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On the effects of repeated tax amnesties

Miguel A. Sanchez Villalba

Abstract: We examine empirically the effect of tax amnesties on long term tax collection when such amnesties are used by a government as a regular source of revenue.

We use data from the Tucuman province (Argentina) to test the main hypothesis of the model, namely, that amnesties lower the government's revenue, as they reduce the penalties and make evasion more profitable. We find, however, that amnesties do not affect the long-term revenue.

The other main result is in line with the theoretical predictions: the increase in short-run revenue is temporary and only accelerates the collection of the taxes but does not increase the amount collected.

Thus, we conclude that amnesties were used only to obtain a short-run surge in revenue and to avoid more fundamental tax reforms.

Keywords: Tax amnesties, tax evasion

JEL codes: H27, H26, C32

1. Introduction.

In the 1980's, nearly 30 states in the United States, as well as many countries, offered a tax amnesty. Despite the widespread use of this tool, its efficacy as a fiscal instrument remains unclear, and a significant amount of theoretical, empirical and experimental research work has been undertaken in an attempt to reach a final verdict on the issue. Most of the studies focused on one-time amnesties, even when it is known than in many cases they were used repeatedly by the authorities[1].

This essay intends to examine the effect of tax amnesties on long term tax collection where such amnesties are used by a government as a regular source of revenue.

The building block to achieve that goal consists of the empirical analysis of the effects of amnesties in the Argentinian State of Tucuman during the period 1978-1999.

The essay is organized as follows: we define and characterize tax amnesties in section 2 and consider how to evaluate their impact in section 3. In section 4 we review the related literature and in section 5 we develop a theoretical model for tax amnesties. In section 6 we test the theoretical predictions using data from Tucuman, a province in Argentina and, finally, we provide our conclusions in section 7.

2. Tax Amnesties. Characterization.

A strand of the theory on tax evasion (Cowell and Gordon (1988), etc.) suggests that it exists because individuals are not prone to voluntarily finance the optimal level of public goods. The greater the divergence between the perceived individual benefit from public expenditure and the private cost, the greater is the incentive to evade taxes.

Another strand (Allingham and Sandmo (1972), etc.) considers evasion a gamble where people "win" if evasion is not discovered and "lose" if it is. Accordingly, a government could,

[1] Andreoni (1991), who studies the case of permanent amnesties, is one of the exceptions.

supposedly, eliminate it by choosing a level of enforcement such that people find the gamble unattractive.

However, government may be unable to apply the optimal level of enforcement in practice: increasing the audit probability (one of the variables it can use to manipulate enforcement) is costly, and maybe its optimal value cannot be achieved given the budget constraints. Similarly, penalties for evasion, the other instrument that can be used, are generally limited by institutional/feasibility constraints and, despite of being almost costless, the optimal level can be unattainable[2]. In such situations, evading taxes is part of a person's optimal strategy and government must admit that a degree of tax evasion is inevitable: because of its cost, eradicating evasion completely is just not worth it.

Under these circumstances, the discovery of a cheaper way to fight the problem became one of the most important objectives of tax agencies, and tax amnesties came onto the scene.

A tax amnesty is a temporary opportunity that the government offers to people and/or firms that failed to pay their due taxes in earlier periods. The opportunity consists of a partial/total reduction in a person's liabilities generated by previous evasion (unpaid taxes, interest and/or penalties) if that person voluntarily discloses it. In some cases, the government can also commit not to investigate/prosecute them.

Amnesties promised an easy and quick growth in revenue and, even more importantly, would place additional individuals on the tax rolls, in so doing decreasing current evasion as well as –allegedly– improving future compliance. Amnesties appeared to be a "free lunch", and policymakers were easily convinced of their multiple advantages: they would avoid both cuts in public expenditure and higher taxes, and the extra revenue would not come from honest taxpayers but from freeloaders who have been failing to pay their due taxes.

[2] A common constraint on the penalties is that they cannot exceed the residual wealth.

However, some voices rose against amnesties, arguing that their success was not in fact theirs. According to them, the real factor that pushed revenue upwards was that enforcement was tighter once the amnesty finished. Moreover, if this tightening of enforcement activities was not carried out, the end result would be a decline in revenue.

Two opposing positions developed, and people for and against amnesties offered arguments supporting their points of view.

The common arguments in favour (besides the increase in revenue and the addition of new individuals to the tax rolls cited above) ranged from moral to economical reasons. Amnesties would reduce government *administrative costs* as they would free resources that otherwise would be spent in investigating past years' evasion and would allow them to be used to increase today's enforcement[3]. They also allow evaders to reduce their *guilt*, turn over a new leaf and start a new life of compliance. This increase in *future compliance* level may even lead the government to lower statutory tax rates[4]. In addition, the new taxpayers added to the records may provide valuable *information to improve enforcement* and make it cheaper, as the government could analyse their characteristics and find common patterns amongst evaders and take advantage of them. Another argument says that amnesties are good instruments to be used in the *transition* to a system with more severe penalties and that the results are better than if the enhanced enforcement is implemented alone[5]. Finally, more

[3] This is particularly true since the probability of detecting a tax evader typically decreases over time. Hence, amnesties would avoid wasting time and money in hopeless investigations.

[4] With respect to the guilt issue, the argument says that former delinquents may wish to correct their previous illegal actions but are afraid of the prosecution and penalties that normally accompany the discovery of tax evasion. Since penalties are reduced under the amnesty, that fear disappears and they agree to participate in the amnesty. The most appealing way to understand why a person who originally decides to evade taxes then considers participating in an amnesty is by assuming that some kind of uncertainty is present when the first decision is taken, is solved before the second, and the new information changes the circumstances in such a way that the new optimal strategy is to participate in the amnesty. This approach is followed by some authors (Andreoni (1991), Marceau and Mongrain (2000), Malik and Schwab (1991)). Precisely Malik and Schwab (1991) develop a model in which guilt can be understood in an economic environment because people are uncertain about their utility functions. Another model that can capture the idea of guilt is the one of Alm and Beck (1990), based on prospect theory. It allows people to change their opinions as a result of a change in their reference points (by the effect of, for example, the publicity accompanying the amnesty). Thus, guilt can be generated when a person who formerly considered evasion the norm begins to consider paying taxes as the norm.

[5] See for example Alm, McKee and Beck (1990)

elaborate theories support the idea that amnesties can generate opportunities for intertemporal consumption-smoothing and improved insurance for citizens[6].

However, other people challenged these alleged benefits of amnesties. One of the main points of discussion is the *addition of new individuals* to the tax agency's records. People against amnesties claimed that, in truth, they do not add the hardcore evaders but only people who, sooner or later, would have been caught anyway. This is especially true, they continued, when they allow people under investigation to participate in them, and so the government is overestimating the revenue raised[7]. It was also maintained that people probably decide not to participate in the amnesties because (part of) the taxes they evaded are not covered by them, and so the effect on the number of new people added to the rolls is lessened. The assumption that amnesties increase *future compliance* was also questioned: the granting of an amnesty creates the perception that additional ones may be offered sooner or later (even if it is said that it will not be repeated), and so people will decide to pay less taxes in anticipation that this evasion will be forgiven at some point in the future. Another reason for a decline in voluntary compliance is rooted in the possibility that honest taxpayers feel the system is *unfair*, as it rewards non-compliance instead of fighting and punishing it. This can also reduce the sense that tax evasion is wrong among people: as "cheaters" are not punished, people can think that cheating is the norm, and change their behaviour accordingly. But even if this subjective change of opinion does not take place, the mere announcement of the amnesty may make taxpayers *aware* of the extent of undetected tax evasion and the low level

[6] See for example Franzoni (1998) and Andreoni (1991).

[7] Using an opportunity cost approach, as long as these people would have been caught anyway the government should not consider the tax collected from them as a gain of the amnesty. In this case, the amnesty only acts as a catalyst that accelerates the revenue collection. And even when this effect could be beneficial when considering it in terms of intertemporal substitution, it must also be pointed out that, by granting the amnesty, the government renounces its entitlement to the penalties that would have been charged otherwise against these people. Related to the intertemporal issue, another point raised against amnesties (but only against those that eliminate the penalties as well as the interest) stems from the fact that, if interest on unpaid taxes is forgiven, an amnesty participant will pay lower taxes (when adjusted for the time value of money) than taxpayers who paid their taxes when due.

of efficiency of the tax agency, which could lead people to revise downwards their estimates of the probability of detection. In the margin, some people who were paying tax will stop doing so, again affecting the compliance.

As usual, there is merit to the arguments on both sides of this question. However, the potential risks may outweigh the potential benefits as even a small decrease in compliance by the majority who currently pay their full tax liability could be more than offset by the short-term, one-time gains from collecting past unpaid tax liabilities.

On the other hand, there is an almost total coincidence about one point: if people anticipate the amnesties or if they are used repeatedly, their effect is necessarily a decline in long-term compliance[8]. This hypothesis is the one that the present essay intends to test.

Characterization

Before moving to the judgment of tax amnesties, it is necessary to analyse their basic ingredients. The importance of this activity stems from the fact that different types of amnesties imply different effects on equity and efficiency, the two standard attributes used to evaluate them.

The components that define an amnesty are the following:

- Eligibility: Which individuals are eligible for participation in the amnesty? This is an important topic in terms of revenue and long-term compliance. If people who are known to be tax delinquents by the tax administration are allowed to participate, amnesty revenue is overstated as their amnesty payments would have been collected anyway.[9] The long-term effect stems from the fact that forgiving evaders already known as delinquents may suggest that the tax authority does not consider tax evasion a serious offence, and so people are likely to reduce their compliance.

[8] Andreoni (1991) is one exception.
[9] Moreover, the government misses the corresponding penalties.

- Coverage: Which taxes are included in the amnesty? In general, taxes included fall into the category of those based on the submission of returns to the tax authority (income tax, sales tax, etc.), as they are easier to be evaded.
- Incentives: What incentives and facilities are provided by the tax authorities to people who participate in the amnesty? These may include the amount/percentage of unpaid taxes, interest and/or penalties that the tax administration will forgo, the possibility of paying in instalments, etc. Another important incentive is the promise by the government to abstain from following certain actions that would be undertaken if the amnesty was not in place. According to this criterion, Franzoni (1996) classifies tax amnesties as follows:

    1. Return amnesties: The possibility offered to evaders to revise their tax returns with a reduced penalty. Individuals accepting the amnesty are not immune from the investigation and auditing activities of the tax administration.
    2. Investigation amnesties: The possibility offered to evaders to get exemption from audits on payment of an amnesty fee. This is essentially an offer not to investigate the real amount or the origin or the taxable income of the taxpayers who take part in the programme.
    3. Prosecution amnesties: The possibility offered to caught evaders to obtain a partial waiving of the penalty if they plea guilty (which eases the judicial course of action). In this case, only the prosecution power of the tax administration is suspended.

- Duration: What is the length of the grace period? In general, it is predetermined and announced as a one-time benefit. However, some countries (including the US, Canada, Germany and Sweden, amongst others) have or have had permanent amnesties (e.g., Alm (1998)).

- Anticipation by individuals: Do people anticipate the granting of the amnesty? In general, literature considers unexpected amnesties superior to anticipated ones (Andreoni (1991) is one exception).

Thus, we can determine and evaluate the effect of an amnesty based on these criteria. This evaluation is the subject of the next section.

3. Evaluation of tax amnesties. Set up.

Determining the desirability of a tax amnesty implies deciding which attributes will be used to measure their benefits and costs. Among them, two are generally chosen: equity and efficiency.

The first one relates to the relative situation of taxpayers and evaders: how does an amnesty affect them? It is generally believed that they are advantageous for evaders, but this is not necessarily the case. If the evader does not participate in it, no benefit accrues to him/her. Even more, some costs may be borne if enforcement is tightened after the amnesty, thus leading to a decrease in his/her expected utility[10]. With respect to the honest taxpayers, the common view is that their situation under a tax amnesty *vis-a-vis* one without it is –at best– unchanged or –more usually– worse. The main rationale for this stems from the idea that they feel the tax system is unfair. However, it is said, if the amnesty is accompanied by an improvement in the level of enforcement and a publicity campaign that leads to a rise in compliance, this could lead to a higher revenue and, possibly, to a lower rate of statutory taxes that would increase taxpayers' utility. Nonetheless, it is hard to determine the net effect

[10] Of course, this decrease was not enough to move him/her to take part in the amnesty.

of the amnesty in this case, and in any case this reduction of the tax rate is not granted automatically if the tax revenue goes up[11].

The second attribute that can be used to evaluate a tax amnesty is its efficiency: if one extra pound is spent on the amnesty programme, will it yield more benefits than if spent in the best alternative application? In other words, are the resources used in the most profitable way as basic microeconomic principles demand? This question is actually very difficult to answer, as it will usually rely on assumptions about the marginal effect of alternative actions, and these are generally only rough guesses. The general approach to resolving this issue consists in assuming that the benefits of an amnesty are summarized in the behaviour of the "net tax revenue" that it yields.[12] This is simply the "gross liabilities" from amnesty returns minus the following items:

- Taxes that have been collected previously, mainly through withholding[13].
- Amounts known to tax authorities that could be collected without an amnesty (including those attributable to tax collection cases where receipt of tax revenue is only accelerated by the amnesty, to cases which would have been identified through routine audits).
- Penalties forgiven on amounts that would otherwise have been collected.
- Actual costs of publicizing and administering the amnesty.
- Opportunity costs of transferring enforcement personnel from their usual work to the amnesty."[14]

[11] The decision on whether or not to lower the tax rate is a political one, and therefore there is no certainty that the rate will be cut. Moreover, many amnesties are used as a way to obtain quick revenue increases to close the deficit gap. In this situation, a decrease in the rate is rather unlikely to happen.
[12] Andreoni (1991) and other authors who use shock-models include risk-sharing as another element that can be used to measure the efficiency of a tax amnesty.
[13] If an amnesty return is an amendment of a previously filed return, previously admitted liability must be subtracted.
[14] Lerman (1986)

Both criteria are hard to implement in practice. Consequently, and before embarking on the analysis of the empirical case, a review of how the related literature has handled this problem will be undertaken in the next section.

4. Related literature.

In general, the literature focuses on one-time amnesties and follows the standard approach firstly developed by Allingham and Sandmo[15]. However, the study of repeated amnesties is undertaken by some papers. Some are purely theoretical, others purely empirical, and others mix both approaches.

Alm, McKee and Beck (1990) run an experiment and find that an amnesty per se lowers compliance, but if it is accompanied by an enhancement of the level of enforcement, compliance increases more than if enforcement alone is increased and no amnesty was granted. They conclude that the government promise that an amnesty will not be repeated is not credible and therefore the expectation of a future amnesty reduces compliance. However, experimental groups were composed of only 5 people, and maybe that is why they get that an individual's compliance decision depends upon the actions of the other players.[16]

Alm and Beck (1990) point out that, as people choose jointly the amount of past evasion to report in the amnesty and the amount of current income to declare to the authorities, total revenue increases but its composition is unclear: if the amount of past evasion increases, the income declared decreases, and vice versa[17]. They also find that an individual who considers evasion as the norm is unlikely to participate in an amnesty, while an individual whose norm is to pay taxes is more prone to report any unpaid taxes from previous years in-full. Thus, a

[15] Allingham and Sandmo (1972).

[16] There is a literature that supports the interaction between members of the society when deciding whether to evade or not: stigma and social conformity models are examples of it. What it is pointed out here is that, by taking a small group of people in the experiment, this effect can be overestimated.

[17] It is worth noting that this is true as long as the tax agency does not check the evasion declared, as when an investigation amnesty is granted. The authors failed to mention it despite the fact that it is implicitly assumed.

good publicity campaign that emphasizes that failure to pay taxes is a serious crime can change some people's reference point and so increase compliance, something that could not be explained using expected utility theory.

Andreoni (1991) focuses on permanent amnesties, assuming that people are motivated to accept the amnesty because shocks to their consumption make them unwilling to bear the risk of an audit. He proves that a permanent amnesty can improve (or at least maintain) the efficiency of the system, as it acts like a partial social insurance, and that it can also enhance the equity, as it reduces the loss of the people who suffered a negative shock. Strikingly, this can happen even when revenue declines.[18] He claims that although cheating will rise as a result of the amnesty, revenue will not necessarily fall; moreover, cheating will only rise to the extent that people expect to participate in the amnesty, and if they do participate government will recapture not only the new cheating but the pre-existing ones as well.

Malik and Schwab (1991) assume that people are uncertain about the utility/disutility from tax evasion, and so an amnesty (granted once the uncertainty is solved, but after the people filed their tax returns) is an opportunity to revise their original choice[19]. According to the paper, people take advantage of amnesties because they realize –after the uncertainty is solved– that the costs of cheating outweighs its benefits.

Stella (1991) bases his model on the fact that the government can only enforce the tax laws by increasing the audit probability, but this is costly. So, as it is difficult for people to monitor

[18] Interestingly, when considering the equity issue, he says that "an argument may be made that amnesty favours those with lower ethical standards. This is especially true if amnesty requires raising taxes, which means that the honest people may have to pay part of the insurance benefits granted to dishonest people. However, if the amnesty increases tax revenues, then only the dishonest people will see their tax payments raise. In this case, the honest people may benefit the most since they will share in the tax cut that the amnesty makes possible. Therefore, even if only dishonest people get the direct benefit of the amnesty, it may still treat the honest taxpayers equitably". Nonetheless, he also points out an important comment of a referee: "If cheaters are given lower welfare weight in a social welfare function than honest taxpayers, then amnesty may reduce welfare (even if revenues rise and each individual's utility rises) simply by converting sufficient numbers of honest people to cheaters".

[19] One way to characterize honest and dishonest people (according to the authors) is by their absolute risk aversion: greater absolute risk aversion implies more income will be reported. So, according to this interpretation, "honesty" is the result of a level of risk aversion high enough to dissuade the person from evasion.

the actual enforcement effort of the government, the government could be tempted to lower its audit rate and reduce cost without announcing it. Knowing these motivations are present, tax evaders will be sceptical about government claims that tax enforcement will be increased and therefore will not participate in the amnesty. Consequently, revenue will increase only if the government is credible[20]. But a "weak" government (i.e., one which enforcement costs are high) has incentives to pretend it is strong and is determined to effectively increase the enforcement. So people will be uncertain about the type of government even if the audit rate rises, simply because the government could be just pretending to be a strong one in order to gain from increased compliance and participation in the amnesty. Under these circumstances, the effects of granting an amnesty will be rather poor, even when enforcement is increased. Standing amnesties deliver even worse results, since they lessen the risk of tax evasion and reduce the revenue the government could get from actually increasing enforcement.

Alm and Beck (1991) test the effects of tax amnesties using data from 1980ies's amnesties in US states. They find that greater enforcement increases the income reported in the amnesty, but stress the fact that the revenue impact is relatively small.

Pommerehne and Zweifel (1991) construct a political economy model where people must vote in favour or against the granting of a tax amnesty and then decide whether or not to participate. They find that the amnesty increases compliance, insinuating that the success of the amnesties depends heavily on public support.

Alm and Beck (1993) empirically investigate the effects of the 1985 Colorado amnesty. Their main result is that it had virtually no long run impact on either the level or the trend of tax collection. They also presume that if the amnesty had not been followed by stiffer penalties, then post-amnesty revenue may well have fallen. Consequently, they conclude that a typical

[20] Government reputation from previous experience in similar situations constitutes an important sign that people take into account to determine government credibility.

amnesty seems unlikely to generate large one-time revenues but (opposite to theoretical predictions) it also seems unlikely to have significant negative effects on long run compliance. *Graetz and Wilde (1993)* focus on "strategic non-filers" (i.e., evaders whose tax due is large and the cost of filing a return is low, so they are fully aware that they are breaking the law). They find that more enforcement leads to more non-filers participation in the amnesty and that the expected revenue falls when an amnesty is offered[21].

Franzoni (1995) models a world where the authority is uncertain about the innocence of a person, finding it out is costly, and the authority can offer a settlement to people who declare themselves guilty.[22] A tax amnesty is then a settlement offer open to everyone who fulfils the tax agency requirements. The problem is one of time consistency: ex-ante, the penalties are selected by the parliament to minimize the social loss resultant from the offence (goal: deterrence); but ex-post the enforcer (tax agency) focuses on the cost of the investigation process (goal: efficiency). The settlement allows decreasing these costs (increasing welfare), but it also decreases the deterrence power of the enforcement policy (decreasing welfare), so the net effect is ambiguous.

Cassone and Marchese (1995) find that amnesties are profitable as long as taxpayers have heterogeneous demands for insurance against penalties and that they can induce self-selection of taxpayers[23]. They focus on perfectly anticipated periodic amnesties and compare them with "the sales of fashion wear held at the end of the season, when the residual period is short". A government that provides this type of amnesty, they say, engages in mixed bundling, where the insurance can be bought as part of the bundle (tax) or on a unit basis (amnesty), but only at a given time and if certain conditions are met. However, they say, if less visible

[21] This last conclusion comes from the assumption that individuals are risk neutral. The authors highlight the fact that amnesties can increase government revenue only if taxpayers are sufficiently risk averse or their discount factors differ substantially from the government's discount factor.

[22] This settlement offer is made on a take-it-or-leave-it basis (i.e., the accused has no bargaining power).

[23] According to the authors, the amnesty is selective because more "visible" individuals are more likely to be caught before the amnesty date (and thus are willing to pay immediately) while less visible ones are more likely to accept the amnesty.

people correctly anticipate this effect they may prefer not to participate in the amnesty. The solution they propose is that the government should credibly commit itself in advance not to use the information gathered in the amnesty. But it is difficult for a government to commit to it: that information is perhaps the most valuable gain from an amnesty as it is likely to provide pointers on where and how to catch hard-core evaders.

Franzoni (1996) focuses on permanent investigation amnesties, in which the tax agency offers the option to taxpayers of paying a fixed amount or filing a return, and finds that they increase the tax administration's net revenue. This stems from two facts: the administration extracts the risk premium from amnesty participants (as they get insurance against audits) and collects resources from taxpayers on the basis of a pure (costless) threat. Amnesties, he argues, induce taxpayers with the highest willingness to pay to self-select and to elude the standard enforcement/prosecution procedure (which is expensive to the administration).

Engel and Hines (1998) model an economy where the government audits people's current year's returns and, if evasion is discovered, it also investigates earlier years' returns. So, people decide how much to evade today and how much tomorrow. Consequently, if a person participates in the amnesty, he/she will evade next period as he/she would pay only the fines on current year evasion if caught. Aggregate tax revenue is therefore likely to fall in years after amnesties, though tax collections in the long run are unaffected.

Franzoni (2000) argues, in line with his 1995 paper, that amnesties allow the tax agency to overcome its limited control over the enforcement parameters, and therefore to increase net revenue[24]. He proves that amnesties are superior to individual deals (as they allow the agency to reduce an excessive tax differential) and that it is part of an optimal strategy for the tax agency. In the model the agency acts as a monopolist which provides insurance against audits via the amnesty and it is assumed that everyone (evader or not) is interested in getting it since

[24] The enforcement parameters considered are the tax rate and the penalty levels, which are set by the parliament and cannot be modified by the tax agency.

audits impose a defence cost on people inspected that is not refunded by the state nor can be covered by private insurance. Nonetheless, he recognizes that in a first-best world in which all enforcement parameters are optimally chosen, amnesties and settlements cannot increase tax revenue, and they can only represent second-best instruments that can be used when major reforms of the tax system are not practicable.

Marceau and Mongrain (2000) develop a model in which an exogenous shock affects the parameters of the problem after the individual has decided whether to evade or not but before he/she decides whether to participate or not in the amnesty in the case it is granted[25]. One of the striking conclusions they reach is that under certain conditions (a large number of very cooperative participants, so a large proportion of the social cost is recovered) fully anticipated amnesties can be efficient and, furthermore, the optimal level of enforcement can be lower than in the no-amnesty scenario (as there are fewer criminals and they are cooperative).

Evaluation of the literature

The first point to note is that most of the papers reviewed develop models based on the expected utility theory (Alm and Beck (1990)'s model based on prospect theory is an exception). However, "given the percentage of tax returns that are audited and the penalties imposed on audited tax returns, taxpayers would have to exhibit risk aversion far in excess of anything observed for compliance predicted by expected utility theory to approximate actual compliance" (Skinner and Slemrod (1985)). Furthermore, some of them also assume risk-neutrality (Pommerehne and Zweifel (1991), Graetz and Wilde (1993)), mainly for simplicity. In practice, most individuals are risk averse, and the degree of risk aversion is crucial to

[25] This shock-approach is the same followed by Andreoni (1991) and Malik and Schwab (1991). The importance of introducing it stems from the fact that if an individual was willing to commit a crime when the sanction was large, then this individual will certainly want to remain a criminal when an amnesty is offered and the sanction is reduced (i.e., the cost of being a criminal is reduced), unless something happens on the side of benefits. The shock acts, then, as the factor that reduces the benefits of tax evasion and makes some individuals willing to participate in the amnesty.

determine the level of compliance of a person: the greater the absolute risk aversion, the greater the amount of income that will be declared to the tax agency.[26,27]

Another feature to take into account is that many models are perfect-information ones (assume people and the government know every –or almost every– parameter), which is hard to believe: yet they assume, for example, that people know the true probability of being audited (Stella (1991) is one of the exceptions), their future income (Andreoni (1991)) or even their utility functions (Malik and Schwab (1991)). It is also implausible that the government knows, for instance, the utility functions of the taxpayers or their risk aversion.

Also, many papers overlook the heterogeneity of the individuals and assume instead a representative individual.[28] Finally, the empirical results are far from definitive: some studies support amnesties (Pommerehne and Zweifel (1991), etc.), others reject them (Alm and Beck (1991), etc.), and others consider them innocuous (Alm and Beck (1993), etc.). In the next section we consider an empirical case that will help us to shed some light on this discussion.

5. Model and results.

Despite the weaknesses in the literature identified in the previous section, a traditional approach will be taken to model the effects of a tax amnesty. The main reason for this is data-driven: only aggregate data are available, and so we cannot take heterogeneity into account. The issue of uncertainty is solved by assuming that people and government learn as time goes by.[29]

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[26] Malik and Schwab (1991).
[27] Nonetheless, note that the assumption of risk neutrality can be true in the case of firms.
[28] The "shock models" (Marceau and Mongrain (2000), Andreoni (1991), and Malik and Schwab (1991)) do consider heterogeneous people by allowing certain parameters to change across the population (income, risk aversion, etc.). Cassone and Marchese (1995) also allow heterogeneity in their model.
[29] This can be justified because our study is based on the analysis of time series, and because learning is very likely to occur as our database includes data from several amnesties.

The standard tax evasion model (Allingham and Sandmo (1972)) relies on the assumption that people maximize their expected utility (EU) by choosing the optimal amount of income to be declared to the tax authority:

$$EU = (1-q)\cdot U(Y) + q\cdot U(Z) \tag{1}$$

where Y=W-tX (i.e., disposable income if not audited) and Z=W-tX-p(W-X) (disposable income if audited[30]), W is true income, X is reported income, t is the tax rate, q is the audit probability, p (which must be greater than t) is the penalty rate and U( ) is the utility function such that U'( )>0 and U"( )<0[31]. Thus, evasion is simply another "risky investment", and the expected disposable income of this gamble is

$$E(W^D) = (1-p\cdot q)\cdot W - (t-p\cdot q)\cdot X \tag{2}$$

and the expected rate of return is

$$e = t - p\cdot q \tag{3}$$

per dollar evaded.

The interpretation of (3) is straightforward: as an extra pound is evaded, two opposite effects materialize:

1. Expected benefits rise (first term in (3)): the extra pound evaded does not pay a fraction *t* of taxes anymore.

[30] The standard model also assumes that audits disclose evasion with certainty, i.e. audits are 100% effective. This is in fact a strong assumption, since the investigation can be less efficient in reality, individuals can spend money in improving the concealing technology (e.g., "creative" accounting) and/or bribing inspectors, etc.
[31] Actually, U"( ) could also be equal to zero when firms are considered. This is especially relevant here since data used in the study case comes from sales taxes paid by firms.

2. Expected costs also rise (second term in (3)): the extra pound evaded should pay a fraction p as a penalty; however, this effect is moderated by the fact that there is only a probability q of being audited and caught.

Individuals then solve the maximization problem and choose the optimal level of evasion $E^*=W-X^*$, that satisfies the first order condition:

$$\frac{U'(Z^*)}{U'(Y^*)} = \frac{t \cdot (1-q)}{(p-t) \cdot q} \tag{4}$$

It is important to note that a person will declare all his/her income if and only if

$$t = pq \tag{5}$$

and will evade only if

$$t > pq \tag{6}$$ [32]

Note that, as expected, if a person declares all his/her income (i.e., the condition stated in equation (5) is satisfied), then there is no uncertainty: the individual's disposable income is $W^D = (1-t) \cdot W$. According to this and taking into account that evasion does exist in the real world, it will be assumed from here on that the condition in equation (6) is satisfied.

The comparative statics analysis reveals that improving enforcement, i.e., increasing the probability of an audit (q) or the penalty rate (p), decreases the evasion level (X). Nonetheless, the effect of a change in income is ambiguous, as is the effect of a change in the tax rate. The rationale for the first case is that a higher income implies a higher disposable income if the individual is not caught evading, but a higher fine if s/he is caught, and so the net effect depends on which one of these forces prevails. Similarly, an increase in the tax rate has two

[32] The remaining case (t < p*q) is omitted since individuals will declare all their incomes. However, as audits are costly, the government would never choose q such that t <p*q since it can get the same result (no evasion) with a lower expenditure by setting t = p*q.

opposite effects: it makes evasion more profitable in the margin, and so evasion will rise, but also reduces disposable income, and so evasion will decrease.[33,34]

Summarizing, the optimal amount of reported income will be a function of the parameters of the model:

$$X^* = f(\underbrace{t}_{(?)}, \underbrace{q}_{(-)}, \underbrace{p}_{(-)}, \underbrace{W}_{(?)}) \tag{7}$$

However –and even when they are closely related– the main interest is not in the optimal level of reported income, but the expected total tax revenue, which is given by:

$$R = t \cdot X(t, q, p, W) + q \cdot p \cdot [W - X(t, q, p, W)] \tag{8}$$

where the first term is the revenue raised from voluntary payments and the second one is the revenue expected to be raised from penalties. Totally differentiating this expression we find that:

$$\frac{\partial R}{\partial t} = X + (t - pq)\frac{\partial X}{\partial t} \tag{9}$$

$$\frac{\partial R}{\partial q} = p(W - X) + (t - pq)\frac{\partial X}{\partial q} \tag{10}$$

$$\frac{\partial R}{\partial p} = q(W - X) + (t - pq)\frac{\partial X}{\partial p} \tag{11}$$

$$\frac{\partial R}{\partial W} = qp + (t - pq)\frac{\partial X}{\partial W} \tag{12}$$

It is worth noting that each one of these derivatives can be positive, negative or zero, as long as there is evasion (i.e., $t - pq > 0$). Therefore, the theory alone cannot help us to

[33] Under Arrow's Hypothesis that absolute risk aversion increases as income decreases.
[34] See appendix for the computation of the first order conditions.

determine the impact of changes in the parameters on net revenues and we need to carry out an empirical analysis to pin them down.

Notice that we can introduce an amnesty in the model by assuming that, during the time the amnesty is granted, the penalty rate (p) is reduced. Consequently, the theory will suggest that a tax amnesty will decrease the amount reported to the tax authority (i.e., evasion will increase), but the effect on the revenue will be uncertain. The reason for this is that a reduction in the penalty rate makes evasion less costly, and so people will evade more. On the other side, the effect on the expected revenue is ambiguous as the first term in (11) –the direct effect- is positive and the second –the indirect effect- is negative. But as the former is expected to be larger than the latter, we predict the revenue to decrease when an amnesty is offered.

6. Empirical analysis.

The next step is, now, the evaluation of the effects of tax amnesties. Now, as mentioned before, the two attributes most generally used to evaluate the effects of the tax amnesties are equity and efficiency, but equity is difficult to assess (since we only have access to aggregate date), and so we will focus on efficiency, that will be measured in terms of revenue. Consequently, we constructed an "expected tax revenue" series for the Tucuman province in Argentina for the 1978-1999 period, and investigated if amnesties affect it.

The expected tax revenue is defined simply as

$$R^e = t \cdot S \tag{13}$$

where t is the tax rate and S is the total amount of sales in a given period[35]. In other words, the expected tax revenue is the revenue collected by the tax agency in the no-evasion

[35] In spite of having developed a model where people decide how much income to declare, the empirical analysis will be based on data from sales taxes. However, the model can be easily transformed into one in which firms decide how much sales to declare by substituting sales for income in every equation.

scenario.[36] So, if effective revenue mimics the behaviour of R^e, then the amnesty does not affect revenue[37].

Other factors to be considered are, as theory suggests, the penalty rate, the tax rate and the audit probability. Nonetheless, Tucuman province's penalty rate was roughly fixed in the period (it remained around 25% of the evaded tax), and so it is useless to explain the behaviour of the revenue[38]. The same can be said of the tax rate: its value was almost unchanged, being about 2.5% during the entire period. With respect to the audit probability, the information was not disclosed by the local tax agency, and so it is missing in the analysis[39]. Finally, given the lack of reliable statistics on the total amount of sales, we use Tucuman province's GDP as a proxy.[40]

Therefore, the equation to be estimated is:

$$T_t = f(A_t, Y_t) \tag{14}$$

where T is tax revenue per capita, Y is GDP per capita and A is a dummy variable that takes the value 1 when an amnesty is granted and 0 otherwise.

Assuming a linear functional form, the expected signs are:

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[36] As evasion is assumed to exist, the expected net revenue will always be greater than the effective tax revenue. However, the important factor is not the actual gap between them, but if they move together or not. If they do, it can be deduced that the cause of the joint movement is the same for both series. If they do not, an exogenous shock (as the grant of a tax amnesty) is probably the reason of the divergence.

[37] This is true irrespective of the actual behaviour of the effective revenue: even if it rises (what someone could interpret as an effect of a successful amnesty), if it is only reproducing the path followed by the expected tax revenue the logical conclusion is that amnesties are not affecting it and that its movements are the result of changes in other variables.

[38] Even more important, this reveals that no effort to increase enforcement was made through this channel.

[39] In any case, it is thought that one of the reasons to deny the information is precisely the poor performance of the audits in terms of revenue. It must be stressed, however, that although the audit probability is important for our analysis, it might be even more relevant to know how effective the audit are: even with a high audit probability revenue could fall if the inspectors cannot discover the evasion (e.g., because firms can hide it successfully and/or inspectors' skills are low) or if corruption keeps it undisclosed (i.e., inspectors discover it, but they accept bribes from evaders to conceal it).

[40] Two other factors were considered, even if they were not part of the model: inflation and population growth. With respect to the first one, both tax revenue and GDP were expressed in constant prices. With respect to the second one, the inspection of the correlation matrix revealed a high correlation between both series mentioned above (already adjusted for inflation) and population. To resolve this difficulty, the series were transformed into per capita series. For a description and graphic representation of the series used, please see sections 2.1. and 2.2. in the appendix.

$$\frac{\partial T}{\partial Y} > 0 \tag{15}$$

(i.e., the higher the income, the higher the revenue -as the tax rate does not change-), and

$$\frac{\partial T}{\partial A} \gtreqless 0 \tag{16}$$

(i.e., the effect of an amnesty on the revenue is undetermined). It is precisely the theoretical discussion about the sign of this derivative why we undertake this analysis, and determining it is therefore its main goal.[41]

The results of the analysis (in error correction form) are set out in the next table[42]:

Dependent Variable: DT		
Variable	Coefficient	t-Statistic
DA(-2)	0.4525	2.3418
T(-1)	-0.5460	-6.3879
DT(-1)	-0.3212	-4.2939
DT(-2)	-0.2256	-4.0477
DT(-5)	-0.1544	-3.8357
DT(-12)	0.1244	3.3754
Y(-1)	3956.2780	5.0005
DY(-1)	14503.2900	3.2169
DY(-4)	-26250.2500	-3.6140
DY(-5)	16197.8000	2.3393
DY(-12)	-16249.0800	-3.6876
	R-squared	0.6108
	Adj. R-squared	0.5941

It is immediately recognizable that amnesties do not affect long run revenue, but they do have a short run effect. Reorganizing, the equation can be rewritten as follows:

[41] The stationarity and autocorrelation analysis are shown in sections 2.3., 2.4. and 2.5. in the appendix.

[42] References:

$DT = T_t - T_{t-1}$	$DA(-2) = A_{t-2} - A_{t-3}$
$T(-1) = T_{t-1}$	$DT(-1) = T_{t-1} - T_{t-2}$
$DT(-2) = T_{t-2} - T_{t-3}$	$DT(-5) = T_{t-5} - T_{t-6}$
$DT(-12) = T_{t-12} - T_{t-13}$	$Y(-1) = Y_{t-1}$
$DY(-1) = Y_{t-1} - Y_{t-2}$	$DY(-4) = Y_{t-4} - Y_{t-5}$
$DY(-5) = Y_{t-5} - Y_{t-6}$	$DY(-12) = Y_{t-12} - Y_{t-13}$

$$T_t = 0.4525 \cdot A_{t-2} - 0.4525 \cdot A_{t-3} + 0.4540 \cdot T_{t-1} + \\ + 3956.278 \cdot Y_{t-1} + T \ \ differences + Y \ \ differences \tag{17}$$

So, an amnesty raises revenue by $ 0.4525 millions (roughly 6% of the average revenue) two months after it starts, but this revenue is lost against the following month[43].

In the long run, $Y_t = Y^{LR}$, $A_t = A^{LR}$ *and* $T_t = T^{LR}$ $\forall t$, and so every difference vanishes. Then the long run equation reduces to

$$0 = -0.546 \cdot T^{LR} + 3956.278 \cdot Y^{LR} \tag{18}$$

or

$$T^{LR} = 7245.2802 \cdot Y^{LR} \tag{19}$$

and it is clear that the amnesty does not affect the long run revenue[44].

7. Conclusions

The goal of this essay is to determine the effects of repeated tax amnesties on the economy.

To achieve it, a model was developed and its predictions were tested against the data from Tucuman (Argentina). The fundamental conjecture of the model affirms that amnesties lower the revenue, as they reduce the penalties and make evasion more profitable.

Despite of that prediction, the analysis provided an opposite outcome: tax amnesties do not affect the long-term revenue. The other main result of the study is in line with what the theory suggests: the increase in short-run revenue is temporary and only accelerates the

[43] The rationale for this behaviour comes from the fact that the mean duration of the amnesties during the period was 2.29 months and that the bulk of the amnesty revenue was generally raised the last days before the deadline. However, the increase in revenue is only temporary as can be noticed from the fact that the extra amount raised the last month of the amnesty is exactly the same amount "lost" the next period. So, this will support the hypothesis that the amnesty only accelerates the collection on taxes but it does not affect revenue in the long run.

[44] Note, however, that the audit probability and its effectiveness could be an important factor in order to explain the behaviour of the long run revenue, and so equation (19) is not necessarily the most accurate estimate of the long run revenue. It is just the best one given the availability of information.

collection of the taxes but does not increase the amount collected. Both results are, however, the same found by Alm and Beck (1993).

As an institutional remark related with tax amnesties, it is worth citing the comment of Franzoni (1995) on the relationship between the underlying situation and the application of tax amnesties as a source of revenue: "It is no surprise that amnesties are abundantly used in countries in which the enforcement systems suffer from major structural problems. In these contexts, amnesties can be viewed not only as an indication of an inability of the enforcer to commit, but also as attempts to overcome the structural rigidity which gives rise to problems. The problem is, however, that the unlimited use of these second best tools allows the state to capitalize on its own inefficiency and provides an excuse to indefinitely delay any thorough-going reform of the enforcement system."

In short, despite the possible short-run benefits and apparent innocuousness in the long-run they generate, tax amnesties are only second-best tools and should only be used when deep reforms in the tax system cannot be undertaken. The results in this essay support this view, as the frequent amnesties issued in the period considered increased revenue only temporarily but did not affected the long-run levels, and so they were just used to avoid a tax reform that is getting more and more urgent as time goes by.

Appendix

1. First order conditions of the optimal evasion problem

$$\frac{\partial X}{\partial t} = \frac{tX(1-q)\cdot U''(Y) - qX(p-t)\cdot U''(Z) - (1-q)\cdot U'(Y) - q\cdot U'(Z)}{t^2(1-q)\cdot U''(Y) + q(p-t)^2\cdot U''(Z)} \begin{matrix} \geq \\ \leq \end{matrix} 0$$

$$\frac{\partial X}{\partial q} = \frac{t\cdot U'(Y) + (p-t)\cdot U'(Z)}{t^2(1-q)\cdot U''(Y) + q(p-t)^2\cdot U''(Z)} < 0$$

$$\frac{\partial X}{\partial W} = \frac{-t(1-q)\cdot U''(Y) + q(p-t)(1-p)\cdot U''(Z)}{t^2(1-q)\cdot U''(Y) + q(p-t)^2\cdot U''(Z)} \begin{matrix} \geq \\ \leq \end{matrix} 0$$

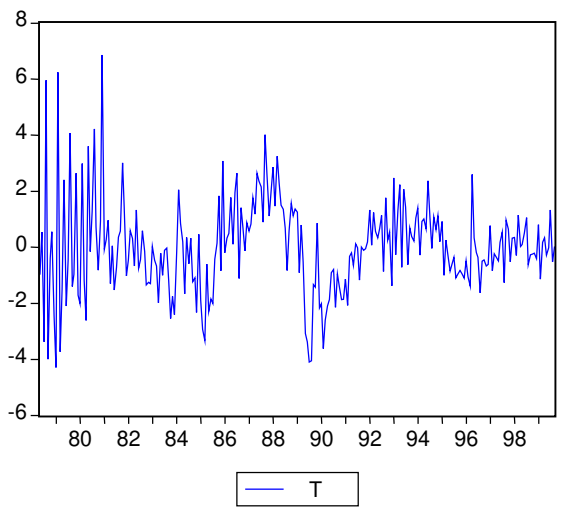
$$\frac{\partial X}{\partial p} = \frac{-q(p-t)(W-X)\cdot U''(Z) + q\cdot U'(Z)}{t^2(1-q)\cdot U''(Y) + q(p-t)^2\cdot U''(Z)} < 0$$

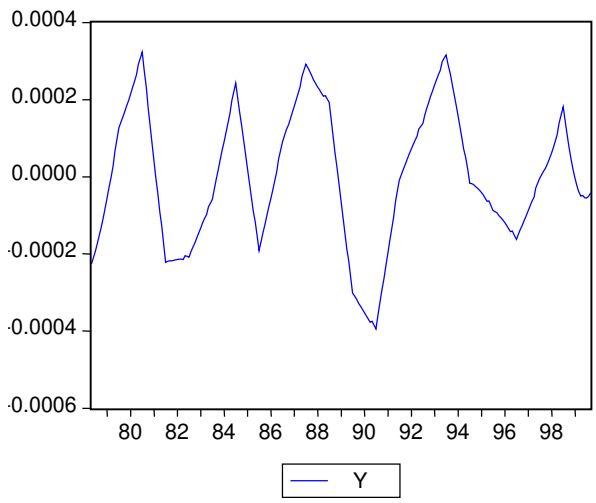
2. Estimation of the model

2.1. Data

- Sales tax revenue. Tucuman province (Argentina). May 1978 - September 1999. In tens of pesos (base: 1993=100). Source: Tax Agency – Tucuman, Argentina.
- GDP. Tucuman province (Argentina). May 1978 - September 1999. In millions of pesos (base: 1993=100). Source: University of Tucuman – Tucuman, Argentina.
- Tax amnesties. Tucuman province (Argentina). May 1978 - September 1999. In tens of pesos (base: 1993=100). Source: Tax Agency – Tucuman, Argentina.
  17 amnesties were granted in the period. Everyone included the sales taxes. Except the first four ones, all of them were investigation amnesties.
- Consumer prices index. Tucuman province (Argentina). May 1978 – September 1999. Base 1994=100. Source: University of Tucuman – Tucuman, Argentina.
- Population. Tucuman province (Argentina). May 1978 – September 1999. Source: University of Tucuman – Tucuman, Argentina.

2.2. Graphics: The (detrended) series are plotted below:





2.3. Stationarity: Both series are stationary, as well as the residuals, what confirms that there is a long run relationship between the variables. The unit root tests (no constant and no trend included) are presented below.

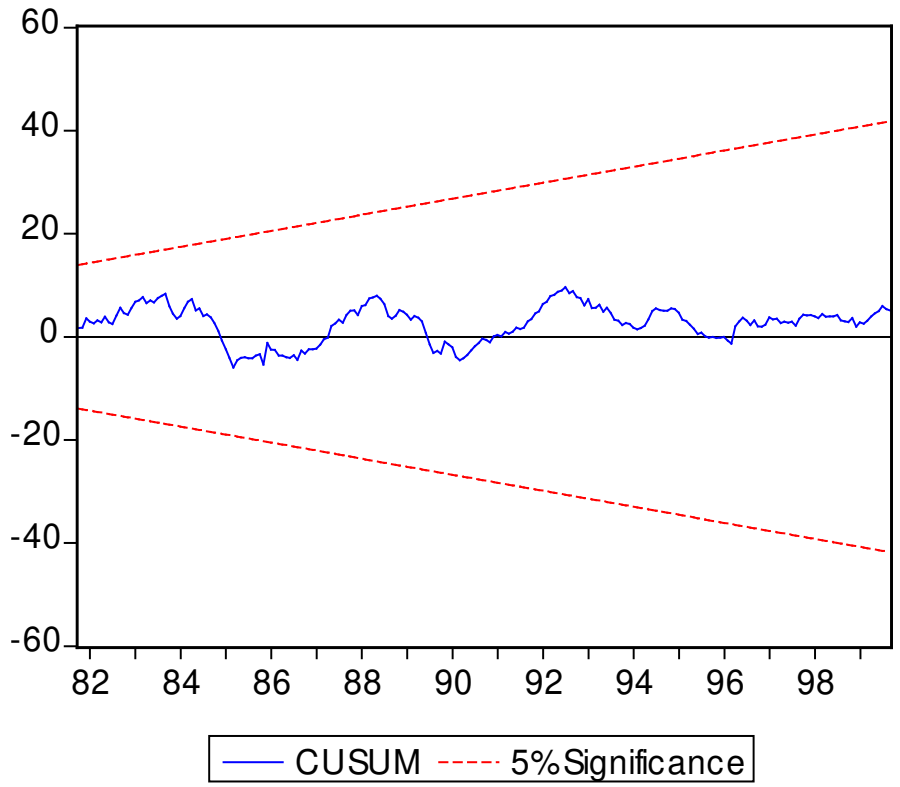
Variable: T				
ADF Test Statistic	-3.2707	1%	Critical Value*	-3.4588
		5%	Critical Value	-2.8735
		10%	Critical Value	-2.5731
Variable: Y				
ADF Test Statistic	-4.0609	1%	Critical Value*	-3.4588
		5%	Critical Value	-2.8735
		10%	Critical Value	-2.5731
Variable: RESID				
ADF Test Statistic	-3.7599	1%	Critical Value*	-3.4588
		5%	Critical Value	-2.8735
		10%	Critical Value	-2.5731

2.4. Correlation: As the residuals are not correlated with the independent variables, OLS provides consistent estimators and the t-tests are valid. (This was confirmed by revising the correlation matrix).

2.5. Serial correlation: The Lagrange Multiplier test corroborates that residuals are not serially autocorrelated:

Variable: RESID			
Breusch-Godfrey Serial Correlation LM Test:			
Obs*R-squared	19.5717	Probability	0.106417

2.6. Stability of the coefficients: The CUSUM test shows that the coefficients are stable:



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