Beyond Conventional Wisdom and Anecdotal Evidence: Measuring Efficiency of Brazilian Courts

Luciana Luk-Tai Yeung*
Paulo Furquim de Azevedo**

ABSTRACT

The Brazilian Judiciary is well-known for its inefficiency and delay. Yet, such conclusions are often based on anecdotal evidence. Little effort has been made to objectively measure the efficiency in Brazilian courts. Studies that combine quantitative and qualitative analysis are even harder to find. This paper uses Data Envelopment Analysis (DEA) to measure the efficiency of State Courts in Brazil in the year of 2008. Results show that relative efficiency varies substantially across different Courts. Moreover, the typical usual criticisms which blame judicial inefficiency on a lack of material and human resources are not supported. Instead, efficiency in courts seems to be related to the organizational climate, staff motivation, and management quality.

Keywords: Efficiency, Courts, DEA

RESUMO

O Judiciário brasileiro é conhecido por sua ineficiência e morosidade. Entretanto, tais conclusões baseiam-se em grande parte em evidências anedóticas. Poucos esforços foram feitos para medir-se objetivamente a eficiência nas cortes brasileiras. Estudos que combinam análises qualitativas e quantitativas são ainda mais raros de se encontrar. Este artigo usa a Análise Envoltória de Dados (DEA) para medir a eficiência na Justiça Estadual do Brasil, no ano de 2008. Os resultados indicam que a eficiência relativa varia significativamente entre os diferentes estados. Além disso, as usuais críticas que apontam para a falta de recursos humanos e materiais como sendo a principal causa de ineficiência nos tribunais não é corroborada. Por outro lado, a eficiência nas cortes parece ser relacionada ao clima organizacional, à motivação dos funcionários e à qualidade da gestão dos líderes.

Palavras-chave: Eficiência, Cortes, DEA

Área ANPEC: Microeconomia, Métodos Quantitativos e Finanças
JEL Codes: K4, D02, C14

* Escola de Economia de São Paulo, Fundação Getúlio Vargas, São Paulo; corresponding author: luciana.luktai.yeung@gmail.com

** Escola de Economia de São Paulo, Fundação Getúlio Vargas, São Paulo.

1. Introduction

Since the beginning of the 20th century, the Brazilian Judiciary has been considered as in a state of crisis. Early in the 1930s, inefficiency in the Federal Courts led to the end of Federal Justice in the country. More recently, the declaration of the new Constitution, in 1988, placed a sudden and gigantic burden on the courts. After 20 years of a strict military dictatorship, the country was craving for democracy, and the Constituents materialized this wish by drafting a socially and politically ambitious Constitution. It contains dozens, if not hundreds, of fundamental rights, private and collective in nature (Cintra, Grinover & Dinamarco 2008; Moreira 2004). Moreover, several new procedural instruments were created, which made it relatively easy for many agents to initiate lawsuits against the government (Ballard 1999). Some warned that these measures could mess up with the judicial system in the country, especially the higher courts (Rosenn 1998). This seems exactly what happened. Since that time, the state of the Judiciary has continued to deteriorate, as the privatization of several big public enterprises, the establishment of political democracy, and the implementation of many inadequate policies by the central government have led to thousands and thousands of lawsuits from citizens. From 1988 to 1996, the number of judicial deposits in Brazilian courts had a tenfold increase (Dakolias 1999). Courts clearly have not been able to respond to all these demands.

That courts in Brazil are inefficient and slow is a well-understood and oft-stated fact. The crucial questions are: "Why?" and "How bad are they?" Several attempts have been made to answer the first question; very little has been done to respond to the second. Most of the time, the discussion is based on anecdotal evidence and restricted to judicial circles. Due to the complete absence of quantitative courses in most Brazilian law schools, this means that quantitative research has rarely been carried out. On the other hand, researchers from other fields, such as economics, have shown little interest in analyzing judicial matters in depth. As a result, little progress has been made in the study of judicial function. Not surprisingly, proposals for judicial reform – most of them based on conventional wisdom – have produced very little concrete impacts year after year.

This paper has two main objectives. First, we offer an economic analysis of the Brazilian Judiciary. We will provide a brief overview of the current situation of Brazilian courts, and discuss some of the elements most commonly identified as reasons for the judicial crisis. Yet, our economic analysis differs from conventional legal studies. For an economist, courts may be viewed as organizations, analogous to firms. Based on this method, our analysis shows that management, leadership, incentives, and organizational climate may play crucial roles in determining the level of court efficiency.

The second objective of this paper is to objectively measure court efficiency in Brazil. We employ Data Envelopment Analysis (DEA) to analyze data of year 2008. Our results show that relative efficiency varies substantially across the states. In contrast to conventional wisdom, courts are not "equally bad" in the country: some of them are performing much more efficiently relatively to others.

We then offer some preliminary evidence of the correlation between efficiency and quality of internal management and organization of courts. Finally, we point to some directions for promising future research in this topic.

2. Overview and Diagnosis of the Current Situation

In general, one can affirm that Brazilian Judiciary has a very poor track record. The duration of an ordinary process is estimated to be around 1,000 to 1,500 days, although officials affirm that for the Supreme Court (STF), an average process takes 14 years to be completed (Fuck, 2008). This is even more astonishing if one takes into consideration that the 11 Justices at the STF decided more than 130,000 cases in the year of 2008, and 150,000 in 2007. This heavy workload is not particular to the Supreme Court: any judge in Brazil is, on average, responsible for 10,000 cases at any moment in time (Sherwood, 2007). The rate of appeals is also high. The World Bank (2004) estimated that, between 1993 and 2003, the ratio of cases judged in the second-degree courts and those judged in the first-degree courts varied from 0.5 (in the last year of the survey) to 1.0 (in 1999 and 2000). However, these numbers do not indicate whether the level of appeals is uniformly high across all cases, or whether some cases generate multiple appeals.

Judicial demand is not equally distributed across different courts. A survey carried out by the Ministry of Justice in 2007 indicated that State Justice Courts account for 73% of all judicial services in the country. From 1990 to 2002, filings and adjudications in first-degree State Courts increased threefold, while appeals in second-degree courts increased sixfold (World Bank, 2004).

Inefficiency in Brazilian courts is usually credited to two factors: shortage of material and human resources (e.g., Rebelo 2003), and poor quality of procedural law (e.g., Sherwood 2007; Moreira 2004; Hammergren 2002; Dakolias 1999; Rosenn 1998; Machado 2005; Machado 1997). Let us take a deeper analysis of both arguments.

Factor 1: Shortage of Material Resources

Judiciary staff members are the most frequent critics of the lack of resources; they argue that human and material resources at all levels are insufficient to deal with the large number of cases. In recent years, the concern with the apparent underuse of information technology has also increased. Creating a modern electronic infrastructure and digital files have become a "*frisson*" in the courts.

Yet, the analysis is quite different when one considers the opinions of legal scholars and experts who are not daily involved with operations in the courts. According to them, the lack of resources, including information technology, is not the main problem. Specifically with regards to the shortage of judges, Maria Dakolias, an expert on judicial systems at the World Bank, affirms:

> "The number of judges is always a delicate topic for reformers, because hiring more judges is often a favorite solution for problems of inefficiency. Lack of judges has historically been cited as the main reason for delay. This perception, however, relates primarily to those courts that are not *well-managed* … This is not to say that in some cases there is not a need for additional judges, but additional research is needed to justify the increase, as increasing the number of judges may not always solve the problem" (1999, p. 20, emphasis by the author).

Interestingly, some high ranked judges also support this opinion. Justice Gilmar Mendes, when taking office as President of the Supreme Court in May 2008, expressed much concern about judicial

inefficiency and slackness, but took a different approach to the problem: "The Judiciary is being challenged to contribute to the effort of resource rationalization, without necessarily expanding the existing [material] structures. Thus, the emphasis should be on the optimization of already available means". His predecessor on the STF Presidency, Justice Ellen Gracie, has the same opinion: "The challenge of the Judiciary is to restructure itself. It is useless to only increase the amount of judges and courts. In the long run, this will not work"[1]. Both the current and the ex Presidents of the Supreme Court believe that the best way to increase judicial efficiency is to use resources wisely, in other words, to improve management of resources.

Factor 2: Bad Quality of Procedural Law

Brazil inherited a highly bureaucratic procedural law from the Portuguese and the civil law traditions. This is one of the primary reasons for current court inefficiency. Slackness, a complex system of procedural rules, and an overemphasis on format are traces still present in today's law. In addition to that, one central criticism is to the ease of appealing to judicial decisions. The large number of appeals is considered to be unavoidable by some lawyers, because they say it minimizes trial errors. Yet, this conclusion is not supported by the data. Rosenn (1998) shows that 90% of all decisions made in first instance courts is maintained by judges in the appellate courts. In other words, the high level of appeals simply means more useless work, more slackness, and more wasted resources.

Moreover, at each stage of the system, work is done in a very ineffective manner. A survey carried out by the Instituto Nacional de Qualidade Judicial (*in* Sherwood, 2007) shows that cases in courts spend a great amount of the time simply "waiting in line". It takes, on average, three years for a case to go through a first-degree court. Yet, it takes no longer than six aggregate hours for a judge to analyze it. All the remaining time is used for waiting or moving through different bureaucratic stages within the court.

Do the lack and waste of resources, bureaucracy, and bad quality of procedural law in Brazil tell the whole story? To a casual observer, they do; yet, there is more than reveals a superficial analysis.

First, since an average process takes years to be concluded, only parties with plenty of financial resources, or with strong financial interests at stake, can afford the full costs of a lengthy judicial process. In general, these are parties associated with one of three following categories: the State, big creditors, and big debtors. The great majority of judicial cases in Brazilian courts is brought by companies and individuals who have money to receive from the State. In other words, the most frequent debtor in the courts is the State; and, by far, the largest debtor in the country is the National Pension System (Instituto Nacional de Previdência Social – INPS). Not only the State is the most frequent user of the Judiciary, it is also a bad user: it always appeals, even when it knows that there is no chance for winning. For this reason, it is not unfair to blame the State (represented by the Federal, State and Municipal Governments) for a large part of the current judicial crisis. Using an economic concept, it can be said that the State "crowds out" judicial demand in the country: since it overuses the system, it pulls the price of judicial services up (actual prices and opportunity costs); and for this reason, private demand is inhibited. Although this comes as no surprise for anyone who is acquainted with the Brazilian Judiciary, it is rare to

[1] Quoted by the Strategic Planning Nucleus of the State of Maranhão Judiciary, in a "Best Practices Guide" (2009).

see discussions about the abuse by the State as one of the primary causes of the judicial problems.

Another factor comes to light based on the above analysis (again, using an economic term): the "adverse selection" in the demand of judicial services. It is very attractive for debtors to use judicial inefficiency simply in order to delay payments. Since procedural law allows anyone to appeal almost without restriction, and since slackness in courts is so high, lengthening the process by appealing multiple instances makes it possible to gain time. This is another unfortunate byproduct of judicial inefficiency: it attracts the bad users, and repels many who are in need of courts for protection of their genuine rights.

There is, at least, one additional explanation for inefficiency, which is not often mentioned. It is less related to the external dimensions of courts, and more related to *internal* dimensions of their functioning.

A Complementary Explanation: Poor Administrative Management, Lack of Leadership

The Brazilian public sector has no tradition of developing professional management. Managerial sciences have evolved quite satisfactorily, but there have been no spillover effects on the public sector. Moreover, public employees are covered by a specific set of laws, completely apart from ordinary labor laws applicable to workers in the private sector. As in other countries, laws for public employees allow much less flexibility for management to foster efficiency at the workplace.

The belief that poor management may be a primary factor causing the judicial crisis has gained more adherents, including top-level judges. Some experts even point to poor court management as the most serious problem in the Brazilian Judiciary. Sherwood (2007) shows that each court has a president who is responsible for its budget, purchase of material, information technology, hiring and training of staff, infrastructure maintenance and systems management. Yet, one must remember that, by law, every court president must be a judge. Thus, the author concludes that the judicial system in Brazil is managed by amateurs: almost every judge is, by definition, an amateur in management, since law school curricula do not include any managerial training. The law requiring judges to manage courts certainly is another sad historical inheritance: since Imperial times, judges were frequently involved with administrative matters (Carvalho, 2003). The need to devote a large part of their scarce time to bureaucratic issues is another strong factor that contributes to high inefficiency in courts. Dakolias (1999) shows that Brazilian judges spend 65% of their working time involved with non-judicial, bureaucratic duties[2].

Staff members also suffer from the lack of professional managers. As a direct consequence, it is not hard to find typical principal-agent problems in court operations. There are very few leaders with ability to drive human resources in the desired direction. Some quantitative research confirms this analysis: the Ministry of Justice (2007) found out that the main causes of inefficiency in some judicial offices were workers' apathy and lack of managerial leadership.

What is needed to make the above discussion more complete is an objective evaluation of (in) efficiency in the Brazilian Judiciary. This is what we do next.

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[2] Corresponding numbers are 70% for Argentina and Peru, and 0% in Germany and Singapore.

3. Methodology and Data

Evaluation of court efficiency will be carried out by employing Data Envelopment Analysis (DEA). DEA is one of the methods based on calculations of production frontiers; another one is the so-called Stochastic Frontier Analysis (SFA). Production frontier models are classified into different categories: statistical/non-statistical, stochastic/non-stochastic, parametric/non-parametric. SFA is based on statistic, stochastic and parametric models, while DEA models are based on non-parametric, linear programming optimization calculus[3].

DEA differs to most parametric models in a significant manner, since it does not assume direct *a priori* knowledge of the production function. Yet, it is consistent with the principles of microeconomic theory of the firm, and includes most of its elements. The production possibility set, (T), is made up by feasible combinations of the vectors of inputs, (X), and outputs, (Y). Since Y is a function of X - Y(x) - and X is a function of Y - Y(x) - it turns out that, if Y is known for every x, and X is known for every y, then T is known indirectly. T's frontier constitutes the production frontier, and indicates the objective basis of comparison for all Decision Making Units (DMUs). Efficient units are located on the frontier, while inefficient ones are within T, away from the frontier. In this sense, DEA provides measures of *relative* efficiency among different DMUs and these are based on an analysis of the inputs employed and the outputs produced by each unit.

Important assumptions about T should be remembered from the microeconomic theory:

(1) T, Y and X are convex sets: if $(x, y), (x', y') \in T$, $\alpha \in [0, 1] \Rightarrow \alpha (x, y) + (1 - \alpha)(x', y') \in T$. Y and X are also bounded and closed.

(2) A positive amount of inputs is necessary for the production of a positive amount of outputs: if $y > 0$, then $x \neq 0$. Also, if $x \geq 0 \Rightarrow y \geq 0$.

(3) It is possible to freely dispose outputs and inputs: if $(x, y) \in T$, $x' \geq x \Rightarrow (x', y) \in T$; if $(x, y) \in T$, $y' \leq y \Rightarrow (x, y') \in T$. It is also possible, under the weak version, that $x' = \alpha x$, and/or $y' = y\alpha^{-1}$ for $\alpha \geq 1$.

(4) It is possible to proportionally resize the scale of any productive process in T: if $(x, y) \in T \Rightarrow \alpha(x, y) \in T$, for any $\alpha \geq 0$.

Following Simar & Wilson (2001), one may recall Shephard (1970), who provides a distance function in outputs for an observed production possibility, (x, y), to the frontier of T:

$$D(x, y) \equiv \inf\{\theta \,|(x,\theta^{-1}y) \in T\}, \qquad (1)$$

Details about the variables and their meanings will be discussed below. For now, one needs only to attain to the fact that this distance shows the maximum feasible augmentation in y, an observed output vector, letting x constant. Calling each of the observed production possibility points a DMU, $\theta = D = 1$ for efficient DMUs, and these ones are on the frontier of T; all others have $\theta = D < 1$. DEA finds a linear

[3] Traditional DEA models were mainly non-statistic, and non-stochastic. Yet, recent developments in the field include statistic and stochastic approaches. We will not employ these very advanced models in this paper.

combination of observed DMUs that employ, at most, as many inputs as the unit being evaluated, DMU_0, but which produce a fraction of θ^{-1} more of outputs than DMU_0 does.

We can also write expression (1) as a linear programming problem:

$$[D(x,y)]^{-1} = \max\{\theta \mid \theta y \leq \lambda Y, x \geq X\lambda\} \qquad (2)$$

DEA has been widely used in efficiency analysis across many different areas, especially in the public services sector. Among its advantages is the ability to analyze not-for-profit organizations, and the possibility to analyze efficiency of multi-product firms. DEA presents many advantages over other traditional methods in economics for the analysis of courts. First, there is little confidence that we can accurately model the production function in the Judiciary. It is even harder to convincingly assume that we know the distribution of the error term. This makes parametric methods, including Stochastic Frontiers, not well-suited for an adequate analysis. Moreover, some studies (e.g., Souza, 2001) suggest that DEA has several advantages when dealing with non traditional sectors: random impacts have less influence over the final results, multi-product production functions are more frequent, input and output market prices are hard to stipulate, and hypotheses of profit maximization and cost minimization decisions are not adequate for the analysis. In such circumstances – which seem to be the case of the Judiciary – DEA is the most appropriate methodology. For this reason, it is not surprising that DEA is the most commonly used method for measuring court efficiency around the world. We carried out a brief survey in the literature and found out that most of the papers that attempt to measure court efficiency employ DEA or Free Disposal Hull (FDH), a more sophisticated version of DEA[4].

Defining Efficiency

Before we start measuring efficiency, we must be very clear about what we are measuring. In other words, what do we exactly mean by *court efficiency*? In part 2 of this paper, we referred several times to efficiency as a synonym of speediness; and this idea matches the common understanding of an "efficient court". However, the economic definition of efficiency is usually that of Pareto: one firm (court) is considered efficient if it is unable to produce more outputs (adjudications) without employing more of any inputs (judges, staff, computers, etc.). The DEA methodology is in accordance to this concept, since it is based on the microeconomic theory, and this can be seen by the fact that it mainly compares the usages of inputs and outputs across different units. One can also see that the economic definition does not differ from that one which relates to speediness: a speedy court is certainly more able to deliver more adjudications than a slower one. Thus, the economic concept is the one adopted here: a court will be considered efficient if and only if it is able to produce as many judicial decisions as possible, given a certain amount of judges, staff and other capital goods. Furthermore, as we will explain more into details later on, it is not enough for a particular court to produce the greatest amount of decisions in the sample. It is also necessary that it does so in *relative terms*: if a State Court is faced with a high level of

[4] The result of this (short) survey is available upon request.

demand, for it to be considered efficient it must produce a proportionally higher amount of decisions, as compared to less-demanded courts. It is possible to understand this point by taking a potential litigant's perspective: if a court is efficient, the litigant will have a speedy service, no matter if he/she lives in a state with very busy or very "idle" courts.

The Output Oriented, Constant Returns to Scale CCR Model

The adequate choice of a DEA model is of crucial importance because it has significant impacts over the results that one might derive. Differences of the many models developed in DEA literature may be summarized into: assumptions of returns to scale, input and/or output orientations, and, for the variable returns to scale assumption, radial or non-radial metrics. As Charnes et al (1994) point out, the envelopment frontier is identical for all choices, but the projection point, i.e., the basis for comparison for an inefficient unit, is different for each model[5].

The DEA model employed here is the one originally developed by Charnes, Cooper and Rhodes, CCR (1978), which assumes constant returns to scale. Lewin et al (1982) and Schneider (2005) assume constant returns to scale for American Criminal Courts and German Labor Court, respectively. Pedraja-Chaparro and Salinas-Jimenez (1996) did the same for Spanish courts, after regressing efficiency scores on size and finding no statistical significance in the coefficients. The results obtained by Dalton & Singer (2009) and by Kittelsen & Førsund (1992) seem to indicate one same factor: only courts that are smaller in size and handle less complex cases are those likely to show increasing returns to scale. This is not observed in larger courts. Moreover, very few papers found evidence of decreasing returns to scale in courts, the one example being Beenstock & Haitovsky (2004) in Israel. For all these reasons, we assume the hypothesis of constant return to scales.

Even if we had no indications from the literature to corroborate the assumption of returns to scale, we could infer it from knowing the actual structure and functioning of Brazilian courts. As briefly discussed in the "Overview and Diagnosis" section, there are some characteristics that may give us hints about the "judicial production process". Judges and staff are legally required to follow a long series of steps for each specific case; they need to devote particular time for each one that arrives to the courts, and this time is not changed with the increase or decrease in the number of suits. Another characteristic that further impedes gains of scale in Brazilian courts is the infrequent use of jurisprudence, as opposed to common law countries. This means that judges rarely use the precedents for similar cases; instead, they would go through the case from the beginning, analyzing all its details. This is especially true for lower degree courts. For all these reasons, it seems reasonable to assume a model of constant returns to scale.

DEA employed here is, furthermore, output oriented: it analyses by how much a court can increase the level of output, while maintaining constant the level of inputs. The alternative would be an *input oriented DEA*, which in turn analyses how much input a court could save, while maintaining a

[5] DEA models include: the CCR (adopted in this paper), the BBC, the Additive, and the Multiplicative, among others. Charnes et al (1994) provide a good introduction to most of the basic DEA models, and discuss the implications when employing each of them.

constant level of output. Choosing between these two orientations is a matter of evaluating the power of decision that managers have over each variable. Not only the literature more usually employs the output-oriented model, but also, the particular characteristics of the Brazilian Judiciary suggest that those who run the courts have little leverage on the level of inputs, since this is determined by laws. Thus, it seems that court managers have more potential impact on the decision of the level of *outputs* produced.

Having the CCR, output-oriented model in mind, the linear programming problem (2) can be written as:

$$\begin{aligned} &\max_{\phi,\lambda,s+,s-} z_0 = \phi + \varepsilon s^+ + \varepsilon s^- \\ &st \quad \phi Y_0 - Y\lambda + s^+ = 0 \\ &X\lambda + s^- = X_0 \\ &\lambda, s^+, s^- \geq 0 \end{aligned} \tag{3}$$

Because this is an output-oriented model, instead of θ, which is a number between 0 and 1, we need a $\phi = \theta^{-1}$ *increase* in the amount of outputs to transform inefficient DMU_0 into an efficient unit.

If a specific DMU has an optimal value of z_0, it is an efficient unit and it lies on the production frontier. An inefficient DMU, *(X_0, Y_0)*, may become efficient if it is projected to an efficient point, $(\hat{X}_0, \hat{Y}_0)$, on the frontier. This efficient point may not be empirically observable. Yet, in such cases, $(\hat{X}_0, \hat{Y}_0)$ will be a convex combination of observable efficient DMUs. In other words, $\hat{X}_0 = \Sigma\lambda_k^* X_k$ and $\hat{Y}_0 = \Sigma\lambda_k^* Y_k$ where $\lambda_k^* \geq 0, \forall k$ is a vector of empirically observed weights attached to each X_k and Y_k of efficient units. The maximum increase in output may be achieved by means of multiplying ϕ to inefficient DMU outputs vectors Y_0. Variables, s^+ and s^-, tell us that, in order to be efficient, a DMU also needs to have slacks all equal to zero. s^- measures the excessive amount of inputs employed by an inefficient unit, and s^+ the lack in the quantity of outputs produced by this same unit. The difference between the slack variables and ϕ is that, the latter is a proportional measure applied to the entire vector. In the output-oriented case, ϕ indicates the proportional increase applied to *all* outputs of an inefficient unit. As Charnes et al (1994) show, "[this increase] is applied simultaneously to all [outputs] and results in a radial movement toward the envelopment surface" (p. 32). Instead, s^+ is a vector containing independent measures to be applied to each individual output. Mathematically, s^+ and s^- are vectors, while ϕ is a scalar. Finally, ε is a non-Archimedean constant, or, a non-real number. Its presence guarantees that all variables are restricted to positive values (Cooper et al 2007).

DEA solves maximization problem (3) for each of the observed DMUs. This is a great contrast to what is done in regression models, where a single "average" plan is considered.

Data and Variables

Data for DEA analysis comes from the annual reports, "Justiça em Números", issued by CNJ, the National Council of Justice. These reports cover Federal Justice Courts, State Courts, and Labor Courts. In this paper, we will focus only on State Courts data, and for the latest year, 2008. All numbers are provided by each State Court and include a long list of measures, such as: expenditures, number of

judges, number of employees, number of computers, new filings, backlog, appeals, and adjudications.

Two outputs were used: the number of adjudications in first and second-degree courts. Each of these was divided by a measure of "workload", which in turn, consists of the number of filings in the current year added to the number of pending cases from the previous year. For instance, the second-degree court in the State of Pernambuco adjudicated 12,341 cases in 2008. There, 22,453 new cases were filed in the same year, and 50,561 cases were pending on December 31, 2007. Therefore, the ratio of adjudications controlled by workload was 0.1690. In order to avoid inaccuracy of results due to the small numbers, we multiplied the above ratio by 100[6]. Thus, for DEA calculation, Pernambuco's output was entered as 16.90. Controlling output by workload is crucial, given the high disparities of judicial movement across different states.

Three inputs were used: the number of judges, the number of auxiliary staff, and the number of computers. All of these variables were weighted. The former two were weighted by "workload" (as we did for outputs) in order to consider the *relative amounts*, since the absolute value is determined by law, which is usually very inflexible to the oscillations in workload. One should compare the relative amount of inputs employed by one state with the relative amount employed by another state. Again, in order to avoid small numbers, the resulting ratio was multiplied by 100,000. Thus, one could read the "weighted number of judges" as the number of judges available for every 100,000 cases that need to be adjudicated. The number of available computers was weighted by the number of internal users[7].

4. Results and Discussions

Table 1 shows summary of descriptive statistics for outputs, and Table 2, for inputs:

Table 1: Descriptive Statistics - Outputs

	Adjudications 2nd degree	Adjudications 1st degree	Weighted adjudications 2nd degree	Weighted adjudications 1st degree
Mean	50791	465631	43.55	44.00
Minimum	1184	15306	10.79	8.81
Maximum	438307	3005626	72.06	133.69
Median	12472	182373	42.23	32.87

[6] DEA procedures seem to be sensitive to the presence of extremely small numbers.

[7] Computer users include judges, internal and outsourced employees, interns and other hired workers who "regularly use computers in the year considered". All variable definitions were provided in the report appendices.

Table 2: Descriptive Statistics - Inputs

	Weighted numb. Judges	Weighted numb. Staff	Average numb. Computers
Mean	52.79	583.82	0.87
Minimum	11.27	128.82	0.11
Maximum	201.32	1654.97	1.16
Median	45.86	492.45	0.91

With regards to outputs, there is clearly a great heterogeneity across the different State Courts in the country, but in general they do have heavy workloads. If one recalls the manner in which the "weighted output" variables were constructed, it becomes evident that Brazilian courts are not being able to cope with the increase in workload. Only one state, Rio de Janeiro (in the first degree courts), has weighted output equal or higher than 100 (in first-degree courts). An important observation should be made here. It is possible that several adjudications have to occur before a lawsuit is finally solved. This is particularly true for the case of Brazilian procedural law, which, as discussed above, is cumbersome and offers multiple possibilities of appeals. Therefore, a perfectly efficient court, that clears all the pending cases from the previous year and also the new filings in the current year, would have a number of adjudications larger than the simple summation of the number of pending cases and the number of new filings.

As for inputs, one special point deserves attention. With regards to the number of computers, recently, the CNJ launched a national campaign in order to disseminate the usage of computers and electronic files all over the country. Some State Courts have explicit goals of making 100% of its records available in electronic format in a few years, while others have already achieved this goal.

Table 3 shows efficiency measures for year 2008:

Table 3: Efficiency Measures – State Courts 2008

DMU (State Court)	Efficiency (θ)
Rio de Janeiro	1.000
Rio Grande do Sul	1.000
Piauí	1.000
Rio Grande do Norte	0.935
Goiás	0.887
Paraná	0.887
Mato Grosso	0.886
São Paulo	0.878
Alagoas	0.792
Rondônia	0.777
Acre	0.764
Paraíba	0.726
Sergipe	0.717
Maranhão	0.688
Minas Gerais	0.681
Santa Catarina	0.613
Distrito Federal	0.552
Mato Grosso do Sul	0.549
Amapá	0.532
Ceará	0.497
Amazonas	0.491
Tocantins	0.462
Pernambuco	0.436
Espírito Santo	0.422
Pará	0.395
Bahia	0.349
Roraima	0.344

The average efficiency in Brazilian State Courts is 0.676; however, if one discards the perfectly efficient units, average efficiency falls to 0.636. The numbers above show that courts from the States of Rio de Janeiro, Rio Grande do Sul and Piauí are on the production frontier, i.e., they are *relatively* the most efficient units in the country. All other States could improve the level of their outputs without recurring to increases in the amount of inputs employed.

We would like to emphasize, again, that DEA provides *relative* measures of efficiency instead of *absolute* ones. Therefore, we are comparing Brazilian State Courts between themselves, and not to an

idealized measure of exogenously given, absolute level of efficiency. As discussed before, relative measures may have advantages of not needing an *a priori* knowledge of the sector's production function, and also of indicating the potential benchmarking cases for actual policy implementation.

Peer Group and "Genuine Efficient Units"

The next table shows a "test" for the efficiency measures presented above. DEA uses the number of times an efficient DMU is peer for inefficient ones as a way to test robustness of results. One might recall from the theoretical discussion that, for each inefficient unit, it is possible to derive an efficient projection onto the production frontier. This projection point is a convex combination of empirically observed efficient units. For this reason, the more a DMU appears in the comparison group of inefficient units, the more it is likely to be "truly" efficient.

Table 4: Frequency in which efficient units appear as peer for inefficient ones

Efficient Unit	N. of times it is peer (total = 24)
Rio de Janeiro	23
Rio Grande do Sul	22
Piauí	1

As explained by Cooper et al (2007), if an efficient DMU does not appear as peer for others, or appears few times, we should be cautious about the result. It might be the case that this unit has an unusual production function and/or that it has different input weights, as compared to others. Pedraja-Chaparro & Salinas-Jiménez (1996) consider only those who appear many times in the peer group as "genuine efficient" units. With this in mind, and according to the above results, we can say very confidently that Rio de Janeiro and Rio Grande do Sul are efficient units among Brazilian State Courts.

The case of Piauí, on the other hand, deserves much caution. Not only it is peer to only one state – Amapá, which also has Rio de Janeiro as its peer – but also because of particular problems with the data of the *piauiense* Court, about which we discuss next. One should be skeptical about this efficiency result.

Reliability of Data and Outcomes

DEA results may be obtained by calculations based on a very few input/output measurements. Thus, many authors warn that data accuracy is crucial (Charnes et al, 1994). The national collection of judicial statistics in Brazilian courts started in 2003, one year before the creation of CNJ. A brief look over the data shows that the quality at the beginning of the time series was questionable. For many states, there were several blanks, making them useless for a temporal panel. Clearly, the quality of data has been improving greatly throughout the years, especially because State Courts are now legally mandated to gather and send all statistics to CNJ, which by its turn, has punitive power over all judicial members. Yet, six years later, data is still not perfect. Two states were not 100% compliant in our sample, for the variables we employed: Mato Grosso and Piauí. There were only three gaps in this dataset (a great improvement if compared to previous years), but two of them were related to the number of

adjudications, which are not trivial gaps[8]. Thus, the efficiency measures calculated by DEA for these two State Courts have questionable reliability.

Even for some states without data gaps, we still have confidence issues and are unsure whether the numbers provided do really "make sense". To check this, one would need to go to the raw data and analyze it in details; furthermore, a comparison of the statistics in a temporal panel would be needed. For some previous research, we carried out this very exercise, with some gloomy results. Hopefully, with the improvement of recent data collection the problems that we found before are now less frequent. We leave the continuation of this task for future works.

Actual Outputs *vs.* Target Outputs, Actual Inputs *vs.* Target Inputs

Next table presents valuable information for policy recommendations. It shows, for a selected group of DMUs, the empirically observed level of outputs, as well as the level they should be, if the unit were an efficient one[9]. In other words, the table offers the *projected points lying on the production frontier*, for the observed DMUs. By definition, efficient units are already on the frontier and, therefore, constitute their own projection points, so they have target output values equal to the observed output values. Calculations of the slacks in the table come from efficiency measures (θ) and output slacks (s^+).

Table 5: Outputs – Observed vs. Targets (selected units)

	Observed Adjudications 2nd degree	Slack to Target	% Difference (Slack / Observed)	Observed Adjudications 1st degree	Slack to Target	% Difference (Slack / Observed)	Efficiency Measure
Rio de Janeiro	72.064	0.000	0.0%	133.695	0.000	0.0%	1.000
Maranhão	56.294	0.000	0.0%	41.147	77.292	187.8%	0.688
Distrito Federal	56.674	0.000	0.0%	92.177	5.760	6.2%	0.552
Ceará	10.789	43.002	398.6%	26.990	0.000	0.0%	0.497
Roraima	28.265	0.000	0.0%	35.299	23.104	65.5%	0.344

Again, recalling from the theoretical discussion, the results above show that it is possible to improve output levels without increasing the amount of inputs employed. The direct comparison is not of an inefficient unit to an efficient one, but of an inefficient unit to a "fictional" (but feasible) projection of itself, located on the production frontier[10].

DEA also provides us with the following table[9]:

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8 We filled these gaps with the average values of the two previous years.

9 The complete version of this table is available upon request.

10 It comes as no surprise that all inefficient units in our analysis have one observed output equal to the target output (percentage difference equals to zero). If both outputs were different to the target, it would be possible to make a *radial movement* , which would imply a change in the measure of θ. One must recall that slacks are represented by s^+ and s^-.

Table 6: Inputs – Observed vs. Targets (selected units)

UF	Observed Judges	Slack to Target	% Difference (Slack / Observed)	Observed Staff	Slack to Target	% Difference (Slack / Observed)	Efficiency
Rio de Janeiro	45.856	0.000	0.0%	802.563	0.000	0.0%	1.000
Maranhão	78.482	30.520	38.9%	814.556	0.000	0.0%	0.688
Distrito Federal	60.341	0.000	0.0%	1038.403	12.191	1.2%	0.552
Ceará	38.317	15.572	40.6%	287.274	0.000	0.0%	0.497
Roraima	52.984	8.204	15.5%	738.745	0.000	0.0%	0.344

As one can see from Table 6, although we have employed the output-oriented DEA model, it is still possible to get calculations for the input slacks[11]. The numbers in the table indicate that inefficient units not only produce outputs below the target level, but also employ inputs *above* the target level. Here, the slacks directly come from the calculations of s^-. Since only the efficient units have all input slacks equal to zero, Table 6 (when filled with data from all states) indicates that, in fact, all inefficient units are employing *more* resources than they need to become efficient. This result weakens considerably the justifications of lack of resources as being one of the main results for court inefficiency.

5. Preliminary evidence of correlation between court organization and efficiency

As discussed in previous sections of this paper, one might suspect that the presence of good management is an important determinant of the level of efficiency in the courts. In a preliminary survey, we have found that, indeed, the State Courts of Rio de Janeiro and Rio Grande do Sul do have some common features. From their website, it was possible to get information about internal programs aimed at increasing efficiency and improving organizational climate. The website of Rio de Janeiro, for example, publishes productivity measures for *each of its judges,* which may be considered quite extraordinary, even for international standards. The State Court, which a 2004 World Bank Report considered to be a benchmark in Brazil, searched for and got the ISO 9001:2000 certification, the well-known international standard for quality in services. The certification first came in December 2006. These initiatives, as well as others implemented by different efficiency top-performers, are positive novelties, especially if one considers the perverse Brazilian public sector tradition.

On the other hand, our preliminary results show that courts with very low performance are those that, at first glance, seem to be "lagging behind" in terms of internal organization and "user friendliness". On their website it was not possible to find information about how resources are being allocated, or how much productive judges and/or local courts are. Moreover, there was no information

[11] Due to lack of space, we omitted the column relating to computer slack. Only one state has this input slack different to zero.

about objective strategic goals of any kind (such as, "x%" improvement in court delay in "y" years). Finally, there do not seem to be specific programs aimed at staff career development or work motivation. These do not seem to be priority points in their agenda at all.

With the purpose of evaluating internal organization in a more objective manner, we constructed a "quality of court organization index". The aim of this index is not to offer a scientific proof of our arguments, but rather, a less judgmental indication of the importance of organization on efficiency. Five indicators were used to construct this index and they were based on Hammergren's (2007) "proposed instrument for assessing judicial operation" (pp. 252-5). The five indicators evaluated were:

1) There is managerial or customers' service training for staff and/or judges to improve their productivity at the workplace (training in legal issues did not count).
2) The court has a strategic, multi-year plan with well-defined goals and areas for improvement.
3) The court employs alternative methods to quickly solve disputes, such as arbitration and/or conciliation. It informs users about these services and offers guidance about how to access them[12].
4) Judges' productivity or efficiency performance results' are publicized.
5) The court publishes its recent statistics on productivity and efficiency results.

In this first stage of the project, information used to construct the index was entirely obtained from the State Courts' websites. Thus, transparency comes above all indicators. Although this might raise some problems in our assessment, one could justify it for the need of judicial transparency; as judicial reform experts indicate, transparency is an element that cannot be ignored by any Judiciary in modern democracies[13].

All indicators carry the same weight. Therefore, if this index is a good measure of quality of court organization, a very organized court must get an index with a full-score of 5. Then, we considered all State Courts that achieved scores of 4 or 5 to be the "top performers" with regards to organizational quality; those who achieved scores of 0 or 1 are considered "poor performers", and all the remaining, are "average performers". On the other hand, we considered "DEA top performers" to be all units with scores higher than 0.70; those under 0.5 were considered "DEA low performers", and the remaining units are "DEA average performers". Our hypothesis is that performance measured by the "quality of organization index" is related to efficiency performance measured by DEA. If we take all "DEA average performers" and consider a "perfect correlation" when they either present top, average or poor performance in the

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[12] CNJ, the National Council of Justice, has been stimulating all State Courts to disseminate conciliation procedures. In recent years, it has organized the "National Week of Conciliation" involving several State Courts. The indicator here was only considered to yield a "yes" if there were other non-CNJ mandated campaigns to disseminate the use of conciliation and other alternative dispute resolutions mechanisms.

[13] Four websites were completely unavailable or contained serious problems for access during the period of our research: Espírito Santo, Mato Grosso do Sul, Rondônia and Roraima; for the reasons just described above, their indicators where all considered to be equal to zero. Further details about the construction and measures of this index are available upon request.

"quality of organization index", we would have a correlation of 81.5%. If we were to be more cautious, and disregard those cases of "average organization performers" who got either "top DEA" or "poor DEA" scores, we would have 15 (out of 27) "right matches", i.e., a correlation of 56% between the "quality of court organization index" and DEA-efficiency results. There seems to be evidence that the quality of internal organization does have some relation to court efficiency.

Again, this index has no solid scientific basis yet, and was constructed based solely on information gathered from the websites. However, despite these weaknesses, we believe this index offers some indications of the correlation between internal organization and efficiency performance. A second stage of this research should include a more in-deep analysis of the differences in the internal organization of efficient courts as compared to inefficient ones. We hope to be able to go beyond data published on the internet, and, hopefully, we will be able to reach more objective conclusions about this correlation measurement in future works.

6. Preliminary Conclusions and Directions for Future Research

Given the above results, what might one conclude? First, the lack of material resources cannot be mainly blamed for the low levels of efficiency in Brazilian courts. DEA shows that at least 24 State Courts could further improve their level of efficiency, even if inputs – i.e., human and material resources – were kept constant. In fact, most of them should *decrease* the amount of inputs employed. DEA also allows us to analyze the target level for outputs and inputs of inefficient units.

Second, as one can infer from the "Diagnosis" section of this paper, and as evidences indicate, the ability of good managers to organize the internal structure of courts, including the allocation of material resources and motivation of staff, seems to have a very important role that the literature and common-sense have never realized. Further research is necessary to confirm these preliminary results in a more scientifically based manner. Yet, we are confident that the role of management on court efficiency is much more important than it has traditionally assumed to be.

As this is such a novel topic among Brazilian studies (not in the content, but in the methodology), there is still much to be done, which is quite stimulating. In recent years, there have been very fast and very sophisticated advancements in DEA models, which include stochastic elements, including the construction of confidence intervals, probabilistic variables, etc. Incorporating some of these new elements might probably offer even more precise measurements for the reality of the Brazilian courts. A long road rests ahead all of us who are interested in this important and challenging topic.

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