Volume **3** (1) 2021 https://doi.org/10.5204/lthj.1966

The Quantification of Law: Counting, Predicting, and Valuating

Alice Granada Ribeiro
University of São Paulo, Brazil

Abstract

Legal reasoning is increasingly quantified. Developers in the market and public institutions in the legal system are making use of massive databases of court opinions and other legal communications to craft algorithms to assess the effectiveness of legal arguments or predict court judgments; tasks that were once seen as the exclusive province of seasoned lawyers' obscure knowledge. New legal technologies promise to search heaps of documents for useful evidence, and to analyze dozens of factors to quantify a lawsuit's odds of success. Legal quantification initiatives depend on the availability of reliable data about the past behavior of courts that institutional actors have attempted to control. The development of initiatives in legal quantification is visible as public bodies craft their own tools for internal use and access by the public, and private companies create new ways to valorize the "raw data" provided by courts and lawyers by generating information useful to the strategies of legal professionals, as well as to the investors that re-valorize legal activity by securitizing legal risk through litigation funding.

***Keywords**:* Quantification; legal prediction; legal technology; litigation finance; third-party funding.

Introduction: The Many Goals of the Quantification of Law[1]

On the morning of August 30, 2019, I attended an event titled *Technology and Access to Judiciary Branch Data*,[2] held at the São Paulo Lawyer's Association.[3] One at a time, five speakers addressed an audience of a little under 100 people, including lawyers, judges, law students, scholars, as well as entrepreneurs and developers from prominent Brazilian "lawtechs" — another popular buzzword, like "legaltech," that is used to refer to software companies creating technology to automate legal work and quantify the behavior of various parties in the legal system. The first four speakers were university professors and lawyers (one also an economist). The fifth and main guest was a representative from the National Council of Justice (CNJ),[4] a public body that oversees the judiciary branch and produces statistical data about its operations, and is responsible for ensuring a minimum level of standardization in the way each of the over 18,000 Brazilian state and federal judges[5] use technology in their work. On that occasion, however, the focus was instead on technology's use *of* judges. Under discussion was how the Brazilian judiciary might respond to increasing public demand for access to its own data. In recent decades, courts countrywide have adopted electronic legal proceedings as standard, releasing an enormous quantity of opinions in digital formats. Now, you no longer need to skim through hundreds of pages of case law in paper-printed compendia, as a computer can do this for you – or

[1] I would like to thank the three anonymous reviewers from the Law, Technology and Humans journal, who offered kind and constructive commentary on this paper, as well as University of São Paulo professors André V. Nahoum and Flávio R. Batista.
[2] Lawgorithm, "Tecnologia e Acesso a Dados do Poder Judiciário."
[3] *Associação de Advogados de São Paulo* (AASP), a private class entity founded in 1943, not to be confused with the Brazilian Bar Association (aka Order of Attorneys of Brazil, or *Ordem dos Advogados do Brasil* [OAB]).
[4] *Conselho Nacional de Justiça* is an administrative entity belonging to the Brazilian Judiciary Branch that is headed by the President of the Brazilian Supreme Federal Court (STF). Established in 2004, it has among its tasks the production of statistics concerning the Brazilian justice system.
[5] An amount roughly half the total of the 31,770 state and federal judges in the United States (US). See Institute for the Advancement of the American Legal System, "FAQs."

something close to it.[6] This transition from paper to bits has cleared the path for a wave of quantitative empirical research on the behavior of judges[7] and the development of digital services offering practitioners statistics useful to their work.[8]

One of the speakers at the event referred to his work at the Brazilian Jurimetrics Association.[9] Using data from over 157,000 decisions from the São Paulo Court of Appeals,[10] he showed that different criminal law chambers[11] within the Court varied wildly in their appeal conviction rates, with averages ranging from 16 to 81%, which strongly suggested to him the existence of bias in the Court's decisions.[12] J. Maranhão, a lawyer and scholar in the field of artificial intelligence (AI) and law, discussed how new technological tools allow one to evaluate the "performance" and "efficiency"" of the litigation system, hinting at a "transformation" from a case-by-case model to a massified, large-scale model of legal practice. That technology is changing the legal market, he said, is clear from the introduction of a new lexicon among lawyers, who now talk of "case portfolios" as stockbrokers speak of "investment portfolios." From the audience, a professor of computer science raised some quite poignant questions. Notably, given the creation of a "tech law" made possible by jurimetrics and the digitization of legal proceedings, he asked, "Is 'non-tech' law humane? Will technology further dehumanize it? Could technology help humanize it?"

Finally, the justice from Brasilia discussed concerns raised by court administrators countrywide, who in addition to privacy worries,[13] had consistently brought up one particular issue: the recent increase in automated, mass-scale access to data from legal proceedings that is routinely performed by researchers and programmers, which court administrators claimed, often took a toll on the internet server infrastructure of courts. Akin to what happens in denial-of-service attacks, too many requests often led servers to shut down, blocking all users from accessing court services. Unable to cope with this new demand, the judiciary suffered from what the judge saw as a "tragedy of the commons." Accordingly, the judge noted that one solution under consideration by courts was to charge fees for requests to access case law, in the spirit of the PACER[14] system used in the United States (US). Concurring, another speaker argued that fees could work as a compromise, ensuring a steady income source to help courts counterbalance the "infrastructure costs" that they had to bear and to avoid said "digital tragedy of the commons," while also permitting companies to access data the demand for which has only risen. One of the lawyers raised preoccupations regarding market competition, noting that closing massive access to data at this point would affect the emergence of new lawtechs, who might be unable to cover hitherto inexistent costs of entry in an incipient market — an argument that represents a variation of the famous theme played by Google, Facebook, and other tech giants. He further asserted that researchers and the general public might also be unjustly harmed by being forced to pay fees for the exercise of non-profit activities to gain access to information that is public by legal mandate.

The short report above exemplifies the state of several debates currently ongoing in the Bar, the Bench, academia, the market, and the civil societies of various countries regarding the development of services and tools for the automation and quantification of law. The mass-scale quantitative analyses of legal decisions carried out by computer algorithms today are only possible because of the conversion from paper-based to electronic legal proceedings, which has been under implementation in Brazil

[6] For a historical discussion of the transition from paper to digital case law research and the role of large publishing houses in categorizing US law, see Hanson, "From Key Numbers to Keywords."

[7] Recent examples of empirical quantitative analyses of Brazilian courts include Nunes, "Reformas de Decisão nas Câmaras de Direito Criminal em São Paulo." See also Yeung, "Nem Robin Hood, nem King John," and Yeung, "Decifrando o Fórum João Mendes."

[8] In Brazil, see for example, "Jurimetria Neural," or "Terranova." An industry association was recently founded, see AB2L, "Associação Brasileira de Lawtechs e Legaltechs." In the US, see the review by Remus, "Can Robots Be Lawyers?" 515.

[9] ABJ, "Associação Brasileira de Jurimetria."

[10] *Tribunal de Justiça de São Paulo* (TJ-SP). The São Paulo State Court website somewhat proudly describes the Court as the "largest court in the world" in terms of both the number of judges (2,600) and the number of active proceedings. See "Tribunal de Justiça de São Paulo."

[11] In the Brazilian legal system, a "chamber" (*câmara*) is a subsection of a Court (*Tribunal*) tasked with deciding certain classes of cases, specializing in criminal law, civil law, public law, and so on.

[12] Nunes, "Reformas de Decisão nas Câmaras de Direito Criminal em São Paulo."

[13] In Brazil, legal proceedings are public by default. Secret proceedings are reserved for exceptional situations, such as for certain family or criminal law proceedings. Before computers, this theoretically meant that any individual had a legal right to request access to the physical paperwork of any public proceeding at a court of law. Today, this can be done remotely online, and any (but only a) registered attorney can gain access to the files of any proceeding. Thus, while the publicity of legal proceedings has always implied privacy concerns, the technologies discussed in this paper facilitate access to legal documents at a scale, speed, and precision previously impossible, raising said concerns to a new level. Recent events, such as scandals involving the use of personal data for political micro-advertising, and the surge of data protection laws in Europe and Brazil, reflect the public's increased preoccupation with the private use of "public" information. Such concerns are very real; however, one should be wary of taking references to privacy concerns at face value, especially when studying the behavior of public and private institutions. Institutional or corporate public relations discourse, much like law, is the art of coding otherwise "egotistical" or non-moral economic or pragmatic interests as publicly acceptable reasoning.

[14] "Public Access to Court Electronic Records" is the US federal court online electronic database of court documents, through which practitioners can search for relevant case law. Users are billed US$ 0.10 per search query or document page viewed, and fees are waived if the user does not exceed a lower bound of US$ 30 in a quarter. For further details, see PACER: Federal Court Records, "Pricing: How PACER Fees Work."

since 2004. This has made the operations of legal systems, much like those in finance or digital advertising, subject to analysis, prediction, and (attempts at) control by means of descriptive statistics, complex mathematical models, or machine-learning–based AI, as information once inextricable from its physical media is quantified into data suitable for processing by computers. The source of the "data" in question includes an ever-increasing number of procedural documents, such as court decisions, parties' submissions and evidence, as well as metadata provided by courts' electronic filing systems on meta-procedural information, such as dates, cases' "fields" of law (e.g., civil law, criminal or tax law), and document authorship.[15]

Using this and all other information available on the behavior of parties and judges, attorneys try to predict the future and strategize, corporations standardize their interactions with the law to the point of treating proceedings in bulk as risks to be pooled efficiently, "lawyers-turned-entrepreneurs" aggregate legal risk into financial assets,[16] and researchers and activists decry the "biases" of a legal system that comprises too many judges and too many lawsuits for any one team of human scholars to analyze manually.[17] Faced with this demand for legal numbers, technologists and investors in Brazil and worldwide have developed a market to provide quantified pictures of law, harnessing technologies and concepts from fields such as statistics and probability, computer science, linguistics,[18] econometrics,[19] and even formal logic.[20]

Recent developments in the quantitative analysis of law have been heralded by entrepreneurs[21] and scholars[22] as capable of analyzing documents, writing statements, helping lawyers make strategic decisions, and even improving access to justice.[23] Others have wondered whether the use of assistive AI may constitute an ethical obligation for lawyers.[24] The last decade has seen the emergence of services offering tools[25] that aim to answer questions of law posed in natural language, or provide relevant statistics for attorneys on the behavior patterns of judges and opposing counsel.

This process is hardly unified or coherent, and the preliminary results presented herein spring from an ongoing research project.[26] My observations look to three main axes: (1) The economy of legal quantification: who develops legal numbers, for whom, and with what interests and goals in mind? (2) The quantification technologies as developed by software companies or public agencies' information technology (IT) departments[27] and used by practitioners; and (3) The institutional and professional disputes that, solidifying as regulations on professional conduct or access to legal data, may shape the possibilities of these technologies and their effects on the market for legal services. The institutions involved include private companies, law firms, research institutions, the judiciary, the bar, and other legal-professional associations, each of which has different capacities to constrain and nudge the behaviors and actions of its members and other actors.

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[15] In the age of paper, such metadata was often fed into court records manually, by clerks and interns who skimmed over the contents of suits filed and categorized them accordingly for distribution among specialized chambers. This was largely still the case until a few years ago. Today, Brazilian courts have taken to automating this data annotation activity (see footnote 27 below).

[16] See Section 3 below.

[17] Nunes and Trecenti's research, for example, would have been unfeasible if biological eyes had to catalogue each of the thousands of opinions their algorithms analyzed. A back-of-the-envelope calculation suggests as much assuming it takes three minutes to read a page, and that each decision has around five pages (a very low estimate), it would have taken one person a little under 5,000 workdays just to read through all 157,000 decisions.

[18] Ashley, Artificial Intelligence and Legal Analytics.

[19] Yeung, "Nem Robin Hood, nem King John."

[20] Robaldo, "Reified Input/Output Logic."

[21] See Rayo, "AI in Law and Legal Practice."

[22] Katz, "Quantitative Legal Prediction."

[23] Cf. e.g. Oliveira, "Access to Justice involves the Automation of Legal Services." See also, Lawlor, "What Computers Can Do;" Katz, "Quantitative Legal Prediction;" and Stevenson, "Bargaining in the Shadow of Big Data."

[24] See, most notably, Arruda, "An Ethical Obligation to Use Artificial Intelligence." Incidentally, Arruda is also the co-founder of ROSS Intelligence, one of the most prominent companies offering "legal analytics" services in the US.

[25] Another major vendor of legal statistics in the US is Lex Machina. See Lex Machina, "Legal Analytics by Lex Machina."

[26] This paper is a product of ongoing research in the context of my Master of Science degree at the University of São Paulo School of Law, provisionally titled "What's Left of Law? Quantifying and Automating Litigation Practice." As part of my research, I study the changes brought about by automation on the work practice of Brazilian Federal Government attorneys.

[27] Attorneys from the Federal Government Attorney General's Office (*Advocacia Gerão da União*) created "Sapiens," a web-based platform that "supports the creation of legal content" by using text similarity algorithms to recommend ready-made templates and arguments public lawyers might wish to employ, and even automatically adapting said templates to the specifics of each case (Advocacia-Geral da União, "AGU Aposta em Inteligência Artificial e Automação de Processos para Agilizar Trabalhos Jurídicos.") Brazilian Supreme Court's "Victor" AI sorts through proceedings to identify "repetitive" appeals (Supremo Tribunal Federal, "Inteligência Artificial Vai Agilizar a Tramitação de Processos No STF."). The Federal Prosecutor's Office (Procuradoria-Geral da República, "Ministério Público Federal Lança Plataforma de Inteligência Artificial e Robô Para Classificar Pareceres Em HC") and state courts (Tribunal de Justiça de Roraima, "Inteligência Artificial do TJRO") have announced similar tools. Public agencies in Brazil apparently tend to rely first on internal solutions, developed by public servants seeking to automate rote tasks, rather than buying pre-made software; however, if the adoption of such in-house projects grow in scale, it is not uncommon for their development to be outsourced to private developers via public biddings.

In the next section, I evaluate how the different ways in which actors approach law guide the various proposals for its quantification. In Section 2, I examine how the politics of digital access to legal proceedings, the raw material of quantification initiatives, have been a focal point of institutional dispute in various legal systems worldwide, shaping markets for legal information. Finally, I consider how these technologies, which provide novel ways of processing legal information, are used to help evaluate legal risk and create "assets" from legal uncertainty, leading to new ways of creating value atop legal disputes or valorizing law.[28]

1. From Jurimetrics to Prediction: How do Judges Decide?

> In short, members of the Bar will be well advised to stay very far away from computers if they want to remain — or become — lawyers rather than simply attorneys at law. Computers are fine for inertial guidance problems, but the law is neither a missile nor an atomic submarine.[29]

> Research of this type and the use of start-ups is anything but Law. They are anything but Legal Theory. Therefore, Law is no more. There are only results, consequences, teleologisms. Perhaps we are in urgent need of a new start, of rehab clinics for those addicted to consequentialist theories, realist theories, and the like.[30]

What are the odds of success in a lawsuit? This is a central question throughout law practice, and the work of litigation counsel always involves attempts at predicting how courts will decide cases. Indeed, legal pragmatist Oliver Wendell Holmes once claimed that law is nothing *but* the "prophesies of what the courts will do in fact."[31] This question immediately leads lawyers to ask others: How did other judges decide similar issues in the past? How does the judge hearing *my case* usually decide similar cases? What is the track record of the opposing counsel? What is the most effective argument I could make? Answers to these questions traditionally rely on the qualitative, background knowledge of lawyers and their assistants regarding not only whether statutory or case law in the abstract "apply" to the case at hand, but also "hunches about the leanings of a particular judge or jury, the resolve of the opposing party or lawyer, or the salesmanship of a witness;"[32] that is, intuitions about other people's behavior that are usually based on personal experiences or discussions with colleagues, rather than knowledge founded upon quantified observations. This latter approach to legal knowledge has been proposed time and again in the literature. In 1949, inspired by the rise of disciplines such as econometrics and biometrics, Lee Loevinger coined the term *jurimetrics*, which was defined plainly as "the scientific investigation of legal problems."[33] *Scientific*, to Loevinger as many others since, is unreflectively taken as synonymous with *quantitative*: vendors and researchers today refer variously to "legal analytics"[34] or "quantitative legal prediction"[35] as an inescapable future for legal practice, among other reasons, because the shift to numbers is seen as shortening the distance between law and sciences, such as biology or psychology, where quantitative methodologies have taken hold in the past. Such hype is not new and has been the target of criticism time and again. Below, I consider two examples, and contrast legal and medical practices as to the pursuit of truth to discuss why, despite these disciplines' different orientations, many attorneys and corporations alike are eager to adopt number-based predictions to understand litigation.

In 1962, Frederick Wiener wrote that doctors' increasing reliance on the laboratory had placed "clinical diagnosis in real danger of becoming a lost art, as indeed an increasing number of patients — and their relatives — have unhappily learned."[36] Wiener's reference to medical practice was only analogical; as a lawyer, he was reacting to presentations at the 1962 Annual Meeting of the American Bar Association in San Francisco, at which it was suggested that (then room-sized) electronic computers might be able to predict decisions of the Supreme Court of the US.[37] For Wiener, "the notion that a computer can predict the course of judicial decision (…) does violence to the very nature of law, and is moreover certain to blunt the professional techniques of any lawyer who relies on machines rather than on his own powers of reasoning and advocacy."[38] Weiner argued that computer

[28] The term is borrowed from Vatin, "Valuation as Evaluating and Valorizing." Following a strand in the crossroads of economic and social theory sometimes dubbed *conventionalist economics*, Vatin argues that the work involved in *evaluating* economic assets (including standardizing them and crafting conventions necessary for trade) has a circular relationship to the work of *valorizing* them or increasing their value in the market.
[29] Wiener, "Decision Prediction by Computers," 1028.
[30] Streck, "Lawtechs, Startups, Algoritmos."
[31] Holmes Jr., in Molot, "A Market in Litigation Risk," 368.
[32] Stevenson, "Bargaining in the Shadow of Big Data," 1373.
[33] Loevinger, "Jurimetrics," 483.
[34] Carothers, Legal analytics based on party, judge, or law firm.
[35] Katz, "Quantitative Legal Prediction."
[36] Wiener, "Decision Prediction by Computers," 1023.
[37] Wiener refers specifically to the presentation by Lawlor, Kort and Kenison titled "Using Computers to Predict Supreme Court Decisions: The Right-to Counsel Cases." See American Bar Association Electronic Data Retrieval Committee, "EDR Committee to Present Program at 1962 ABA Convention." See also a subsequent paper on the same subject by Lawlor, "What Computers Can Do."
[38] Wiener, "Decision Prediction by Computers," 1024.

calculations could not be trusted because their predictions relied on "questionable assumptions," for example, that courts could be expected to consistently rely on *stare decisis* — given that courts are known to overrule past opinions and only change the law in a few "landmark" decisions, and that "even members of the Court of long tenure whose outlook by and large is predictable still are unpredictable in particular instances,"[39] Wiener believed predictions based on past behavior were bound to fail. His objections saw quantitative analysis as incapable of doing justice to the complexity of a legal practice that appeared dependent on the qualitative experience and intuition of lawyers.

A convergent but fundamentally different response to legal technology was published by professor of legal theory Lenio Streck in a 2019 essay.[40] A harsh critic of the use of statistics as guides for legal decisions, Streck recalls the Danziger study — the widely cited findings of which showed that judges tended to give more favorable rulings after food breaks[41] — writing that "if law depends (or were to depend) on what judges eat, we have failed in everything we have ever written. So long Hart, Dworkin, Gadamer, Ferrajoli…"[42] The quantification enterprises of start-ups and the research on jurimetrics are considered "anything but law," and the result of untenable consequentialist or legal realist assumptions.

At this point, it is relevant to distinguish between the different types of factors that "predict" the way judges decide; that is, between *internal* and *external* factors. The arguments lawyers employ when defending their clients in court provide "internal" reasons that both influence legal decisions by judges *and* help predict them. When assessing the likelihood of a court decision, a lawyer may point to how statute and case law favor a certain legal framing of one set of facts rather than another. In response, another lawyer may argue that a recent jurisprudential trend, in addition to legal principles X and Y, endorses instead an opposing interpretation. Likewise, a sitting judge is supposed to justify their decisions solely on statute, case law, jurisprudence, or (at most) legal theories. Such internal reasons thus have a double nature: they are reasons that judges and other interpreters may find persuasive, and also reasons that judges will explicitly point to when justifying their decisions. In this interpretive sense, internal reasons influence judicial thinking, and *consequently*, they also help practitioners anticipate judicial decisions, insofar as any lawyer can "think like a judge" when assessing the different solutions a case may have. Conversely, *external* factors point to the empirical likelihood of a certain decision. In addition to a beneficial interpretation of the law, an experienced attorney's strategy may also rely on their knowledge of the court's past behavior. They may be acquainted with the results of the Danziger study and prefer to submit appeals after luncheon. Similarly, a judge may bear an "unconscious bias," of the type described in experimental psychology,[43] against a certain class of defendants, disproportionately and predictably handing out harsher sentences to them.

An external factor can nonetheless reveal important truths about internal factors. For example, the fact that a judge gives harsher sentences may indicate not (only) that they are somehow biased, but that that the judge consistently interprets criminal law in a manner distinct from their circuit peers. Moreover, although the practice of attorneys is concerned with both kinds of factors, only internal factors are accepted in legal argumentation. For example, knowledge that a court has interpreted arbitration clauses broadly in the past will be relevant to a lawyer's choice of which case law and arguments they present (or for which forum they "shop"); however, it is only by presenting said arguments as normative, *internal* reasons that a lawyer can make knowledge of this fact relevant *within* law. Past correlations between external factors and certain legal outcomes, regardless of their importance to strategic or policy analyses, can hardly be legitimately raised *as such* in support of legal arguments in court. Legal thinking, it would seem, refuses to jump over the "is/ought" gap unless whatever "is" the case is relevant to whatever the law says "ought" to be. In such circumstances, external factors do not so much *influence* judicial behavior interpretively from the "inside" as help *predict* it from the "outside." This difference emerges from the very way in which the social practice of law is organized. The written rules establish "dogma" that requires those who accept them to code future disagreements or

[39] Wiener, Decision Prediction by Computers," 1024.
[40] Streck, "Lawtechs, Startups, Algoritmos."
[41] Danziger, "Extraneous Factors in Judicial Decisions."
[42] Streck, "Lawtechs, Startups, Algoritmos."
[43] See, for instance, Guthrie, "Inside the Judicial Mind." Researchers submitted questionnaires to a sample of just over 160 federal magistrates in the US, and found, among other things, that judges are often almost as susceptible as lay persons to fall prey to "cognitive biases," such as hindsight bias, anchoring, or framing. The description of such cognitive "deviances" in the psychology literature is usually taken to contradict traditional assumptions regarding human, including judicial and lawyerly, rationality. The research for "biases" in judicial thinking is a way of quantifying legal practice preferred by activists and researchers, in which the distinction herein set out regarding internal and external factors is often brushed aside in favor of a comparison between *actual* legal decision making and supposed *correct* decision making. This comparison may seem straightforward when we contrast the description of human "bounded rationality" with a classic (normative) model of cognition based on rational choice theory; however, as in economics, it is not clear that the crafting of justifications that is the *métier* of judges can be assessed in terms of wrong/right "objectively;" that is, according to criteria independent of the opinions of judges themselves in a specific legal system. After all, "correct" law is what courts say is the law, a positivist tenet embodied in law itself in the form of the hierarchical court system and the legal prohibition on the re-examination of identical issues. On this "closure" of law with respect to truth, see Luhmann, Law as a Social System, 186.

diverging interests as "legally accepted" interests.[44] This greatly limits the universe of possible ways of framing a disagreement. Going to court requires an otherwise emotional, economic, or political dispute being transformed into a legal dispute, with its particular ways of reasoning and framing conflicts, and requires leaving out other possible arguments that might otherwise be acceptable in non-legal argumentation.

The distinction above is akin to the one between external and internal viewpoints of law offered by Hart, who noted that an external observer may be "content merely to record the regularities of observable behaviour"[45] of courts and rule-abiding members of a group. This external observer may be concerned with and able to refer to how those inside a group accept rules; however, she must somehow take the group's internal viewpoint if she is to understand their reasoning as rule-based, including its accompanying distinction between facts and norms and inherently normative modes of communication. Lawyers are constantly shifting between these perspectives in practice.

To illustrate how this distinction plays out in forecasting legal settings, it helps to compare present initiatives in law to the process of quantification in medicine that helped transform medical research into a full-fledged positive science. Both in law today as in medicine previously, the introduction of numbers as "rational" guides for decision making was met with hostility by some practitioners. Thus, the question arises: Could the early resistance to numbers in medicine help explain the contemporary resistance of lawyers to numbers?

In 18th-century France, physician P. C. A. Louis used "percentages of people healed" as a way of comparing the effectiveness of different treatments against typhoid fever,[46] paving the way for modern evidence-based medicine. Despite the apparent rationality of his so-called "numerical method" of research, it was subject to harsh criticisms from colleagues in the profession. One of the founders of experimental medicine, Claude Bernard, accused statistics "of diverting attention from the specific causes of each illness and of leaving, under the cloak of 'probability,' a part to uncertainty and approximation." [47] Medical science to him demanded experimental analyses of the microcausal chains involved in a disease, meaning that "a doctor could not treat patients 'on the average.'"[48] Similarly, for family doctor Risueno d'Amador, "medicine was an art, based on the intuition and instinct of the practitioner manifest during the specific, privileged communication" with the patient leading "to a prescription resulting from the individuality of every case."[49]

Despite such responses, only a few more decades of developments in statistics and probability were needed for Louis's numerical method to prevail as the arbiter of truth among doctors and medical scientists alike. In the end, statistical thinking proved wholly compatible with the practice and research of medicine, and the above criticisms did not develop into "incommensurable" alternatives to quantified medicine.[50] Rather, these objections were linked to how different areas of medical research, with their "specific combinations of cognitive schemes and particular forms of action and insertion into larger networks,"[51] conceived of the ability of statistical methods to provide such fields with useful information. Social hygiene, family medicine, and experimental medicine, grounded in distinct practices and objects, required different ways of conceiving, using, changing, or interacting with reality, and correspondingly different ways of measuring its "causes."

The same applies to the above-mentioned distinction between the way in which internal and external factors influence judicial decisions. Differently positioned actors in the legal system will view different sets of factors as relevant to their analyses. Quantitative legal knowledge thus appears "useful" in very different ways to judges, lawyers, bureaucrats, and researchers. Statistics of past judicial behavior, which correlate external factors with internal decision outcomes, exhibit patterns of use to researchers interested in contrasting the reality of judicial behavior with legal or moral standards, but are at best a curiosity to judges, obliged as they are to found their legitimacy on the law's authority and communicate in the language of internal factors. For the lawyer seeking to predict the behavior of such judges, these same numbers are heralded as invaluable tools. If a judge's eating habits or political stance is a good statistical predictor of their decisions, litigators are happy to use knowledge on these

[44] Luhmann, *Law as a Social System*, 143.
[45] Hart, The Concept of Law, 89.
[46] Desrosières, The Politics of Large Numbers, 83.
[47] Desrosières, The Politics of Large Numbers, 83.
[48] Desrosières, The Politics of Large Numbers, 83.
[49] Desrosières, The Politics of Large Numbers, 83.
[50] Of course, "alternative medicine" may constitute an exception to this statement warranting sociological analysis. For a discussion on the social construction of commensurability and the difficulties inherent in quantifying what seems incommensurable, see Espeland, "Commensuration as a Social Process."
[51] Desrosières, The Politics of Large Numbers, 82.

topics to guide their strategic decision making. Court administrators and public attorneys, in turn, look to aggregate statistics about their practice to construct "performance metrics" of public servants' work.[52]

The end goals of statistics also differ between medicine and law. In medicine, statistics is a tool for convincing a community of experts of the scientific truth of a certain proposition (e.g., that treatment X is more effective than treatment Y). Conversely, in litigation, there is no such truth to be found. Given that courts define what the law says, and that the work of lawyers involves convincing judges of what *lawyers* claim the law says, anyone who discusses "what the law says" or tries to predict "what courts will do" is doomed to oscillate between two conflicting but complementary perspectives regarding the nature of legal reasoning. In court, lawyers must speak as if they believe[53] that "proper" judicial thinking is capable of silencing the influence of whatever individual preferences a particular judge may have regarding the consequences of their decisions, professing that without a "robust theory of decision (…) a judge may decide as he [sic] wish[es]."[54] On the other hand, as lawyering requires attentiveness to external and internal factors, it requires one to set legal formalism aside, if only briefly. And so while Wiener writes that judges are "conscientious men [sic] virtually all of whom work hard to eliminate personal predilections from the task of adjudication,"[55] he also recalls how his knowledge of judges' pride "of their trial experience while at the Bar"[56] was consciously taken as a qualitative predictor of such judges "predilection" for rhetoric strategies that appealed to just such a background. Similar to the quantification of medicine, the introduction of numbers in law thus appears not to be antithetical to the discipline itself. Indeed, some criticisms of the process seem to spring from an inability to grasp the different goals that actors seek to achieve by using legal statistics.

The distinction between internal and external factors may help explain the various reactions to legal statistics; however, it is not mirrored in the mathematical models crafted to predict judges' or lawyers' behavior. In general, computer models employed today simply do not seem to rely on such a distinction, and the choice of features for model building is instead shaped by the availability of data, research interest, and (legal) market demand. Models may explicitly code for internal factors, such as the facts of a case, as well as external factors, such as the judge's identity.[57] Other models rely solely on textual frequency analysis to make predictions, and do not require any information external to court records.[58]

More than half a century has passed since Loevinger argued for a "jurimetrics" based on the "scientific methods" of "astronomy, physics, chemistry, biology, medicine and (…) psychology."[59] Although today the word is employed to refer exclusively to the quantitative study of lawyers and judges, Loevinger had in mind a much broader meaning of law that not only included the actions of courtrooms and law firms but also the enforcement and social effectiveness of legal rules, the study of criminal "aberrations of behavior," and the activity of legislators.[60] Thus Loevinger viewed law as oriented to "social control" broadly put.[61] Contemporary initiatives of quantification in the realm of social control thus defined are more multifaceted, and include developments close to Loevinger's ideal, such as political science's study of law-making activities, but also market initiatives, such as FiscalNote, an American startup that "synthesize[s] myriad sources of data" regarding government activity to make "it easier for lobbyists to zero in on targets and protect their clients' preferred positions."[62] The quantification of legal practice, too, has not been a business carried out strictly in the interests of scientific inquiry. In the next section, I examine how the politics of access to legal data have shaped markets for legal information.

[52] This is a trend I observe in my ongoing dissertation. For a typical analysis discussing a shift to "results-based management" at the Brazilian Federal Public Attorney's Office, see Watanabe, "A Gestão Por Resultados Da Procuradoria-Geral Da União."
[53] They need not, of course, accept its legitimacy, but simply behave as if they accepted its normative or coercive power, as Kelsen's anarchist law professor, who "could describe positive law as a system of valid norms, without having to approve of this law;" Kelsen, Pure Theory of Law, 218, footnote 82.
[54] Streck, "Lawtechs, Startups, Algoritmos."
[55] Wiener, "Decision Prediction by Computers," 1025.
[56] Wiener, "Decision Prediction by Computers," 1025.
[57] See, for example, the section on "Features and Feature Engineering" in Katz, "A General Approach for Predicting the Behavior of the Supreme Court of the United States."
[58] Aletras, "Predicting Judicial Decisions of the European Court of Human Rights."
[59] Loevinger, "Jurimetrics," 472.
[60] Loevinger, "Jurimetrics," 486.
[61] Loevinger, "Jurimetrics," 483.
[62] Zaleski, "Tim Hwang's FiscalNote Is Revolutionizing Washington Lobbying with Big Data."

2. A Market for Legal Numbers

In the past two centuries, science,[63] education, management,[64] journalism,[65] advertising,[66] and a host of other fields of human activity have incorporated numbers and measurement technologies as guides for reasoning, and in doing so, have very often appeared to remove the role of human judgment in decision making altogether.[67] In contrast to this, legal practice has remained largely unchanged throughout its history. Indeed, lawyers are generically preoccupied with numbers; after all, hours must be billed, and damages must be calculated. Still, except for these auxiliary applications, the core of legal practice appears to have remained oblivious to the last two centuries' spread of statistical and probability theory to other spheres of human life. Lawyers are famously and admittedly at odds with statistics about their own practice. One lawyer recalls "replying to a client that he had a 70% chance of success", before promptly admitting that the figure just given "was completely meaningless."[68] Qualitative, heuristic judgment has until recently reigned absolute in the minds of lawyers and judges alike. Why has law "evaded" quantification thus far?

One reason might lay in methodological barriers recently lowered by technology. The literature on "artificial intelligence and legal analytics" has pointed to the existence of a "knowledge representation bottleneck."[69] In short, machines require structured information to operate. As programming teachers enjoy pointing out, computers are "dumb;" their processors can perform little more than the four basic arithmetic operations, a fundamental level into which all "higher-level" instructions carefully written by developers are translated. Programmers must specify in painful detail how all other more complex activities should be carried out.[70] This requires that any information usable by a computer is also available in digital format. However, this alone will not suffice; for example, computers cannot understand this text, despite the fact it was written using one. So, how does one turn legal communications into usable data? How is law nominalized?[71]

Previously, human experts were required to read legal texts and represent "relevant" parts of their content in a language computational models could parse.[72] For instance, one might manually specify the logical "truth-value" of propositions in a text[73] and have machines perform complex automated syllogisms on a formal model of a case. Alternatively, one might explicitly list a certain set of features (or properties) and manually check for their presence in each text. Once each case is reduced to an array of binary or categorical features, statistics can be easily calculated on a set of cases to detect correlations between features.[74]

This has changed with the recent burst in development and funding of statistics- and machine-learning–based AI, which has spurred progress in the field of natural language processing (NLP), the goals of which include automating tasks such as text classification and information extraction.[75] Such techniques permit one to bypass the need for manual data annotation. Under "unsupervised" methods, definitions can emerge from otherwise formally unstructured data, such as the text of a court opinion, assuming, of course, that a sufficiently large dataset of cases is available for models to be trained and tested on, which is not always the case. Scholars have also used NLP models to predict judicial decisions with considerable accuracy,[76] and companies,

[63] Desrosières, The Politics of Large Numbers. See also Hacking, The Taming of Chance.
[64] Miller, "Governing by Numbers."
[65] Wu, The Attention Merchants.
[66] Christin, "Counting Clicks."
[67] For a thorough survey of contemporary sociological texts observing the social use of numbers, see Espeland, "A Sociology of Quantification."
[68] Mackenzie, "Calculating Prospects of Success in Litigation."
[69] Ashley, Artificial Intelligence and Legal Analytics, 4.
[70] Including how "translation" is carried out between these different levels, using programs called "compilers" or "interpreters." An accessible introduction to the relationship between different levels of computer programming is available in Hofstadter, *Gödel, Escher, Bach*, 294.
[71] In the context of different "levels" of numerical representation, nominal measures allow otherwise non-quantifiable properties to be marked by clear-cut categories, indicating that a situation is like or unlike another "with no provision of variation within or across categories, rank or magnitude." One example is the coding of gender (0 = female; 1 = male) in social science surveys. See Espeland, "A Sociology of Quantification," 409.
[72] Ashley, Artificial Intelligence and Legal Analytics, 4.
[73] This was the theoretical-technological framework underlying the SCOTUS forecasting algorithm presented by Lawlor and others at the 1962 ABA Convention. See Lawlor, "What Computers Can Do." For a contemporary example, see Maranhão, "A Logical Architecture for Dynamic Legal Interpretation."
[74] This is the case of Katz, "A General Approach for Predicting the Behavior of the Supreme Court of the United States." It is also the case of Nunes and Trecenti's research cited above; however, in that case, the categories for analysis did not come from a manual coding of the text of opinions (as in Katz) but from metadata extracted from proceedings' court records.
[75] Ashley, Artificial Intelligence and Legal Analytics, 270.
[76] In particular, relying solely on textual frequency analyses of the European Court of Human Right's textual descriptions of the facts and law (but not the disposition sections) of opinions in right-to-a-fair trial cases (sample n = 80), researchers have developed a model that predicts

attuned to the economic advantages of removing human judgment from mass-scale manual data classification, are early and eager adopters of NLP.[77]

However, before one can classify legal information in any way, one needs first to access it. Another reason for law's supposed "delay" in the adoption of numbers relates to the different ways legal systems make information about their operations available to the public. The claims of mathematical Platonists notwithstanding, numbers are produced by people. In legal quantification initiatives, these people include traditional legal professionals (e.g., lawyers and judges), who craft the decisions and appeals that comprise the "raw" data fed into algorithms. But these people also include an army of data annotators, underpaid contractors,[78] court clerks, and interns who attach metadata to the above communications, the regulators who define the politics of access to these data, as well as the researchers, developers, and entrepreneurs trying to build markets and technologies using such data.

Information on the authorship of judicial decisions provides one such example. Given that "individual judges are usually consistent with themselves and often cite their own prior decisions to support their position,"[79] knowledge of the authorship of any given decision is important for developing predictive judicial statistics. Some US (in *per curiam* opinions) and French courts have traditionally concealed the authorship of judicial decisions before their release to the public. This has motivated systematic attempts by lawyers to detect authorship, which have also been subject to quantitative treatment.[80] In France, a penalty against services offering statistics based on the identity of judges was imposed. Following suit, the French Bar raised a "parity of arms" argument to request that the identity of lawyers also remains concealed.[81] Such responses attempt to avoid similar developments seen in the US, where legal firms already grapple with the existence of services that claim to be able to predict their opponents' — and of course, their own — behavior.[82] In Brazil, judicial authorship is supposedly not an issue,[83] as court records and judges' identities are public by default. However, in addition to explicit regulation or institutional negotiations, access may also be obstructed through technology. Below, I consider how programmers and companies tackled the issue of accessing court record data.

Several companies in the legal technology market focus on automating access to legal information, offering services to check court websites for updates on proceedings and download court documents, or computer-assisted search of statutory and case law. Gaining access to the contents of a lawsuit used to require speaking directly to court clerks and requesting access to the physical files of a (paper-based) proceeding, including the submissions and evidence submitted by each party, which one could copy at will. To access past case law, one had to come up with keywords related to the legal problem one was interested in and look them up in physical books, navigating tables of content and indices of compendia containing important past decisions by courts. Since the adoption of electronic lawsuits, it is possible to search for case law by querying online databases for the full-

with an average of 84% accuracy the court's final ruling. See Aletras, "Predicting Judicial Decisions of the European Court of Human Rights." The authors view this and other findings on the statistical predictability of judicial decisions as evidence for legal realist claims — a disputable claim and a claim staunch legal formalists may dispute committed as they are to the authority of interpretive methods (based solely on internal factors) in guiding judicial reasoning. Thus, that the facts and the law of a case can together (statistically) predict its outcome should not be surprising if one believes such internal factors are what actually guides judges' decisions.

[77] For example, US-based legal technology vendor Lex Machina has registered patents for NLP modules that it claims can "clean, code, and tag the legal data," and that "may be able to identify legal entities, legal events, [and] timestamps," by employing "one or more word recognition processes to determine what words are present in the legal data." Carothers, Legal Analytics Based on Party, Judge, or Law Firm, col. 9.

[78] The emergence of legal numbers has also led lawyers to work in conditions that were traditionally reserved for those in call centers and undertaken by other underpaid professionals. In particular, law firms have turned to performance metrics and workflow automation software to maximize profit over legal disputes by turning lawyering into assembly line-like work. Describing the technological "success story" of one of Brazil's largest law firms, installed in a warehouse in a mid-sized town at the countryside of São Paulo, business publication *Exame* writes of attorneys "pouring out" from the eight law schools in the region "willing to work for 1500 Brazilian Reais a month" (at the time, roughly 970 US$) helping computers to process the firm's over 360,000 simultaneous cases. Comparing the firm to a "legal sausage factory," the article cites one of the firm's (four) partners as proudly noting how thanks to strategies to help "boost productivity" like having its over 400 attorneys go home at lunchtime, the firm had "no fat to burn." See Moschella, "A Salsicharia Do Direito No JBM." See also, "Com Robôs, Escritório Atua em Mais de 360 Mil Processos com 420 Advogados."

[79] Lawlor, "What Computers Can Do."

[80] Li, "Using Algorithmic Attribution Techniques to Determine Authorship in Unsigned Judicial Opinions."

[81] Grottes, "Open Data et Nom des Avocats: Le CNB Demande la Même Protection que celle Accordée aux Magistrats."

[82] As marketed on the Lex Machina's website: "Want to know upfront if your opponent tends to file motions fast and furiously? Or if they file only a few key motions? With Motion Metrics, you can craft your motion strategy with confidence. You can easily determine the kind of motions your opponent tends to file in cases like yours and see if they have been successful." See Lex Machina, "Legal Analytics by Lex Machina."

[83] However, legal-tech market insiders point out that the incomplete records regarding, for example, authorship or the court of origin of a decision in executive government-maintained law-related database LexML (https://www.lexml.gov.br/), makes the job of extracting useful information from such data often unfeasible.

text decisions issued in every public proceeding, and not only briefings or Westlaw-like categories.[84] Keyword hunting was thus both facilitated by the possibility to construct search queries using logical operators, and made more laborious by the sheer amount of case data one usually has to go through to separate the wheat from the chaff and find past decisions actually relevant to one's issue. This has ensured that case research remains a task left for junior lawyers or interns.

In spite of the transition into digital media, access to legal data remains an issue in Brazil and the US, even if for different reasons. On the website of any of the 91[85] Brazilian courts of law, access to the records of past legal proceedings is quite unlike that in the age of cellulose. In personal communications and interviews conducted with software developers working on access to electronic case law, I encountered different concerns from those raised by the National Council of Justice regarding privacy and server overloads. Although any individual user can freely search for case law, they must first find their way around the website at which they are looking. 91 courts have 91 websites that are unlike each other in many respects, including in how they structure data, how searches are performed, and how and if limits are imposed on queries, all of which affect the work required of programmers looking to "scrape"[86] information from said websites. As a rule, for instance, access to public court decisions is preceded by a CAPTCHA[87] (i.e., an automated test to determine that a visitor is *not* making automated data requests). Access to any other case document requires one to be a registered lawyer and up until recently, to be directly involved in the case.[88] For companies and researchers interested in analyzing massive numbers of court decisions, automatic access to documents is indispensable, leading to a cat-and-mouse game in which better CAPTCHA-breakers are developed in response to better CAPTCHA tests — to a point where those seeking access either pay humans to pass the tests,[89] try to train their own AI models to pass CAPTCHAs,[90] or, as insiders reveal, rent login information from registered attorneys to avoid the possibility of having one's internet protocol (IP) address banned in response to "excessive" requests made automatically to court servers.[91]

Corporate demand for legal data, coupled with the "inefficiencies" of systems for accessing such data, have motivated markets dedicated to supplying it in friendly and useful formats.[92] This is akin to what has happened in the US, where the PACER system's high fees and inadequate infrastructure and user interface have motivated credit rating agencies and legal technology outfits, like LexisNexis, to collect, aggregate, and resell PACER court record data to other market players.[93] As these information resellers can centralize demand by individual lawyers or even law firms, they are PACER's heaviest users, and effectively subsidize its fee waivers. Notably, the system itself was "set up to be self-financing;"[94] that is, paying users were supposed to help "cross-subsidize" the unpaid access of other users. Nevertheless, waivers have been criticized as insufficient, and the PACER interface as unfriendly to end users.[95] American court administration officials however have openly admitted to such setups and seem to have no issue with them.[96] In response, activists and scholars have developed alternatives, such as the academia-oriented, free-to-access RECAP.[97] As mentioned in the introduction, the Brazilian CNJ envisions PACER's pay-per-view system as a possible solution for courts' so-called "digital tragedy of the commons." and a committee of justices, state attorneys, and law professors has been assembled to discuss the governance of access to electronic proceedings.[98] Given the

[84] The transition to electronic proceedings has also altered what counts as case law. In São Paulo, sitting judges used to have discretion in deciding whether or not to send each particular opinion issued to the paper-based case law reports periodically issued by courts. Today, every published opinion is added to courts' electronic databases by default. In effect, the set of information available to lawyers searching for relevant precedent no longer passes through the "filter" of judges' discretion, and thus every opinion is "case law" and researching precedent now requires clever key-wordplay. In a large and complex legal system like that of Brazil's civil law system, this assures that lawyers can almost always find past cases that minimally fit their situation of interest. Common law regimes, relatively more bound by the doctrine of *stare decisis*, have dealt with this potential cacophony of seemingly valid precedent either by limiting what is published, as in the UK, or by allowing every judicial opinion to be published, as in the US. On common law regimes, see Hanson, "From Key Numbers to Keywords."
[85] Folha de São Paulo, "O Brasil Tem 91 Tribunais."
[86] Scraping algorithms simulate a user's interaction with a website to automatically browse and extract content from large numbers of pages. This commonly occurs in cases in which no interface (e.g., an API) is provided by the website owner for third parties to extract data from it, as is the case of Brazilian courts today.
[87] An acronym for Completely Automated Public Turing test to tell Computers and Humans Apart.
[88] Rover, "Publicada lei que Garante Acesso de Advogados a Processos Eletrônicos."
[89] Colombo, "Challenges When Using Jurimetrics in Brazil."
[90] As suggested by the Brazilian Jurimetrics Association. See Associação Brasileira de Jurimetria, "Pacote Decryptr - R Para Jurimetria."
[91] Interview with software developer working at a lawtech start-up based in São Paulo, Brazil. November 28, 2019.
[92] In Brazil, for example, see "Juit." Other examples can be found on "Associação Brasileira de Lawtechs e Legaltechs."
[93] For a detailed treatment on the economics and institutional history of PACER and legal information markets in the US, see Martin, "Online Access to Court Records."
[94] Martin, "Online Access to Court Records," 861.
[95] Carver, "What Is the "PACER Problem"?"
[96] Robinson, "Judiciary Doubles Fee Waiver for PACER Access to Court Records."
[97] Today maintained under Princeton University's "Free Law Project RECAP grants the public free access to PACER files donated by individual, paying users – a relatively slow and small-scale operation compared to private information resellers. For information on the history of RECAP, see Lee, "The Inside Story of Aaron Swartz's Campaign to Liberate Court Filings."
[98] Agência CNJ de Notícias, "Grupo Inicia Trabalho Para Regulamentar Acesso a Bases de Dados do Judiciário."

private appropriation of public information on the legal system afforded by PACER in the US, the fact that the CNJ is inspired by it raises serious concerns. From the (non-corporate) public's perspective, it would be perhaps preferable if courts invested in improving server infrastructure and user interfaces to increase compatibility and ensure standardization. To take the "easy route" of retaining the *status quo* and merely avoiding server blackouts by charging access fees would further impair access to justice by the poor and non-profit actors, who would be forced to rely on private services to properly access justice system data. However, what can one do with all such data? Before the shift from cellulose to electronic media, it was much more difficult to draw statistical conclusions about hundreds of thousands of judgments, let alone extrapolate from the statistics that once concerned only legal sociologists and political scientists to the future probabilities that will interest attorneys. The demand for legal numbers has created suppliers of "raw" court records and processed legal analytics. This demand has increased due to the (real and perceived) predictive abilities of quantitative analyses in litigation that are of immediate value to lawyers. However, besides legal victories, the quantification of law has served less obvious goals, helping turn legal risk and claims into investment opportunities.

3. Evaluating and Valorizing Law: From Risk to Profit

> What makes litigation seem so daunting, and distinguishes litigation risk from most other risks, is that litigants lack a mechanism to dispose of litigation risk. Virtually any other risk that a business faces can be spread or eliminated via the market. [99]

> Institutional investors may sell their investments in secondary markets. They may do so directly by bundling and securitizing legal claims or indirectly by selling shares in the investment firm itself. Parties thus may find themselves bargaining in the shadow of financing. [100]

Offering greater (perceived) certainty in the evaluation of documents than that provided by their human counterparts, legal-risk analyses based upon the aggregation of information from massive amounts of case records facilitate the attachment of numbers (whether frequentist past statistics of court behavior or Bayesian degrees of certainty of success in an ongoing lawsuit) to different legal strategies. By lending economic rationality to hitherto "instinctual"[101] decisions, legal numbers help lawyers adopt calculative practices that, like those of accountants, allow them to more easily become "rationally calculating selves" of the kind posited by microeconomics.[102] As a result, the daily reality of legal practice has changed. From the choice of the new personnel to hire in law firms to the problem of picking the best strategy, legal numbers "alter the capacities of agents, organizations, (…) the connections among them [and] the power relations that they shape and are embedded within," enabling "new ways of acting upon and influencing the actions of individuals."[103]

Beyond law firms, such processes also affect corporate decision making. More openly motivated by a "finance conception of control"[104] than traditional law firms, companies can use numbers to replace external legal counsel's immeasurable predictors of success, such as partners' "hunches," with strategies based on metrics seemingly more "clearly" defined, such as lawyers' win rates[105] or the risk associated with different categories of suits. As lawsuits are managed in bulk by corporate legal departments,[106] a general counsel is called upon to act not (only) as a lawyer but as a "legal-risk portfolio manager."[107] Under such an aggregate and relatively more "detached" view of the legal process, the particular content and context of any one case matter less than the fact that it belongs in the same set as other "similar" cases. Such categorization makes otherwise disparate legal claims against a company commensurate[108] to each other, and favors standardized treatment. For instance, if cases are aggregated based upon expected risk/reward factors, they can be subject to the same economic-legal strategy, say making a settlement or going to trial. The emergence of the new calculative practices outlined above appears to have not only changed

[99] Molot, "A Market in Litigation Risk," 367.
[100] Steinitz, "Whose Claim is this Anyway?" 1319.
[101] Carothers, Legal analytics based on Party, Judge, or Law Firm.
[102] Miller, "Governing by Numbers," 381.
[103] Miller, "Governing by Numbers," 379.
[104] Miller, "Governing by Numbers," 391.
[105] For example, legal human resources company LawyerMetrix's "predictive hiring model" uses firms' "internal performance data and analytics to identify the shared biographical characteristics of successful hires." See "Lawyermetrix." Also see Katz, "Quantitative Legal Prediction," 935. One may legitimately ask whether it is possible to mathematically disentangle or "control" an attorney's individual performance from the many "confounding" factors influencing the course of litigation. Regardless of the difficulties inherent in such statistical operations, the perceived objectivity of numerical measures of performance may provide such numbers with sufficient authority to influence social behavior, for instance increasing lawyers' resistance to take cases thought to have a (perhaps also quantified) small chance of success. On the various ways numbers evoke authority, see Espeland, "A Sociology of Quantification," 417.
[106] Or by law firms specializing in such wholesale lawyering. See Footnote 78 above.
[107] Katz, "Quantitative Legal Prediction," 948.
[108] Espeland, "A Sociology of Quantification."

the way attorneys and judges conceive of their work, but also to have allowed economic agents to reconceive of legal reality, with its uncertain concepts and obscure lexicon, into the more graspable terms of accounting. Following conventionalist economics, it can be said that legal quantification technologies work like "cognitive instruments," facilitating the appraisal of the "quality" of legal claims in terms more conventional to the economic system,[109] just as financiers' categorization of mortgage debtors as "prime" or "subprime" is a requisite for trading their future payments.[110]

Once the probability of the success of a legal claim is calculated, viewing its filing before Courts as a type of risky economic investment represents a small step. Indeed, in private litigation, in which potential claimants routinely use the prospect of a trial victory when strategically deciding whether to go to trial or to settle a matter (and if so, for how much), this has always been the case.[111] What changes when intuition joins or is replaced by statistics is *subjective certainty*, or the appearance thereof. Technologies lending greater certainty to lawyers' analyses increase the predictability of legal risk, and the explicit evaluation of legal issues in economic terms help companies blur the distinction between legal risk and other investments. Private litigation thus conceptualized is prone for codification by the economic system, much like betting or finance. Today, corporations not only manage "case portfolios" by themselves, but ofttimes also by outsourcing such risk to third parties.

Since the late 2000s, Brazil, Australia,[112] the United Kingdom and the US[113] have witnessed a growth in the third-party funding of litigation risks or claims, a form of arrangement whereby someone other than a party directly involved in a legal suit as a claimant or a defendant can subsidize the costs related to legal representation, court fees, and the like (which the party might not otherwise be able to afford), in exchange for a percentage of the amount awarded to the winning party. In doing so, the third party effectively buys a stake in the success of a claim. "Legal finance" companies specialize precisely in providing a new avenue of investment for investors by claiming to be able to predict, with some degree of confidence, who among the litigants is most likely to receive a favorable decision.

In *legal* finance as the rest of finance, the ability to invest is reinforced by the ability to predict. Consequently, greater confidence in the predictions of "legal risk assessors" turn legal risks into objects amenable to financialization by making them more certain bets. This attracts investors, who increase their own chance of *economic* success by funding and thus increasing investees' chances of *legal* success. Such an *evaluation* of legal claims, which was initially made possible by predictions of their risks (and potential awards), contributes further to *valorization*, in a cyclical process. As Vatin observed, "all along the chain of production, valorization is present in acts of evaluation, in that they are provisional modalities for establishing a value that is under construction."[114]

This operation of financialization is itself coded by law through contracts akin to those employed by contingency fee attorneys or between litigants and investors for after-the-event insurance.[115] From an economic point of view, however, litigation finance is viewed as a new type of asset for investment, and one that is particularly attractive because its risks are often uncorrelated with swings in stocks and other markets.[116] In practice, legal finance is conducted by funding institutions made up of what Molot, in his 2009 paper outlining contemporary litigation funding, referred to as "lawyers-turned-entrepreneurs."[117] By dealing with risks as principals instead of serving as agents for clients, such lawyers "manage legal risk for their own account."[118] At companies such as Burford Capital[119] and Harbour Litigation,[120] this new type of legal professional specializes in evaluating (and thus valorizing) legal claims primarily as financial assets, acting as full-fledged economic agents in the financial system, packing together different clusters of cases based on their chance of success (and inversely, their risk of default) and offering them as financial products. But lawyers-turned-entrepreneurs also act as lawyers, using their legal skills to draft contracts that provide legal structure to the relationships between themselves, as brokers, and investors and parties to the case.

[109] Vatin, "Valuation as Evaluating and Valorizing," 35.
[110] On the importance of standardization for financial trading, see Mackenzie, An Engine, Not a Camera, 13.
[111] Stevenson, "Bargaining in the Shadow of Big Data."
[112] Baptista, "Brazil — The Third Party Litigation Funding Law Review - Edition 2."
[113] Kalajdzic, "Justice for Profit."
[114] Vatin, "Valuation as Evaluating and Valorizing," 45.
[115] In Brazil, for instance, although litigation funding remains unregulated, and legal arbitration chambers have expressed concerns over its use, legal commentators have already proposed ways of coding it – thus 'privately legalizing' it – in national law. See Farache, "Legal Finance no Brasil."
[116] Molot, "A Market in Litigation Risk," 399.
[117] Molot, "A Market in Litigation Risk," 437. Molot is also co-founder of Burford Capital.
[118] Molot, "A Market in Litigation Risk," 437.
[119] Burford, "Burford Capital."
[120] "Harbour Litigation Funding."

In *The Code of Capital*, Katharina Pistor has analyzed the history of how law has been employed to transform land, promises, skills, funds, and many otherwise disparate objects into economic *capital* by "coding" them as legal "technologies," such as "contract, property rights, collateral, trust, corporate, and bankruptcy law."[121] Following Pistor, it could be argued that legal finance is a way for the economic system to have law code the uncertainty inherent to law as a form of capital. The cycle of valuation of legal claims mentioned above can be seen as an interlocking chain of reentries of *risk* from the legal system into the economic system and back. First, procedural law encodes how to settle a contractual dispute using legal operations. But this only converts a source of economic uncertainty into legal uncertainty related to the way judges decide, to the strength of evidence, the quality of witness testimony, and so on. Additionally, although a judicial decision is the result of proceedings carried out primarily in the language of law, its consequences for parties are often perceived mostly as economic — or reduced in this manner by tort law. Both parties and third parties may then conceive of the dispute, even before it is settled, in economic terms, and employ legal tools such as lending contracts and contingency fee arrangements to *valorize* the dispute over it by betting on one of the sides. Over and above itself, the economic system may further assess the risk of an aggregate set of lending contracts, and securitize them for investors by once again "encoding" them in law via the signing of contracts within the financial market). Such is the case of Sydney-based IMF Bentham[122] which has transitioned from financing lawsuits with their own resources to acting as fund managers for wealthier investors.[123]

In addition to such "legal technologies" as novel contract arrangements, these cycles of valuation are also permitted by information technologies of the type described in the previous sections. In particular, legal predictive technologies have been claimed to facilitate lawsuit pricing in third-party funding. Litigation finance was initially restricted to very large lawsuits, as the transaction costs involved in pricing legal claims made third-party funding prohibitively expensive for cases involving small amounts.[124] Many hours of "due diligence" work by teams of lawyers reviewing documents or interviewing witnesses can be "expensive enough to eat up a large chunk of whatever premium" a defendant might pay investors,[125] making litigation finance attractive only in "a small subset of cases, primarily those in which pending litigation is very large and threatens to interfere with business transactions."[126] Funding company Therium reports that while it "does not have a minimum case size," it "will typically invest £15m or more" in cases involving claims with a value of at least six or 10 times the investment.[127] Recently, however, burgeoning legal finance start-ups have started targeting relatively smaller claims, brought by small businesses and individuals, under US$ 1 m,[128] crediting the reduction of transaction costs associated with case evaluation to the use of digital technologies quantifying law. In an interview, Legalist Chief Executive Officer Eva Shang stated that they "scrape state and federal court records and look for indicators, like whether a court is favorable to plaintiffs, if particular case types tend to win, who the judge is" in helping their lawyers to determine which cases to fund.

Buzzwords like "legal analytics" have already found their way into the marketing materials and investors' relations booklets of litigation funding companies in Europe,[129] Australia,[130] and the US[131] that advertise the use of AI in pricing analyses. Some commentators urge conservatism in face of the tiresome hype[132] about the specific predictive aspects of the use of AI in legal financing,[133] but nonetheless appear to agree that technology can assist case assessors.[134]However, once a cycle of valuation has been established, it appears that "foundational" questions regarding the importance of internal or external factors in predicting legal decision making fade to the background. What comes to the fore is the work of law as a measurement-production activity by entrepreneurs, investors, technologists, lawyers, judges, clerks, and others, geared simultaneously toward

[121] Pistor, The Code of Capital, x.
[122] Cadman, "For the World's Super Rich, Litigation Funding Is the New Black."
[123] There are several important normative issues involved in legal finance, mostly related to the various possibilities for conflicts of interest that may arise from the economic-legal entanglements described herein. Observers have also raised the possibility that third-party funding may help access to justice. Such implications go beyond the scope of this article; however, the interested reader will find an extensive treatment in Steinitz, "Whose Claim is this Anyway?"
[124] Katz, "Quantitative Legal Prediction," 376.
[125] Molot, "A Market in Litigation Risk," 390.
[126] Molot, "A Market in Litigation Risk," 376.
[127] Therium, "Litigation Funding Frequently Asked Questions."
[128] Hunt, "What Litigation Finance Is Really About."
[129] "Nivalion."
[130] Artificial Lawyer, "Litigation Finance Group Apex Launches with Legal AI Co. CourtQuant."
[131] The Law Lab Channel, Eric Blinderman—The Application of AI and Machine Learning to Litigation Finance.
[132] Indeed, much of the literature on the increased use of AI technology, in law and elsewhere, displays a mixture of acritical optimism and technological determinism that is blind to many of the most disturbing social implications and problematic normative assumptions that technological change often accompanies. On this, see the review by Wajcman, "Automation: Is It Really Different This Time?"
[133] Due *inter alia* to a lack of sufficient data for constructing sufficiently reliable statistics. For example, arbitration cases, one of the legal finance's most notable markets, are typically confidential; a fact that makes any analysis (qualitative *or* quantitative) of arbitral awards impossible.
[134] Jackson-Grant, "Will Artificial Intelligence Revolutionise the Litigation Funding Market Any Time Soon?"

evaluating law by counting, nominalizing, aggregating, and predicting the behavior of its practitioners, and valorizing it, by reutilizing its newfound predictability to re-cast law as an attractive financial product.

Conclusion

Legal reasoning is increasingly being quantified. What was once the exclusive province of seasoned lawyers' arcane knowledge is now perceived as a field ripe for analysis by algorithms that can search thousands of documents for useful evidence and create statistical models capable of analyzing dozens of factors to quantify the odds of success in a lawsuit. However, initiatives toward the quantification of law depend on the availability of reliable data on the past behavior of courts, including data about factors "external" to legal reasoning, such as judges' personal preferences, and data on regularities involving "internal" factors, such as the effectiveness of legal arguments before courts. Informed by their understanding of the market value and the political importance of legal numbers, institutional actors have reacted to this process by attempting to control access to court data, be it by prohibiting the de-anonymization of court opinions, or obstructing access to them by charging fees or employing technological barriers against automated access. Further, the predictive applications of legal technologies have fueled preexisting markets in finance. As the future of litigation is more easily evaluated, litigation futures trading becomes a more valuable investment. Cyclically, as investors' appetite for legal risk reverts into more funds for parties' defenses, a predicted future becomes more likely to occur, further valorizing legal uncertainty as an asset. Legal quantification is visible today as state bodies craft tools for internal use and access by the public, private companies create new ways to evaluate courts and lawyers through predictive legal analytics, and third-party investors valorize legal uncertainty by funding litigation.

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Correction to Riberio (2021)

The article *The Quantification of Law: Counting, Predicting, and Valuating* by Rafael Viana Ribeiro (*Law, Technology and Humans*, 3, no 1 (2021): 51-67. https://doi.org/10.5204/lthj.1603) was originally published on March 2, 2021. The author name has been changed at the request of the author. The correction notice can be found at https://doi.org/10.5204/lthj.1965