IREF Working Paper Series

Efficiency and productivity of tax courts

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Abstract:

This paper attempts to penetrate the "black box" of the judiciary through an empirical investigation of the Italian tax courts of first instance. Both judicial delay and two-stage Data Envelopment Analysis approach with bootstrap are used to measure the efficiency of the courts system and to further identify the main determinants of efficiency which, in line with the previous literature, seem to be mostly related to the judges' effort. The study also takes advantage of an idiosyncratic feature of this branch of the Italian judiciary – in which judges are temporarily appointed and can continue to practice an external (though not conflicting) profession – to assess the impact of opportunity costs on the behavior of judges. The overall outcome confirms that judges maximize utility "the same as everybody else does" (Posner, 1996).

Keywords: Judicial efficiency; Judges incentives; Data Envelopment Analysis; Tax Justice;

Jel Classification: K41, J45, M11, C44

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1. Introduction

Any democratic society and its economy are solidly rooted in the effective workings of adjudication. The organization that carries out the bulk of this task, the judiciary, is crucial not only in supplying justice to citizens in the broadest sense of the word but, equally, in providing certainty and completeness to economic agents. In this respect, dispute resolution is a central task of the judiciary because it fills the interaction gap between the parties, thus enabling the reshuffling of unexpected contingencies which might otherwise lead to market failures (Voigt, 2016).

Moreover, judicial enforcement can also be decisive for policy success, or failure. For instance, in the case of tax courts, their workings are equally essential in providing incentives against tax evasion and in collecting tax revenues.

From an economic perspective, adjudication can be represented as an industry. Its main production entity – often a monopoly – is the judiciary, and serves society by supplying various outcomes needed to regulate interactions among individuals. In other words – though this is an extreme simplification –, the courts system has many features in common with other production sectors. Accordingly, it is amenable to be investigated using the customary tools of economic analysis.

In this light, our paper contributes to the study of the industrial organization of the judiciary through the investigation of its dispute resolution technology. Using a novel dataset on the Italian fiscal judicial system, it investigates the performance of Italy's tax judiciary and the incentives characterizing the activities of its judges. In particular, it advances the current understanding of courts' production technology and its main input, the work of judges, by taking advantage of an idiosyncratic feature of Italy's tax courts, which rely to a great extent on part-time judges (e.g. public administration employees or tax professionals) with temporary and renewable mandates. In this respect, our study follows the literature on judges' behavior by testing the effects of external income opportunities on the effort of judicial activity, thus trying to advance the literature on judicial decision making as far as income maximization is concerned. Our main findings confirm Posner's claim (1993) that tax judges are economic agents just like everybody else, so that increasing their productivity requires considering the costs and benefits of a heavier workload in terms of cases decided.

The rest of this paper is organized as follows. Section 2 frames the research within the relevant literature, while Section 3 presents an overview of the Italian tax judicial system and its production organization. Section 4 briefly introduces the methodology and presents the data, descriptive statistics, and results, as far as judicial efficiency is concerned. Section 5 empirically tests and

discusses our findings about the economic behavior of tax judges. Finally, Section 6 concludes.

2. Economic features of courts

The courts system produces a number of outputs that are not all economic in nature, although many of them may be correlated with economic performance. It provides justice to citizens; it fills gaps in a world of incompleteness where unexpected events emerge; it can create rules (mostly in common law systems) or produce inputs for lawmaking; it disseminates information; it facilitates value-creating activities, while at the same time curbing value-destroying activities (Voigt, 2016). In the case of the tax judiciary, courts also produce fiscal revenue.

Understanding how judicial technology works and whether it can be productive becomes central to determining its effectiveness in providing the expected outcomes. This, in turn, requires increasing efforts on the part of scholars to shed light on the activities of the judiciary, its optimal organization, and its effectiveness given a particular set of resources.

2.1   Two measures of judicial efficiency

Spurred by the efforts of governments and international organizations to better understand and improve the performance of judicial systems, a growing body of literature has recently tried to gain deeper insights into the workings of the courts. A number of studies have targeted the most evident 'disease' (at least from the perspective of citizens) of the judicial system, that is to say 'delay', or the time it takes to reach a decision. This dimension, easily detectable in many judicial systems, has thus been adopted as a proxy to measure the efficiency of courts, according to the adage saying that "justice delayed is justice denied". Although this dimension has been used in several papers as a rough measure of judicial efficiency, many factors can contribute to increasing delay, thus making it an inaccurate indicator (Mitsopoulos and Pelagidis, 2007; Di Vita, 2010; Christensen and Szmer, 2012; Voigt, 2016).

Hence, other measures might be considered in order to provide a deeper understanding of judicial efficiency with reference to the resources consumed and the outcomes produced. A substantial and growing stream of literature relies upon a methodology borrowed from production economics, Data Envelopment Analysis (DEA), specifically suited to assessing efficiency in case of homogenous production units. More precisely, DEA is a non-parametric technique that makes it possible to

comparatively assess the efficiency scores of several basic production components (Cook and Seiford, 2009). This approach lets researchers build a deterministic, non-parametric production frontier comparing the performance of several Decision Making Units (DMUs), so that technical efficiency scores are computed based on the radial distance of every DMU from the frontier.

A number of studies on judiciaries have successfully implemented the methodology (Lewin *et al.,* 1982; Kittelsen and Førsund, 1992; Pedraja-Chaparro and Salinas-Jiménez, 1996; Yeung & Azevedo, 2011), and a few of these have used the two-stage DEA approach (Schneider, 2005; Deyneli, 2012; Ippoliti et al., 2015) to analyze the determinants of judicial inefficiency. An extensive overview of DEA applications in the judiciary and elsewhere is provided by Falavigna et al. (2015) and Voigt (2016).

2.2   *The role of judges*

At the aggregate level, many aspects of the productivity of courts can be measured by considering the relationship between inputs and outputs. However, once one enters the black box of the judiciary, it emerges that a key role is played by the judges, who represent the most important productivity factor, although there are also organizational features that obviously affect the overall results (Gillespie, R., 1976; Binford et al., 2007; Lindquist, 2007; Cauthen & Latzer, 2008).

While for a long time judges were likened to calculating machines, mechanically applying rules to facts with no discretion, a more recent viewpoint, championed by the so-called "legal realism", has finally brought judges into the real world, seeing them as individuals acting in the labor market and maximizing the utility function just like everyone else.

Building on the seminal contributions by Cooter (1983) and Posner (1993) about the impact of incentives on the behavior of judges, in terms of effort and choices, some scholars have tried to test the performance of courts by identifying some determinants of judges' productivity and estimating their utility function, although a number of critics have challenged this approach (see Baum 2006).

Consequently, the individual characteristics of judges have been empirically investigated. Taha (2004) applied the utility-maximizing model to judicial decisions, focusing on federal district court judges in the US and their habits concerning publishing their decisions, with results confirming the economic orientation of judicial choices. Studies by Landes et al. (1998) and Choi et al. (2010) on the US and by Ramseyer (2012) on Japan analyzed how the performance of judges is affected by their educational background (a proxy for their intellectual ability). Other studies have shown that courts and judges generally respond to a heavier caseload by increasing productivity (e.g.,

Beenstock and Haitovsky, 2004 for Israel and Dimitrova-Grajzl et al., 2012 for Slovenia). At the same time, the behavior of judges may also be characterized by inertia in their work habits, which nullifies the effects of law amendments designed to promote efficiency (Eisenberg & Huang, 2012). A handful of studies have tried to shed light on the many factors determining judicial decision-making. Some investigations have focused on political preferences, on how pressure from the authorities may affect the judges' decisions in Russian commercial courts (Lambert-Mogiliansky, Sonin & Zhuravskaya, 2007), or on how higher unemployment rates may bias judges deciding on dismissals in Italian courts, with decisions more favorable to the workers (Ichino, Polo & Rettore, 2003).

On the whole, the above shows that, despite rigid legislation, there is a substantial degree of judicial discretion in the enforcement phase and many variables can enter the judges' utility function – in line with the interpretation offered by Posner (1993). However, there is still a lack of empirical evidence regarding the simplest hypothesis, i.e. that of income-maximizing judges. Many factors contribute to making the gathering of this evidence difficult. As argued by Rubin (1983), difficulties generally arise from the fact that judges are never paid on a case-by-case basis; hence, their earnings do not depend on their efforts or their productivity. Consequently, at best we can consider parameters such as the number of files dealt with, or other indirect measures like aversion to effort, or costs in term of leisure time lost, or proxies for other non-pecuniary determinants.

This limitation makes the peculiar arrangement of the Italian tax judiciary quite noteworthy, since it allows us to directly link productivity, income, and opportunity costs. In fact, most Italian tax judges are part-time civil servants and professionals with appropriate experience in tax law, still practicing their original job. We can thus observe whether their productivity within the court is affected by concurrent income opportunities.

3. Italian Tax justice in a nutshell

The Italian tax judiciary decides on fiscal allegations made by the state against individuals and firms. It is worth reminding that, in this particular context, an efficient judicial system not only guarantees better justice to citizens, but it also plays a key role in ensuring that the state collects sufficient tax revenues to finance its own activities and curbing tax evasion. The Italian tax judiciary is governed by Legislative Decree 546/92, according to which this specialized courts system provides a judicial forum where individuals can dispute accusations of tax irregularities. Tax

courts are actually special jurisdiction courts, since their scope is limited to fiscal controversies. The Ministry of Economy and Finance (MEF) is in charge of administering the tax courts of first and second instance, while the court of last resort falls under the remit of the Ministry of Justice.

More specifically, the *Commissione Tributaria Provinciale* (henceforth CTP) is the court of first instance, with province-wide jurisdiction. Italian provinces are local administrative divisions which include a major city and the minor municipalities around it (e.g., Milan and the surrounding small towns). The *Commissione Tributaria Regionale* (henceforth CTR) acts as the court of appeal for cases decided by the CTPs within its jurisdiction, which corresponds to the territory of an Italian region. There are 103 CTPs (corresponding to Italy's 103 provinces) and 21 CTRs (corresponding to Italy's 19 regions, plus 2 additional CTRs for the autonomous provinces of Trento and Bolzano, which enjoy quasi-regional status)[3].

The court of last resort is the *Corte Suprema di Cassazione* (henceforth CSC). It is based in Rome and acts the appellate court for all civil, criminal, and tax cases. The CSC cannot overrule the interpretation of the lower courts, but it simply ensures the legitimacy of their decisions.

Since the ability to obtain statistically significant results crucially depends on adequate sample size, in light of the above discussion, the courts of first instance (the CTPs) represent the best sample in order to study the Italian tax judiciary, as they provide a total of 103 observations. Of course, the assessment of court efficiency undertaken here will essentially be a comparative measure. While it is difficult to obtain an abstract efficiency measure, it is easier to compare different homogenous units in terms of their inputs and outputs.

3.1   The main productive factor: (part-time) judges

To hone in on the main determinants of justice production, we must first describe the organization of the CTPs and certain features of their legal procedures, strictly regulated by the aforementioned Legislative Decree 546/92. Under that law, two types of workers make up the court personnel: the judges who decide on tax cases, and the administrative staff assisting in the decision-making process by performing all related bureaucratic tasks. Each CTP is divided into a number of 'sections', and among the judges we can further single out the president of the CTP and the section presidents. The former is responsible for the whole CTP and is in charge of screening cases before

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[3] See http://www.giustizia-tributaria.it

they are assigned to a competent section. The latter are each responsible for a specific section of the court and for the cases assigned to that section by the president of the CTP[4]. Each section features a president, a vice-president, and at least four judges, and there can be up to two benches, comprising the president or vice-president and another two judges. The number of sections in a CTP can vary and is regulated by the MEF.

The MEF is also in charge of appointing judges. The candidates who apply to serve in this capacity are selected through a merit-ranking procedure. The CTP president and the section presidents are recruited from among civil, criminal, administrative or military magistrates, who can be either still in service or retired; the vice presidents can be career judges or tax judges with at least 5 years of seniority. The other judges are civil servants or professionals with appropriate experience in tax law (e.g. fiscal experts, such as public accountants or tax law attorneys).

Although the judges must avoid any conflict of interest, their service is not constrained by exclusivity, so they can continue to practice their original profession. They can therefore work part-time both in the private/public market (as professionals or government employees) and in the tax judiciary (as judges). This is an interesting feature for our investigation, because it allows us to study the effects of competing incentives, by measuring the trade-off between external income opportunities and productivity within the court. In other words, this peculiar arrangement is ideal to test the impact of opportunity costs on the behavior of judges and, consequently, to verify whether – as asserted by Posner (1993) – judges are utility maximizers. Also, following Cooter (1983), since judges are paid mostly on a case-by-case basis, we can directly analyze how the opportunity costs created by the private market affect the expected income of judges and, in turn, their effort in judicial activities[5].

3.2 The production chain

The legal procedure of tax courts, representing the production chain of dispute resolution, is divided into a number of successive stages, alternatively managed by staff members or judges (Figure 1).

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[4] Note that the president of the CTP is also the president of the first section.
[5] The remuneration of a tax judge is a two-part salary, with a variable part depending on the number of cases managed.

Figure 1

Diagram of the tax procedure
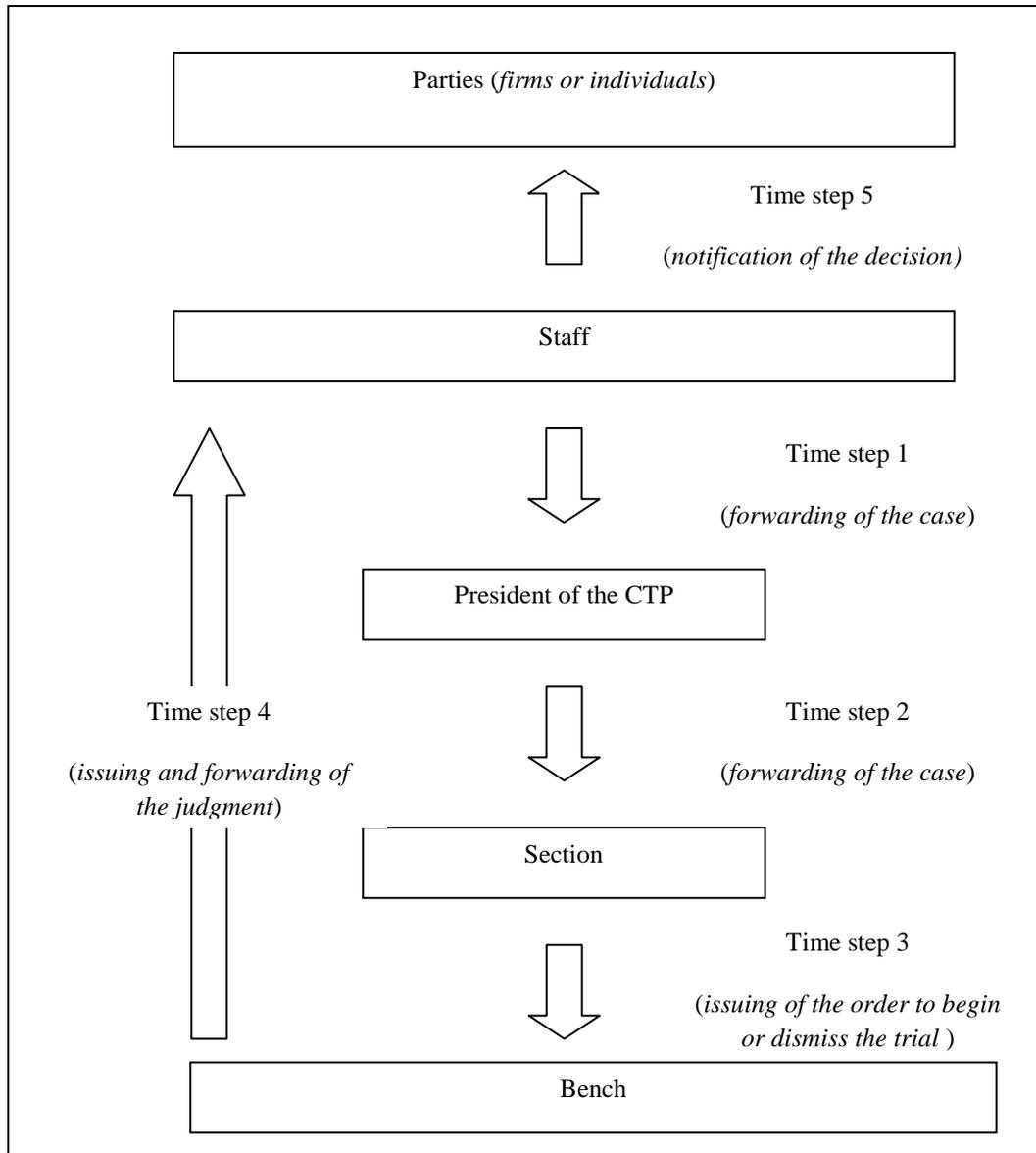
In the first stage, once an allegation has been made by the Italian Revenue Agency (*Agenzia delle Entrate*), the MEF agency responsible for tax collection, the defendant can file a complaint with the CTP. The CTP staff receive the complaint and carry out all the necessary procedures, including filing the case in the ministerial register; they then forward the case to the CTP president (within a discretionary time span). In the second stage, the CTP president performs a preliminary screening of the case, following which the case is either dismissed or forwarded to a competent section. In the third stage, the section president performs a more in-depth screening of the case, which can be

concluded either with its dismissal or with the beginning of the trial (i.e. the date for the first hearing is set). If the president decides in favor of the latter, the bench holds the trial, which is the fourth stage and ends with the judgment being delivered. Finally, in the fifth stage, the staff office notifies the final decision to the parties, i.e., to the citizens or firms and to the State.

Taken together, this sequence of stages constitutes the production chain of the tax courts of first instance (as summarized in Figure 2), and is thus relevant to interpret overall performance. Any single task may play a crucial role in determining the final decision and creating inefficiency. Notice that, from an industrial point of view, each section corresponds to a production line, which provides an end-product – i.e., the case decision – to the judicial market.

Figure 2
CTP procedural organization
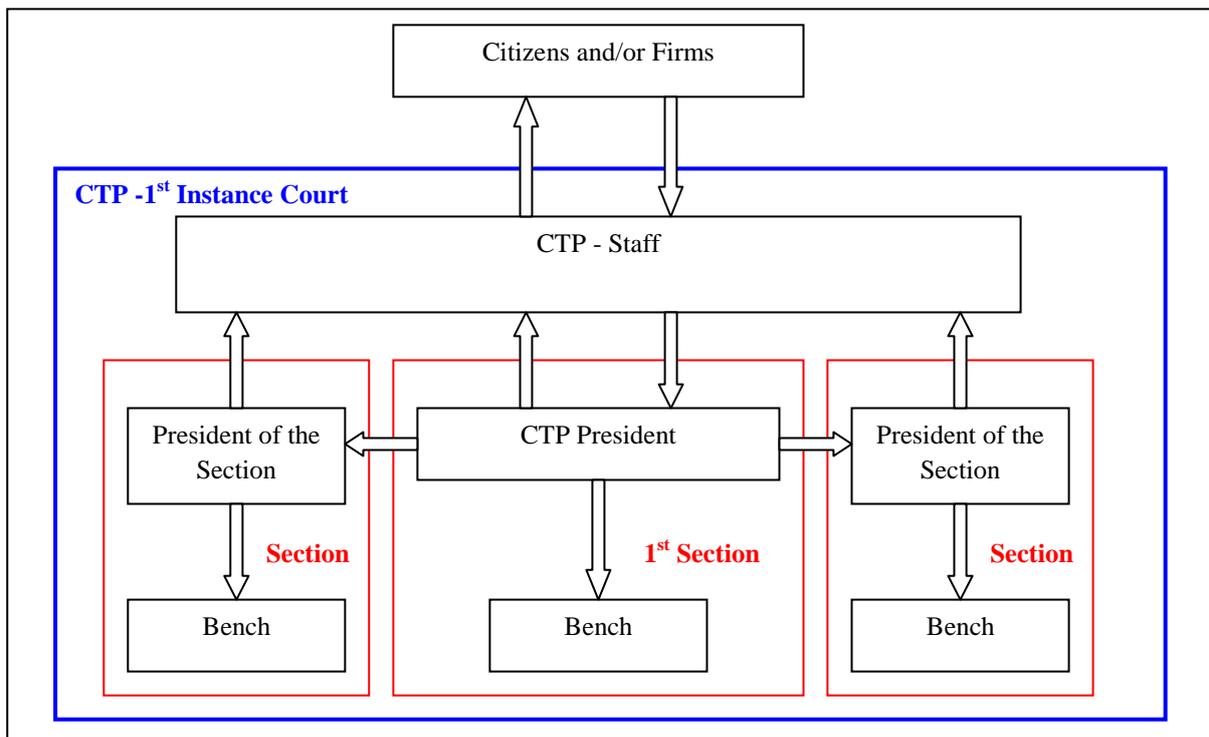
4. *Judicial efficiency of tax courts and its determinants: a two-stage approach*

In order to assess judicial efficiency and to investigate its main determinants, in line with the

aforementioned literature adopting the DEA methodology, we follow a two-stage approach (Simar and Wilson, 2007). The first stage is devoted to estimating the efficiency of the CTPs, while in the second stage a regression analysis is used to detect correlations between efficiency measures and some key explanatory variables.

In order to provide more robust findings, in the first stage we use two distinct measures of efficiency. The first measure, extensively adopted by a stream of literature studying courts (Voigt, 2016), is the so-called judicial delay, calculated as the average number of days needed by a CTP to solve a fiscal controversy, from its filing to the notification of the decision. This is a rough yet real measure, supplied by the Italian Ministry of Economy and Finance.

The second measure is the technical efficiency score (TE), obtained through the output-oriented DEA procedure with bootstrap, as suggested by Simar and Wilson (2007), to correct the bias in the efficiency scores and their confidence intervals. The bootstrap option is further applied in the second stage, as also proposed by Simar and Wilson (2007) [6].

4.1 First stage

The output of the DEA model here is the number of cases resolved (i.e., the number of cases resulting in a sentence or a warrant). The input variables are all the factors which might affect court productivity in this particular context (i.e., the number of judges) and the demand for justice (number of cases pending on January 1st of each year and number of new incoming cases). In other words, the input 'caseload' consists of the backlog plus yearly incoming cases. The proposed approach is in line with other studies (e.g. Schneider, 2005; Castro Finocchiaro and Guccio, 2014)[7]. According to this approach, the efficiency score of a CTP is defined as its ability to meet the demand for justice – i.e., to maximize the number of cases completed – taking the available resources into account. It is worth noting that DEA does not require any specific type of distribution.

Table 1 presents descriptive statistics on the output, the inputs, and the efficiency scores computed using DEA. Data pertaining to the number of judges, backlog, and incoming cases, as well as number of cases resolved, are extracted from the annual MEF report on the tax judiciary. Based on the available data, the analysis considers the 103 CTPs over a period of three years (2009, 2010, and 2011). The data are normalized through a logarithmic transformation in order to satisfy the

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[6] For an in-depth explanation of the bootstrap see, among others, Falavigna et al. (2015).
[7] The use of caseload as an additional input might be questionable. The most affordable and shared justification for using it is that since the courts work once cases are filed, hence caseload becomes a sort of raw material or intermediate input for the productive process. For a lengthy discussion and further explanations see Peyrache & Zago (2015).

normality assumption of these variables in the parametric models.

Table 1
Descriptive statistics of efficiency scores, output, and inputs
1st *instance courts (2009-11)*

Type	Variable	Obs.	Mean	Std. Dev.	Min	Max
	Judges	309	3.006785	0.674930	1.609438	5.521461
Input	Pending cases on Jan 1st of each year	309	7.633440	1.235312	4.753590	11.253530
	Incoming cases	309	7.329466	0.962457	5.318120	10.412590
Output	Resolved cases	309	7.232129	0.968087	5.303305	10.390960
Scores	Technical Efficiency Scores	309	1.104380	0.071762	1.001323	1.352502

Table 2 reports the average efficiency scores and judicial delay. For the sake of readability, the figures are presented by region (each including a number of CTPs listed in the "frequency" column, thus considering the average CTP for each Italian region), while the second column indicates the geographical macro-area of Italy where each region is located.

Table 2
Regions ranking, according to technical efficiency scores
1st *instance courts (2009-11)*

Region	Macro-area	Technical Efficiency scores			Judicial delay	
		Mean	Std. Dev.	Frequency	Mean	Std. Dev.
Umbria	Center	1.0247296	0.0281375	6	316	47
A.P. Bolzano	North-East	1.0406542	0.0285754	3	457	179
Campania	South	1.0516791	0.0580366	15	404	146
Basilicata	South	1.0552177	0.0472551	6	530	233
Valle d'Aosta	North-West	1.0594364	0.0134874	3	320	30
Lombardia	North-West	1.0690065	0.0546820	33	355	121
Puglia	South	1.0930052	0.0606040	15	1014	789
Friuli Venetia Giulia	North-East	1.0947127	0.0785105	12	560	247
Sardinia	Islands	1.1015786	0.0618571	12	672	318
Calabria	South	1.1047708	0.0980669	15	1747	1970
Veneto	North-East	1.1093999	0.0635638	21	410	140
Emilia Romagna	North-East	1.1134270	0.0523254	27	441	141
Lazio	Center	1.1135625	0.0968112	15	609	250
Sicilia	Islands	1.1154287	0.0732308	27	1013	408
Liguria	North-West	1.1174906	0.0337724	12	489	113
Abruzzi	South	1.1175784	0.0949208	12	388	90
Piemonte	North-West	1.1183048	0.0707856	24	477	377
Toscana	Center	1.1249365	0.0560510	30	583	306
Molise	South	1.1555796	0.0537761	6	513	201
Marche	Center	1.1562548	0.0840830	12	540	266
A.P. Trento	North-East	1.2340742	0.0811092	3	406	113
Total		1.1043800	0.0717620	309	610	604

Because of the functional form chosen, the range of the TE scores is $TE \in [1, \infty)$, where 1 means that the regional CTP system is on the efficiency frontier, while for $TE > 1$ judicial inefficiency proportionally increases[8].

As explained above, judicial delay is a rough measure often used as a proxy to estimate the efficiency of judicial systems. The table comparing regions clearly shows that, although in some cases DEA and delay may produce comparable outcomes − with the notable example of Umbria ranking first in Table 2 for both indicators −, the other values substantially differ. For example, in the case of Puglia delay is higher than in many other regions, yet its TE score indicates that Puglia is more efficient, since its regional CTP system employs fewer inputs (judges) than Basilicata's to produce the same output (resolved cases), for a given number of incoming cases.

4.2 Second Stage

Table 3 reports the descriptive statistics for the dependent and independent variables adopted in the second stage of the empirical analysis focusing on the determinants of judicial efficiency.

Table 3
Descriptive statistics of dependent and independent variables - step 1

Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
Technical Efficiency score	309	1.104	0.004	1.096	1.112
Judicial delay †	309	6.214	0.032	6.151	6.276
Backlog †	309	7.633	0.070	7.495	7.772
Average number of active sections †	309	1.549	0.039	1.473	1.626
Average number of hearings per judge †	309	3.066	0.021	3.026	3.107
Average number of cases managed per judge †	309	4.734	0.032	4.672	4.796
Time needed to forward the case to the president of the court	309	3.780	1.710	0.414	7.146
Time needed to assign the case to a competent section	309	47.547	4.729	38.242	56.852
Time needed to forward the sentence to the staff	309	54.042	1.420	51.248	56.836
Time needed to notify the sentence to the parties	309	3.152	0.131	2.895	3.409
North West	309	0.233	0.024	0.186	0.280
North East	309	0.214	0.023	0.168	0.260
Center	309	0.204	0.023	0.159	0.249
South	309	0.223	0.024	0.177	0.270
Islands	309	0.126	0.019	0.089	0.163

† Logarithmic transformation has been applied

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[8] It is worth noting that the previous choice implies that a higher TE in fact corresponds to a larger inefficiency and this makes easier than the comparison with the delay that is equally measure of the inefficiency.

The first independent variable is the backlog. The average number of active sections, computed by averaging the number of active sections on January 1st and on December 31st of each year, expressly seeks to capture features such as internal organization and economies of scale.

The other independent variables are proxies for the activities of the staff and judges, according to the legal procedure. First, we include the average number of hearings per judge and the average number of cases handled per judge. The former is given by the number of presences at hearings (i.e. the total number of hearings multiplied by three, which is the number of judges in a section, divided by the total number of judges in a CTP). The latter is given by the number of cases managed divided by the number of judges in a CTP.[9] These variables can be used as proxies for the amount of effort judges expend in their work within the court, since they roughly indicate the amount of time spent on the bench and the number of cases individually managed. The former is more of a rough quantitative measure, since it essentially refers only to how much time a judge spends sitting on the bench, while the second implies a more pro-active involvement as a reporting judge, and it is thus also qualitative. Surely, a judge might spend time on the bench, but doing little in terms of cases personally managed.

In addition, we also consider the time taken to perform each task of the procedure, when those data are available. The time per task serves as a proxy for productivity at each stage of the production line and, since the organizational structure of CTPs is decided by law, productivity hinges essentially on the 'human factor', meaning the CTP president, the section president, the judges on the bench, and the staff. More specifically, we use the available data to analyze the time taken to complete each stage of the procedure as follows:

- the time elapsing between the submission of a case to the CTP, its filing, and its subsequent forwarding to the court president (the staff are responsible for this task);
- the time between the submission of a case to the CTP president and its assignment to a section (the CTP president is responsible for this task)[10];
- the time needed to deliver the written decision to the staff (the president and the members of the bench are responsible for this task);
- the time taken to notify the judge's decision to the parties (the staff are responsible for this task).

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[9] Note that these values are regularly provided and used by the MEF and published in its annual report on tax courts' activities.

[10] No data are available about cases dismissed. Hence, only cases litigated can be analyzed.

Finally, the classification by macro-areas and regions attempts to control for heterogeneity among CTPs, ascribable to their geographical location.

The independent variables are normalized through a logarithmic transformation to satisfy the normality assumption of their distribution. Finally, the correlation among variables is tested through a covariance matrix, with acceptable results.

The TE scores and delay measures thus become the implicit variables in a truncated regression model, in which the regressors should account for differences in court efficiency.

4.3 Preliminary results and discussion

Table 4 and Table 5 present the results of a multiple regression focusing on the determinants of judicial efficiency[11]. In both cases, we control for geographical variables that might account for local specificities possibly influencing the final outcome. The first column refers to the macro-areas (North West, North East, Center, South, and Islands) and the second column to the regions where the CTPs are located.

Finally, a pooled sample is proposed, adopting a dummy variable to capture the temporal effect, with 2009 being the dropped year against which the model is assessed. The cross-sectional analysis, instead of a panel analysis, is coherent with the approach by Simar and Wilson (2007). The models proposed in Table 5 are all statistically significant (*F-test*) and there are no serious issues of *collinearity* (mean VIF); additionally, the R-square is extremely high.

Our findings confirm some of our suppositions. Table 4 provides evidence that the backlog is clearly one of the determinants of judicial delay. Indeed, assuming a "*first in first out*" approach in the cases management, the existing queue has trivially an impact on the timing affecting the dispute resolution of newly submitted cases.

Moreover, the delay can be reduced by increasing the number of sections, which represent the internal production lines; this is fairly logical, since overall productive capacity increases.

The two variables are obviously not present in Table 5, as they are both DEA inputs. Yet, this methodological difference does not affect the main and most important result: in the case of both measures, we observe that a CTP can boost its efficiency to some extent by increasing the number of cases decided by a judge. This result confirms what already found by Beenstock & Haitovsky (2004), and Eisenberg & Huang (2012) and once more, as observed in many different judicial

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[11] In the DEA literature, a truncated regression model is often used in order to exclude outliers (Simar and Wilson, 2007). Since all the TE values are between 1 and 2, this is not necessary here. However, we further test the TE scores using the truncated regression model for values between 1 and 2 and, as expected, we obtain comparable results.

systems and jurisdictions, also in the case of the Italian tax courts, the main productivity element is indeed the judge. Whether measured roughly as the duration of the procedure to solve a dispute or in a more sophisticated way as an index weighting inputs and output, judicial efficiency always depends on actual judicial-making effort proxied by the number of cases individually managed (and not, of course, by the time spent on the bench); this is true across all countries, despite possible socio-economic differences. The findings are thus significant and robust.

It is worth reminding that in both cases the relation is negative because an increase in the average number of cases managed by a judge decreases the delay. Therefore, being $TE \in [1, \infty)$, where 1 is the most efficient value, the coefficient must show a negative sign.

Table 4
Multiple regression model - Delay (dependent variable)

VARIABLES	(1)	(2)
Backlog	0.695***	0.693***
	(0.0327)	(0.0331)
Average number of active sections	-0.663***	-0.622***
	(0.0422)	(0.0426)
Average number of hearings per judge	0.0158	0.0396
	(0.0582)	(0.0585)
Average number of cases managed per judge	-0.544***	-0.501***
	(0.0548)	(0.0543)
Time needed to forward the case to the president of the court	0.00136**	0.00117**
	(0.000574)	(0.000529)
Time needed to assign the case to a competent section	-0.000240	-8.58e-05
	(0.000212)	(0.000213)
Time needed to forward the sentence to the staff	0.000484	0.000789
	(0.000727)	(0.000684)
Time needed to notify the sentence to the parties	0.000192	0.00103
	(0.00765)	(0.00812)
2010 (Year)	-0.0120	-0.0235
	(0.0420)	(0.0383)
2011 (Year)	-0.0353	-0.0490
	(0.0436)	(0.0400)
Constant	4.379***	4.173***
	(0.259)	(0.260)
F test	58.86***	36.70***
Observations	309	309
R-squared	0.737	0.798
Control	Macro areas	Regions

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The data in table 4, which is the one directly relating to the time dimension, lead to an additional remark, which seems intriguing though preliminary: if the duration of dispute resolution is more specifically considered, fostering overall judicial efficiency does not simply equate to reducing delay across the board, but instead it depends on individually fine-tuning each of the stages which make up the production process. While this is true for most of the stages, more significant gains can be achieved in terms of speeding up the whole procedure by exercising greater care (once more, the proxy here is time) in the preparation and forwarding of the file to the CTP president. So, thorough preparation of every case might marginally speed up the subsequent phases.

The second phase and the third phase, more directly relying upon the judges' work, do not yield any significant coefficients. Hence, there is no clear evidence that judges can boost court productivity by simply speeding up case resolution. Rather, and quite straightforwardly, they should increase the number of cases individually decided. It is not a matter of doing better what they are already doing, it is a matter of doing more.

Table 5
OLS regression model - Technical efficiency scores (dependent variable)

VARIABLES	(1)	(2)
Average number of hearings per judge	-0.00576	0.0175
	(0.0134)	(0.0142)
Average number of cases managed per judge	-0.0324***	-0.0348***
	(0.00997)	(0.0119)
Time needed to forward the case to the president of the court	-0.000103	-0.000134
	(0.000133)	(0.000129)
Time needed to assign the case to a competent section	-2.43e-05	4.72e-05
	(4.87e-05)	(5.04e-05)
Time needed to forward the sentence to the staff	0.000387**	0.000303*
	(0.000163)	(0.000165)
Time needed to notify the sentence to the parties	-0.000407	0.00287
	(0.00181)	(0.00202)
2010 (Year)	-0.0156	-0.0191**
	(0.00993)	(0.00950)
2011 (Year)	-0.0136	-0.0164*
	(0.0102)	(0.00986)
Constant	1.289***	1.196***
	(0.0579)	(0.0599)
F	3.04	3.32
Prob > F	0.000	0.000
Observations	309	309
R-squared	0.110	0.249
Control	Macro areas	Regions

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

5.   *Judges and economic incentives*

According to the above results and in line with the existing literature, the judges' effort (measured as the number of cases individually managed) is the essential driver to foster judicial efficiency. The next step will thus be to check whether the judges' effort is affected by their opportunity costs in terms of external income opportunities. More precisely, the idea here is that, given a certain amount of leisure time, due to the idiosyncratic arrangement of the Italian tax judiciary, tax judges will decide either to manage more cases or to devote more energy to their private practice when the latter allows them to have a higher income[12]. The number of cases per judge, taken as a proxy for their effort within the court, will thus become the dependent variable of the empirical models.

Table 6
Descriptive statistics of independent variables

Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
Tax attorneys' average income					
- capital of the province †	308[a]	11.587	0.026	11.536	11.638
- province except the capital †	309	11.368	0.025	11.319	11.416
- whole province †	309	11.477	0.025	11.428	11.526
Public accountants' average income					
- capital of the province †	309	11.396	0.019	11.358	11.433
- province except the capital †	309	11.223	0.019	11.186	11.260
- whole province †	309	10.972	0.018	10.936	11.008

† Logarithmic transformation has been applied

[a] In 2009 there is a missing value concerning the town of L'Aquila, which experienced a terrible earthquake that significantly affected all activities.

Table 6 reports the descriptive statistics for the independent variables adopted in this step of the

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[12] Of course, the assumption here is that being a tax judge carries a reputation or status that may, for example, be used in one's profession outside the court. Incidentally, every judge must manage a minimum number of cases in order to be reappointed, which represents a constraint. Otherwise, the optimal strategy could be to devote 100% of effort to the private practice (which is not possible by definition), or simply not to become a tax judge at all.

empirical analysis. In detail, the expected average income of tax judges and public accountants is used as a proxy for the opportunity cost coming from their work outside the court, considering – for the sake of robustness – either only the capital of the province where the CTPs are located, or the province except the capital, or the province as a whole. Again, consistent with the previous model, a pooled sample is proposed, adopting a dummy variable to capture the temporal effect, with 2009 being the dropped year against which the model is assessed. As above, the data have been extracted from the dataset of the Italian Ministry of Economy and Finance and they refer to the years 2009, 2010, and 2011.

Table 7
Multiple regression model, robust option
Lawyers' income

VARIABLES	Average number of cases managed per judge		
	(1)	(2)	(3)
Average income (capital of the province)	-0.666***		
	(0.102)		
Average income (whole province)		-0.805***	
		(0.0974)	
Average income (whole province except the capital)			-0.888***
			(0.110)
2010	0.197***	0.195***	0.202***
	(0.0717)	(0.0685)	(0.0670)
2011	0.240***	0.242***	0.254***
	(0.0694)	(0.0661)	(0.0644)
Constant	12.18***	13.63***	14.32***
	(1.176)	(1.097)	(1.214)
F(3, 305)	18.53***	26.48***	25.65***
Observations	309	309	309
R-squared	0.192	0.262	0.302

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Both models proposed in table 7 and in table 8 are statistically significant (F-test). Considering the market of legal services, the R-square is acceptable (between 0.19 and 0.30), while, for what concerns the accounting professionals, it is extremely high (between 0.37 and 0.40).

Based on these results, we cannot reject the hypothesis that alternative economic opportunities might affect the effort of part-time tax judges within the court. [13]

Table 8
Multiple regression model, robust option
Accounting professionals' income

VARIABLES	Average number of cases managed per judge		
	(1)	(2)	(3)
Average income (capital of the province)	-0.710***		
	(0.0603)		
Average income (whole province)		-0.769***	
		(0.0621)	
Average income (whole province except the capital)			-0.765***
			(0.0650)
2010	0.189***	0.200***	0.199***
	(0.0631)	(0.0615)	(0.0621)
2011	0.238***	0.246***	0.243***
	(0.0609)	(0.0595)	(0.0601)
Constant	12.82***	13.41***	13.28***
	(0.703)	(0.718)	(0.745)
F(3, 305)	51.26***	57.56***	51.86***
Observations	308	309	309
R-squared	0.368	0.400	0.389

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.3 The judge oeconomicus

The previous sub-sections achieved the main objective of this work, i.e. to clarify the key determinants of CTP inefficiency and judges' productivity.

First, in line with a growing body of literature focusing on different types of courts in different countries, it emerges that the effort of judges is the crucial factor to explain CTP efficiency. It is worth noting that our evidence does not suggest that what judges do can be done better, but rather that judges could increase the number of cases handled. Nevertheless, we can draw some

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[13] It is important to remind that we are observing only the share of professionals that decide to become part-time judges, while we do not have data on the whole population of professionals nor we study the reasons leading to become a tax judge. However once become part-time judge, the individuals within our sample regulate their effort within the court in accordance to the external profit opportunities.

preliminary conclusions and formulate a few thought-provoking hypotheses that might be the subject of further study.

In particular, we would like to revisit the literature on judges' incentives and related behaviors, since here we have a peculiar situation in which the effort devoted to judicial activities can be indirectly understood in terms of opportunity costs. Tax judges are essentially part-time workers whose effort in judicial activities also depends on the income provided by their external profession. The second step draws a simple but compelling picture of this tradeoff: it analyzes the judges' productivity in relation to their potential income in the private market. This income thus becomes a proxy for the opportunity cost of alternative occupations (or sources of income) available to judges. The negative relation (Tables 8 & 9) suggests that productivity within the court increases as opportunities for external complementary income decrease. Since a lower potential income means fewer opportunities to make money outside the court, it makes sense for judges to devote more effort to their judicial activities by essentially managing more cases. In addition, this can improve their chances of being reappointed.

More specifically, we consider the case of a public accountant and of a tax law attorney. The choice faced by these professionals is whether to devote more effort to their profession (the alternative market) or to judicial activities. The latter will be more attractive only when professional opportunities are limited or poorly remunerated.

A glimpse into the existing remuneration scheme can provide additional insights. Remuneration for tax judges is made up of two parts: a lump sum (€310.00 per month), plus a per-unit fee (€26.00 per case). Hence, a substantial increase in cases decided can significantly affect the income of a judge, but a judge is unlikely to choose this option when more appealing external opportunities exist.[14] This underscores the fundamental trade-off between the two activities.

Now, by putting all these pieces together, a clear picture emerges. Judges respond to economic incentives, just like everybody else does, and their productivity is very much linked to a proper balance between reward opportunities and aversion to effort, as suggested by Cooter (1983) and Posner (1993). In particular, within the Italian tax system, Cooter's (1983) suggestion that productivity can be boosted by increasing economic incentives applies. If external opportunities to make money are plentiful, boosting judicial efficiency is impossible without increasing the judiciary's internal rewards (e.g. by raising the variable component of the remuneration). Once

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[14] For example, the average income (per month) of a tax judge in Southern Italy is €700.00, whereas this decreases to €500.00 in Northern Italy. This difference is clearly affected by differences in productivity, in terms of cases decided.

again, this is because judges – at least Italian tax judges – behave as utility maximizers and direct their efforts towards whichever activity is more remunerative.

Consistent with the cited literature, our findings suggests that, since judges are indeed economic agents, any policy aimed at increasing their productivity should carefully consider what competing opportunities exist, and reasonably weigh incentive-compatibility. Increasing the effort required within the court can be successful only if judges do not have any alternative means of increasing their income. If judges do have alternative options, they will increase the effort expended on judicial activities only if the opportunity cost is less than the expected benefit.

Overall, a remuneration scheme tightly linked to effort and opportunity costs is necessary in order to enhance efficiency. A more suitable incentive system needs to be designed (and this is, interestingly enough, exactly what Italian judges are currently asking for), with the aim of reviewing and, if necessary, increasing the amounts paid to judges[15]. However, any such increases should not be made indiscriminately across the board, but rather carefully tailored to the local job market, so as to take the different opportunity costs into account. In other words, a public solution relying upon a 'one size fits all' reward scheme cannot be expected to yield the desired outcomes, and might result in compensation that is overly high for certain areas yet too low for others.

Finally, our overall findings indicate that the judiciary can indeed be treated as a productive activity, not only in so far as the judges are concerned, but also when it comes to appropriately managing the stages of production. In light of this, the tools normally employed in industrial organization may provide some insights into how to optimally fine-tune the judiciary – just like they have done for other sectors.

6. Conclusions

Adjudication is a crucial activity for society. Although it supplies a complex set of outcomes, from an efficiency perspective its workings can (and should) be investigated by adopting the usual tools of economic analysis.

The paper does exactly that, by providing an empirical investigation of the Italian tax judiciary. In particular, adopting both judicial delay and the DEA approach, we compare the efficiency measures of tax courts and the determinants affecting their performance. Moreover, since the Italian tax judiciary relies on the non-exclusive commitment of judges, who can also concurrently practice

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[15] See the proposal "Progetto Finanziario di Rimodulazione Compensi dei Giudici Tributari", which was approved by the Council of the Presidency of Tax Justice (15.02.11).

another profession, we test whether judges behave economically, by maximizing their utility (as far as their income is concerned), as a stream of literature suggests they do.

Our findings show that judges do indeed act as profit maximizers and, because of this, outcomes can greatly vary depending on external opportunities to make money, which in turn represents the opportunity cost for the judicial activity. In order to be efficient, a court essentially needs to boost its judges' productivity and, when other external economic opportunities exist, this means that judges face a trade-off between increasing the court's performance or their private income. Our analysis confirms that the latter seems to prevail, in accordance with the predictions of economic theory. Consequently, an effective policy to promote judicial efficiency cannot simply rely on increasing the number of judges or their rewards. The findings of this study indicate that, in order to be effective, a policy has to consider incentive-compatibility constraints, which calls for a solution tailored to the local job market. A systemic perspective, combined with some help from industrial organization theory, might therefore support the designing of more cogent policies.

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