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

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ABSTRACT

The Brazilian judiciary is well-known for its inefficiency and delay. Yet, such conclusions are often based on anedoctal 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. 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.

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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 Judiciary. Since that time, the state of the judiciary has continued to deteriorate, as the opening of the economy, 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. 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. Yet, 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 analysing judicial matters. 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 little objective result year after year.

This paper has two main objectives. First, we offer an economic analysis of the Brazilian Judiciary. We will provide a brief historical analysis of the origins of Brazilian courts and law. Later on, we 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 corporations. Based on this method, our analysis shows that management, leadership, incentives, and organizational climate 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 a linear programming method called Data Envelopment Analysis (DEA). Our results show that relative efficiency varies substantially across different states. In contrast to the conventional wisdom in this area, there are indeed efficient courts in the country, and court performance has less to do with the level of material and human resources available, and more to do with the manner in which these resources are allocated by management.

2. Origins and Current Structure

The Brazilian Judiciary is descended from the court systems of European monarchies, which were traditionally weak and subservient to the power of the monarchy. For a long time, the Judiciary in Brazil had no power to intervene in the other branches of the State. Even now, in the 21st century, all laws which define the structure and functioning of courts in Brazil are solely dictated by the Legislative and the Executive branches. One needs only to remember the Constitutional Amendment Number 45, which institutionalized the so-called Judicial Reform in 2004, as well as all the small-scale reforms in the civil law system. These were the result of many years of discussion and bargaining in the Congress, and were only implemented after approval by Congress and/or the President. It can then be immediately inferred that any change in Brazilian judicial system will only take place if the two other branches of power (Executive and Legislative) also benefit. If proposed changes would be detrimental to either the Congress or the Executive Power, it is very unlikely that they will be approved or implemented.

In addition to this, Brazilian law results from the mix of Roman and Canon laws – both dominant in Portugal during the 18th and 19th centuries, the historical period in which Brazilian political and social institutions were most strongly influenced by their counterparts in the Metropolis. Roman and Canon laws, as well as Portuguese laws, had some common characteristics: their procedural system was slow and bureaucratic, it was possible for the process to be halted by multiple interlocutory appeals , and format was of greater importance than content. The Philippine Ordinances (*Ordenações Filipinas*) were one legacy of the Portuguese court system which has had a strong influence on the Brazilian legal system. These were a collection of written, consolidated

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legal cases, and established the legal process in several separate and inflexible steps. Their impacts were visible in Brazilian law until the beginning of the 20th century, when a "genuine" Brazilian legal process was finally created.

On the other hand, Brazilian judges have an elitist origin. The first law schools in the country were only created after Independence, in the second half of the 19th century. Therefore, during colonial times, attorneys and especially judges were trained in Europe, most often in the University of Coimbra and Porto in Portugal. They all belonged to the highest social classes in Brazil, since middle and lower-class families could not afford to send their sons to European schools. This elitist trend among judges has declined as years have passed, but is still very strong. A recent study carried out by Sadek (2006) shows that 85.7% of all active judges are white and only 13.3% are black or brown (*pardo*), while these same racial groups constitute 53.7% and 44.7%, respectively, of the Brazilian population. Moreover, 54.4% of Brazilian judges have a father with at least a high school diploma, with judges' mothers having graduated high school 51.9% of the time. The 2007 National Survey carried out by the Brazilian Official Statistical Institute (PNAD 2007 by IBGE) shows that, in the national population, only 28% of males and 32% of females are high school graduates. It is almost certain that the schooling difference between judges' parents and the average Brazilian citizen is underestimated, since the above comparison was made using different generations, and since the average level of education of the general population has been increasing in recent years.

Another historical characteristic that seems to have persisted through the years is the close relationship between judges and bureaucracy. For many years, even after Independence, the highest rank of Judiciary in Brazil was part of the government bureaucracy. As Carvalho (2003) shows, during the years of the Empire (1823 to 1889) judges were frequently involved with purely administrative duties in their daily work. Because judges never received any formal training in administrative management, this type of work was usually very inefficient. Of course, such responsibilities also wasted precious time which otherwise could have been devoted to what judges

do best: rule on judicial cases. With the judicial backlog's rapid growth in recent years, it is even more unacceptable today that judges continue allocating a significant portion of their time to administrative duties. This inefficient way of allocating human resources seems to be one of the main reasons why Brazilian courts are inefficient; thus, this is one of the historical legacies that needs to be revisited. We shall come back to this subject later in this paper.

On October 5th, 1988, a new Federal Constitution was promulgated in Brazil, after more than 20 years of military dictatorship. Certainly this Constitution had a great impact on the Judiciary, and has largely determined its successes and crises since that time. In fact, it was created with the goal of fulfulling all the democratic dreams of the whole nation, which had been suppressed during the military years. Social, political and economic inequalities had to be addressed urgently, and it was hoped that the new Constitution would do this. For this reason, it is no surprise that the document was very idealistic and that it promised to deliver more than it could realistically be expected to do. The hundreds of empty promises contained in the Constitution, guaranteeing a long list of civil rights, are one of the main causes of the overloaded Brazilian court system some decades later. Moreira (2004) analyses this problem as caused by the need to consolidate political, civil, and social rights at the same historical moment. In other countries, these different rights were achieved gradually, in distinct and successive stages. In any case, the Brazilian Judiciary is paying a high price for the recent establishment of democracy.

Articles 92 to 135 of the Federal Constitution establish the organization of Judiciary Power in Brazil. It is legally made up by the:
- Federal Supreme Court (*Supremo Tribunal Federal - STF*)
- Superior Court of Justice (*Superior Tribunal de Justiça - STJ*)
- National Council of Justice (*Conselho Nacional de Justiça - CNJ*)
- Federal Regional Courts and Federal Judges
- State Courts and Judges, and the Court of the Federal District and its Judges
- Labor Courts and Judges
- Electoral Courts and Judges
- Military Courts and Judges

This paper focuses on an analysis of the State Courts and the Court of the Federal District. Each of these Courts is controlled by the corresponding state in an independent manner. In every state, there are first and second degree courts (trial and appellate courts, essentially). First degree courts are organized by districts, which may include one or more counties. In addition to that, State Courts include the Special Courts (*Juizados Especiais*[1]), the Justice of the Peace, and the Jury Courts.

The National Council of Justice (*Conselho Nacional de Justiça - CNJ*) was created during the Judicial Reform of December 2004. It is mainly an administrative body without jurisdictional role. One of its duties is to serve as an internal auditor to the Brazilian Judicial system. For this purpose, it is entitled to adopt disciplinary procedures against members of the Judiciary. However, probably one of the most important results of the CNJ's creation is the systematic collection and publication of statistics related to the Brazilian Judiciary. These statistics are the source of data used in the quantitative analysis of this paper, which will be elaborated in the following sections.

3. Overview and Diagnosis

Very briefly, one can affirm that Brazilian Judiciary has a very poor track record. The causes of its current crisis include historical, cultural, political, structural, and legal elements. For this reason, a variety of measures will be required to solve these issues. In this paper, we will discuss some of the primary factors that are usually blamed for the current judicial crisis in Brazil. Yet, one must keep in mind that no single chabge will be able to solve all these problems at once. Hopefully, future research will help us understand more about other factors that are also important in explaining this judicial inefficiency.

It is difficult to offer a precise diagnosis of any organizational fault without reliable numerical data. With regards to Brazilian judicial statistics, they vary considerably from study to

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1   Juizados Especiais were created for sues in which total value of complaint are limited to 40 national minimum wages. If the complaint has a value of less than 20 minimum wages, it is not mandatory for the parties to hire an attorney to represent them in the courts.

study. Yet, all of them show a gloomy scenario. Estimates of the duration of an average process vary from 1000 to 1500 days, although officials affirm that for the Supreme Court (STF), an average process takes 14 years to be completed (Fuck, 2008). This long delay is caused by the high volume of work in the courts: each Brazilian judge is on average responsible for 10,000 cases at any moment in time. 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 how many 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, and there is an marked concentration in the state of São Paulo, which adjudicates almost half of all cases in the country. From 1997 to 2002, filings and adjudications in first degree State Courts increased threefold, while appeals in second degree Courts increased sixfold. A simple calculation reveals that the level of appeals doubled over the same period.

Factor 1: Shortage of Material Resources

Inefficiency in Brazilian courts is usually credited to two factors: shortage of material and human resources, and poor quality of procedural law.

Not surprisingly, Judiciary staff members are the most frequent critics of the lack of resources. Judges and mid-level judicial employees argue that human resources at all levels are not sufficient to deal with the large number of cases that arrive every day. Material resources are also insufficient, according to them. The greatest concern is the continued lack of utilization of modern electronic methods. In October 2008, the National Council of Justice (CNJ) launched a national plan in order to implement electronic processes in all the courts of the country. The plan aims to "define short-term, mid-term and long-term goals that should be accomplished in 18 months to 5 years, until the full implementation of electronic judicial processes. The goal is to diminish

Judiciary costs and improve judicial services".

However, the analysis is quite different when one considers the opinions of legal scholars and experts who are not involved in the day-to-day operations of the courts. In their view, the lack of human and material resources, including electronic processes, is the 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).

The author shows that the management of resources seems to be more important than the amount of resources available. Interestingly, some highly-ranked judges also agree with this opinion. Justice Gilmar Mendes, when taking office as President of the Supreme Court in May 2008, expressed serious concerns 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". Justice Mendes is aware that it is unrealistic to demand more material and human resources. It is highly unlikely that either the Congress or the Executive Power will provide a larger budget to the already well-endowed Judiciary. The President of the Supreme Court knows that the best way to increase judicial efficiency and solve the current crisis is to use resources wisely; in other words, to improve court management.

In the following sections, we will employ Data Envelopment Analysis (DEA) to evaluate the sources of court inefficiencies. If there is indeed a material or human resource shortage in the courts, DEA can determine what level of resources must be provided so each court can be

considered a fully efficient unit.

Factor 2: Bad Quality of Procedural Law

We have already showed that Brazilian law has a highly bureaucratic "gene". This characteristic is one primary reason for the present court inefficiency. Slackness, a complex procedural structure, and an overemphasis on format are common characteristics of legal processes in Brazil until the present day.

Sherwood (2007) reports the findings of a survey carried out by the National Institute of Judicial Quality (*Instituto Nacional de Qualidade Judiciária – INQJ*), which indicate that, for each process, there are ninety distinct steps to be followed, many of them repetitive and with no apparent usefulness. Some judges report instances in which a process is denied entry into the second level courts because of the existence of typos in the written documents. It seems that too much time is spent on the discussion of procedural issues, and too little time on the true matters involved in the case. In the end, the probability of winning a process is less related to its merit, and more related to the skill of the attorney in navigating these procedural pitfalls.

One central criticism of the Brazilian judicial process focuses on the ease of obtaining multiple appeals. It is quite unanimous, even among the most conservative experts, that the law is too permissive, allowing ordinary processes to be admitted to higher courts far too often. This explains why a single case can take years or decades to be finally decided, and it also explains how the judicial system is inefficiently monopolized used by a relative handful of cases, usually those brought by rich and powerful parties, who are able to bear the financial burden of a long process. The excessive number of appeals is justified by some lawyers as unavoidable if one wishes to minimize trial errors. However, this conclusion is not supported by the data. Rosenn (1998) shows that 90% of all decisions made in first instance courts is sustained 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.

Additionally, at each stage of the system, the work is done in a very ineffective manner.

The survey carried out by the INQJ shows that a vast majority of the processing time for a judicial process in the courts is waiting time. It takes, on average, three years for a process to go through a first degree court. Yet, it takes no longer than six aggregate hours for a judge to analyze it. All the rest of the time is wasted while the case waits or moves through different bureaucracies within the court. Another survey (Ministry of Justice, 2007) shows that a process may spend 50% of its total processing time in the "waiting line", even after the final judicial decision has been made.

Summing up, Brazilian courts suffer from a bureaucratic and inefficient inheritance. In addition to that, resources are wasted in a careless manner. Finally, bad legal tradition, which includes bad procedural laws and an excessively liberal Constitution, created the current situation, characterized by excessive delays, restricted access for the poor, and inefficient usage of the judicial system. In other words, the Brazilian Judiciary is going through a deep and complex crisis.

Does the above passage tell the whole story? To a casual observer, it does; yet, there are several hidden elements that are rarely caught by brief and superficial analysis.

First, as discussed above, given that judicial resources are limited, and given that procedural law is very permissive regarding appeals, it turns out that an average process takes years to be concluded; for this reason, 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, people who are able to afford such a process are associated with one of three categories: the State, big creditors, and big debtors. There are an increasing number of courts that make full-text processes available online, including the two High Courts (STF and STJ) and several State Courts. Browsing their databases immediately allows us to conclude that, among suits brought by creditors, it is most common for suits to be brought by companies and individuals who have money to receive from the State. On the other hand, the most frequent debtor in the courts is the State. If one only considers suits brought by individuals, by far, the largest debtor in the country is the National Pension System (Instituto Nacional de Previdência Social – INPS). For this reason, it is not hard to conclude that the State is the most frequent user of the Judiciary; even worse, it can be considered to be an abuser of

the system, since it is the State which takes greatest advantage of the permissiveness of procedural law: it is common knowledge among practitioners that the State will always appeal, 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 (here, the price is represented by actual prices and also by opportunity costs); and for this reason, private demand is inhibited. Although this fact comes as no surprise for anyone studying the Brazilian Judiciary, it is surprisingly rare to see abuse by the State cited as one of the primary causes of judicial problems in the country.

Another factor that immediately comes to light based on the above analysis is (again, using an economic term) the adverse selection in the demand of judicial services. As mentioned before, big debtors are beneficiaries of the current state of the Brazilian courts. It is a highly attractive option for debtors to make use of judicial inefficiency simply in order to delay debt payments. Since procedural law allows anyone to appeal almost without restriction, and since slackness in the courts is very high, lengthening the process by appealing several times makes it possible for debtors to "gain time". This is another unfortunate byproduct of judicial inefficiency: it attracts the worst users, and repels those who are most in need of justice for genuine protection of their rights.

Finally, there are two additional elements that may have a great impact on judicial efficiency. These have less to do with external dimensions of Judiciary, as we have just discussed, and more to do with *internal* dimensions, and more specifically, with the internal organization of courts. For this reason, we may call them the "termites" of the Brazilian Judiciary: poor administrative management, and a negative organizational culture.

Poor Administrative Management

The Brazilian public sector has no tradition of developing professional management. The state of the managerial sciences has evolved quite satisfactorily as compared to industrialized countries, but there has been no real spillover effect on the public sector. As of today (2009), there is only one school of Public Administration in the country, and it is usually considered a second choice for students who are primarily interested in Business Administration[2]. Moreover, public sector employees are covered by a specific set of rules, completely apart from the labor laws applicable to all the rest of the workers in the private sector. As happens also in other countries, the former set of rules allows much less flexibility and less incentive for management, which fosters efficiency in the workplace.

The belief that poor management may be a primary factor causing the judicial crisis has gained more and more adherents, including top level judges. The President of the Supreme Court, Justice Gilmar Mendes affirmed, "The continuous search for betterment of administrative management, which will reduce costs and maximize resources, will certainly result in the improvement of public judicial services"[3]. Some experts 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, staff hiring and training, 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. Sherwood further reminds us that each judge serves in the court presidency for no longer than two years. In other words, there is no learning process, and managerial chaos is therefore commonly seen in many courts across the country.

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2 The fact that this school is located in São Paulo, the business capital and not the political capital of the country, also reveals something more.

3 Speech in May, 2008.

The law requiring judges to manage the courts very certainly comes from the imperial tradition, in which judges were frequently involved with administrative matters, as previously discussed. The need to devote a large part of their scarce time to administrative matters leaves these judges incapable of issuing rapid, high-quality judicial decisions. Dakolias (1999) shows that Brazilian judges spend 65% of their working time involved with non-judicial, bureaucratic duties[4].

Other staff members also suffer from the lack of good managers. It is not hard to find typical principal-agent problems in day-to-day court functioning. Employees working in court back offices (*cartórios*) are examples of agents, while judges might be considered principals. A survey by the Ministry of Justice (2007) concluded that the main causes of inefficiency in these offices were worker apathy and a lack of managerial ability on the part of the judges.

Culture

One must bear clearly in mind that when using the term "culture" we are referring more to the business meaning of the term, and less the sociological one. The conventional wisdom among Brazilians holds that most national institutional deficiencies are a matter of "culture", in sociological terms; implicitly the message is: there is nothing that one can do to change the situation, since changes in culture are impossible (at least in the short run). Certainly, the judicial crisis in Brazil cannot be attributed to culture, from this perspective. On the contrary, culture in this case can better be defined as the set of informal rules that are dominant in a particular environment. These rules determine the behaviors and decisions of each actor in the system. Because culture is frequently understood as the set of informal rules governing people over the long-term, it is by definition something which is difficult to change rapidly. This conclusion clearly holds with the "culture" of the Brazilian Judiciary. In recent years, several measures have been taken in order to foster efficiency. Many have faced direct or indirect opposition, which clearly reduced their effectiveness. For instance, in some judicial back offices there were initiatives to disseminate the

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4   Corresponding numbers are 70% for Argentina and Peru, and 0% in Germany and Singapore.

implementation of electronic processes. However, many of these offices did not see concurrent staff training in digital systems, and consequently a high level of mistrust was created towards the new technology. The result was that, in many workplaces employees started to adopt electronic procedures – because they were now required by superiors – but did not abandon manual, paper-based operations – because these were the ones they really trusted. In other words, the amount of bureaucracy at least doubled, and efficiency decreased as a result of the digital processes, just the opposite of the intended goal.

There is another type of "culture" that pervades Judiciary, this one related to the views that judges have of judicial services. This so-called "judicial culture" believes that formal Justice is the only entity capable of. and entitled to, solve societal conflicts. A survey by Sadek (2006) shows that 89,3% of all judges are of the opinion that the Judiciary should have a monopoly on judicial services, and 78,3% agree that all forms of conflict resolution – including mediation and arbitration – should be controlled by the Judiciary. This corporatist culture keeps the judicial system overloaded and incapable of attending to society's judicial needs in a rapid manner.

For this reason, experts warn that any attempt to increase judicial efficiency must take into account not only technical measures, but also cultural ones. In order to be successful, proponents of reforms must have a deep knowledge of the legal culture being discussed. This does not mean that economic theory has nothing to contribute to this debate. However, it seems that incentives have not been adequately established. First, given that courts are overloaded, and given the possibility of multiple appeals – whereby the case will be analyzed by many different judges in different phases of the process – judges have no incentive and no means to perform a complete and careful analysis of the case. On the other hand, lower-ranking staff members have an even harder time seeing the meaning in their daily work. The reason is limited human capital, but also a lack of managerial leaders, who should be the ones offering motivation and creating incentives in the workplace. One of the main results from the survey of the Ministry of Justice (2007) was that the most productive judicial back offices were those in which lower-rank staff members considered

themselves "motivated" in the workplace, and more satisfied with the organizational leadership. If "culture" obstructs efficiency and productivity, it is necessary to create adequate incentives to change culture, both for judges and for lower-rank employees. In this manner, one can consider the "cultural" problem as another facet of a larger management problem, (specifically, a problem in management of personnel).

In the following sections, we will employ a quantitative method to analyse Brazilian judicial data. We will objectively measure efficiency of the 27 State Courts in the country. We will then perform a qualitative analysis of the results, and check to what extent the above elements can be considered real determinants of the level of efficiency in each court.

4. 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 the opposite is true for DEA models, which are based on linear programming optimization calculus.

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, since it 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 (DMU's). 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 DMU's and these are based on an analysis of the inputs employed and the outputs produced by each unit.

Some important assumptions about T should be remembered:

(1) T, Y and X are convex sets: if (x, y), (x', y') ∈ T, α ∈ [0, 1] ⇒ α (x, y) + (1 - α)(x', y') ∈ 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 ≠ 0. Also, if x ≥ 0 => y ≥ 0.

(3) It is possible to freely dispose outputs and inputs: if (x, y) ∈ T, x' ≥ x => (x', y) ∈ T; and if (x, y) ∈ T, y' ≤ y => (x, y') ∈ T. It is also possible, under the weak version, that x' = αx, and/or y' = yα^{-1} for α ≥ 1.

(4) It is possible to proportionally resize the scale of any productive process in T: if (x, y) ∈ T => α(x, y) ∈ T, for any α ≥ 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:

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

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 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 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. First, there is little confidence that we can accurately model the production function in some sectors, such as 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 when studying 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 which attempts to measure court efficiency employ DEA or Free Disposal Hull (FDH), a more sophisticated version of DEA[5].

The Output Oriented, Constant Returns to Scale CCR Model

The adequate choice of a DEA model is of crucial importance and has significant impacts over the results that one might achieve. 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[6].

The DEA model employed here is the one originally developed by Charnes, Cooper and Rhodes, CCR (1978), which assumes constant returns to scale. In fact, there is no agreement in the (rather short) literature about the "true" returns to scale of judicial courts. Among those who assume variant returns to scale, there is also disagreement whether it is increasing or decreasing, for

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5   The result of this survey is included in the appendix.

6   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.

example, Beenstock & Haitovsky (2004) *vs.* Sousa & Schwengber (2005). Kittelsen & Førsund (1992) found out that differences in scale may exist when one compares different types of court, for instances, city courts as contrasted to rural ones, and diversified as contrasted to specialized ones. Their results show that minimum staff courts, which are more diversified and more predominantly located in rural areas, are those driving the production frontier to increasing returns to scale. Since this paper compares State Courts to State Courts, we will not be faced with problems of heterogeneity across them. To further support our assumption, we find that Lewin et al (1982) and Schneider (2005) also assume constant returns to scale for American Criminal Courts and German Labor Court, respectively. And last but not least, in a paper about Spanish courts, Pedraja-Chaparro and Salinas-Jimenez (1996) regress efficiency scores on the number of judges and on the size of total staff. Neither was significant, which induced them to confidently assume there were constant returns to scale in Spanish courts.

DEA employed here is, furthermore, output oriented. In other words, it analyses by how much a court can increase the level of output, while maintaining a constant level of inputs. The alternative is to run an *input oriented DEA*, which in turn analyses how much input a court could save, while maintaining a constant level of output. Choosing which of these to use is a matter of evaluating the power that managers actually have over each number. The literature, again, presents no consensus about which one better applies to courts. However, as we discussed in the "Overview and Diagnosis" section above, the particular characteristics and structure of the Brazilian Judiciary suggest that people who run courts have little leverage on the level of inputs, since these are defined by law (from the Congress). Thus, it seems that court managers have more potential impact on the level of *outputs* produced.

Having this in mind, the linear programming problem (2) can be written as:

18

$$\max_{\theta,\lambda,s+,s-} z_0 = \theta + \varepsilon \vec{1} s^+ + \varepsilon \vec{1} s^-$$

$$st \quad \theta Y_0 - Y\lambda + s^+ = 0$$

$$X\lambda + s^- = X_0 \tag{3}$$

$$\lambda, s^+, s^- \geq 0$$

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, which also lie on the frontier. Since we are employing the output-oriented model, the maximum increase in output may be achieved by means of multiplying the variable θ 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. λ is a (1 x N) vector of weights (N being the number of observed DMUs) that is empirically calculated by observing inputs and outputs of each DMU in the sample. Finally, ε is a non-Archimedean constant.

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

Data for DEA analysis come from annual reports organized and published 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. 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 available computers, new filings, backlog, appeals, and adjudications. Unfortunately, as of the end of December 2008, when the first draft of this paper was concluded, only the reports from years 2003 to 2006 were published by the CNJ. Some reliability issues convinced us to only use data of the most recent year, 2006. We will come back to this discussion later on.

Two outputs were used: the number of adjudications in 1st and 2nd 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 2nd degree court in the State of Pernambuco adjudicated 10,413 cases in 2006. There, 18,300 new cases were filed in the same year, and 48,312 cases were pending on December 31, 2005. Therefore, the ratio of adjudications controlled by workload was 0.1563. In order to avoid inaccuracy of results due to the small numbers derived from this ratio, all weighted outputs were multiplied by 100. Thus, for DEA calculation, Pernambuco's output was entered as 15.63. Controlling output by workload is crucial, given the high disparities of judicial movement across different states.

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.

Three inputs were used, and these are straightforward: number of judges and number of other staff per population over 100,000, and number of available computers per number of users[7].

5. Results and Discussions

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

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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 1: Descriptive Statistics - Outputs

	Adjucations 2nd degree	Workload 2nd degree	Weighted output 2nd degee	Adjucations 1st degree	Workload 1st degree	Weighted output 1st degee
Mean	44613	95283	50.08	360351	1482611	32.24
Maximum	391907	1050679	89.88	2986589	16559603	136.52
Minimum	1017	1699	6.22	11278	33055	2.05
Median	10413	23360	50.24	106365	503004	21.15

There is clearly a great heterogeneity across 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, has weighted output equal or higher than 100 (in 1st degree courts), which means that it might be clearing its backlogs – or, close to doing so.

Table 2: Descriptive Statistics - Inputs

	Judges per (pop/100K)	Staff per (pop/100K)	Computer per internal user
Mean	6.95	114.19	0.79
Maximum	12.27	294.76	1.26
Minimum	4.10	19.15	0.46
Median	6.79	112.11	0.76

Because personnel hiring and material acquisitions are subject to higher-level approvals, there is little flexibility in decisions about resource allocations in Brazilian courts. Yet, there seems to be less variability than non-controlled variables, such as outputs. Recently, CNJ has launched national campaigns in an effort 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 2006:

Table 3: Efficiency Measures – State Courts 2006

DMU	Efficiency Score
Rio de Janeiro	1.000
Goiás	1.000
Amapá	1.000
Alagoas	1.000
Acre	1.000
Rio Grande do Sul	0.866
Rio Grande do Norte	0.812
Sergipe	0.733
Maranhão	0.707
Rondônia	0.703
Piauí	0.666
Mato Grosso do Sul	0.658
Mato Grosso	0.645
Paraná	0.641
Pará	0.623
Minas Gerais	0.576
Amazonas	0.549
Paraíba	0.511
Distrito Federal	0.469
São Paulo	0.399
Roraima	0.386
Espírito Santos	0.369
Santa Catarina	0.334
Tocantins	0.326
Bahia	0.310
Pernambuco	0.214
Ceará	0.115
Mean	**0.616**

The average efficiency in Brazilian State Courts is 0.616; however, if one discards the perfectly efficient units, average efficiency falls to 0.528. The numbers above show that Courts from the States of Rio de Janeiro, Goiás, Amapá, Alagoas and Acre are on the production frontier, i.e., are relatively the most efficient units. All other States could improve the level of their output by

employing the same amount of inputs, i.e., it is possible for all other units to be perfectly efficient (in comparative terms) without changing the level of inputs already employed.

It is surprising the great disparity in the results even for states belonging to the same geographical region. In the richest regions of the country (Southeast and South) one finds very good results, such as those in Rio de Janeiro and Rio Grande do Sul, but also very poor results, such as those in Espírito Santo and Santa Catarina. São Paulo, by far the most active court in the country, has a disappointing but unsurprisingly low level of efficiency, mainly due to the extremely high level of filings and backlog found in *paulista* courts. There are other noteworthy results. Ceará and Rio Grande do Norte are two neighboring states in the poor Northeast region. Their physical proximity did not result in similar performance, though. While the latter got an efficiency score of 0.812 – among the highest in the country, the former got 0.115 – the lowest score of all, and almost a factor of ten less than the top performers.

Peer group

The next table shows a test for the efficiency measures just discussed. 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 above 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 = 22)
Rio de Janeiro	20
Alagoas	19
Goiás	12
Acre	7
Amapá	7

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 other units. In this case, we might suspect that the efficiency result is not very robust. With this in mind, we can say very confidently that Rio de Janeiro, Alagoas and Goiás are efficient units among Brazilian State Courts. The same is not as true for Acre and Amapá.

Next table presents valuable information for potential policy recommendations. It shows, for each DMU, the empirically observed level of outputs, as well as the level they should be, if the unit were an efficient one. In other words, the table offers the *projected points lying on the production frontier, for each of the observed DMUs.* By definition, efficient points are already on the frontier and, therefore, constitute their own projection points. As the table shows us, efficient units have target output values equal to actually observed output values.

Table 5: Outputs – Observed vs. Targets

DMU	Observed output 2nd degee (weighted)	Target output 2nd degee (weighted)	Observed output 1st degee (weighted)	Target output 1st degee (weighted)	Efficiency Score
Rio de Janeiro	72.16	72.16	136.52	136.52	1.000
Goiás	81.22	81.22	20.60	20.60	1.000
Amapá	89.88	89.88	34.12	34.12	1.000
Alagoas	86.40	86.40	7.67	7.67	1.000
Acre	72.60	72.60	50.35	50.35	1.000
Rio Grande do Sul	75.60	87.29	29.94	34.57	0.866
Rio Grande do Norte	70.61	87.01	18.67	23.01	0.812
Sergipe	66.84	91.23	42.09	57.45	0.733
Maranhão	54.81	77.49	23.64	33.42	0.707
Rondônia	50.24	78.86	98.23	139.81	0.703
Piauí	31.99	48.01	20.95	31.44	0.666
Mato Grosso do Sul	51.22	77.81	32.29	49.06	0.658
Mato Grosso	56.98	88.32	21.15	40.32	0.645
Paraná	40.37	63.00	3.96	15.98	0.641
Pará	44.20	70.91	10.26	16.46	0.623
Minas Gerais	48.88	84.85	24.11	41.85	0.576
Amazonas	35.86	65.29	12.36	22.50	0.549
Paraíba	51.14	100.02	40.10	78.43	0.511
Distrito Federal	58.75	125.20	101.16	215.57	0.469
São Paulo	37.30	93.60	18.04	45.27	0.399
Roraima	30.55	79.17	30.93	80.16	0.386
Espírito Santos	38.73	105.03	27.64	74.95	0.369
Santa Catarina	39.01	116.78	17.20	51.49	0.334
Tocantins	23.86	73.20	21.01	64.45	0.326
Bahia	21.03	67.82	14.88	47.99	0.310
Pernambuco	15.63	72.93	10.58	49.37	0.214
Ceará	6.22	54.27	2.05	17.89	0.115

Again, recalling from the theoretical discussion, the results above show that it is possible to improve output levels without altering 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.

Reliability of data, Gap Filling Procedures 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 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 are several blanks, making them useless for a temporal panel. This is the main reason why we decided not to use data related to years 2003 to 2005. Yet, even the numbers of 2006 are not 100% reliable. Two State Courts presented particularly serious gaps: Paraná and Ceará. The former did not present the number of 1st degree courts adjudications, and the latter did not have the same number for 2nd degree courts. The failure to satisfactorily provide these numbers, even when legally mandated, is, by itself, an evidence of managerial and organizational deficiencies. Trying not to discard these observations from the analysis, we decided to fill these two gaps in the most conservative fashion: by replacing the missing values with those observed in the previous year. Surprisingly, for Ceará, the number was *also* missing in the 2005 report! For these reasons, the number of Paraná's adjudications in 1st degree courts is, in fact, relative to the year of 2005. For Ceará, the number of adjudications in 2nd degree courts is from 2004. How much do these replacements impact on the reliability of the results? We may have a reasonable guess. One month after the first draft of this paper was concluded, CNJ made the report of year 2007 publicly available. We did a second exercise, now in a "liberal" manner, by replacing the two missing data with the corresponding found in the new report[8]. Ceará still showed a poor performance, but its score increased from 0.115 to 0.326. Paraná, though, increased its efficiency score from 0.641 to a perfectly efficient score of 1.000. In other words, if the number of adjudications in 1st degree courts during the year of 2006 were the one observed in 2005, it would be 64% efficient; yet, if it were the one observed in 2007, the court would be perfectly efficient. Two possible things may be happening

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[8] We define "liberal" and "conservative" based on the assumption that adjudications tend to increase throughout the time, as it is empirically observed overall in Brazilian courts.

here: either the data for one (or both) of the years is incorrect, or the court is going through a very fast improvement in efficiency (which is also possible to occur). Unfortunately, if we start making analysis and comparisons throughout the time, many more similar cases will become evident. This exercise is, unfortunately, beyond the scope of this paper, and we will let it for future works.

The problems we just described create worrisome implications for policies: no confident recommendations can be derived, because nobody knows what the real situation is. CNJ itself is also concerned about the reliability of data. For this reason, it launched a big campaign in 2006, in which officials of the statistics departments of each State Court were sent to the Federal Capital for some statistical training. With this effort, the Council expects to have some minimum degree of uniformity and comparability across data coming from the 27 states and throughout the time. Hopefully, the learning curve will become evident very soon, and we will be able to get data of better and better quality.

6. Preliminary Conclusions

Given the above results, what might one conclude? First, the lack of material resources cannot be blamed as the main reason for low levels of efficiency in Brazilian courts. DEA shows that at least 22 State Courts could further improve their level of efficiency, even if inputs – i.e., human and material resources – were kept constant. The method also allows us to analyze the target levels of inputs and outputs for inefficient units.

Second, as discussed in the "Diagnosis" part of this article, one might suspect that the presence of skillful managerial leaders 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, Goiás and Alagoas do have some common features, namely, that they are all committed to adopting internal policies and setting specific goals to increase efficiency and improving organizational climate, including staff motivation and morale. These are very novel initiatives, especially if one considers the perverse Brazilian public sector tradition (as discussed above). In fact, the World Bank presented in a 2004 report concerning "best practices" in Brazil, and included the State Court

of Rio de Janeiro as an exemplary case. The second best practices case highlighted by the same report was Rio Grande do Sul, which according to our results also had a very good performance.

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". These are courts that lack transparency in showing how resources are being internally allocated, and how much productive judges and/or local courts are. Another common characteristics among low-performers are inexistence of objectively and publicly announced goals (such as, "x%" improvement in court delay in "y" years), and inexistence of personnel management plans. On the other hand, top performers seem to be more concerned with staff career development and working motivation, making the improvement of these points one of the priorities in their agenda.

For the final version of this paper, we intend to perform a comprehensive analysis of each of the State Courts, at least, each extreme case (i.e. those courts with very high and very low performance). Since procedural law is the same across the whole country and states have little flexibility in adopting and interpreting law, it seems very reasonable that the important differences from state to state are the internal organization and management skills in each Court.

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APPENDIX: ARTICLES MEASURING COURTS EFFICIENCY (BRIEF COMPILATION)

Author, Paper title	Methodology	Country of Analysis
Beenstock, M. & Haitovsky, Y. (2004), "Does the appointment of judges increase the output of the judiciary?", *International Review of Law and Economics,* 24: 351-369.	Econometric Regression	Israel
Blank, J., van der Ende, M. ; van Hulst, B. & Jagtenberg, R. (2004); "Bench Marking in an International Perspective – An International Comparison of the Mechanism and Performance of Judiciary Systems", *Commissioned by the Netherlands Council for the Judiciary, Rotterdam.*	Measures, graphical analysis of correlations	11 European countries
Dalton, T. & Singer, J.M. (2008); "A Matter of Size: An Analysis of Court Efficiency Using Hierarchical Linear Modeling".	Hierachical Linear Modeling	District Courts, USA
Djankov, S.; La Porta, R.; Lopez de Silanes, F. & Schleifer, A. (2002), "Court: the Lexis Mundi Project", *NBER Working Paper Series, Working Paper 8890.*	Index construction, Econometric Regression	109 countries
Hagstedt, K. & Proos, J. (2008); "Has the recent restructuring of the Swedish district courts improved efficiency?*A DEA analysis*"; Uppsala University, Department of Economics; Spring.	DEA	Sweden
Kittelsen and Forsund (1992) "Efficiency Analysis of Norwegian District Courts", *The Journal of Productivity Analysis,* 3: 277-306.	DEA	Norway
Lewin, A.L., Morey, R.C., and Cook, T.C. (1982), "Evaluating the Administrative Efficiency of Courts", *Omega,* 10: 401-411.	DEA	North Carolina, USA
Ostrom, B. & Hanson, R. (2000); "Efficiency, Timeliness, and Quality: A New Perspective From Nine State Criminal Trial Courts", *Research in Brief,* June, National Institute of Justice, U.S. Department of Justice.	General Frontier Analysis	Criminal Courts, USA
Pedraja-Chaparro & Salinas-Jiménez (1996), "An assessment of the efficiency of Spanish Courts using DEA", *Applied Economics,* 28: 1391-1401.	DEA	Spain
Schneider, M. (2005); "Judicial Career Incentives and Court Performance: an Empirical Study of the German Labour Courts of Appeal", *European Journal of Law and Economics,* 20: 127-144.	DEA	Labor Courts, Germany
Souza, Maria da Conceição Sampaio e Schwengber, Silvane Battaglin (2005), "Efficiency Estimates for Judicial Services in Brazil: Nonparametric FDH and the Expected Ordem-M Efficiency Scores for Rio Grande do Sul Courts", *Encontro da ANPEC 2005*.	FDH (Free Disposal Hull)	Rio Grande do Sul, Brazil
Tulkens, H. (1993), "On FDH Efficiency Analysis: Some Methodological Issues and Applications to Retail Banking, Courts, and Urban Transit", *The Journal of Productivity Analysis,* 4: 183-210.	FDH (Free Disposal Hull)	Belgium