to the legal sector, where they can enjoy the benefits of liberalization.

As for future research, it may be useful to further investigate the long-run effects of tax amnesties in the context of liberalization, maybe in an infinite horizon-model. Also, we take θ_i , the variable of future progress or liberalization, as exogenous; it may be of value to investigate our approach in the setting of growth models, where θ_i evolves. Finally, it may also be interesting to test the empirical validity of our results.

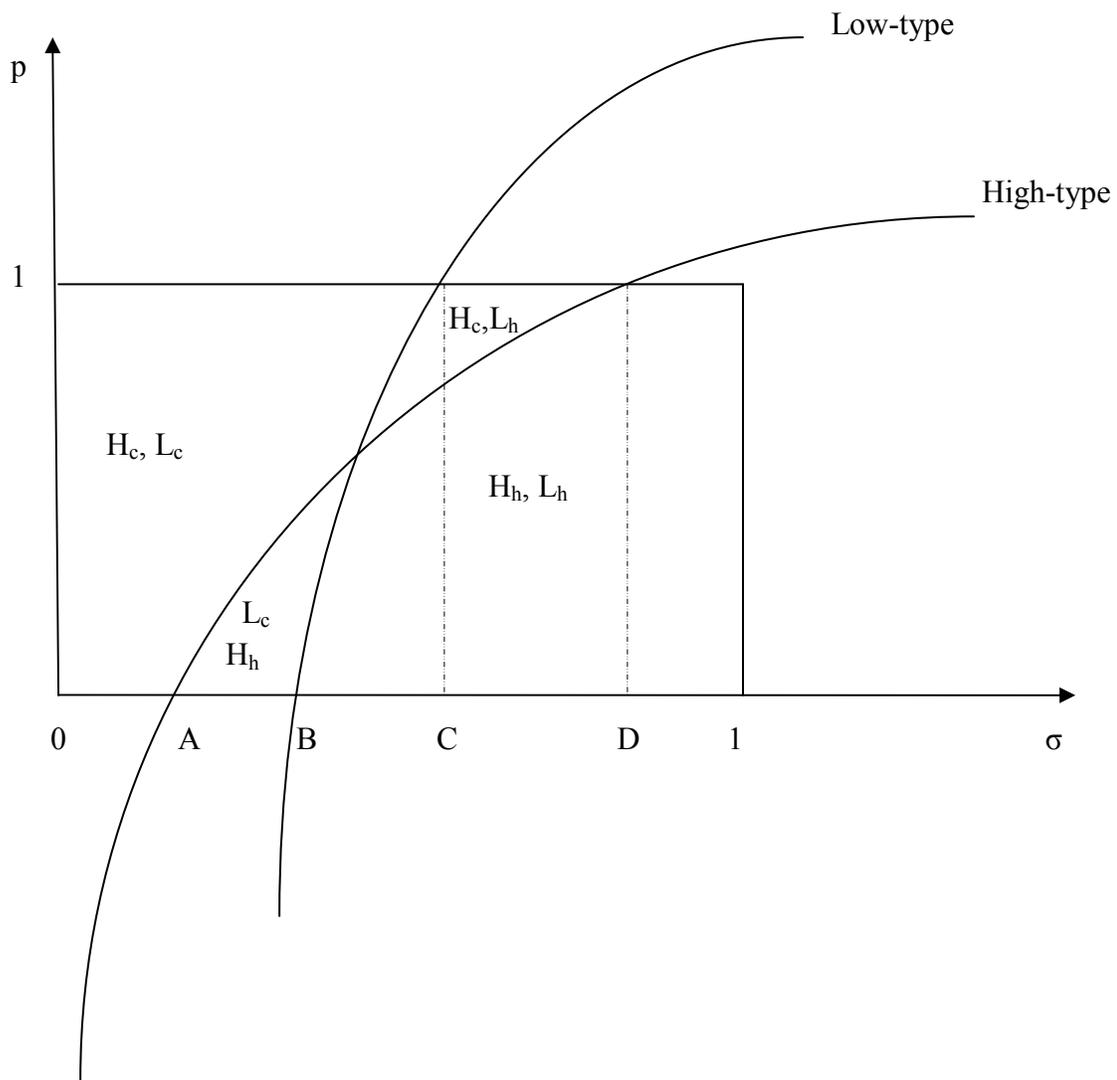


Figure 1.

The relationship of p (anticipated probability of an amnesty) and σ (anticipated probability of liberalization/technological progress). H= High-type, L= Low-type. Subscripts denote cheating or honest.

Appendix

Derivation of (1):

$$Y - m(1 + \mu)(t + f)Y \geq Y(1 - t) - \mu(t + f)Y$$

Canceling Y's and isolating m gives

$$m \leq \frac{t + \mu(t + f)}{(1 + \mu)(t + f)} = \frac{(1 + \mu)t + \mu f}{(1 + \mu)(t + f)}$$

Derivation of the lower limit of (A.3) using (2):

$$Y - m[(t + f)Y - (1 - t)Y] + (1 - m)[Y - m(1 + \mu)(t + f)Y] \geq 2(1 - t)Y \quad (2)$$

the L.H.S. of (2) is strictly greater than

$$Y - m[(t + f)Y - (1 - t)Y] + (1 - m)[Y - t(1 + \mu)Y].$$

Rearranging gives

$$m \leq \frac{t(1 - \mu)}{t(1 - \mu) + f}$$

Deriving (15b) from (15a):

$$Y + m[-(t + f)Y + \sigma(Y + \theta_L)(1 - t) + (1 - \sigma)(1 - t)Y] + (1 - m)[\sigma pb + (1 - \sigma p)a] \geq 2Y(1 - t) + \sigma\theta_L(1 - t) \quad (15a)$$

(15a) can be rewritten as

$$m[-(t + f)Y + \sigma\theta_L(1 - t) + Y(1 - t)] + (1 - m)[\sigma pb + (1 - \sigma p)a] \geq Y - 2tY + \sigma\theta_L(1 - t).$$

Isolating p gives

$$p(1 - m)\sigma[b - a] \geq (1 - m)[Y + \sigma\theta_L](1 - t) - tY + m(t + f)Y - (1 - m)a$$

From here

$$p \geq \frac{\frac{mY(t + f) - tY}{1 - m} + (Y + \sigma\theta_L)(1 - t) - a}{\sigma(b - a)} \quad (15b)$$

follows.

Derivation of (16b) from (16a):

$$Y + m[-(t + f)Y + \sigma(Y + \theta_H)(1 - t) + (1 - \sigma)(1 - t)Y] + (1 - m)\{\sigma pb + (1 - \sigma)a + \sigma(1 - p)[(Y + \theta_H)(1 - t) - \mu(t + f)Y]\} \geq 2Y(1 - t) + \sigma\theta_H(1 - t) \quad (16a)$$

First, notice that θ_H cancels out since

$$b = (Y + \theta_i)(1 - t) - tY. \quad (14)$$

Then

$$\begin{aligned} p(1 - m)\sigma\{b - [(Y + \theta_H)(1 - t) - \mu(t + f)Y]\} \\ \geq m(t + f)Y - mY(1 - t) - (1 - m)(1 - \sigma)a \\ - (1 - m)\sigma[Y(1 - t) - \mu(t + f)Y] + Y - 2tY \end{aligned}$$

Using the fact that $a = Y - m(1 + \mu)(t + f)Y$, Y 's canceling out and simplifying both sides:

$$p\sigma[\mu(t + f) - t] \geq (1 - \sigma)(1 + \mu)(t + f)m + \sigma[t + \mu(t + f)] - 2t + \frac{mf}{1 - m}$$

from which (16b) follows.

Figure 1 – using (15b) for the low-type agent and (16b) for the high-type:

$$\text{Point A (high-type, } p = 0): \quad \sigma_A = \frac{2t - m(1 + \mu)(t + f) - \frac{mf}{1 - m}}{t - m(1 + \mu)(t + f) + \mu(t + f)}$$

$$\text{Point B (low-type, } p = 0): \quad \sigma_B = Y \frac{2t - m(1 + \mu)(t + f) + \frac{t - m(t + f)}{1 - m}}{\theta_L(1 - t)}$$

$$\text{Point C (low-type, } p = 1): \quad \sigma_C = \frac{t - m(1 + \mu)(t + f) + \frac{t - m(t + f)}{1 - m}}{2t - m(1 + \mu)(t + f)}$$

$$\text{Point D (high-type, } p = 1): \quad \sigma_D = \frac{2t - m(1 + \mu)(t + f) - \frac{mf}{1 - m}}{2t - m(1 + \mu)(t + f)}$$

References

- Alm, James, Beck, William (1993), 'Tax Amnesties And Compliance In The Long Run: A Time Series Analysis', *National Tax Journal*, Vol. 46, no.1
- Alm, James, McKee, Michael, Beck, William (1990), 'Amazing Grace: Tax Amnesties And Compliance', *National Tax Journal*, Vol. 43, no.1
- Andreoni, James (1991), 'The desirability of a permanent tax amnesty', *Journal of Public Economics* 45, 143-159
- CIA Factbook 1990 and 1998; <http://nodedge.com/CIAWFB/>
- Das-Gupta, Arindam, Mookherjee, Dilip (1995), 'Tax Amnesties In India: An Empirical Evaluation', IRIS-India Working Paper No.4
- Andreoni, James, Erard, Brian, Feinstein, Jonathan (1998), 'Tax Compliance', *Journal of Economic Literature*, Vol. 36, No. 2, pp. 818 – 860
- Das-Gupta, Arindam, Mookherjee, Dilip (1996), 'Tax Amnesties as Asset-Laundering Devices', *Journal of Law, Economics, & Organization*, Vol.12, No.2
- Goldberg, Pinelopi Koujianou, Pavcnik, Nina, 'Trade, Inequality, and Poverty: What Do We Know?', *Brookings Trade Forum*, 2004
- Graetz, Michael, Wilde, Louis (1993), 'The Decision by Strategic Nonfilers to Participate in Income Tax Amnesties', *International Review of Law and Economics* 13, 271 – 283
- Macho-Stadler, Ines, Olivella, Pau, Perez-Castrillo, David (1999), 'Tax Amnesties in a Dynamic Model of Tax Evasion', *Journal of Public Economic Theory*, 1 (4), 439 – 463
- Malik, Arun S., Schwab, Robert M. (1991), 'The economics of tax amnesties', *Journal of Public Economics* 46, 29-49
- Marchese, Carla, Cassone, Alberto (2000), 'Tax Amnesty as Price-Discriminating Behavior by a Monopolistic Government', *European Journal of Law and Economics*, 9, 21 – 32
- Ministry of Finance of India, 'Tax Measures: 1997-98', <http://indiabudget.nic.in/es97-98/chap22.pdf>
- Uchitelle, Elliot (1989), 'The effectiveness of tax amnesty programs in selected countries', *Federal Reserve Bank of New York Quarterly Review* 14.n3 (Autumn 1989): pp48(6)