Local Enforcement Externalities and the Long Run Evolution of Tax Compliance in Italy

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Abstract

We study a model of tax evasion dynamics in the presence of an enforcement externality and social learning by taxpayers. Conditions under which the distribution of the perceived probability of apprehension and compliance behavior converge to one or multiple steady states are studied. We show that the emergence of long run history dependence crucially depends on the level of the tax rate compared to a measure of efficiency in the (local) enforcement.

The insights obtained from the model are used to interpret the high level of geographical dispersion of tax evasion and its persistence in Italy as consequences of an unanticipated and substantial tax raise and of the local dimension of tax jurisdiction since unification. We finally use a novel data set from the Italian Revenue Agency and historical data from the Ministry of Finance in 1870 to show that persistent geographical dispersion in tax evasion is consistent with an institutional trap by the unification process.

Keywords: tax evasion, local enforcement externality, learning, tax compliance dynamics.

JEL: D62, D81, H26, K41, K42.

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"As rates rise to over 20 or 25 percent, the income tax becomes destructive, taxpayer compliance breaks down and enforcement fails".
J.A. Schumpeter, Policy Essays, 1926-32.

1 Introduction

Long-run persistence of individual behavior has long attracted the attention of economists and historians. In this paper the specific issue of the persistence of tax evasion is investigated theoretically and empirically on the basis of some relevant traits of the evolution of tax compliance in Italy.

In particular, we are interested to understand why tax evasion can persistently (meaning more than a century) differ across geographical areas of a unified nation and whether Italy is a case in point and why. We focus on two specific aspects: geographic dispersion in tax compliance and its persistence, despite a nation-wide tax code stipulating uniform taxes and uniform procedural rules for its enforcement.

Our aim is to establish under which conditions geographically heterogeneous compliance levels are likely to emerge and persist in the long-run. Is it about culture, social capital or social norms? Is it about genetics? Is it about political institutions? Or is it the individual response to the design of apparently minor administrative details, such as a problem of decentralized enforcement?

These questions and the historical example seem to us relevant for two reasons. Convincing answers could, firstly, help us in understanding the long term consequences of the design of tax enforcement procedures by nation states and how these impact on the process of reform. Secondly, they could also set a frame for the assessment of the difficulties involved in the process of political unification arising from economic integration.

To address these questions we set up a simple dynamic model characterized by two main assumptions: there exists an enforcement externality arising from limited resources available to the fiscal jurisdiction to enforce tax compliance and taxpayers take their decisions based on a social learning process, which determines their perceptions of the probability of conviction. Individual perceptions are, in fact, based on past perceptions and on an imperfect signal on the current period efficacy of enforcement at the aggregate level.

Due to the enforcement externality the actual level of sanctions administered by the fiscal jurisdiction depends on the amount of evasion in each district. Individual behavior and actual evasion rates in each district, on the other hand, depend, among other elements, on the taxpayers' past experience with the enforcement system, as current individual perceptions incorporate information about local enforcement levels in the past.

In this setting it will be shown that an enforcement externality can be not only at the root of sudden changes in the compliance behavior by the average
citizen, but it can also affect permanent traits of a fiscal system by inducing persistent heterogeneity of tax compliance at local level.

More specifically we shall consider a simple model of individual tax compliance where private agents, given their information, make their choice based on their perception of the probability that non-compliance will be sanctioned, on their individual incentives as set by the income tax rate, by the level of the fines and by an individual cultural trait that measures attitudes towards the state, i.e. tax morale. Hence cultural traits can contribute to the dynamics induced by social learning. Clearly then, current choices are affected by current individual perceptions that incorporate information about aggregate enforcement levels in the past. So, also the current aggregate behavior affects future compliance through the enforcement externality.

As a result the evolution of perceptions (and evasion behaviors) at local level are simultaneously determined along with the equilibrium level of deterrence locally provided by the state and both depend on the nationwide tax rate enshrined in the tax code. Indeed the mutual relationship between the level of enforcement and evasion behavior in each fiscal district is a dynamic one, so the current distribution of perceptions in a given area will depend on the past distribution of perceptions in that same area.

The theoretical analysis identifies conditions under which geographically persistent patterns of tax compliance may emerge. We show that the equilibrium distribution of taxpayers’ perceptions and behavior converge to a steady state distribution, possibly depending on the initial distribution. In particular, for high enough tax rates—not so high, however, to disrupt compliance—both a high and a low evasion equilibria become part of the set of steady states. In this case the specific outcome the economy approaches to is determined by the initial perception at local level.

Under these circumstances differences in the initial perceptions and attitudes by taxpayers at local level may be perpetuated or even magnified into the future. The model shows that a large increase in the level of taxation can get initial, even small, differences in the perceptions of the enforcement system, which are then magnified in the dynamic process of social learning and become persistent at local level.

The historical evidence we provide on the way the tax system was designed in Italy since unification (1870) supports the insights of our theoretical model. Already at that time experts and tax scholars pointed out that tax evasion was a main issue for the newly born country and the main factors thought of being responsible for that were the high tax rates and the local design of the enforcement process. All of the historical sources consulted highlight that tax evasion was a relevant phenomenon and it was associated to flaws in the enforcement system.

Relying on the brief historical reconstruction the implications of the model are also explored within a more standard econometric approach. To this aim we construct a new data set featuring a proxy of tax evasion at province level in 1870, as registered by the Ministry of Finance at that time, and, similarly a measure in the period 2008-2010, as officially assessed by the Italian Tax Revenue Agency. We find a positive correlation between the historical and
current measures of tax evasion. This correlation turns out to be robust to controls that account for structural characteristics of the provinces and for the efficiency of the current enforcement system.

To control for the role of unobserved factors (e.g. persistent cultural heterogeneity at the province level) we also exploit the large tax shock experienced by some of the Italian provincial districts in the aftermath of the unification. This shock took place in the fiscal years 1861-64 as a result of the aim of the national government to harmonize the fiscal obligation across regions of the newly-born country and in order to repay the war debt that had been required by the Kingdom of Sardinia to finance several military episodes and wars for independence that had characterized the decades before unification. To this aim an index of the fiscal shock experienced by each district is constructed to measure the increased fiscal burden in each district.

Arguably, as an implication of theoretical models of tax evasion behavior, the increase the tax burden provides a good instrument for tax evasion in each district at the time of unification. When the index is used as an instrumental variable for historical evasion then the long-run persistence of that fiscal shock is fully confirmed, providing evidence that the large unexpected fiscal shock in the aftermath of the unification still affects tax evasion at the provincial level as officially measured by the Tax Revenue Agency.

We conclude that the empirical evidence reported here provides some support to our theoretical hypothesis according to which the persistence of tax evasion at district levels has to do with flaws in the decentralized system of fiscal jurisdiction rather than with cultural heterogeneity among populations of Italian districts.

Our contribution is related to several strands in the literature, mainly to those papers exploring the relationships between tax evasion and growth, the literature studying the micro-foundations and the implications of the enforcement externality in crime, the literature pursuing the exploration of the importance of history in development.

As for the analysis of the relationship between tax evasion and growth, Chen (2003) and Bethencourt and Kunze (2017) explore the consequences of tax evasion in the context of standard dynamic models with or without endogenous growth. Although our contribution also takes such a long-run perspective, our focus is on the institutional details of the enforcement system rather than on the distortions produced by tax evasion and its determinants on capital accumulation and infrastructures, and the effects of evasion for the income distribution. Interestingly, Bethencourt and Kunze (2017) highlight the possibility of history dependence which in their model, in the absence of an enforcement externality, is due to the effect of evasion on the financing of public infrastructures.

Several contributions have underscored the importance of the enforcement externality (see, among others, Becker 1968, Ehrlich 1973, Votey and Phillips 1972). In particular, Ehrlich (1973) introduces the assumption that the productivity of the resources allocated to law enforcement is lower the higher the level of criminal activity. The evolution of perceptions in the presence of an enforcement externality has been studied in Sah (1991), who focuses on a model

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1Shavell (2014) provides a survey on mechanisms of deterrence.
with a unique stable equilibrium. We stress, instead, the convergence process of individual perceptions when the institutional setting allows for an important role of history in selecting the relevant dynamic path and on long-term persistence of perceptions and behavior.\textsuperscript{2} The specific focus of our study is about the local dimension of the enforcement externality and its ability to persistently support heterogeneous patterns of non compliance even in the presence of a nationwide tax code.\textsuperscript{3}

Both the model and the empirical analysis is related to the literature on the long-run persistence of behavior, attitudes, culture and expectations as surveyed by Acemoglu et al. (2005). Compared to other contributions (e.g. Guiso et al. 2016) rather than local culture, we emphasize the long-run consequences of apparently small details in the legislation.\textsuperscript{4} It is possible- and perfectly consistent with our model- that initial cultural or even ideological attitudes towards the Piemontese monarchy who unified the state got perpetuated and affected fiscal compliance behavior at the local level. We agree that there are good reasons to believe that mechanisms of cultural transmission (within the households or other social mechanisms in place for the reproduction of trust and social capital) are important. However we also believe that, in the attempt to provide an explanation for the persistence of social behavior regulated by law and assisted by a formal sanction, the institutional design that shape the deterrence value of the sanctions in a context with learning is relevant, both from the theoretical and the empirical point of view. In this respect our investigation and results are closer to the view that long-run persistence of tax compliance is more related to what has been called "institutions". In the case of fiscal compliance it turns out that apparently minor details of the organization of the fiscal jurisdiction and tax collection - the mode of their decentralization in particular - can play an important role.

The paper is organized as follows: Section 2 presents the model and the results. In Section 3 we provide an interpretation for the high level of tax evasion and its persistence in Italy since unification (1870) in the light of our model implications. In Section 4 we provide an empirical analysis using novel data from the Italian Revenue Agency and some historical data in the period 1868-1870. Section 5 concludes.

\textsuperscript{2}The importance of individual perceptions for crime participation has been shown by Lochner (2007).

\textsuperscript{3}Acemoglu and Jackson (2017) consider the interplay between social norms and private cooperation with law enforcement provided by the members of a society. However the mechanism that sustains dynamic persistence of individual behavior in that paper is quite different, since it is based on the matching by individuals of different generations. Some of the mechanisms on which these authors focus could be applied to tax evasion and could also be at work in the historical example we consider. Here, we focus on the learning by agents since it seems more appropriate for the case in which individuals decide about tax compliance compared to law breaking in the case of criminal law or offenses of administrative law.

\textsuperscript{4}In particular the composition of local fiscal courts and the decentralized trait of the fiscal jurisdiction and tax collection in Italy.
2 Model

To study the consequence of decentralized enforcement on the persistent geographical dispersion of tax compliance we consider a country whose territory is divided in \( n \) districts denoted by \( d \), each district being populated by a unit measure of individuals denoted by \( i \) with exogenous income \( Y_i^d \) who have to report a fraction of their income \( \delta_i^d \in [0,1] \).

A nationwide tax code is in place, whose essential features are the income tax rate denoted by \( \tau \) and the fines, denoted by \( \phi \), to be administered in case evasion by a non compliant taxpayer is proved in court.

In our model detection of tax evasion, which is the result of an audit policy, does not necessarily induce a sanction on detected tax evaders, as in the standard model of tax evasion. A fraction of tax reports \( a \in [0,1] \) is audited and, for the sake of simplicity, it is assumed to be the same in all districts and so it does not depend on \( d \). In the event that evasion has been found by the auditor, the case goes to a fiscal trial, which is instead decentralized at the district level. Only a fraction \( \theta_i^d \) of the trials is successfully finalized by the local fiscal court and the taxpayer is sentenced to pay fines in proportion of the unreported income tax \( \phi \tau (1 - \delta_i^d) Y_i \).

There exists an enforcement externality in fiscal jurisdiction such that the fraction of successfully finalized fiscal trials (and hence the probability of punishment governing compliance behavior) depends negatively on the aggregate level of cases of evasion in that district denoted \( e_t^d \), so \( \theta_i^d = \theta(e_t^d) \).

Therefore the actual probability that fines will be enforced, \( r_t^d \) faced by the taxpayer in district \( d \) is given by the joint probability that the taxpayer is audited and that a sentence is inflicted. Formally, in each period \( t \), it holds:

\[
r_t^d = a \theta(e_t^d)
\]

(1)

where \( \theta(x) \) is a function such that \( x'' \geq x' \) implies \( \theta_i^d(x'') \leq \theta_i^d(x') \). This property is assumed to arise from a congestion externality that can originate from decreasing returns to the activity of jurisdiction but also as a consequence of the local political economy in a system where the fiscal court is appointed by local governments and therefore reflects attitudes by local taxpayers towards the fiscal state: the larger the fraction of non compliant agents in a given district, the larger the possibility that a more lenient attitude in the local fiscal court will emerge. To keep the analysis simple we further restrict the function \( \theta(e_t^d) \) at eq. (1) and we suppose that the congestion effect is triggered when the evasion is above a fixed threshold \( \bar{e} \). So the real probability that fines are enforced in the fiscal system is

\[
r_t^d = a \theta(e_t^d) = \begin{cases} a \bar{\theta} & \text{for } e_t^d \leq \bar{e} \\ a \theta^d & \text{for } e_t^d > \bar{e} \end{cases}
\]

(2)

where \( \bar{\theta} > 0 \) and \( \bar{e} > 0 \) are fixed exogenously.

For the ensuing analysis it is relevant to notice that the key simplifying aspect of our assumption about the enforcement externality built into the analytic properties of eq. (2) is not in the specific functional form of the threshold.
externality. It is rather the fact that the actual level of deterrence \((r_t)\) will only
depend on the average non compliance prevailing in each district.

The real probability that a fine for evasion is inflicted, however, is not
observed by the taxpayer, who takes her decision on the basis of her perception \(\bar{p}_{i,t}\) about \(r_t^d\). This perception evolves over time according to an adaptive
learning process defined as follows:

\[
\bar{p}_{i,t} = E[r_t^d \mid I_{i,t}] = L_t^d(p_{i,t-1}^d; s_{i,t}^d).
\]

To simplify the analysis we assume that \(L_t^d\) to be as follows:

\[
\bar{p}_{i,t} = L_t^d(p_{i,t-1}, s_{i,t}) = \alpha \bar{p}_{i,t-1} + (1 - \alpha) s_{i,t},
\]

where \(\alpha\) is weight on past experience\(^6\) and \((1 - \alpha)\) is the weight on new
information coming from a non distorted signal \(s_{i,t}\) of the actual frequency of
apprehension prevailing in the district of residence in the previous period. In
particular the signal \(s_{i,t}\) depends on the level of deterrence actually enforced
in the previous period as follows:

\[
s_{i,t} = r_{t-1} + \eta_{i,t}
\]

where \(\eta_t \in [-\eta, \eta]\) is a i.i.d (across time) noise component with distribution
function \(H(\eta)\), such that \(E(\eta_t) = 0\) and \(Var(\eta_t) = \sigma^2_{\eta}\). Notice that the individual signal is undistorted in the sense that the signal on the average frequency of
punishment in the past period is correct on average among the taxpayers.

The dynamics of individual perceptions can therefore be written as

\[
\bar{p}_{i,t} = \alpha \bar{p}_{i,t-1} + (1 - \alpha)(r_{t-1} + \eta_{i,t})
\]

This learning process formalizes the idea that individual \(i\) uses past experience and she acquires information (at a negligible fixed cost by direct sampling
the experience among peers in period \(t - 1\) or from informed consultants) about
the average enforcement level prevailing in district \(d\) in the past. Notice that
this representation formalizes the notion of an externality since individual per-
ceptions (and hence compliance behavior) evolve based on the aggregate past
level of enforcement.

The mappings \(\theta(e_t^d)\) and \(L_t^d(p_{i,t-1}^d, s_{i,t}^d)\) illustrate the mutual relationship
between social learning and the enforcement externality. Any positive shock to
aggregate evasion in any period will affect signals that all individual agents will
receive in the next period: at any period \(t\) the current distribution of percep-
tions (and induced compliance behavior) will depend on the past distribution
of perceptions due to the learning rule.

This distribution of perception \(\bar{p}_{i,t}^d\) prevailing among the taxpayers in
district \(d\) at time \(t\) is denoted by \(\mathbb{P}_t^d\). It will evolve according to the evolution of
individual perceptions defined by the learning rule and the enforcement exter-
nality, starting from an initial distribution \(\mathbb{P}_0^d\).

\(^5\)Hence it will depend on the first moment of the distribution of perceptions that taxpayers
hold about \(r_t^d\).

\(^6\)Notice that this formulation is not inconsistent with Bayesian learning rule (see Sah, 1991), where weights evolve according to the accumulation of experience following the Bayes
rule. Our choice of time invariant \(\alpha\) greatly simplifies the dynamic analysis. As an alternative
specification of adaptive mechanisms see the literature on OLS learning (Honkapoja 2010).
A dynamic equilibrium of the model consists, therefore, of a sequence of actual enforcement levels $r^d_t$ and an associated distribution of perceptions $P^d_t$ starting from an initial condition $r^d_0$ and $P^d_0$, with a steady state being denoted by $r^d_\infty$ and $P^d_\infty$.

It is important to notice that in the proposed formulation, by complete decentralization of the fiscal jurisdiction, the level of enforcement in each district $d$ only depends on the distribution of perceptions and behavior by taxpayers in that district. On the other hand, given that only local jurisdiction matters, taxpayers will only have incentives to learn about the probability of a sanction being inflicted by a local court. In other words due to complete decentralization of jurisdiction, the evolution of tax compliance in each of the districts does not interact with each other and it only depends on the initial conditions and local features of fiscal jurisdiction: if history matters or not may depend on aggregate parameters of the fiscal system like the tax rate or the fines, but, if it does, only local history matters. For this reason we drop the superscript $d$ henceforth from all the variables of the model and only reintroduce it when needed for the discussion of the empirical implications of the model.

Summarizing the main features of the fiscal system, we denote the exogenous elements of the model by $\Gamma = \{Y_i, \tau, a_i, \theta, L_i, r_0, P_0(\hat{p}_i)\}$, the analysis will focus on endogenous variables defined by the triple $\{P_t(\hat{p}_i), e_t, r_t\}$ describing the evolution of perception compliance and enforcement levels, i.e. the elements of a fiscal system, at the district level.

In the following we describe the tax evasion choice by each agent $i$ in a given district for a given distribution of perceptions $P_t(\hat{p}_i)$, then we illustrate the details of the learning rule and the externality in the fiscal jurisdiction. Then the dynamics of individual perceptions will be characterized along with the convergence of the distribution of perceptions and provide the results on the convergence of $P_t$ to its limit distribution $P_\infty$. Additional specific parametric assumptions will be made to keep the model tractable. These parametric assumptions will pertain to the utility function used by agents to decide compliance. Subscript $t$ will only be considered when relevant, i.e. in the characterization of the dynamics.

### 2.1 Tax evasion

Given the institutional framework described above, tax evasion is decided by each taxpayer $i$ depending on the size of the tax rate, the perceived probability of punishment, the fine and a moral benefit from abiding to the fiscal obligation. We consider risk neutral agents endowed with a linear utility function.

Notice that in the above setting neither $a$ (the probability of an audit) nor $\theta_t$ (the probability that non compliance is fined in a fiscal trial) depend on the individual history of compliance.\footnote{This is equivalent to assume that the cost of current evasion being discovered has no future consequence neither in terms of liabilities on future streams of income, nor for the probability of future audits or convictions. In a more sophisticated model of tax evasion in which these feature had been modeled, the source of persistence due to learning and the consequences of the externality for convergence would not be eliminated. Clearly the dynamics of the equilibrium distribution of perceptions and enforcement would be more}
Individual compliance is as follows:

Lemma 1

\[ U(\delta_i) = (1 - \hat{p}_i)Y_i(1 - \tau \delta_i) + \hat{p}_i(Y_i - \tau \delta_iY_i - \phi \tau Y_i(1 - \delta_i)) + \varepsilon_i(\delta_i) \] (6)

Where \( \delta_i \in [0, 1] \) denotes the percentage of income reported by taxpayer \( i \), \( Y_i \) denotes her income, \( \hat{p}_i \) denotes her perceived probability of apprehension in case of evasion, \( \tau \) denotes the tax rate, \( \phi \) denotes the fine proportional to evasion in case tax evasion is discovered by the audit and successfully finalized by the fiscal court.

The parameter \( \varepsilon_i \) measures the additional utility from compliance measuring the individual tax morale. We assume \( \varepsilon_i(\delta_i) = \varepsilon_i \delta_iY_i \) so that the additional utility associated to tax morale is proportional to the tax bill. Notice that that \( U(\delta_i) \) is linear as a consequence. Moreover \( \varepsilon_i \) is taken uniformly distributed on \([0, \varepsilon]\). Finally, to simplify the analysis, we assume \( \phi \tau = 1 \) (maximal fine).

Lemma 1 Individual compliance is as follows: \( \delta_i = 0 \) if \( \varepsilon_i \leq \bar{\varepsilon}_i = (\tau - \hat{p}_i) \) and \( \delta_i = 1 \) otherwise.

Proof. Linearity of eq. (6) and \( \delta \in [0, 1] \) imply that the solution exists, it is unique and it can only be at the boundaries, i.e. \( \delta_i \in \{0, 1\} \). Specifically, for any given \( Y_i \), there will exist a threshold value of \( \varepsilon_i = \bar{\varepsilon}_i \) such that taxpayer \( i \) is indifferent between evasion and full compliance. Since \( U(\delta_i = 0) = (1 - \hat{p}_i)Y_i \) and \( U(\delta_i = 1) = (1 - \tau)Y_i + \varepsilon_i Y_i \), it is immediate to see that \( \delta_i = 0 \) obtains if \( \varepsilon_i \leq (\tau - \hat{p}_i) \) and \( \delta_i = 1 \) otherwise.

Lemma 1 above characterizes individual compliance for a given individual perception \( \hat{p}_i \). Intuitively, given a perception \( \hat{p}_i \), an individual with low enough (moral) benefit from compliance will evade the whole income. For given fiscal morality the incentive to evade are increasing in the tax rate and decreasing in the perceived probability of apprehension.

Before turning to the dynamics of perception, for later use, we compute here the aggregate compliance rate for a given \( P_i(\hat{p}_i) \), with an average being denoted by \( \hat{p}_{m,t} \). Then the average non compliance rate can easily be obtained as follows:

Lemma 2 For any given distribution of perceptions \( P_i(\hat{p}_i) \) prevailing as of time \( t \), the aggregate evasion rate is given by

\[ e_t = \frac{(\tau - \hat{p}_{m,t})}{\bar{\varepsilon}} \] (7)

where \( \hat{p}_{m,t} = \int_{\hat{p}_i = 0}^{\bar{\varepsilon}} \hat{p}_i dP_i(\hat{p}_i) \).

Notice that for \( \hat{p}_{i,t} > \tau \) the incentive effect of expected punishment is large enough to guarantee full compliance by those individuals with such a perception. Although no particular problem would arise if this possibility is allowed \( \{ \text{just take } \varepsilon_i \leq \min\{0, (\tau - \hat{p}_i)\} \} \). No problems with atoms in the equilibrium distribution of perceptions should arise since the signal has a diffuse support. In any case conditions can be provided to avoid this case so that the average perception is strictly interior, i.e \( \hat{p}_{m,t} \in (0, \tau) \) and hence \( e_t \in (0, 1) \).
Proof. From Lemma 1 we know that the tax evasion decision is \( \delta_i = 0 \) if and only if \( \varepsilon_i \leq (\tau - \bar{\rho}_t) \). So the measure of non compliant taxpayers in a district will be given by \( e_t = \Pr[\varepsilon_i \leq (\tau - \bar{\rho}_t)] \), where \( \varepsilon_i \) is uniformly distributed on \([0, \pi]\) by assumption. Therefore \( e_t = \int_{\bar{\rho}_t}^{\tau} \frac{(\tau - \bar{\rho}_t)}{\pi} d\bar{\rho}_t(\bar{\rho}_t) \) and eq. (7) follows.

Eq. (7) describes the equilibrium aggregate evasion rate corresponding to an average perception computed for a given \( \bar{\rho}_t \). Notice that for \( \bar{\rho}_{m,t} \rightarrow 0 \), \( e_t \rightarrow \frac{\pi}{\tau} \), so that average compliance does not disappear even in the presence of no enforcement due to the presence of moral benefits from compliance.

Hence, aggregate evasion increases (linearly) in the level of the tax rate and it decreases with the average perceived level of deterrence in the district as measured by the average perceived probability of apprehension.

Summarizing, Lemma 1 and Lemma 2 describe individual evasion choices as a function of individual perceptions \( \bar{\rho}_i \) in each district and the average evasion rate as a function of the average perception for any given probability distribution \( \bar{\rho}_t \). This latter is to be determined in the equilibrium dynamics to be studied in the following.

2.2 The dynamics of the distributions of perceptions

We move now to the analysis of the evolution of a random process \( \bar{\rho}_t(\bar{\rho}_i) \) describing the distribution of perceptions at each period \( t \) induced by \( \bar{\rho}_{t-1}(\bar{\rho}_i) \), the past distribution of perceptions and in particular by its average \( \bar{\rho}_{m,t-1} \) with the associated tax evasion decision by each taxpayer in the population and the ensuing aggregate evasion rate \( e_{t-1} \), for the exogenously given learning rule and the signal, \( s_i,t \), obtained by each agent \( i \) as of time \( t \).

In the following we start with the formal description of the stochastic process followed by the taxpayers’ perceptions about the probability of apprehension, then we prove existence and convergence of the sequence of \( \bar{\rho}_t(\bar{\rho}_i) \) to \( \bar{\rho}^*(\bar{\rho}_i) \), starting from an arbitrary initial distribution \( \bar{\rho}_0(\bar{\rho}_i) \). The analysis proceeds by adapting standard results in the theory of Markov Process as in Stockey, Lucas and Prescott (1989), SLP (1989) henceforth.

Let us start by noticing that the transitions of individual perceptions are driven by the lagged aggregate level, \( \bar{\rho}_{t-1} \). By using equation (2) lagged one period, \( \bar{\rho}_{i,t} \) can be written as:

\[
\bar{\rho}_{i,t} = \Phi(\cdot) = \begin{cases} 
\alpha \bar{\rho}_{i,t-1} + (1 - \alpha)(a\bar{\theta}_i + \eta_{i,t}) & \text{for } e_{t-1} \leq \bar{\varepsilon} \\
\alpha \bar{\rho}_{i,t-1} + (1 - \alpha)(a\bar{\theta}_i + \eta_{i,t}) & \text{for } e_{t-1} > \bar{\varepsilon}.
\end{cases}
\]

By recovering \( \bar{\rho}_{m,t-1} \) from (7) and by replacing its value into the equation above the stochastic difference equation can be written as follows:

\[
\bar{\rho}_{i,t} = \Phi(\cdot) = \begin{cases} 
\Phi_h = \alpha \bar{\rho}_{i,t-1} + (1 - \alpha)(a\bar{\theta}_i + \eta_{i,t}) & \text{for } \bar{\rho}_{m,t-1} \geq \bar{p} \\
\Phi_l = \alpha \bar{\rho}_{i,t-1} + (1 - \alpha)(a\bar{\theta}_i + \eta_{i,t}) & \text{for } \bar{\rho}_{m,t-1} < \bar{p},
\end{cases}
\]

where \( \bar{p} = \tau - \pi \bar{\varepsilon} \).

Hence the dynamics of individual perceptions are described by the stochastic difference equation in (8) as a function of their past value \( \bar{\rho}_{i,t-1} \) and the
signal given by (4) according to the past average perception $\hat{p}_{m,t-1}$ and the idiosyncratic component $\eta_{i,t}$.

To avoid uninteresting cases we will assume that $\tau$ and $\bar{c}$ are such that $\hat{p} \in (0, 1)$. The notation emphasizes that $\Phi$ is a stepwise linear correspondence $\tilde{\pi}_{i,t-1} \rightarrow \Phi_i(\tilde{\pi}_{i,t-1}, \ldots)$ mapping the set of equilibrium perceptions achievable by agent $i$ at time $t$ starting from a perception $\tilde{\pi}_{i,t-1}$, for different values of $\eta_{i,t}$ and given the aggregate state $(r_{t-1}, e_{t-1})$ of the fiscal system in the previous period. For future reference we denote $\bar{\Phi}_h \equiv \max_{\eta} \Phi_h(_\eta)$, $\underline{\Phi}_h \equiv \min_{\eta} \Phi_h(_\eta)$, $\bar{\Phi}_l(\cdot) \equiv \max_{\eta} \Phi_l(_\eta)$ and $\underline{\Phi}_l(\cdot) \equiv \min_{\eta} \Phi_l(_\eta)$. A graphical representation of this difference equation is provided at Figure 1.

Figure 1 here

Suppose, for the moment, that $\eta$ is small and it satisfies the following condition $\Phi_l(\hat{p}) \leq \Phi_h(\hat{p})$ or $\alpha(\theta - \bar{\theta}) \geq \eta - \bar{\eta} = 2\bar{\eta}$.

Clearly, the stochastic difference equation defined by (8) satisfies the conditions of theorem 8.9 in SLP (1989) and hence it defines a transition function for the Markov process denoted by $Q(p, S)$\(^9\). The transition function defines the probability that individual taxpayers end up having perception $x' \in S$ starting from perception $\hat{p}_{i,t-1} = x$, with $Q$ satisfying the usual definition.\(^10\)

It follows that the sequence of distribution functions $\mathbb{P}_t$ satisfies the following recursive relation

$$\mathbb{P}_t(x') = \int Q(x', x; r_{t-1})d\mathbb{P}_{t-1}(x)$$  \hspace{1cm} (9)

starting from any initial $\mathbb{P}_0$.

Hence, an equilibrium distribution of perceptions as of time $t + 1$ is a probability measure satisfying $\mathbb{P}_{t+1} = T^*\mathbb{P}_t$, where $T^*$ is the self adjoint Markov operator associated to the transition $Q(p, S)$. $\mathbb{P}_t$ may converge to an invariant distribution, possibly depending on $\mathbb{P}_0$. A steady state of the fiscal system (invariant distribution of perceptions and induced evasion behavior) is a measure $\mathbb{P}$ on $[0, 1]$ satisfying $\mathbb{P}^* = T^*\mathbb{P}^*$. Endowed with this definition we will now provide some results about the existence of $\mathbb{P}^*$, its convergence and the dependence of the dynamics on $\mathbb{P}^0$.

In the next subsection we first discuss the steady state assuming that $\mathbb{P}^*$ exists, then we will prove and characterize convergence of the distribution of perceptions $\mathbb{P}_t$ to $\mathbb{P}^*$.

---

9 A transition probability on the state space $\tilde{\pi}_i$ is a function $Q: Z \times Z \rightarrow [0, 1]$ such that: 1. $Q(\tilde{\pi}_i, \ldots)$ is a probability measure and 2. $Q(\ldots, S)$ is a $Z$ measurable function on $\mathbb{R}_+$, where $S$ denotes a Borel set. It is easily verified that $Q$ satisfies both conditions in our case.

10 See Theorem 8.9 SLP (1989). The only non negligible difference here is that $Q$ at each period depends on $r_{t-1}$ in general. However, the structure of the enforcement externality as defined at eq. (2) clearly implies that for any given $\mathbb{P}_0$ the standard definition applies. Indeed, if $\mathbb{P}_0$ is such that $p_{\tau,0} \leq \tau - \bar{c}$ then $\hat{p}_{i,t} = \Phi_h(\hat{p}_{i,t-1}, \eta_{i,t}; r_{t-1} = \bar{\theta})$ for all $t = 0, 1, 2, \ldots$; on the other hand if $\mathbb{P}_0$ is such that $p_{\tau,0} > \tau - \bar{c}$ then $\hat{p}_{i,t} = \Phi_l(\hat{p}_{i,t-1}, \eta_{i,t}; r_{t-1} = \bar{\theta})$ for all $t = 0, 1, 2, \ldots$.
2.3 Steady States and convergence of perceptions. The role of local history

Suppose, for the moment, that the fiscal system converges to a distribution of perceptions (not necessarily unique, for any initial distribution \( P_0 \)) such that \( P^* = T^* P^* \).

Let \( \bar{p}_m = \int_{\bar{p}_0=0}^1 \bar{p}_i dP^*(\bar{p}_i) \) be the average perception at steady state. The steady state level of the average perceptions must satisfy \( \bar{p}_m^* = \bar{p}_{m,t} = \bar{p}_{m,t-1} \) and from equation (8) it necessarily holds:

\[
\bar{p}_m^* = \begin{cases} 
\alpha \bar{p}_m + (1-\alpha)a\bar{\theta} & \text{for } \bar{p}_m^* > \bar{p} \\
\alpha \bar{p}_m + (1-\alpha)a\theta & \text{for } \bar{p}_m^* \leq \bar{p}
\end{cases}
\]

with \( \bar{p} = \tau - \bar{e}\bar{e} \). Then it follows

\[
\bar{p}_m^* = \begin{cases} 
a\bar{\theta} & \text{for } \bar{p}_m^* > \bar{p} \\
a\theta & \text{for } \bar{p}_m^* \leq \bar{p}
\end{cases}
\] (10)

From the agents’ optimal evasion choice at equation (7) the steady state aggregate evasion rate is given by \( e^* = \frac{(\tau-\bar{p}_m^*)}{e} \) and hence, by definition of \( \bar{p}_m^* \), it necessarily holds

\[
e^* = \begin{cases} 
e^*_l = \frac{(\tau-a\bar{\theta})}{e} & \text{for } \bar{p}_m^* > \bar{p} \\
e^*_h = \frac{(\tau-a\theta)}{e} & \text{for } \bar{p}_m^* \leq \bar{p}
\end{cases}
\] (11)

Moreover, the steady state probability of apprehension is obtained by setting \( r_t = r_{t-1} \) at equation (2)

\[
r^* = \begin{cases} 
a\bar{\theta} & \text{for } \bar{p}_m^* > \bar{p} \\
a\theta & \text{for } \bar{p}_m^* \leq \bar{p}
\end{cases}
\] (12)

From equations (10), (11) and (12) it follows that there are at most two steady states. The result can be summarized in the following

**Proposition 1** Suppose there exists an invariant distribution of perceptions \( P^* \). Then there exist at most two steady states levels of aggregate perceptions \( \bar{p}_m^* = r^* = a\bar{\theta} \) and \( \bar{p}_m^* = r^* = a\theta \) and at most two associated aggregate evasion rates \( e^* \) given by eq. (11). Depending on the tax rate (\( \tau \)) and the enforcement system \( (\bar{e}, a, \theta) \) there are three possible regimes:

i) low tax level: if \( \tau \in [0, \bar{e} + a\bar{\theta}] \) then there exists a unique steady state \( \bar{p}_m^* = \bar{p}_m = \tau = a\bar{\theta} \) and \( e^* = e^*_l \leq \bar{e} \);

ii) intermediate tax level: if \( \tau \in [\bar{e} + a\bar{\theta}, \bar{e} + a\theta] \) then there exists two steady states \( \bar{p}_m = \bar{p}_m^* = \tau = a\bar{\theta} \) and \( e^*_l \leq \bar{e} \) or \( e^*_h > \bar{e} \) and or \( \bar{p}_m = \bar{p}_m^* = \tau = a\theta \);

iii) high tax level: \( \tau \in [\bar{e} + a\theta, 1] \) then there exists a unique steady state \( \bar{p}_m = p^*_m = \tau = a\theta \) and \( e^* = e^*_h > \bar{e} \).

**Proof** Suppose there exists \( P^* := S^* \rightarrow [0,1] \), where \( S^* \subseteq [0,1] \) is the support of \( P^* \). Then it holds \( \bar{p}_m^* = \int_{\bar{p}_0=0}^1 \bar{p}_i dP^*(\bar{p}_i) \) and \( e^* = \tau - \bar{p}_m^* \). That every possible steady state coincides with a rational expectation equilibrium and it holds: \( \bar{p}_m = \bar{p}_m^* \). That
at most two steady state aggregate evasion rates exist clearly follows from (11). Depending on \( \Gamma \), there are three possible regimes under which the fiscal system operates in the steady state. These are obtained from the study of the fixed points of the function
\[
\hat{\rho}^* = f(\rho) = \begin{cases} 
\alpha \rho^* + (1 - \alpha) \rho \theta & \text{for } \rho^* > \rho \\
\alpha \rho^* + (1 - \alpha) \rho \theta & \text{for } \rho^* \leq \rho.
\end{cases}
\]
Where it is easy to see that for \( \tau \in [0, \bar{e} + \theta] \) only \( \bar{\rho}_m^* = \rho \theta \) satisfies \( f(\rho \theta) \) and hence \( e = e^*_l = (\tau - \rho \theta) \bar{e} \). For \( \tau \in [\bar{e} + \theta, 1] \) only \( \underline{\rho}_m^* = \rho \theta \) satisfies \( f(\rho \theta) \) and \( e = e^*_h = (\tau - \rho \theta) \bar{e} \). Finally, for \( \tau \in [\bar{e} + \theta, \bar{e} + \rho \theta] \) both \( \rho^*_m \) and \( \bar{\rho}_m^* \) can satisfy \( f \). For any \( \rho^*_m \) the associated \( e^*_l \) can be easily recovered by using (11) in each of the two steady states. Clearly, whenever multiple steady states for aggregate perceptions and aggregate evasion are obtained, they must be supported by different limit distributions \( \mathbb{P}^* \).

In words, if the tax rate \( \tau \) is high compared to a measure of efficiency of the enforcement system \((\bar{e}, \theta)\) only the high evasion-low enforcement equilibrium can be a steady state; if the tax rate is low compared to the efficiency of the enforcement system only the low aggregate evasion rate can be consistent with steady state. In all the intermediate cases two equilibria can be consistent with steady state; which one of the two will prevail as a selected equilibrium will depend on historical initial conditions described by \( \mathbb{P}_0 \) or by the permanent effects of transitory shocks to local parameters measuring tax morale \((\bar{e})\), and the measure of local efficiency of the enforcement system \((\bar{e})\).

These results capture the intuition associated to the enforcement externality as in the quote in the introduction, although in a dynamic setting with learning. When the economic profitability of tax evasion is large (i.e. taxation is large) then there will be enough agents (given the distribution of the moral cost \( \bar{e} \)) willing to evade, the tax courts will be less effective in sentencing the fines and the high evasion equilibrium becomes self-sustaining due to the enforcement externality. The opposite happens if the tax rate is low enough. For intermediate levels of taxation both equilibria are possible and the role of history becomes crucial of the selection of the relevant equilibrium.

Notice that in all cases the limit probability of perceptions are correct on average (i.e. after integrating with respect to \( \eta \)) and the steady states coincide with a rational expectation equilibrium, where \( \hat{\rho}_m^* = \rho^*_m \), i.e. the average individual perception coincides with the true probability of apprehension.

We should also notice that, for the steady states of aggregate evasion, the larger the congestion effect on the enforcement system, i.e. the lower the value of \( \bar{e} \), the lower must be the tax rate in order to enforce the low evasion equilibrium at steady state. Moreover, the greater the difference between \( \theta \) and \( \bar{\theta} \), i.e. the greater the consequences of the externality on the returns from audits, the larger the interval for the existence of multiple steady-states.

Our next task is to prove that, indeed, the learning model with the enforcement externality converges to the rational expectations equilibrium over time, as characterized in Proposition (1). In the following we prove that the Markov process defined by the stochastic differential equation at equation (8) converges
to $P^*$ starting from any $P^0$, in all of the three regimes in proposition (1) as defined by the values of the parameters of the fiscal system. In particular, we will prove that in case i) and iii) in proposition (1) convergence to a unique $P^*$ is obtained independently of the initial distribution $P^0$; whereas in case ii) the Markov process will not be ergodic and which distribution of perceptions are induced by the fiscal enforcement system will depend on the initial distribution of perceptions $P_0$.

**Proposition 2** Starting from an arbitrary distribution of perceptions $P_0(P_i)$, the Markov process defined by $\Phi$ at equation (8) will converge to a unique $P^*$, possibly depending on $P_0$.

**Proof.** We proceed by proving the result in a few steps. That the stochastic differential equation defined by $\Phi$ defines a Markov process was already stated in the text as an immediate consequence of theorem 8.9 in SLP (1989). Although individual transitions depend on the past distribution the key observation is that, depending on $P_0$ and hence on initial average $\bar{p}_{m,0}$, dynamic transitions for individual perceptions will be defined either by $\Phi_h$ or by $\Phi_l$. In particular if $P_0$ is such that $\bar{p}_{m,0} \leq \bar{p}$ then individual transitions at eq. (8) will be governed by $\Phi_l$ for all $t > 0$; on the other hand if $\bar{p}_{m,0} > \bar{p}$ then individual transitions at eq. (8) will be governed by $\Phi_h$ for all $t > 0$. Clearly (see fig.1) both $\Phi_l$ and $\Phi_h$ satisfy conditions for contraction and condition M in SLP p.348 for convergence, hold in both cases. Whether ergodicity or history dependency obtains depending on the parameters of the system depending on the value $\bar{p}$ as in the three cases in Proposition 1. The details of the proof for each of the three cases is immediate and it is not reported for brevity.

The case where equilibrium multiplicity can arise is particularly relevant for our investigation. The model shows that an enforcement externality in fiscal jurisdiction arising at the local level can support long-run persistence of geographic dispersion of evasion rates that is likely to emerge if the tax rate is large enough (not so large to disrupt the fiscal state all together) compared to a measure of administrative efficiency.

### 2.4 Convergence when the support of $\eta_i$ is large: the role of experts.

All the results in the previous section were derived under the assumption that $\eta$ is low enough. In particular $\eta$ was such that $\Phi_l(\bar{p}) \leq \Phi_h(\bar{p})$ or $\alpha(\bar{\theta} - \bar{\theta}) \geq \eta - \eta = 2\eta$. It is a standard result of the Markov process that if the random component of the dynamic transition has a large enough variance, then ergodicity is obtained. In the context of our model it is easy to see the consequences for the convergence of $P_t$ in the complementary case when $\alpha(\bar{\theta} - \bar{\theta}) < 2\eta$, that is when the noisy signal in the learning process around its average is not enough precise.

This situation can occur either when the information technology of the taxpayers features lower precision or when there is an intrinsically large noise component in the announcement that the fiscal authority makes about the enforcement system, so that taxpayers strive to learn about the probability of
punishment. This is interesting to emphasize since it highlights the role of experts in the reinforcement of the fiscal externality. More precisely experts provide information to taxpayers, more likely is the possibility that the enforcement externality will make history dependent on initial conditions.

Indeed it is easy to see that if the support of $s_i$ is large i.e. whenever $\bar{\eta} > \frac{\alpha(\theta - \bar{\phi})}{2}$ is large enough, the model will exhibit different dynamics and global convergence is obtained. The result is summarized in the following

**Corollary 1** If $\bar{\eta} > \frac{\alpha(\theta - \bar{\phi})}{2}$ then the fiscal system converges to a unique distribution $\mathbb{P}^*$.

**Proof.** If $\bar{\eta} > \frac{\alpha(\theta - \bar{\phi})}{2}$ then $\Phi_i(p) > \Phi_{\bar{\eta}}(\bar{p})$. Define $\hat{p}_{i,\text{min}}$ as the fixed point of $\Phi_i(p_{i,\text{min}})$ and $\hat{p}_{i,\text{max}} = \Phi_i(p_{i,\text{max}})$. Clearly, they both exist and $\hat{p}_{i,\text{min}} < \hat{p}_{i,\text{max}}$. Moreover, there exists a finite $n$ such that any state $\hat{p}_i \in [\hat{p}_{i,\text{min}}, \hat{p}_{i,\text{max}}]$ must be reached starting from any $\hat{p}_i \in [0, 1]$. By definition any $\hat{p}_i \in [\hat{p}_{i,\text{min}}, \hat{p}_{i,\text{max}}]$ is an invariant set for $t > n$ and any state in it is reachable starting any other state in this interval. Hence, from the mixing condition M, there exists a unique limit distribution for the sequence (9). Consider then case II in Proposition (1) then for $\bar{\eta} \geq \frac{\alpha(\theta - \bar{\phi})}{2}$ the limit distribution does not depend on initial condition. In case i) and iii) in Proposition (1) the model was already proved to be ergodic. ■

Even if the above result easily follows from general principles in Markov processes they highlight an interesting role of experts, or more generally of the factors that influence the precision of the signal in the learning process. The more efficient the market for expert is, the larger the precision of the signal the taxpayers get, the stronger will be the enforcement externality and the emergence of history dependence, if the fundamentals are consistent with their presence.

### 3 The essential traits of the Italian fiscal system since unification.

Our model posits that history dependence in compliance behavior may arise because of a local enforcement externality in fiscal jurisdiction, due to large initial heterogeneity or large initial fiscal shocks which were heterogeneous across provinces. With the aim to assess the foundation of our assumptions and results, in this section we provide a brief historical reconstruction of the main long-run traits of the fiscal system (taxes and enforcement policy) and of tax evasion in Italy, as available among economic historians since unification of the country.

The kingdom of Italy was proclaimed in 1861. This was the final outcome of a long and complex process of political and military campaigns deeply rooted in the geopolitics of Europe in the XIXth century. After the Congress of Vienna in 1815 the Italian territory was divided into eight main states: the Kingdom of Sardinia under the domination of the House of Savoy, which included the North-West of Italy and Sardinia, the Kingdom of Lombardy, formed by the North-East part of
Italy, under the direct control of the Austrian empire, the Grand Dukedom of Tuscany, the Dukedom of Modena, the Dukedom of Parma, (these were independent territories but linked to Austria by alliances and economic interests), the Papal States in the centre of Italy and the Kingdom of the Two Sicilies (formed by the unification of the Kingdom of Sicily and the Kingdom of Naples in 1816, under the domination of the House of Bourbon and consisting of the southern regions of the Italian peninsula and Sicily). The foreign domination was never accepted by these separate political units and insurrection movements started soon after the Congress of Vienna, culminating into two independence wars, the first in 1848-1849 and the second in 1859 which led to the formation of the Kingdom of Italy. Lombardy (with the exclusion of Veneto and Friuli) was annexed to the kingdom of Sardinia at the end of the second independence war, in 1859, and after few months the monarchists loyal to the House of Savoy in Northern Italy and the revolutionary republican Giuseppe Garibaldi in Southern Italy conducted military campaigns to complete the unification process with the annexation of the Dukedoms of Parma and Modena, of the Grand Dukedom of Tuscany, of part of the Papal states (with the exclusion of Rome) and of the Kingdom of the two Sicilies. The unification process was formalized by the Law 17 March 1861 n. 4761, when the Italian Parliament proclaimed Victor Emmanuel, until then king of Sardinia, as the first king of the new Kingdom of Italy. One month before his proclamation, Victor Emmanuel had already assembled the deputies of the first Italian Parliament in Turin, while on 27 March 1861 it was declared that Rome would have been the capital of Italy, even though at that time it was not yet part of the new-born kingdom. The addition of Veneto in 1866 and Rome in 1871 completed the unification process.

3.1 The fiscal regimes in the preunitary states

A great challenge for the newly-born kingdom was the creation of a unified tax system, a very complex task given that the organization of the fiscal system and the tax regimes varied substantially across preunitary states. As documented by Zamagni (2011) and (2012) and by Battilani (2011), the relationship between central and local government was very different across the preunitary states, the two extremes being Lombardy (where local municipalities performed a variety of functions and enjoyed a considerable degree of autonomy) and the Kingdom of the Two Sicilies (where the administration was highly centralised). This meant disparities in the level of fiscal decentralization but also in local public spending and in the weights of the various taxes levied. Public spending, both at central and at local level was the highest in the Kingdom of Sardinia and in the Lombardy region and the lowest in the Kingdom of the Two Sicilies, where the development of public infrastructures and local public services, like primary education, was well below the one experienced in the other states. The level of taxation mirrored the public spending. Overall, in 1860 the per capita tax revenue ranged from about 30 liras in the Lombardo-Veneto and the Kingdom of Sardinia to less than 20 liras in the Kingdom of Two Sicilies. A tax regime similar to that of the Kingdom of Two Sicilies applied within the Papal
states. Before unification the main sources of tax revenues were from excise duties on consumer goods and land taxes. These latter were based on cadastral records and were of prime importance everywhere except in the Kingdom of the Two Sicilies, where the main source of tax revenue was excise duties on consumer goods. Some states also levied various forms of municipal direct taxes connected in some way to income, although they were less important in terms of revenues raised than the land tax: in the Papal states a livestock tax and a sort of family tax (focatico) were levied, in the Kingdom of Sardinia there was a licence tax, in the Lombardy region a crafts and trade tax was applied, while in the Duchy of Parma and Modena there was a tax on business and trade. No such taxes were applied in the Kingdom of the Two Sicilies. The composition of tax revenue varied enormously from one state to another in 1860: the land tax constituted two thirds of the municipal tax revenue in the Lombardy region, 60% in the Grand Duchy of Tuscany and 50% in the Kingdom of Sardinia. For the Papal states there was a considerable difference across municipalities.

3.2 The fiscal reform after unification: the consolidation of public debts, the harmonization of the existing tax regimes and the introduction of new taxes.

These differences and local specificities had to be taken properly into account in the design of a unified fiscal system (Dominici-Marongiu p.12, 2005). The fiscal reform, as emphasised in Zamagni (2011), consisted in consolidating the public debts of the different preunitary states, in harmonizing the already existing taxes to make the tax regimes more homogenous across the territory and in introducing new taxes with the view to reach a balanced public budget deemed of primary importance for the economic stability and the international reputation of the newly born country by the creators of the new tax system.\footnote{See the letter addressed to the electorate by Marco Minghetti (1865), who was a major protagonist, together with Quintino Sella, in charge of restructuring the Italian public finance after unification.}

One of the pillars of the fiscal reform was the introduction in 1864 of the first form of income tax: the tax on "Ricchezza mobile", i.e. a direct tax on incomes on capital and labor. For the first two years, the revenues had been defined at the central level (Sistema del contingente). The tax was an apportioned one, in order to secure a definite revenue. The system was such that the total amount of fiscal revenue the government aimed to raise was apportioned among different provinces. Each provincial quota was then apportioned among the municipalities, and the amounts were then levied upon individuals according to their income. In 1866 the tax was changed to a percentage tax, the rate being made 8.8 percent. In 1869 the tax rate was 13.2%, compared to a rate of 2.46% in the UK in the same year, and at the beginning of the XX century it reached 20 percent. A new indirect tax, called the milling tax ("Tassa sul macinato") was introduced in 1868 on the grinding of wheat and cereals in general. It was introduced to contribute to the reorganization of public finances but it was very unpopular and had to be abandoned in 1883.
Because of the quite high sovereign debt of the kingdom, the harmonization of the existing tax regimes and the introduction of the tax on "Ricchezza mobile" and of the milling tax resulted in a huge increase in the level of taxation mainly in those areas that prior unification had experienced very low taxes (and very low public spending), as we shall document more in details in section 4 where we construct an index of the tax shock for our regression analysis.

3.3 The enforcement system

The introduction of the new income tax called for the organization of a fiscal enforcement system. We can distinguish four fundamental steps: the definition of the fiscal obligation, the assessment of the tax liability, the litigation process in case of disputes between the taxpayer and the public administration and, finally, the collection of taxes and fines.

As for the definition of the fiscal obligation, according to the rules in 1861, each citizen’s tax liability was defined by an individual public official (Agente delle Imposte) or a collective body (Commissione di Accertamento) and publicly notified to the single taxpayer by the major of the municipality of her residence. It is important to notice that the notification was made publicly available through the publication of the whole list of the taxpayers and of the amount assessed for each of them. So the fiscal obligation and tax assessment legally originated at the same moment, as certified by the major. In the early years of the unified state, in order to establish the liberal principle of individual responsibility in front of the tax obligation, each individual declaration was assessed by the Agente delle Imposte and in case of dispute by the Commissione di Accertamento, and then communicated to the major of the municipality. At the moment in which the tax collector handed the list of taxpayers with the individually assigned tax bill the taxpayer became formally a debtor to the state.

In case of disputes, a litigation process was opened. In the aftermath of the unification, three levels of appeals were present in the jurisdiction. The taxpayer could dispute in front of the Commissione di Accertamento Comunale (at the municipality level), which originally had both initiative in the estimation of individual income and a role of inspection. Against their decision taxpayers could appeal at a Commissione Provinciale. A final appeal was granted in front of the Commissione Tributaria Centrale (established since 1865). The nature of the process was administrative.

A quick overview of the history of this local dimension in the design of the enforcement of fiscal law confirms that this original trait has been almost a constant after unification (see Galeotti, 1967 and Palelologo 2005) and survived almost untouched until 1972. The reform of 1972 redefined the geographical borders of the jurisdiction of the courts of first instance, enlarging their territorial competence to the same borders as the ordinary law courts (broader than

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12 These were introduced by the Law "24 Luglio n.1836", passed in 1864.
13 The taxpayer could also contest the decisions in front of ordinary judges for crimes or unlawful decisions, except for the assessment of the tax liability. This principle still holds today making six the total number of appeals in Italy.
the municipality). The second instance of appeal was maintained at the provincial level with a reduced role of the local governments in the appointment of its members, whereas the Commissione Centrale was maintained in its original form and composition. The system remained unchanged until the last reform (1992), still in force. The courts of first instance were redifined at provincial level and the courts of second instance were set at regional level. The court of third appeal (Commissione Centrale) was eliminated and the third instance of appeal was located within the prerogatives of the Corte di Cassazione (upper layer in the ordinary justice), only for disputes about legitimacy. It was also introduced a self-government body (Consiglio di Presidenza della Giustizia Tributaria), in charge of the appointment, promotion, replacement and disciplinary sanctions of the members of the Commissioni Tributarie. The criteria of appointment were however - and still remain today - quite vague and do not guarantee a suitable preparation and experience of the fiscal judges, so crucial for their impartiality and independence (Simone, 2014). If we compare the Italian experience to the experience of other European countries who adopt special tax courts for the process of tax litigations, a clear peculiarity of the Italian system is the local dimension of the tax court (that can deal with all taxes, not only with local taxes). Other specificities of the current Italian system are the length of the litigation process (it takes on average 10 years to complete a case), the very low expected return of litigations, the selection procedures of the fiscal judges (nominated at local level, merely on the basis of qualifications and not merit) and their inadequate remuneration and working conditions (the fiscal judges do not have full time positions).

The last step of the enforcement process is the collection of taxes and fines. In the immediate aftermath of unification the tax collection process was that inherited by the preunitary states. In the Kingdom of Sardinia and in the Dukedom of Parma the person in charge was a government official (so called, Sistema della Regia di Stato), so the central government directly managed the tax collection process. In the Kingdom of Lombardo Veneto and in the Dukedoms of Modena and Parma, the collection was operated by local private agents (Esattori), licensed on an auction basis at the municipality level (the agents were paid in percentage of the revenues "aggio" but were also acting as a bank, anticipating the value of the due taxes to the government - the so called "sistema del non riscosso per riscosso"). In the Kingdom of the Two Sicilies and in the Grand Dukedom of Tuscany the collection system was arranged by a direct involvement of local government employees. The system prevailing in the Kingdom of Lombardo Veneto, judged to be the most efficient in the collection of taxes, was extended to the whole nation in 1871 (Law n.192, so called "Legge Sella") and the basic architecture prevailed for more than one

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14 According to data we collected from the Italian Revenue Agency, the percentage of evaded taxes which were expected to be collected at the end of the litigation process in the period 2006-2010 was on average 3.79%.

15 Although the idea of extending the experience of the Kingdom of Lombardo Veneto was proposed in 1861, it actually took ten years to harmonize the tax collection system for the whole nation, as there were very strong local oppositions to change the original system in the other territories of the nation. See Nuzzo (2011), pp. 18-21.
hundred years until 1988\textsuperscript{16}.

### 3.4 The level of tax evasion

The major increase in the fiscal pressure of the unified tax regime and the local feature of the organization of enforcement were identified as the causes of widespread frauds and abuses at the end of the XIX century, as documented by Alessio (1883) and by Seligman (2004). Alessio (1883) noticed that in 1877 the total income reported by all private workers in Italy amounted to 495 millions liras and that total wage paid to public employees, taking into account also local administrations, was 319 millions\textsuperscript{17}. A simple comparison of these figures with that of the labor force composition suggested that the true income by private employees had to be much higher than the reported one. The excessively high tax rates and the inefficiency of the local enforcement were, according to Alessio the main culprits of the high level of tax evasion. As the author argues, the Commissioni di Accertamento were composed of five members for each municipality, the chairman was appointed by the Prefect (the representative of the central government in the Province) and the others were elected by the Town Councils, where rich land owners and tradesmen predominated among those who had the right to vote. Hence there were important conflicts of interest, as the members of these commissions represented the interests of rich land owners and tradesmen, the same categories of taxpayers engaged with widespread tax evasion at that time, as we shall document below. Lobbying to affect enforcement was also made possible by the fact that the members of the fiscal commissions were in charge for several mandates, with no bans on re-election. Also, there were very limited means to verify declarations, above all for individual businesses and professionals, who were not required to provide a balance-sheet. In the writings of Alessio or other historians, like Manestra (2010) who document the high level of tax evasion since the start of unification, tax evasion was concentrated in few occupations where opportunities to hide income were the highest, like lawyers, judges, engineers, architects and above all pharmacists, doctors and surgeons. Seligman (2004) also identifies with the

\textsuperscript{16}However, since 1972, with the introduction of the individual tax return the involvement of the taxpayer in the determination of the tax liability grew in importance and the collection of unpaid taxes by private agents became more and more difficult. The profits of these agents started to decrease and it became more difficult to fill in their vacancies. In 1988, the collection process was nationalized and licenced to private agencies (Concessionarie) controlled by banks. There was a drastic change in the remuneration and the risk position of the private agents, with a resulting distortion of incentives to focus on the collection of the spontaneously paid taxes rather than on the recovery of the tax debt with coercive actions. Moreover, the system of anticipation of the due taxes by the private agents (sistema del non riscosso per riscosso) was abolished. As a consequence the collection process became less and less efficient and in 2005 (D.L. n. 203) licensing to private agents was suppressed and the provision of the service was operated directly by the state through a Private Company (Riscossione SpA) with 50\% of its capital owned by the Italian Revenue Agency and 49\% by the Italian Social Security Agency (INPS). In 2007 Riscossione SpA was replaced by Equitalia, a private company with the same participation of the Italian Revenue Agency and INPS. It did not operate for Sicily. Since 2017 tax collection, (except for Sicily) is operated and performed by Agenzia delle Entrate- Riscossione, a public agency.

\textsuperscript{17}See Alessio (1883), p. 350.
strong increment in the tax burden driven by the unification the main reason for the peculiar Italian case in the XIX century: “tax rates are so enormously high that evasion and fraud are almost universal”.  
Manestra (2010) argues that noncompliance characterizes the entire history of Italy and has been a persistent phenomenon. In the next section we consider the evolution of tax evasion since unification and use econometric analysis to explore the link between the tax shocks experienced in the aftermath of Italy unification and tax evasion some 140 years later.

4 The long-run effect on compliance of a drastic tax reform.

By its very nature, tax evasion is difficult to measure because of the incentives to conceal the tax base. The study of tax evasion becomes challenging when an historical perspective is pursued. Data relative to Italy provide an opportunity on this grounds. In fact, we are able to compare a measure of unpaid taxes at province level over 1868-1870, that is just after the formation of the Kingdom of Italy, with a quite equivalent measure over 2008-2010, that is about sixty years after the institutional referendum which determined the passage from monarchy to the modern Italian Republic. The main issue for our investigation is that during this very long interval—roughly one hundred and fifty years—the province has almost always been, and it still is, the relevant territorial entity for what concerns tax compliance in Italy. Together with the region, the province level turns out to be the relevant administrative level in case of dispute between the taxpayer and the tax administration. Arguably, this feature makes Italy a relevant case study.

4.1 Data and measurement issues

Before the end of the 1860s, homogeneous information regarding tax bills and tax payments across provinces of the newly-born kingdom was released for the first time. Indeed, the historical measure of tax evasion we use is the official difference—as reported by Ministry of Finance of the Kingdom of Italy—between the assessed taxes, that is the total tax bill notified to all taxpayers in a province, during 1868-70, and the corresponding tax revenue, that is the amount actually paid as taxes during the same period. Hence, the unpaid taxes

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18 When declarations are made by ordinary business man, they are notoriously inadequate. Obviously an income tax running up to twenty percent .... would indeed be unendurable if enforced to the hilt. Satisfactory arrangements are therefore usually made between the individual and the fiscal agent. "It is true that income from real estate is not included, and it is of course true that Italy has less wealth than England or Germany. ""The only thing that would surprise an Italian would be to ascertain that his neighbor had either declared his real income, or had been assessed in any degree comparable to his real income." " .... the tax rate have become so enormous that the administration has broken down under the weight, and that the public conscience has given way to an equal extent.""

19 The monarchy-republic referendum was mainly forced by the civil discontent following the World War II.
represent the measure of all assessed taxes that had not been collected. Assessed taxes include all the direct taxes as determined by the relevant public official and the Province Tax Commission. They represent the official aggregate measure of the amount of direct tax bill due by all taxpayers in any province. In what follows, historical tax evasion will be expressed as the ratio between unpaid taxes and assessed taxes. We denote this ratio as $E_{1870}$.

Although Italy provides an engaging case study for an historical investigation on tax evasion, we recognize at least a couple of difficulties. Because of differences in today’s tax assessment system with respect to that prevailing in the past, we cannot exploit the same measure of unpaid taxes to identify current tax evasion. Only a subset of individual declarations are now assessed, thus we do not have an aggregate measure of the amount of the tax bill due by all taxpayers as we have for the post-unification period. We use data provided by the Tax Revenue Agency on total tax gap and spontaneously paid taxes, that is the taxes that are actually paid. The sum of the two figures is the potential tax revenue amount. The missing portion of the potential tax base is calculated using the top-down approach through the comparison between tax data and the national accounts data of the Italian National Institute of Statistics (ISTAT). The ratio between tax gap and potential tax revenue over 2008-10 provides our measure of current tax evasion, $E_{2010}$, which is compared to the corresponding one for the period 1868-1870.

A second difficulty in comparing the two measures of tax evasion is related to differences in the number of provinces between the two periods. The current measure is based on one hundred and six provinces, that is the number of Italian provinces at the beginning of the current century, while in the aftermath of the unification the corresponding number was sixty-eight, as thirty-eight new provinces had been created in the meantime. Thus, to compare tax evasion in the two periods, we have defined our unit of observation on the basis of the old number of provinces. In particular, for twenty-eight cases each new province consists of land area that was entirely part of a single province at the time of the unification. Thus, in these cases we have simply aggregated the current provinces so as to restore the historical territories. For eight current provinces—Trento, Bolzano, Trieste, Roma, Viterbo, Latina, Frosinone, Rieti—we do not have historical data since, as noted before, these provinces were not yet part of the Kingdom of Italy during the 1860s; hence we have dropped them. Finally, there are five cases such that the land area of the current province was part of two different historical provinces. This is so for Barletta-Andria-Trani, Varese, Pescara, Nuoro, and Enna. We have solved the indeterminacy either by aggregating the couple of historical provinces or by assigning the current corresponding province to one of the two historical ones according to the size of the land area parcelled out. In the former case we end up with sixty-three observations, while in the latter case with sixty-eight. We anticipate, however, that qualitative results are not at all sensitive to the chosen strategy.

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20 They include land taxes, property taxes as well as the *Imposta di ricchezza mobile*

21 Note that data by ISTAT also include an estimate of the underground economy, thus providing a and hence provide an indicator of the "potential " tax base.
4.2 Comparing tax evasion over one century and a half

We first compare the distribution of the two measures of tax evasion over the two periods. Table 1 shows the summary statistics of $E_{1870}$ and $E_{2010}$.

Table 1 here: Tax evasion, summary statistics

During 1868-70 the average rate of tax evasion across Italian provinces was about 25% (see the first row of Table 1). The standard deviation was about 70 percentage points of the average value, suggesting huge variations among point values of the distribution; the minimum and maximum values were 1% and 79%, respectively. Strikingly enough, the second row of Table 1 shows that, on average, the current official measure of tax evasion across provinces is virtually the same as the historical one: overall about one euro of taxes, out of four, is still unpaid in Italy. Thus, over one century and half tax evasion has been remaining on average strongly persistent at a quite high rate.

The two distributions of non compliance also reveal a drop in the measure of dispersion around the constant average: the standard deviation halved from 0.18 to 0.09. Thus, a process of convergence seems to characterize the historical evolution of tax evasion.

A visual representation of this pattern is reported in Figure 2 where the change in the (logarithm of the) tax evasion is plotted against the historical measure.

Figure 2 here: Tax Evasion over 140 years

Clearly, provinces characterized by relatively high rates of evasion during 1868-70 have recorded a drop in noncompliance during time; provinces characterized instead by low rates of evasion have shared increments in the rate of evasion. Moreover, it is also evident from the figure that points of the scatter plot align very well along the downward sloping line, suggesting that there is no specific group of provinces which drives the overall result.

Despite convergence, today substantial spatial differences in the size of unpaid taxes still remain. The standard deviation of the current distribution of tax evasion is one-third of the corresponding mean; the highest evasion rate is about four times the lowest one.

To get a quantitative assessment on the evolution of noncompliance with respect to the initial level of tax evasion we estimate versions of the following empirical specification with our province-level data:

$$ \ln\left( \frac{E_{2010}}{E_{1870}} \right)_i = \alpha + \beta \ln E_{i,1870} + \gamma W_{i,1870} + \delta Z_{i,2010} + \varepsilon $$

(13)

where $i$ is the province, $W_{i,1870}$ includes two controls for the unification period: a proxy for income-wealth inequality after unification and a dummy variable picking provinces with large urban centres (which is equal to 1 for provinces with more than 100,000 population). The proxy for income-wealth inequality is the logarithm of total yields on public debt bonds in 1870 divided by population in 1861. Because of the well-known persistence in economic inequality among
areas of the country since the Kingdom of Italy, this control is mainly sensible. $Z_{2010}$ is an index of efficiency of tax assessment by the Internal Revenue Service in the period 2008-2010, which we expect to explain much of the current differences in tax evasion. It is given by the logarithm of the ratio between the number of tax declarations monitored and the corresponding number of working hours, during 2008-10, as collected from the Italian Revenue Agency. $\varepsilon$ is an error term. Under the maintained assumption that spatial differences in the rate of evasion tend to disappear, the previous equation would be informative on the speed of convergence towards a common evasion rate. In particular, we are interested in whether $\beta$ is less than 0 and greater than $-1$. Results are reported in Table 2.

**Table 2 here: Evolution of Tax Evasion**

As expected, our estimate suggests that $\beta$ is lower than zero; a formal test also provides evidence that it is greater than $-1$. By interpreting equation as derived from a partial adjustment model, our estimate would deliver a low speed of convergence, about 0.015 per year. Thus, Figure 2 and the formal test of convergence suggest that convergence in noncompliance carries out together with persistence in the rankings of the tax evasion rates at province level. The convergence-persistence pattern applies locally, that is it is not driven by groups of provinces whose characteristics tend to persist over time, such as provinces with large cities or provinces that were part of different states before the unification of Italy.

Results reported in columns (2) and (3) provide support to our previous conclusion. As shown in column (2) neither economic inequality nor differences in tax assessment efficiency significantly affect the estimate of the speed of convergence driven by $\ln(E_{1870})$. Finally, we note that provinces in our data set have different sizes. Thus, to account for this heterogeneity, regression reported in the last column is weighted by land area of the province. The main result is unchanged.

To summarize, evidence over one century and a half suggests that the evolution of tax evasion is strongly affected by its initial condition, as measured by tax evasion recorded just after the formation of the Kingdom of Italy that unified in a single new entity the former states of the Italian peninsula. In particular, such evolution is quite well approximated as a convergence process with persistence in the rankings of noncompliance at province level. Our estimate suggests that the speed of convergence is about 1.5 percent and that on average higher value of the tax evasion rate in 1870 by one standard deviation matches with higher value after one century and a half by about 10 percentage points.

It can be argued that our previous specification may be undermined by omitted variables that can affect the level of evasion in 1870 but are not controlled for, so that unobserved heterogeneity may bias our results as the error terms are correlated to the level of evasion in 1870. As we have documented above, according to the evidence of economic historians, the high level of tax evasion in 1870 is driven by the formation of the Kingdom of Italy.

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22 Following Mankiw, Romer and Weil (1992), with beta=-0.873 and 141 years between 1870 and 2010, we can calculate the speed of convergence ($g$) using $g=-\log(1-0.873)/t$. Hence $g=0.0146$. 
evasion in 1870 was mainly due to the fiscal reform conducted after the country unification which introduced very high tax rates and to the local organization of enforcement. One important difference between the fiscal regime and the enforcement policy was that taxes were decided at the level of the central government and provinces had no control over it. On the contrary, provinces had some control over the introduction of the enforcement procedures, as these were devolved to the local government. Hence the increase in taxes can be considered as an external and not anticipated shock for the provinces. Other unobserved factors that may have affected the level of tax evasion in 1870 may be related to cultural traits, which, for example could have determined the public consensus towards the unification process and hence the level of civic duty which is an important determinant for the willingness to pay taxes. However, the fiscal reform was conducted at the time of unification, to finance the public debt and the formation of a new country. Hence the tax shock may have subsequently affected these unobserved factors, but was not caused by them. The tax shock could then be considered as a good instrument for the level of tax evasion in 1870, as it is independent of the other possible unobserved factors that may have affected taxpayers’ willingness to evade taxes in 1870. In what follows we construct an index of the tax shock and we use it as an instrument for tax evasion in 1870.

4.3 Local tax shock and tax evasion

As we have documented in the previous section historians agree in identifying with the strong increment in the tax burden driven by the unification process the main reason for the huge tax evasion that characterized Italy during the last decades of the XIX century. In what follows we exploit this conjecture in a formal way by constructing an index of the local tax shock driven by unification. In particular, we use information relative to the land and capital-labor taxes to derive a proxy for the differential increments in the tax burden across areas of Italy.

4.3.1 The tax reform in the new-born Kingdom of Italy

Because of the fiscal reform, during 1861-69, the average per capita tax revenue increased from 22.2 liras up to 36.8 liras; then it reached 41.1 liras in 1872—see Table 3. As we mentioned earlier, the two pillars of the tax reform were: a) two new taxes, namely the new capital-labor income tax (known as Imposta sul Reddito di Ricchezza Mobile) and the milling tax (known as Imposta sul Macinato)—which determined a drastic change with respect to the past—and b) the harmonization of pre-existing taxes including the various land taxes.

Table 3 here: Tax Revenue in the Kingdom of Italy

Zamagni (2011) shows that the greatest increments in tax revenues over the period 1861-1875 came from the capital-labor income tax and from the milling tax. Tax revenues from the capital-labor income tax increased about 12 times in 1875 compared to 1861, while tax revenues from the milling tax increased
about 13 times, despite an increase of the total tax revenues of 2.4 times\textsuperscript{23}. Zamagni (2011) also considers the per-capita capital-labor income tax across the territories of the pre-unification states in the period 1861-1872. In 1861 some of the areas of the pre-unification states already had a form of business or income tax, before the introduction of the new capital-labor income tax in 1864: the Kingdom of Sardinia had the highest per-capita income tax (2.1 liras), followed by the Kingdom of Lombardy (1.4 liras), the Dukedoms of Modena and Parma (1.2 liras) and the Grand Dukedom of Tuscany (1.1 liras). The Papal States and the Kingdom of the Two Sicilies had no such taxes. By 1872 the Kingdom of Sardinia lost the primacy of the area with the highest value of the per-capita capital-labor income tax, while the Grand Dukedom of Tuscany experienced the largest increase in this tax (9 liras per capita). In the Kingdom of the Two Sicilies and in the former Papal States the per-capita value in 1872 is higher than in the Kingdom of Lombardy - 3.1 lire for the Kingdom of the Two Sicilies, 3.3 for the former Papal States and 2.8 for the Kingdom of Lombardy\textsuperscript{24}.

For the land tax, which was harmonized across the pre-unification states, if we compare the situation in 1860 and in 1867, it is clear that the Kingdom of Sardinia, the Dukedom of Modena, the Grand Dukedom of Tuscany, and the Kingdom of the Two Sicilies underwent an increase in the amount of per-capita land tax, while the Kingdom of Lombardy, Parma and areas of the former Papal State recorded a decrease, with a narrowing of the range between the most taxed — that is, the citizens of the Kingdom of Lombardy who experienced a decrease in the per-capita tax from 7.44 liras to 6.33 liras — and the least taxed — which were the citizens of Sicily, where the per-capita land tax was 3.40 liras in 1860 and became 4.24 liras in 1867\textsuperscript{25}.

\subsection*{4.3.2 An index of local tax shock as an instrument for the initial level of tax evasion}

For those areas where something similar to the new income tax preexisted we have calculated the ratio between the per-capita tax revenue in 1872—the year of available data after the reform most close to that of the reform— and the corresponding measure in 1861. The ratio has then been normalized so to have an index ranging from 1 to 5. A value of 5 is also assigned to the former Papal State and the Kingdom of the Two Sicilies where an equivalent income tax did not exist before the unification. The same procedure has been used to have an index on the increments in the tax burden due to the land tax. In particular, in this case the before-after ratio is relative to the per-capita tax revenue forecasted by the government (at the time of the fiscal reform) for the 1867 and the corresponding actual value in 1860. Since a land tax already existed in all areas of Italy before the unification, variations are smaller than that of the capital-labor tax. Finally, to have an overall index of local tax shock due to the unification of Italy we have simply averaged the two elementary

\textsuperscript{23}See Zamagni (2011), Table 5.
\textsuperscript{24}See Zamagni (2011), Table 4.
\textsuperscript{25}See Zamagni (2011), Table 3.
indices (see Table 4).

**Table 4 here: Index of Local Tax Shock**

We use this index of local tax shock as an instrument for tax evasion in 1870. In Table 5 we report our results using a two-stage least square regression. The first column shows results of the first stage: there is a strong positive relationship between tax gap and local tax shock. In particular, the value of the t-ratio is well above the lower bound for not incurring in the weak-instrument concern. The last two columns—where we report the 2SLS results—confirm the OLS evidence relative to the evolution of tax evasion over one century and half. In fact, the 2SLS estimate is higher than the OLS one, more so when we weigh observations by using the land area of the provinces. The implied speed of convergence is 0.6 percent, lower than in the previous specification. Hence results confirm a convergence of the growth rate of tax evasion over the period and persistence of the level of tax evasion across Italian provinces.

**Table 5: Tax Evasion and Local Tax Shock**

5 Conclusion

We provide a model for explaining the persistence and geographical dispersion of tax compliance. In the presence of high tax rates and of a congestion externality on the enforcement process, the model predicts multiple equilibria and history dependence. Historical evidence for the case of Italy supports the insights of the model and our empirical analysis suggests that the role of the local enforcement externality has been important for the emergence of history dependence. Results suggest that persistent heterogeneity of tax compliance may have to do more with apparently small details of the design of tax collection and jurisdiction than with culture, habits, social norms and social capital. There is support for the idea that the convergence process relies on the importance of formal sanctions (Posner, 1997) for the establishment of a good social norm. Some policy implications on fiscal unification can be drawn. If two economies, which started from two different steady-states are unified, the long-run consequences on the convergence to a unique equilibrium or to multiple equilibria will depend on how the fiscal reform is conducted. In particular, the choice of how to harmonize the tax regimes and of the degree of decentralization of law enforcement are going to affect the initial distribution of perceptions about the fiscal system in an important way for the evolution of tax compliance.

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Figure 1: The Evolution of Individual Perceptions in each district

![Graph showing the evolution of individual perceptions in each district.]

Table 1: Tax Evasion, Summary Statistics

<table>
<thead>
<tr>
<th>Period</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1868-70</td>
<td>0.252</td>
<td>0.179</td>
<td>0.011</td>
<td>0.794</td>
<td>63</td>
</tr>
<tr>
<td>2008-10</td>
<td>0.267</td>
<td>0.094</td>
<td>0.122</td>
<td>0.458</td>
<td>63</td>
</tr>
</tbody>
</table>

Note: The table reports summary statistics relative to the historical and current measure of tax evasion, that is $E_{1870}$ and $E_{2010}$.

Figure 2: Tax evasion over 140 years

![Graph showing tax evasion over 140 years. The graph includes an OLS regression line and data points for the change in tax gap from 1870 to 2010.]

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Table 2: Evolution of Tax Evasion

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln(E 1870)</td>
<td>-0.869***</td>
<td>-0.846***</td>
<td>-0.873***</td>
</tr>
<tr>
<td></td>
<td>(-22.00)</td>
<td>(-22.14)</td>
<td>(-18.75)</td>
</tr>
<tr>
<td>Ln(Inequality 1870)</td>
<td>-0.092</td>
<td>-0.102</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.83)</td>
<td>(-1.71)</td>
<td></td>
</tr>
<tr>
<td>Ln(Inefficiency 2010)</td>
<td>0.329</td>
<td>0.685</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.54)</td>
<td>(0.98)</td>
<td></td>
</tr>
<tr>
<td>Large Cities 1870</td>
<td>-0.196</td>
<td>-0.241</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.10)</td>
<td>(-1.30)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-1.143***</td>
<td>-1.553***</td>
<td>-1.531***</td>
</tr>
<tr>
<td></td>
<td>(-13.08)</td>
<td>(-4.94)</td>
<td>(-4.46)</td>
</tr>
<tr>
<td>Observations</td>
<td>63</td>
<td>63</td>
<td>63</td>
</tr>
</tbody>
</table>

Note: The left-hand side is the logarithm of the ratio between current and historical measures of tax evasion. E stands for tax evasion. Large Cities is a dummy with values equal to 1 for provinces characterized by at least one large urban centre (higher than 100,000 population). Efficiency is the ratio between the number of tax assessments and the corresponding number of working hours by the Internal Revenue Service. Inequality is total yields on public debt bonds in 1870 divided by population in 1861. Estimates in the last column are due to weighted least squares with weights given by the size (land area) of provinces. Statistical significance is denoted as follows: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3: Tax Revenue in the Kingdom of Italy

<table>
<thead>
<tr>
<th></th>
<th>1861</th>
<th>1872</th>
<th>1875</th>
<th>1875/1861</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital and Labor</td>
<td>15.6</td>
<td>188.9</td>
<td>184.7</td>
<td>11.8</td>
</tr>
<tr>
<td>Land</td>
<td>136.3</td>
<td>217.1</td>
<td>186.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>482.6</td>
<td>1,100.2</td>
<td>1,149.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Revenue per capita</td>
<td>22.2</td>
<td>41.1</td>
<td>42.1</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Note: Tax revenue is measured as millions of Italian Liras. The source is Zamagni (2001).
Table 4: Index of Local Tax Shock

<table>
<thead>
<tr>
<th>Former States</th>
<th>Capital-Labor (1872/1861)</th>
<th>Land (1867/1860)</th>
<th>Tax Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom of Sardinia A</td>
<td>1.80 (3.24)</td>
<td>3.95 (1.13)</td>
<td>2.87</td>
</tr>
<tr>
<td>Kingdom of Sardinia B</td>
<td>1.80 (3.24)</td>
<td>3.33 (1.05)</td>
<td>2.57</td>
</tr>
<tr>
<td>Lombardo-Veneto A</td>
<td>1.00 (2.00)</td>
<td>1.77 (0.85)</td>
<td>1.39</td>
</tr>
<tr>
<td>Lombardo-Veneto B</td>
<td>1.49 (2.75)</td>
<td>4.17 (1.16)</td>
<td>2.83</td>
</tr>
<tr>
<td>Parmense</td>
<td>1.49 (2.75)</td>
<td>1.00 (0.75)</td>
<td>1.24</td>
</tr>
<tr>
<td>Tuscany</td>
<td>5.00 (8.18)</td>
<td>5.00 (1.26)</td>
<td>5.00</td>
</tr>
<tr>
<td>Papal State</td>
<td>5.00 (-)</td>
<td>2.41 (0.93)</td>
<td>3.71</td>
</tr>
<tr>
<td>Kingdom of Two Siciles A</td>
<td>5.00 (-)</td>
<td>3.40 (1.06)</td>
<td>4.20</td>
</tr>
<tr>
<td>Kingdom of Two Siciles B</td>
<td>5.00 (-)</td>
<td>4.87 (1.25)</td>
<td>4.97</td>
</tr>
</tbody>
</table>

Note: The table reports an index of changes in capital-labor and land taxes after the fiscal reform in 1864. For the land tax, values in parenthesis denote the ratio between the per-capita tax revenue forecasted by the government for the 1867 and the actual value in 1860. For the capital-labor tax, instead, the corresponding ratio is between per-capita tax revenues in 1872 and 1861. Data are from T. These ratios are normalized to get, for each tax base, an index ranging from 1 to 5. The highest value of the index is assigned if the capital-labor tax was absent before the unification. In the last column we report our global index of local tax shock by averaging the two elementary indices. Former States refer to the territories that unified into the Kingdom of Italy. Kingdom of Sardinia A includes Piedmont and provinces of Novara-Cone, Piacenza, Imperia, and Genova. Kingdom of Sardinia B includes provinces of Cagliari and Sassari. Lombardo-Veneto A includes Lombardy, Veneto, Udine, and Reggio Emilia. Lombardo-Veneto B and Parmense consist, respectively, of the province of Modena and Parma. Tuscany includes provinces of Lucca, Siena, Pisa, Livorno, Grosseto, Firenze, Arezzo, and Massa Carrara. Papal State includes Umbria, Marche, Bologna, Ferrara Forlì, Ravenna, Benevento. Kingdom of Two Siciles A includes Avellino, Caserta, Salerno, Napoli, Puglia, Calabria, Molise, Abruzzo, Basilicata. Kingdom of Two Siciles B includes the region of Sicily.

Table 5: Tax Evasion and Local Tax Shock

<table>
<thead>
<tr>
<th></th>
<th>First Stage</th>
<th>2SLS</th>
<th>2SLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln(Tax Sock)</td>
<td>1.165***</td>
<td>-0.710***</td>
<td>-0.561***</td>
</tr>
<tr>
<td></td>
<td>(5.72)</td>
<td>(-8.79)</td>
<td>(-3.64)</td>
</tr>
<tr>
<td>Ln(E 1870)</td>
<td></td>
<td>-0.0862</td>
<td>-0.0663</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.42)</td>
<td>(-0.85)</td>
</tr>
<tr>
<td>Ln(Inequality 1870)</td>
<td>0.0899</td>
<td>-0.0862</td>
<td>-0.0663</td>
</tr>
<tr>
<td></td>
<td>(0.81)</td>
<td>(-1.42)</td>
<td>(-0.85)</td>
</tr>
<tr>
<td>Ln(Efficiency 2010)</td>
<td>0.311</td>
<td>0.276</td>
<td>0.856</td>
</tr>
<tr>
<td></td>
<td>(0.21)</td>
<td>(0.39)</td>
<td>(0.67)</td>
</tr>
<tr>
<td>Large Cities 1870</td>
<td>0.131</td>
<td>-0.260</td>
<td>-0.438</td>
</tr>
<tr>
<td></td>
<td>(0.54)</td>
<td>(-1.29)</td>
<td>(-1.98)</td>
</tr>
<tr>
<td>Observations</td>
<td>63</td>
<td>63</td>
<td>63</td>
</tr>
</tbody>
</table>

Note: The 2SLS estimates are obtained by using the logarithm of Tax Shock as instrument for our measure of tax evasion in 1870. Specification in the last column is based on weighted least squares. Statistical significance is denoted as follows: * p < 0.05, ** p < 0.01, *** p < 0.001.