Impact of free legal search on rule of law: evidence from Indian Kanoon*

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PRELIMINARY AND INCOMPLETE DRAFT – PLEASE DO NOT CITE WITHOUT PERMISSION
September 21, 2022

Abstract

Access to legal information is limited in many parts of the world. Can digital platforms offering free legal search reduce market-level constraints on economic development? We explore this question by estimating the impact of India's Kanoon, a free legal search engine on cases, courts and firms. We use a simple event study framework that exploits the staggered rollout of the platform across different states. We find a variety of impacts. In the high courts, Kanoon is associated with a 1–2% increased likelihood of case resolutions and an over 20% decline in case backlog. In the district courts, the number of filings decreases during the first two years after the rollout. Cases that are appealed from the district courts are also more likely to be disposed and overturned in the years after the launch. Kanoon also appears to affect the finances of firms with positive impacts on assets and negative impacts on audit fees and bad debts. These results highlights the potential for open access platforms to be transformative for economic development.

JEL Codes: K00, K15, D83, L86, R11

Keywords: Legal Information, Legal Aid, Common Law, Digital Platforms, Event Study, India

*We are grateful to the World Bank and Georgetown University's Summer grant opportunity for financial support. We thank Sushant Sinha, the founder of Indian Kanoon for sharing data and his experiences of establishing this platform. For research assistance, we thank Nixon Joshi, Shilpa Rao, Sunny Anand, and Shashank Singh. We are also grateful to Shibani Ghosh, Vijayendra Rao, Vikram Raghavan, Vasujith Ram, Nicholas Robinson, Mrinal Satish, and Nayantara Vohra for very helpful advice, critical insights and very stimulating discussions. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of the World Bank, its Board of Executive Directors, or the governments they represent.

1 Introduction

Access to legal information in many parts of the world is limited, and even when available, dispersed or hard to access (United Nations 2016). Can digital platforms providing free legal search reduce market-level constraints on economic development? We study India, the world's largest common law country, where a majority of lawyers lack access to expensive commercial legal information services (Greenleaf et al. 2013). Imperfect knowledge about the law can affect economic activity (Djankov et al. 2002; Djankov et al. 2003). A randomized trial among South African firms providing 6 months of free legal search elevated employment by 12% (Bertrand and Crépon 2021). Information about rule of law - the speed of justice - increased reliance on formal institutions in rural Pakistan (Acemoglu et al. 2020).

What happens when everyone gets access to free legal search? We study India's Kanoon, a platform that was launched by an overseas graduate student without any official ties to the Indian state in 2008. He had observed that "the most applicable sections from hundreds of pages of law documents is too daunting for common people" and intended for Kanoon to "bring the knowledge of law to the common people". Emphasis was placed on keyword searches and tight integration of court judgments with laws and with prior judgements to allow automatic determination of the most relevant clauses and court judgments (Iyengar 2010). Today, Kanoon is widely regarded as a "first-stop" in a search for legal information in India. The average time spent per page is six minutes, suggesting people actually read the legal text. In 1 month alone, there are 2.9 million search queries and 1.6 million sessions.

We use a simple event study framework that exploits the staggered rollout of the platform across different states to assess its effects on cases, courts, and firms. We scrape Kanoon and code the resulting corpus for judgment dates, judges, courts, litigants, citations, and merge to our scrape of the eCourts, which also contains filing dates, and the All India Reporter (AIR), which includes cases that are citable in official proceedings. We link these to the Prowess firms database on balance sheets of firms in India, which together comprise more than 70% of its industrial output.

We estimate the two-way fixed effects model adjusting for the fact that the control group for the later-treated is already treated Sun and Abraham (2021). We examine the impact on the Indian judiciary and firms. We find that the launch of Kanoon is associated with a variety of effects. Kanoon is associated with a slight increase in the number of filings per court-month. It is also associated with a discernible increase in the number of decided cases in the three years after the rollout. There is also a pronounced decrease in the number of pending cases of 17% at the end of any month and decrease of backlog by 43% in the post-rollout period. In the lower courts, the number of filings decreases and clearance rate increases. These immediate effects may suggest that more straightforward cases similar to past jurisprudence are more effectively dealt with (or not even filed) after Kanoon improves the accessibility of relevant precedents.

Appeal cases from lower courts that are heard at the high court after the transition period are more likely to be registered, allowed and dismissed, suggesting that greater access to legal information may have raised the total number of appeals. We also find 3–6% fewer cases are dismissed, and there is an increase in the number of cases disposed after the rollout than before. This points to a greater likelihood of having lower court decisions overturned after access to the Kanoon platform. These results indicating the greater success in appealing from the lower courts (and the null effects on citations) is suggestive of litigants (as opposed to judges') improved access to precedent.

Turning to Prowess, a panel analysis of firm's financials suggests that the reduction of search costs had a positive impact on the balance sheet of firms. Whether we look at firms that filed at least one case or all firms, sizeable impacts on assets and reduction of bad debt, audit fees, and bank guarantees reinforce the findings of a 12% increase in employment with free legal search. The magnitude of the effects highlight the potential positive complementarities as more and more people get access to free legal search.

Taken together, we interpret these effects as evidence that the release of Kanoon reduced the cost of legal information to the Indian population, reduced bottlenecks, increased efficiency and also contributed to improvements in the quality of legal research in the courts and these improvements had a significant effect on the econ-

omy and people's life outside of court. This case study offers valuable lessons in the importance of making legal information more accessible to all stakeholders in justice systems and of the value of free and accessible information in general.

We contribute to three key literatures. First, well-functioning legal systems are associated with economic development (Djankov et al., 2003; Ponticelli and Alencar, 2016; Lichand and Soares, 2014; Visaria, 2009; Kondylis and Stein, 2018; Chemin, 2020). Incomplete information about laws and regulations can have steep direct and indirect costs (United Nations 2016). We provide sub-national evidence using the rollout of a digital platform providing free legal search for everyone that reinforces evidence from randomized trials highlighting the causal relationship between access to legal information and economic outcomes (Bertrand and Crépon 2021).

Second, economic theory has long ago shown that the reduction in the cost of gathering information improves the efficiency of decision-making (Stigler 1961; Diamond 1971; Varian 1980). Recent empirical literature has also confirmed that reductions of search costs increase overall market efficiency (Goldfarb and Tucker 2019). We show that the reduction of search costs for legal information can alleviate market-level constraints to economic development with substantial positive impacts on firm assets and negative impacts on bad debt.

Third, procedural formality require considerable deliberation from all key actors, lengthening even simple judicial procedures (Djankov et al. 2003, Chemin 2009). A reduction in the cost of information in this context should improve understandings of the law for all stakeholders, raise the productivity of the courts (e.g. resolution of cases, speed of resolution, and other measures of court performance) and also improve the performance of firms (e.g. legal expenses, assets, income and other measures of financial performance). The causal impact of lowering the cost of legal information however, remains poorly understood. We examine this question for the case of India, a context where the barriers to accessing information are particularly high and the courts are particularly backlogged (Rao 2021).

The remainder of this paper is structured as follows. Section 2 presents background on the Indian legal system and the broad context of this study. Section 3 presents our research hypotheses. Section 4 presents an overview of our data and some descriptive statistics of the samples that are used for analysis. Section 5 presents our empirical strategy. Section 5 presents the results of our analysis. Section 7 explores some mechanisms that may explain our results (or not). The final section concludes.

2 Background

2.1 The Indian Legal System

India's legal system goes back several centuries (Jois 2004). Its modern system of justice, however, is grounded in the common law justice system that was established by the British colonial administration in the 19th century (Baxi 1982, Galanter 1963). The current judicial system is significantly shaped by the Constitution of India, which was written after Indian independence in 1947.

The court system of India comprises a hierarchical structure with the Supreme Court of India at the top, the High Courts at the next tier and subordinate courts at district, municipal and village levels. The justice system is an integrated system, which means that decisions made by higher courts are binding on the lower courts.

While the Indian judiciary commands a high level of public trust, it has been increasingly criticized for a growing backlog of cases, lengthy delays in outcomes and inefficiency (Krishnaswamy and Swaminathan 2019). The numbers speak for themselves. There are currently more than 5.9 million pending cases at the high courts, even though their average rate of disposal between 2015 and 2019 was about 1.8 million cases per year.[1]

Ethnographic studies have found that many citizens incur steep costs in accessing legal information and overcoming the many inefficiencies at the courts (Krishnan et al. 2014). Gridlock in the courts also has significant economic costs (Rao 2021, Chemin 2012). Chemin (2009) for example, argues that amendments to the Code of Civil Procedure that were enacted in 1908 have increased the duration of trials since judges must spend

[1] National Judicial Data Grid (NJDG), https://njdg.ecourts.gov.in/hcnjdgnew/, accessed on March 4, 2022.

considerable time choosing between conflicting views of the law in India's common law system. This affects credit markets, agricultural development, and manufacturing performance across the country (Chemin 2009).

2.2 Legal information

In recent years there has been a significant effort into making the courts more transparent and accessible through the use of technology. Around 2000 the Supreme Court of India began to publish some cases online. In 2005 the Chief Justice of India at the time, R.C. Lahoti, established the Information Technology and Judicial Reform Cell at the Supreme Court of India with the mandate of introducing technologies that could be used throughout the justice system and eventually move many legal services online. The first phase of the program, which lasted from 2007 to 2015, focused on the computerization of courts with the installation of hardware, network infrastructure, and software that could provide basic case related services to the litigants and the lawyers.In the years that followed, cases were uploaded on the websites of the Supreme Court, High Courts, district courts and tribunals (see the top panel of Figure 1).[2]

To upload cases on their websites, states relied heavily on the National Informatics Centre (NIC), a public sector corporation that is responsible for hosting, maintaining and updating the websites of constitutional, central, state and local government agencies all across India. This organization has maintained the websites of the Election Commission, Planning Commission, tax authorities, and the Securities Exchange Board of India (SEBI). Iyengar (2010) notes that considerable legal information was provided at each of these sites through the complete texts of applicable legislations, subordinate legislations, administrative rulings, reports, census data, application forms etc. This was the foundation for the emergence of the Kanoon platform.

2.2.1 The Emergence of IndianKanoon.org

The development of IndianKanoon.org began in the summer of 2007 and was publicly announced on 4 January 2008. The entire effort was led, financed and managed by Sushant Sinha, a graduate student in the Computer Science Department at the University of Michigan.

The project began informally. Sushant Sinha's self-stated goal was to "bring the knowledge of law to the common people".[3] He relied minimally on physical infrastructure or hardware and utilized free and open-source software for the purpose of scraping cases from court websites and building a searchable database that could for legal education and research (Iyengar 2010).[4]

In his reflections from a personal blog that pertain to that time, as well as the objectives stated on the website itself, two key priorities emerged in the initial phases of the project. First, great effort was made to ensure that information about laws was accessible to a broad range of stakeholders. In his own words, Sinha argues that "acts are very large and in most scenarios just a few section of laws are applicable". As a result, "finding the most applicable sections from hundreds of pages of law documents is too daunting for common people". He placed considerable emphasis on the ease of keyword searches, particularly for terms that are of interest to a broad audience.

A second priority was to illuminate how laws are interpreted by the courts. He argues that "laws are often vague and one needs to see how they have been interpreted by the judicial courts". On the website, laws and judgments were thus separately maintained. Legal documents were broken down into smallest possible clauses.

[2] The second phase of the program, launched in 2015 intends to improve the experience of litigants, lawyers and other stakeholders in the courts through provisions such as information in local languages, applications for mobile phones, kiosks in court complexes, the delivery of certified copies of documents via electronic platforms and the deployment of ePayment Gateways for making deposits, payment of court fees, fines etc. Throughout this period however, cases have been uploaded to the court websites.

[3] See `indianKanoon.org/about.html`, accessed April 1, 2022.

[4] Iyengar (2010) interviewed Sushant Sinha in 2010 and documented a heavy reliance on a database in *Postgres*. This was favored for its' "inbuilt search functionality, inverted index and ranking functions" (Iyengar 2010). When existing packages were inadequate for his needs, Sushant Sinha developed patches for the broader community of software developers. His efforts contributed to an improvement in the 'headline citation' functionality of Postgres, which facilitates the retrieval of contextual information associated with search queries.

A tight integration of court judgments with laws and with prior judgements allows automatic determination of the most relevant clauses and court judgments.

Sushant Sinha uploaded on the Kanoon platform in waves. When the website was launched in January of 2008, only cases from the Supreme Court and the texts of Central (Federal) legislations were featured. By 2009, judgments of 10 High Courts and 17 Tribunals had also been uploaded. The full text of India's Constituent Assembly debates, Law Commission reports and the full texts of central legislations were also added throughout this time. The timing of the uploading of cases on the website is summarized in Figure 1.

The public response to the site appeared to be overwhelmingly positive from a brief study of users (Iyengar 2010) and the comments received by Sushant Sinha himself. Users were enthusiastic to have a legal resource that is accessible, user-friendly and free (Iyengar 2010). The site also has some interesting features: the data is searchable, pages have links to posts or other writings on the internet that refer to the cases and there are cross-links within judgements to any cases that a case refers to. These innovations significantly enhance a user's experience of accessing the law, reducing search costs for relevant information substantially.

There were however, also some limitations. Unlike officially curated cases, Kanoon does not provide a case note, it cannot be officially cited as a source and is not accepted by judges during official proceedings. Web scraping errors are not manually corrected, making it somewhat less reliable that paid databases.

To date, there has been no rigorous evaluation of the impact of the Kanoon platform. Sushant Sinha continues to maintain the site, without formal funding or any formal organizational structure. He has become an advocate for freedom of information in India and protecting the rights of citizens to get information from their government.

2.2.2 Other Databases

Indian Kanoon was not the only electronic source of data at the time that it was released. The increased availability of legal data from the courts was accompanied by a proliferation of electronic resources for Indian legal research over the subsequent years. A detailed list is available in the Appendix of this paper. These resources were different than Kanoon in several ways: they were expensive, difficult to access and had only partial coverage of Indian law. Sushant Sinha described these other databases as follows:

> Until very recently, most law resources in India were provided by libraries or Websites that charged a significant amount of money. In effect, they prohibited access to a significant portion of the population that wanted to look into legal issues. The average time spent per page on the Indian Kanoon Website is six minutes; this shows that most users actually read the legal text, and apparently find it easier to understand than they had previously expected.[5]

Since 2015, there has also been an effort to curate all available Indian laws as well as their amendments in a single repository. These are available at http://www.indiacode.nic.in/. This website, which has been functional since 2017 includes all central Acts and subordinate legislation passed by the Centre, including rules, regulations, notifications and circulars. The portal presents the complexity of the chain of laws, starting from the "parent" act to the subordinate legislation. It also includes state government acts, rules, regulations and subordinate legislation. Even today however, this website remains difficult to access for those who do not have a legal background. Sushant Sinha emphasizes that "lawyers are often accustomed to using these interfaces, and of course understand these technical legal terms" but "requiring prior knowledge of this kind of technical legal information as a prerequisite for performing a search raises a big barrier to access by common people" (Sinha, 2022).

In summary, Indian Kanoon has been the *only* free electronic resource that was readily available and accessible to the people of India since 2007. It is widely regarded as a first-stop in the search for legal information, not just for lawyers but lay citizens. Lawyers often browse this site to curate data and then turn to paid databases for adding details and formal citations prior to presenting their work in an official capacity.[6]

[5] https://blog.law.cornell.edu/voxpop/tag/indiankanoon/, accessed on June 23, 2022.

[6] A cursory examination of India legal research guides at libraries across the United States, particularly libraries of prominent law

3 Research Hypotheses

We postulate that the release of Kanoon, a free resource that was curated and released by a single actor without any coordination with the judicial system or public sector more broadly, brought a sudden, substantial and entirely exogenous reduction in the cost of searching for legal information in India. This affected litigants, courts and markets. These effects are likely to evolve over time, as stakeholders adjust to the new technology and form new expectations.

3.1 Individual Cases

For parties who file and contest cases at the courts of India, easier access to legal information can immediately alter both expectations of winning as well as the probability of winning in a court. The reduction of search costs for legal information could strengthen the quality of the arguments on both sides of the case, making it easier for the judge to make a decision on the case, and reducing the time to resolving the case. On the other hand however, if the arguments from both parties become complex with the incorporation of more legal information, judges may need more time to rule on a case. Since these two mechanisms have opposing effects on the time taken to resolve cases, the ultimate impact of Kanoon is an empirical question.

Since Kanoon primarily features high court case rulings (and not the lower courts), petitioners in lower courts may find it easier to gain access to legal information and thus improve the quality of their arguments at this stage. In this scenario, they would be more likely to have the decision reversed at this higher court. Cases would be more likely to be impacted in the high courts rather than the lower courts.

3.2 Courts

Easier access to legal information in India's common law system can directly affect a broad set of performance indicators for courts. We will consider a range of outcomes: the number of filings, the number of decisions, the number of pending cases, the age of the pending cases, the age of decided cases and the rate of clearance of cases in these courts.

We also expect the launch of Kanoon to affect the performance of the lower district courts. Participants at these courts gain access to not only the legal code, but the judgements from higher level courts that have binding precedent for these lower courts. If participants at these courts have steeper barriers in accessing alternative sources of legal information than their counterparts in the higher judiciary, we could expect even bigger impacts at this level of the judiciary. We thus examine the impact of the platform on a full set of performance measures of these courts.

3.3 Firms

Easier access to legal information should not only have benefits for stakeholders within the legal system, but even the broader set of economic actors who rely on this information for economic activity. Firms operating in India face a complex economic, regulatory, and legal landscape for doing business (Bloom et al. 2013; Bertrand and Crépon 2021). Prior to the arrival of a free database like Indian Kanoon, accountants and managers at firms largely relied on lawyers to provide guidance on accounting practices. With the arrival of a free database however, all employees were likely able to access the full body of laws that affect their balance sheets and their business at large. On the basis of this, we expect the rollout of Kanoon to have favorable impacts on all measures of firm financial status. There is also of course, the possibility that the arrival of Kanoon enabled firms and customers to increase litigation – this effect however, will be measured in our analysis of the productivity of the courts themselves.

schools (Harvard University, Yale University, Georgetown University and others) found Kanoon remains prominently listed in the recommended research platforms with a note that the service is free, easy to search and requires no formal registration.

4 Data and Descriptive Statistics

4.1 IndianKanoon.org

We scraped publicly available data on Indian Kanoon for the years 2005-2015. This resulted in a corpus of 5,632,421 cases. We coded these cases for the date of judgement, court name, judge name(s), party names, advocates, and cases cited within the judgement. We also added other useful data not readily available on the website, such as the dates on which individual judgements were uploaded on the website.[7] We validated this data by cross-referencing it with data scraped from the eCourts portal, which contains additional metadata such as the filing dates, the court, the type of case, and judge identifiers.

Figure 2 presents a summary of the data on cases that are found on the Kanoon database by High Court, grouped by the dates of the Kanoon rollout, which are depicted in solid vertical lines on each graph. This figure documents the first stage with a tremendous increase in cases available around the dates of the roll out.

4.2 eCourt High Courts

We webscraped summary data from the eCourts portal to obtain summary information on case types, filing dates, and decision dates (if a given case has been decided), as well as the names of the presiding judge, plaintiff, and respondent. We exported case lists from each eCourt website of an Indian High Court, and analyze cases filed (opened) and cases decided (closed) as a function of their varying Kanoon rollout dates. This gave us a sample of 11,894,096 cases.

Figure 3 presents the total number of filings in the eCourts system for each of the four sets of courts and the corresponding rollout dates that pertained to them. The figure demonstrates a striking level of variability in the resolutions across the four groups of courts, as well as over time. Here too, we see some overlap between the timings of the rollout and the steep increase in the number of cases in the system. In panel (a), at the top-left of Figure 3 we see that the rollout data precedes the increase in the number of cases, while in panel (d), at the bottom right, the rollout date occurs in the midst of this increase.[8]

4.3 eCourt District Courts

The Kanoon platform did not include records from the 2800 district courts of India. Given that Kanoon may have been most useful to stakeholders in less affluent regions of India however, we can expect a greater effect in the district courts: decisions to open or not open a court case affect the District Court system, where cases in the trial of first instance are simpler than the cases on appeal in the higher courts. We include all cases from these courts which were open at any time between 2000 and 2020 in our analysis. We examine the total numbers of cases filed and decided as a sum of District Court cases within each High Court's jurisdiction.

Figures 4 depict the number of filings in these data. We note that there is a jump in the number of cases filed in 2010 for many High courts, and a gradual increase in the number of cases filed for many High Courts post-2012. As noted previously, this is consistent with the previous observation – these increases occurred very close to the time of the Kanoon rollout.[9]

4.4 All-India Reporter (AIR) Online

The All India Reporter (AIR) is one of the oldest and most respected legal publications in India. Court decisions that are published in the AIR are routinely cited in official proceedings. We examine citation patterns in a

[7] We greatly appreciate the support of Sushant Sinha, the founder of Indian Kanoon, in procuring this data. We further thank him for providing additional insight into search engine mechanics and design.

[8] In the appendix, we present additional data on case resolutions. We find that the overall patterns are quite similar to the total number of filings showed here.

[9] Case resolutions are presented in appendix Figure A5, and these too show a similar pattern as the number of filings in the district courts.

subset of cases from the AIR database. We access appeal cases (cases originating in the district courts) on the publisher's website by using the 'comprehensive search' feature by querying for cases by appeal year. This data set includes cases published in AIR and other allied journals from the high courts and the supreme court of India spanning the years from 1980 to 2021. The cases were then matched to cases in the Indian Kanoon database by using the decision date and litigant names.

4.5 Prowess

Prowess is a database that curates financial information of nearly 34,000 listed private and public companies in India. It covers nearly all companies on the National Stock Exchange and Bombay Stock Exchange.[10] These firms account for more than 70% of industrial output and 75% of corporate taxes collected by the Indian government. The database has been widely used in academic analysis (Goldberg et al. 2010). The data is collected, supplied and continuously updated by the Centre for Monitoring the Indian Economy, an independent, non-governmental research organization. The database is compiled from firms' audited Annual Reports and information supplied to the Ministry of Corporate Affairs, as well as company filings with stock exchanges and the prices of securities listed on the main stock markets in the case of publicly traded corporations.

We conduct our analysis focuses on two samples of these firms. First, we use the full sample, regardless of whether or not the firm has pending cases at the courts. Second, we examine the sub-sample of firms that have active cases (either pending or new) during the time-period 2006-2015. To do this we identify all the firm Corporate Identification Numbers (CIN) – unique firm identification numbers – in the Prowess database and then restrict the sample of the e-courts data to the cases where these entities are litigants in the cases.[11]

Summary statistics of all key variables from these different datasets are presented in Table 1.

5 Empirical Strategy

Our empirical strategy begins by estimating the before-after difference in the outcome variables of cases at the courts where Kanoon was introduced to cases at courts where it was not. A court is considered treated when its cases are uploaded on Kanoon. We refer to this event as the "Kanoon rollout date" for that court. On this date, all cases that were filed *prior* to the rollout date *and* available for review on the court websites, are available in an accessible format. For all the dates that follow, cases are added to the websites on the date that they appear on the court websites. Though Kanoon now covers all the courts of India, we restrict our attention to the set of courts where the rollout first occurred and the rollout date is clearly known.[12]

We estimate the following two-way fixed effects (TWFE) model at the case level:

$$Y_{ict} = \alpha + \sum_{j=-4}^{5} \beta_j(\text{Kanoon}_{jct}) + \delta_c + \gamma_t + \varepsilon_{ict} \tag{1}$$

where Y_{ict} is an observed outcome of case i at court c filed at year t. $Kanoon_{jct}$ is a set of dummy variables that take value 1 if court c had cases uploaded on Kanoon at j number of years before or after time t (and 0 otherwise). δ_c and γ_t are court and time fixed effects.[13] We also include court-year fixed effects. We estimate equation 1 using OLS regression. Standard errors are clustered at the court-level.

[10] These are registered companies that disclose their financial statements according to the 1956 Companies Act. Initially, the companies had to meet one of the following conditions to be included in the database. Either the firm needed to have a turnover of at least 2.5 crore rupees, or the firm's annual reports must be available for at least two years before the date of updating.

[11] The CIN number is a 21 digit alpha-numeric number that is given by the Registrar Of Companies of various states under the Ministry of Corporate Affairs (MCA). The CIN number is typically used to track all the activities of an enterprise after its registration by the government of India. This number contains the identity of an organization and additional information such as the type of company, the date of founding of the company, the state code and the types of exemptions that a company is subjected to.

[12] We thank Sushant Sinha for all the details of the rollout in these initial courts.

[13] Time fixed effects include year and month fixed effects separately.

We examine several types of outcome variables. We begin by examining the time taken to case resolution: *Resolved* is a dummy variable equal to one if the case is resolved (and 0 otherwise); *Resolved < 1 Year* is a dummy variable equal to one if the case is resolved in less than one year after its filing (and 0 otherwise). We also look at the parties contesting the cases. *Government* equals one if the petitioner or the respondent is a government organization. We also consider the progression of cases from the lower district court to the upper high court in the form of appeals. For these cases, we examine whether the case was allowed (*Allowed*), appealed (*Appealed*), dismissed (*Dismissed*), disposed (*Disposed*), overturned (*Overturned*) or withdrawn (*Withdrawn*).

Since Kanoon makes it easier for all stakeholders to examine past cases of relevance – a key feature of a common law system – we also examine a set of outcome variables that measure the links between a case and other cases that may have occurred prior to this case, or going forward. *Backward citations* measures the number of (past) cases a judgement is citing. *Forward citations* is a similar measure that measures the number of times a judgement is cited in the future. *Self backward citations* is the number of times a judgement is citing cases from the same court in which it was heard. *Self forward citations* is the number of times a judgement is cited in the future by cases in the same court. *Degree centrality* is a measure of the number of cases a particular case is linked to (either citing or cited by). *Eigenvector centrality* is a measure of how influential a case is i.e. either citing more influential cases or being cited by more influential cases (here influence can be interpreted to be the number of cases it cites or gets cited by). *Square concentration* is measured as the square of the share of the number of citations of a particular case in a particular year. Summing over the squared concentrations of all the cases in a given year gives us the HHI index for that year.

Next, we adapt this two-way fixed-effect (TWFE) model that is intended for cases to aggregated measures of the performance of courts:

$$Y_{ct} = \alpha + \sum_{j=-4}^{4} \beta_j(\text{Kanoon}_{jc}) + \delta_c + \gamma_t + \varepsilon_{ct} \tag{2}$$

where Y_{ct} is an observed outcome of court c at time t, and the remaining variables are defined as for Equation 1. We consider a broad range of measures of court efficiency: the number of filings, the number of resolved cases, the number of pending cases, the backlog, the mean age of decided cases, the mean age of pending cases, the clearance rate and the time taken to disposal.

Finally, we inspect the downstream impact of Kanoon on the firms. For this, we perform an event study analysis on a panel of Indian firms. We consider the following specification:

$$y_{ft} = \alpha + \sum_{j=-4}^{4} \beta_j(\text{Kanoon}_{jcft}) + \delta_c + \gamma_t + \sigma_f + \varepsilon_{ft} \tag{3}$$

where y_{ft} is the the financial indicator of firm f for financial year t, β_j is a set of dummy variables that denotes the years before or after the date of launch of Kanoon at c in year t, δ_c, γ_t and σ_f are court, year and firm fixed effects respectively. We estimate this equation in two ways. First, we examine the full sample of firms. Next we estimate the sample of firms that actually have filed cases, as identified in the Kanoon data.

The coefficients of interest to us in both the case-level, aggregated court-level regressions and firm-level regressions are β_j where $j = -4, \ldots, 4$. In order to interpret the coefficients $\beta_1, \ldots, \beta_4$ as the average treatment effects on the treated (ATT) of the introduction of the Kanoon platform on the outcome variables, we make the parallel trends assumption i.e. in the absence of treatment, the difference between the adopters and non-adopters remains constant over time. We also assume that the court-level average treatment effects are homogeneous across treated courts and over time. We discuss the possible concerns with these assumptions, and our proposed solutions, below.

5.1 Econometric Challenges

The specifications above eliminate some specific sets of confounding factors in the impact of Kanoon. The inclusion of court and year fixed-effects rules out the possibility that Kanoon's observed impact is induced by

some specific court-specific factors that are evolving over time, such as the adoption of internet and technology systems. This is important considering that the Indian judiciary is a single integrated common-law system with a single set of laws and operating procedures throughout the country. This framework also allows us to rule out the role of temporal trends such as macroeconomic fluctuations, changes in internet regulations, digital privacy laws, etc. To the extent that such factors might affect all courts in a similar way, year fixed effects allow us to rule out such concerns.

Causal identification of the impact of Kanoon on outcomes however, hinges on the independence of Kanoon's rollout timeline and thus, the eCourt platform making summaries available online. This assumption would be violated if the Kanoon rollout coincided with a substantive change in law, a change in the judicial functioning, or if it followed closely the digitization of the courts itself. If every time a court digitized and started to publish case level data online, Kanoon followed closely and included the court in its database, we could not extract the relative weights of the causal effect of Kanoon and the causal effect of digitization.

Here it is important to note that the eCourts web hosting program was launched after the significant period of our study. The cases uploaded in the first 5 years of the digitization initiative were those that had been previously been decided into the public domain. Moreover, as Indian Kanoon was developed and launched independently from governmental initiatives, there is no obvious coordination of timing and thus no clear relationship between the outcomes measured and the new service of interest.

That being said, the order of expansion across states may be correlated with other confounding factors. We assess the presence of unforeseen or unmeasurable confounding variables by examining (after accounting for all relevant controls) the trend of a given outcome over time – prior to the introduction of the Kanoon treatment. We assess the validity of the parallel trends assumption by comparing groups which have not received treatment yet against each other. Our dynamic model includes four years prior to the launch of Indian Kanoon (in a given jurisdiction) in each of our event studies. We normalize outcomes to reflect changes in the dependent variable of interest relative to that variable one year prior to the arrival of Indian Kanoon.

We conduct some placebo exercises suggested by De Chaisemartin and d'Haultfoeuille (2020). The Placebo estimates are obtained by assuming that instead of the treatment happening at t, it occurred at time t-k where k $\in \{1,2,3,4\}$. We also present the results using a specification that does not rely on such parallel trends assumption to deliver consistent estimates.

Another challenge to causal inference is the issue of heterogeneous treatment effects. Recent literature in econometrics has demonstrated that TWFE models such as ours can deliver consistent estimates only under relatively strong assumptions about homogeneity in treatment effects. In our case, we might suspect that Kanoon might have stronger or weaker effects when employed in courts with quite different underlying characteristics. Imagine legal system participants in poorer areas rely more heavily on Kanoon, or that Kanoon helps provide timely information specific to a given jurisdiction only when high quality, low-cost Internet services are commercially available. Given that jurisdictions assigned different Kanoon rollout dates are in fact poorer or richer, and have different markets for web access, the TWFE model cannot identify the causal effect of Kanoon on the 'average' Indian court jurisdiction.

To address this identification problem, we implement a re-weighting at each time interval of all groups which (at that time) have yet to be treated against groups which have been treated. We follow the methodology proposed in Sun and Abraham (2021). This method involves estimating the underlying weights on cohort-specific average treatment effects with auxiliary regressions to remove contamination from spillover effects from earlier time-periods (Sun and Abraham 2021).[14]. This method is similar to other proposed corrections in recent literature (see for example, Borusyak and Jaravel 2017, Callaway and Sant'Anna 2020, De Chaisemartin and d'Haultfoeuille 2020 and Goodman-Bacon 2021). Our element-wise difference-in-differences (DID) estimator is consequently an unbiased and consistent estimator for the causal average treatment on the treated (ATT) of each group of courts treated with Kanoon at the same points in time ('cohort'); by weighting these estimators based on their cohort's share of the untreated at each point in time, we report the causal effect of Kanoon in the context of interest, without needing to assume away heterogeneous treatment effects.

[14]We use the STATA package entitled "eventstudyweights" to conduct this analysis (Sun and Abraham 2021)

6 Results

We present and interpret our baseline estimates of the causal effect of Kanoon in three broad areas: (1) The efficiency of courts; (2) Outcomes of cases from lower courts that are appealed at higher courts; and (3) Financial status of firms.

In order to test for pre-trends and to explore whether there is a sharp discontinuity on the year in which Kanoon was rolled out in a state, we estimate an event-study version of the TWFE model with indicators for distance to/from the Kanoon rollout. Specifically, rather than grouping cohorts before and after the rollout of Kanoon in a state in two coarse categories, we allow courts to be affected differently depending on the distance between the particular year and the year of Kanoon rollout. We treat cases filed in the year just before Kanoon was rolled out in the court as the omitted category and compare them to those filed in the remaining years. We also explore the existence of pre-trends in a set of placebo exercises suggested by De Chaisemartin and d'Haultfoeuille (2020) – we present these results for all specifications in the Appendix. Finally, we also present the results using a specification that does not rely on such parallel trends assumption to deliver consistent estimates.

6.1 Impact on Efficiency of Courts

We present the impacts of Kanoon on cases, and then aggregate measures of court-efficiency for both the high-courts as well as the district courts.

6.1.1 High Courts: Case Analysis

Table 2 presents results of the two-way fixed effects estimators on case-level data for 14 High Courts. We use well-defined Kanoon rollout dates of the courts to estimate its impact, building up to our preferred specification with all fixed-effects and controls for the first dependent variable, a dummy variable that measures whether a case in our data is resolved (Columns 1-4). The results suggest that cases that were filed during the first and third year after the inclusion of their High Court on Kanoon are significantly more likely to be resolved compared to cases which are filed during the year before the Kanoon rollout. These effects are modest and represent a 1-2% increase in case resolution compared to the prior year. Interestingly, the effect three years after Kanoon rollout is larger than the significant effect in year 1. In column 5 we investigate the effect on fast resolutions, which we define as cases being resolved during the first year after their filing in the high court. Here, one observes a statistically significant effect only for cases filed during the year following the Kanoon rollout of the court. There, the likelihood of a case to be resolved within one year is increased by 2.2%. Besides this immediate effect, there are no statistically significant effects in the longer run.

Looking at columns 4 and 5 together, we observe an immediate but only short term impact of a High Court's Kanoon rollout on the probability of being resolved during the first year after their filing but a medium term impact on the overall probability of being resolved. This can be interpreted as suggestive evidence for agents needing some time to learn about Kanoon. Not everyone might be aware of Kanoon right after its rollout or people might be aware but haven't yet started using it. Then they still file the same cases as if there would not have been this additional source of (free) information. But during the year, they learn about it and use the additional information to update the beliefs and expectations about the outcome of their case. This could lead to potentially more people willing to withdraw their case or to settle out of court. (See for instance Woodruff, Sadka, and Seira (2020) for how more accurate information decreases the length of cases in court and increases their rate of settlements.)

On the other hand, once people have these information ex-ante, before filing or appealing a case in a High Court, this can change the set of cases present in the court. This can explain why cases filed right after the Kanoon rollout see an increase in their likelihood of being resolved during the first year after their filing but not in their total likelihood of being resolved until the end of our sample period. If the set of cases does not change right after the rollout, parties do not benefit further from Kanoon besides the fact that the additional information

helps to resolve them faster (potentially via the channel of withdrawals and settlements.) But these cases would have anyhow been resolved in later years. But once petitioners, respondents and their advocates have learned about Kanoon, they have this information prior to the filing, which leads to cases potentially not being filed or being settled out of court, given that actors can have a more accurate probability of winning, or alternatively new cases being filed because petitioners learned about their rights and the outcomes of similar cases to their own. This changes the set of cases filed and present in the courts which then leads to the observed effect that these cases have a higher probability of being resolved.

If this actually leads to a decrease (because people are less optimistic about their winning chance) or an increase (because more people learn about their rights) in the number of filed cases at the court level will be investigated in the next subsection. Before looking at these aggregate court efficiencies, one can observe in column 6 of Table 2 that although the set of cases filed in the High Courts can be impacted by the Kanoon rollout, we do not observe any significant effect on the probability that the government or any governmental body is either the respondent or the petitioner in a case. This implies that the effects we observed in columns 4 and 5 are mainly driven by private-to-private or private-to-firm litigation.

6.1.2 High Courts: Court Efficiency

Next we estimate the impact of Kanoon at the high court level (Equation 2). We consider eight outcomes: the number of filings per court-month, the number of decisions per court-month, the number of pending cases at the end of the month, the number of pending cases at least one year old (backlog) at the end of the month, the average age of decided cases during the month, the average age of all cases pending at the end of the month, the number of cases decided divided by the number of cases filed during the month (clearance rate) and the number of disposed cases during the month divided by the number of pending cases at the end of the month (disposition time). As described in the last section, we use the technique from Sun and Abraham (2021) to adjust the weights in a context of potentially heterogeneous treatment effects. We calculate different court efficiency parameters at the High Court-month level and define the treated observations of a court as all months following the Kanoon rollout of the court.

Coefficients of interest are presented in Figure 6. Note that Kanoon is associated with a slight increase in the number of filings per court-month, though this is not statistically significant. It is also associated with a discernible increase in the number of decided cases in the three years after the rollout. There is also a pronounced decrease in the number of pending cases at the end of any month and the backlog of cases in the post-rollout period. The magnitudes of these effects are noteworthy. In the year of rollout, the number of decided cases increases by 402 cases - this is an increase of 18%. Similarly, the number of pending cases decreases by 5,127 cases, which is a decline of 17%. Similarly, the backlog decreases by 12,279 cases - representing a 43% decline with respect to the pre-Kanoon rollout.[15]

Given that the overall number of new filings does not show any statistically significant increase in the aftermath of the platform's rollout, the impacts on efficiency are likely driven by an increase in the number of cases resolved in the first years after Kanoon's arrival in a given jurisdiction. The particularly large magnitude of the causal effect for cases resolved within a year of filing may suggest that more straightforward cases, or those similar to existing jurisprudence, are more effectively dealt with after Kanoon improves the accessibility of relevant precedents.

6.2 District Courts

To study whether and how high courts' Kanoon rollout impacted district court efficiency, we apply again the method from Sun and Abraham (2021). We calculate the same court efficiency parameters as we used for the high courts (filings, decisions, pending cases, backlog, average age of decided cases, average age of pending

[15]The average number of backlogged cases in the high courts in any given month is 301,639 cases. The coefficient in the first year of the rollout is 12,279.

cases, clearance rate and disposition time) at the court-month level. A district court is defined as treated when the high court under which jurisdiction it is, is included on Kanoon.

The results of these regressions are presented in Figure 8. First, one can note that the number of filings decreases slightly during the first years after a high court's Kanoon rollout before returning to its initial and even higher levels, though the confidence intervals of these effect are large and include a zero effect. Second, the number of monthly decided cases shows a two-year period of transition during which the number of decided cases drops significantly, after which estimates revert back to the initial levels.

This large drop in decided cases leads to an increase in the number of pending cases and an increase in backlog (pending cases older than one year), both peaking during the second year after Kanoon rollout. Interestingly, while backlog reverts to initial, pre-Kanoon levels already during the third year after Kanoon rollout, the effect on the number of pending cases is decreasing only slowly before hitting initial levels in the fifth year of treatment. We can interpret this as evidence that the reversion of number of decided cases back to initial levels during the third year is mainly driven by additional decisions of older cases.

These effects are also represented in the findings that the mean age of pending cases drops from the third year after the Kanoon rollout, that the clearance rate first drops but then reverts back and even goes above initial levels and that the disposition time drops (but not statistically significantly) and slowly reverts back to initial levels.

Altogether, we find that the Kanoon rollout of high courts has a significant impact on district courts. In the short run it slows down the judiciary but also reduces the number of filings and the efficiency picks up again in the medium term. Especially, it seems that in the medium term more old cases are decided. However, from this analysis it remains unclear, whether this because the set of cases filed changed with the new source of information and new cases are more complicated or because the additional source of information helps to resolve old cases, for instance because parties update their beliefs and settlement becomes easier.

To interpret these impacts on the district courts we must keep in mind that cases from the lower courts are not included in the Kanoon database. What is important here is that legal information became available to stakeholders in these courts - all decisions from the high courts are binding on the lower courts in India's justice system. Access to Kanoon likely provided all parties contesting a case with better access to information. This likely initially increased the time needed to settle a case, resulting in more pending cases and greater backlog in the system. Eventually however, greater efficiency led to an improvement in the clearance rate. Other explanations are also possible for these effects. For example, access to Kanoon may lead to overconfidence of the parties, which can decrease the number of out of court settlements, which consequently increases the number of open cases.

To better understand the impacts of Kanoon on actual outcomes of the system, we now examine the cases from the lower courts that are appealed at the high courts.

6.3 Appeals from District Courts at High Courts

The High courts of India have appellate jurisdiction, i.e. the authority to review a case decided by a lower court and either overrule or uphold the judgements of the lower courts. If Kanoon improves the capacity of litigants to argue their cases at the lower courts, then it is plausible that even in the transition period and beyond, the rollout of Kanoon could increase the likelihood that cases from lower courts are heard and decisions by the lower courts are overturned or reversed. Alternately, better argued cases in the lower courts would lead to higher quality judgements that would be associated with a lower likelihood of an appeal. Overall, we conjecture that access to the Kanoon platform can affect the number of appeals and also change the likelihood of a reversal conditioned on being appealed. The direction of impact, and the magnitude of impact, will largely depend on who gains more from the platform, the courts or the litigants, which is ultimately an empirical question.

To explore this further, we identify the cases that were filed in the district courts and then later appealed in the High Courts during our period of study. We linked the records from the lower to the upper courts on the basis of official case numbers in the eCourts system and identified appealed cases in each state and year, and also identify

the dates that the cases were registered and decided.[16] Cases in the appeals sample are then further classified as "Allowed", "Withdrawn" or "Rejected".[17] Of the cases that are allowed, official rules specify that appeals can either be dismissed or disposed. Dismissed cases are those that the court decides that is outside of its jurisdiction - in this case the lower court decision stands. Disposed cases are those that have been heard and decided by the higher court. We define a case as "Overturned" if it was allowed and then subsequently neither dismissed nor rejected. Finally, we also calculate the percentage of appeals which are Allowed, Rejected, Withdrawn, Dismissed or Disposed.

We rely on the same empirical framework as the previous regressions. Since the launch of Kanoon may impact the total number of cases as well as the percentage of cases that are allowed, we first examine the impact of Kanoon on the total number of registrations, decisions, appeals (by registration and decision dates) and percentages of cases that are appealed (again, by registration and decisions dates. Results are presented in Figure 9. These results suggest that there is indeed an increase in the number of registrations and appeals in the years that follow the Kanoon rollout. The results in the bottom row suggest that the percentage of cases appealed by registration date shows a more pronounced increase than by decision date (Figure 9). This is consistent with the lower court litigants benefiting from greater time to access legal information from the date the lower court case begins as compared to litigants who only have access when the case closes.

Next we present the results for the dependent variables that measure the outcomes of the cases. We measure these separately as counts of cases (Figure 10) and percentages (Figure 11). Note that in the aftermath of the rollout of Kanoon, we see a statistically significant increase in the number of cases allowed, as well as the number of cases that are dismissed; the dismissals that peak in the second and third year after the rollout (Figure 10). We also see increases in other outcomes, but they are not statistically significant.

We see different results when the outcomes are in percentage terms (Figure 11). Here we see a statistically significant increase, about 3–6% in magnitude over the years after the launch of the Kanoon platform, in the percent of cases that are withdrawn. These effects peak a year after the rollout. We also see a 2–6% decline in the number of allowed cases in the years after the rollout, though these effects are only significant in the first and fifth year. It is striking that conditional on being allowed, we see a 3–6% decline in the percentage of cases that are dismissed and that this is statistically significant and at its lowest value five years after the rollout. This reduction of dismissals is noteworthy. It suggests that the better availability of legal information may have not only increased the number of appeals, but also their quality, for they are more likely to be heard within the court and be overturned.

These results suggest that Kanoon impacted the pipeline of justice that extends from the lower to the upper courts. In aggregate, the results suggest that the effect may be largely driven by the litigants: greater access to legal information affects their decisions to file appeals – this mechanically leads to more rejections, withdrawals, allowances, dismissals and disposals. But it also allows them to file better quality cases.

In other words, Kanoon may have enabled the stakeholders to make better arguments and better argue their cases in India's common law system. The previous results on the improved efficiency and productivity of the courts suggest that this effect may be driven by the improvements in the performance of the courts. The improvements in resolution rates of the cases, and the declines in backlog and pending cases at the high courts left a greater bandwidth to hear these cases. Later in this paper, we rule out another mechanism, i.e. that Kanoon changed the way cases were cited.

[16] We do this in three steps. First, for every year-month between January 2001 and December 2018, we count the number of cases that are registered and decided in all district courts in a state. Of the cases that are registered, we then count the number of cases that are appealed at a high-court (at any time in the sample). We do the same but for cases decided (and not registered) in a month-year. We then calculate the share of the total registrations (decisions) per state, year and month which are appealed (these are referred to as % Appealed by reg. date and % appealed by due date respectively).

[17] These are official terms in the eCourts system that are applied by the e-filing administrator at the time of the review of the paperwork in the case (see https://ecourts.gov.in/ecourts_home/static/manuals/efiling-User-manual.pdf): "Allowed": the paperwork is in order and the case is deemed suitable for processing at the High Court. "Withdrawn": the party that is filing the case decides to no longer pursue the case and accepts the lower courts decision. "Rejected": the paperwork has "defects that are not of curable nature".)

6.4 Impacts on Firms

We linked firm-level data to the legal data by matching the eCourt case level data to the firms in the Prowess database. We restrict our sample to firms for which we have financial information for all years 2006-2015 and, therefore, abstract from entry and exit decisions of firms. We focus on several financial parameters which might be impacted by the decline in the cost of legal information to conduct the event study analysis; assets, income, legal charges, audit fees, bank guarantees and bad debts. Financial variables are measured for financial years and are standardized using an inverse hyperbolic sine transformation.[18] We define as $t = 0$ the first full financial year after the Kanoon rollout of the high court in which judicial area a firm is located in. To address the econometric concerns raised earlier, we once again run the event studies using the corrections from Sun and Abraham (2021). The estimation controls for firm and year fixed effects. Standard errors are clustered at the state level.

We run our analysis on two different samples of the matched data. First we estimate the general equilibrium impact of Kanoon on all firms, regardless of whether they had had any cases within our considered time frame.[19] We then estimate the partial equilibrium effects by restricting our analysis to firms having at least one case at the courts during the 2006-2015 time period. Figure **??** presents both general and partial-equilibrium results.

In both, general and partial equilibrium, settings, the Kanoon rollout had large and significant effects on firms' financial variables. We observe similar effects in magnitude in both settings for legal charges, bank guarantees and bad debts. The effect for legal charges grows over time, during the first financial year after Kanoon rollout legal charges are about 10% increased and five year later even by around 80%. Bank guarantees and bad debts on the other hand, see a sharp decline after the Kanoon rollout.

The general equilibrium results suggest a significant increase in assets and legal charges of firms and to a decrease in income, audit fees, bank guarantees and bad debts. The size of the effect is particularly large for assets. When including all firms in the regression (Panel ??? of Figure **??**), assets increase by 22.14% in the year after Kanoon rollout ($e^{0.2} - 1) \times 100 = 22.14$) and this number increase during the second year to 49.18%. ($e^{0.4} - 1) \times 100 = 49.18$). We see similarly large effects for legal charges as well as audit fees. There is also a similarly large decline in the funds that are guaranteed by banks and the size of bad debts reported by firms. We also see similar effects in the sample of firms that has at least one case filed at the courts.

These results suggest that the reduction of search costs through the introduction of free legal information had a positive impact on the balance sheet of firms. This result is consistent with previous literature. Bloom et al. (2013) demonstrate that firms operating in India face a complex economic, regulatory, and legal landscape for doing business. Bertrand and Crépon (2021) find that providing firms in South Africa with information about labor regulation via newsletters and access to a specialized website resulted in a 12% increase in employment in just six months.

How may greater access to legal information affect firms? Prior to the launch of Indian Kanoon, accountants and managers at firms largely relied on lawyers to provide guidance on accounting practices. With the arrival of this database however, they were likely able to independently and efficiently access the full body of laws that affect their businesses. Our previous results already demonstrated that the rollout of Kanoon was not associated with any increases in the number of filings. We thus believe it is unlikely that the database changed the number of cases being contested by the firm (or against the firm).

We also conducted the placebo tests as suggested by De Chaisemartin and d'Haultfoeuille (2020). Results are presented in Figures A6, A7, A8 and A9. The placebo test results of the aggregate efficiency measures of High Courts and District Courts suggest the absence of the pre-trends for all the outcome variables considered by us as shown in A6 and A7.

[18] A financial year is from April 1st to March 31st of the following year.

[19] Labelling these regression as general equilibrium is a slight but common misuse of language, as we do not allow for entry or exit of firms. We think the label is still informative, as we want to see the effect on firms which are not directly involved in legal charges and therefore impacted by Kanoon.

7 Did Kanoon Change Citation Practices?

Our results thus far suggest that Kanoon increased the likelihood of the timely resolution of cases and also improved the productivity and efficiency of courts. It also enabled firms to optimize their finances. But beyond productivity and efficiency, could it also be that Kanoon changed the way that information is processed, analyzed and cited within the legal profession? This would be an alternate, but nevertheless powerful mechanism that could explain the results of the previous sections. We explore the possibility through the analysis of cases on Kanoon as well as the reputable AIR database.

7.1 Kanoon cases

We explore this question by examining the content of the cases that were uploaded on Indian Kanoon, and the specific citations in these cases. Table 3 presents results on backward citations that build up to our preferred specification (Column 4). Table 4 presents the regression results for this preferred specification for all outcomes of interest. The results in Table 3 suggest that Kanoon has a positive impact on the number of backward citations by year 3 after the rollout. The result is significant at the 1% confidence level in full specification with all the fixed effects (Column 4). This suggests that having greater information at hand for lawyers and judges led to more legal support included as citations by the third year of the rollout. We note however, that the magnitude of the effect is quite small, it is only observed in a single specification and the effect is quite delayed: there is less than 1 extra citation three years after the rollout.

Additional measures of the information content of cases are explored in Table 4. The results column 5 in Table 4 suggest that Kanoon has a positive impact on the eigenvector centrality in the year of its rollout and that this effect is significant at the 5% level in the year of rollout. There is however, no other impact on any of the other citation variables which we considered.

In light of these results, we believe it is extremely unlikely that any of the observed impacts of Kanoon were driven by sustained or pronounced changes in the citation styles or citation patterns of the litigants or lawyers. In other words, the system of referencing prior precedents in India's common law system does not appear to be likely to drive most of the results seen in this paper. We believe that it far more likely that it was the decline in the processing times of cases, and the greater efficiency of the system that was benefited most by Kanoon.

7.2 Analysis of AIR Cases

The last subsection studied the impact of Kanoon rollout on citation patterns of High Courts. The analysis is based on the cases uploaded to Kanoon, so relying on the assumption that the cases uploaded to Kanoon are similar between those which were decided before the Kanoon rollout and those decided afterwards. To relax this assumption and exclude that the observed null effects on citation patterns are driven by differential case upload, we now focus on a very specific but important subset of cases.

We limit our analysis to cases deemed to constitute important precedents by a committee of juridical experts. Once approved by this committee for citing by judges, the cases enter the AIR database. This database serves as the important sample that sets policy (by influencing future judges). We conduct our analysis of the impact of the free Kanoon legal search on this sample to keep similar the composition of cases before and after Kanoon is rolled out. This allows us to study the causal impact of reducing information frictions on rule of law.

Figure 13 presents results for these cases. We note that Kanoon seems to facilitate the self-citations of AIR cases especially within the first two years of its rollout. Apart from this, there is not much effect of Kanoon on the citations of or by AIR cases. We interpret this as additional evidence that the arrival of Indian Kanoon did not induce significant changes in the processes of information curation within India's common law system. Rather, it was the productivity and efficiency gains within courts and firms that is likely to generate the results seen in this paper.

8 Conclusion

Can digital platforms offering free legal information improve the performance of courts and the justice system more broadly? We explore this question by estimating the impact of Indian Kanoon, a free legal search engine that was launched in India in 2008 by an overseas graduate student who had no ties to any branch of the Indian government.

We use a simple event study framework that exploits the staggered rollout of the platform across different states of the country to explore the impact of this platform on courts, outcomes of the processes of justice, formal sector firms and the information content of the cases themselves.

In the high courts, the launch of Kanoon is associated with an 18% increase in the number of decided cases, a 17% decrease in the number of pending cases at the end of any month and a 43% decrease in the backlog of cases in the post-rollout period. Given that the overall number of new filings does not show any statistically significant increase in the aftermath of the platform's rollout, the impacts on productivity are likely driven by an increase in the number of cases resolved in the first years after Kanoon's arrival in a given jurisdiction. The particularly large magnitude of the causal effect for cases resolved within a year of filing may suggest that more straightforward cases, or those similar to existing jurisprudence, are more effectively dealt with after Kanoon improves the accessibility of relevant precedents.

In the district courts, we find that the number of filings decreases during the first two years after the Kanoon rollout before returning to its initial levels. The number of pending cases and backlog however, increases and the clearance rate decreases during the first year after the rollout. This suggests a possible increase in litigation time from access to information, but it could also be driven by a greater willingness to file cases at the grassroots level of justice.

The rollout of Kanoon also affects the outcomes of justice. We find that appeal cases that go from the lower district courts to the higher courts are more likely to be allowed and heard. Moreover, the decisions of these cases are also 2–6% more likely to be overturned in the high courts in the years after the launch of the Kanoon platform.

Kanoon also appears to affect the finances of firms with positive impacts on assets and negative impacts on audit fees and bad debts. In the aftermath of the rollout of the platform, firms report a 20–43% increase in their assets and a similar decrease in their legal bills and bad debts.

The analysis of the information content of the cases on Kanoon and other reputable databases suggests that these effects are unlikely to be driven by any major shift in the patterns of citation of cases in India's common law system. Rather, the drop in the cost of information simply increased the efficiency and productivity of the pipeline of justice.

Overall, insights from Indian Kanoon illustrate that the decline in the cost of accessing legal information confers broad benefits to a full range of stakeholders in the courts.

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9 Figures and Tables

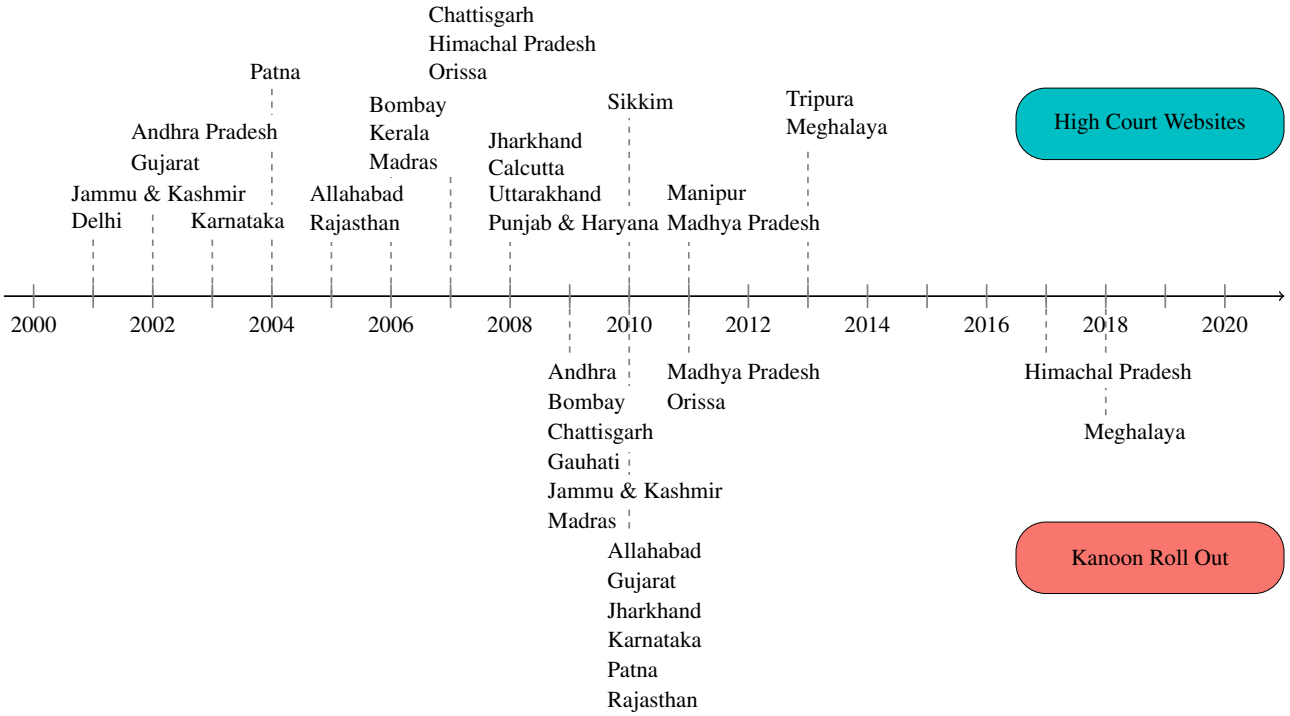


Figure 1: Roll Out Years for High Court Websites (top) and Kanoon (bottom).

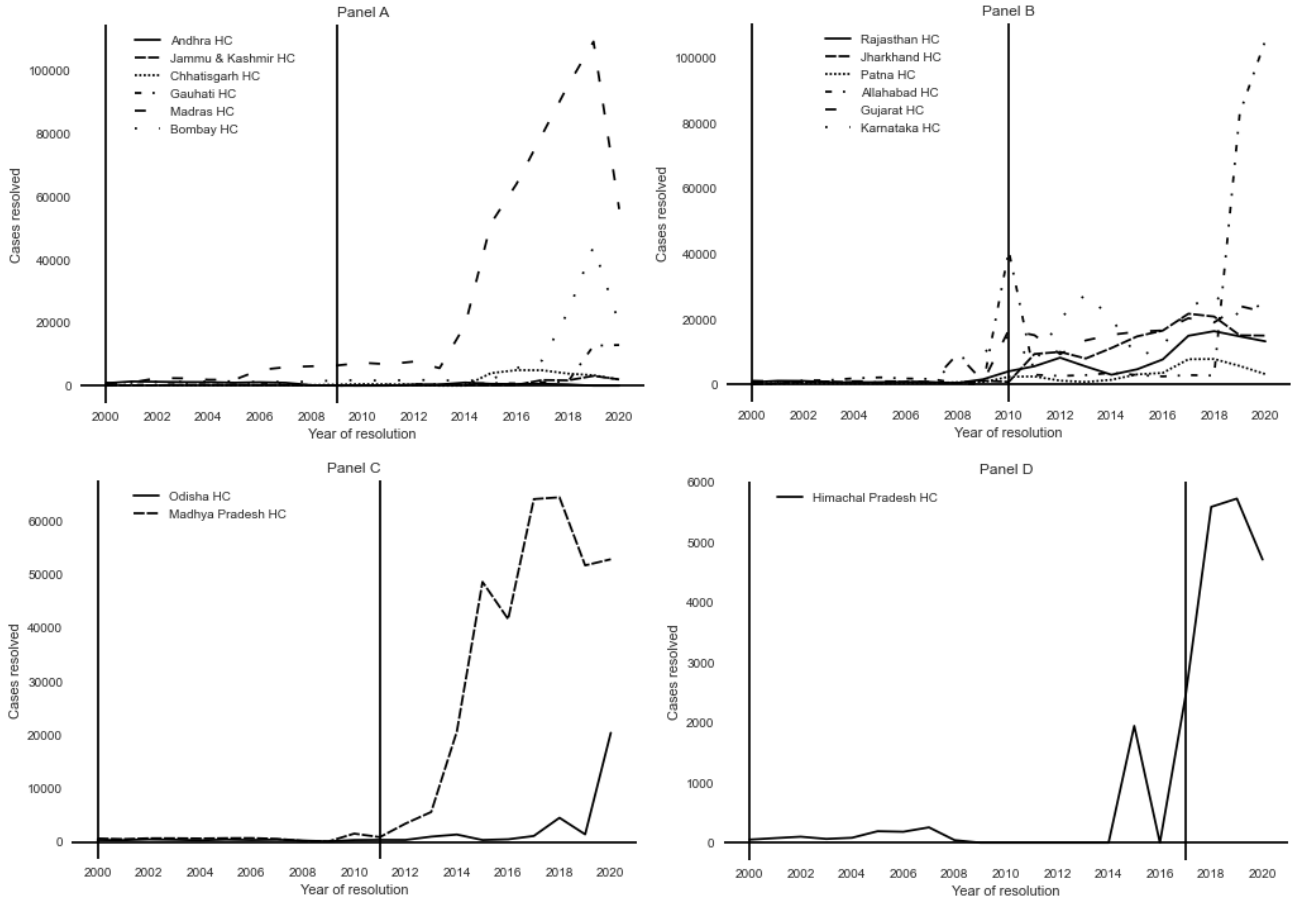


Figure 2: Total number of documents uploaded in Indian Kanoon per year for different rollout years.

Table 1: Summary Statistics

	N	Mean	SD	Min	Max
Indian Kanoon Data					
Backward Citations	196,030	2.81	4.19	1	179
Forward Citations	38,942	3.27	16.28	1	1,621
Backward Self-citations	46,617	1.56	1.33	1	94
Forward Self-citations	27,502	2.76	14.43	1	1,616
Squared Concentration	196,030	21.66	256.92	.00096	10,000
Degree Centrality	2,306,231	0.02	0.05	.00062	1.4
Eigenvector Centrality	2,306,231	0.06	0.12	0	.78
eCourt High Courts Data (Case Level)					
Resolved Cases	11,894,096	0.76	0.43	0	1
Resolved within 1 year	11,894,096	0.50	0.50	0	1
eCourt High Courts Data (State-Month Level)					
Number of Filings (Thsd.)	5,006	2.76	3.43	0.00	54.84
Decided cases (Thsd.)	4,853	2.14	3.76	0.00	182.75
Pending cases (Thsd.)	5,292	452.14	473.52	0.20	2,602.00
Backlog cases (Thsd.)	4,691	28.68	48.42	0.00	438.30
Mean age of Pending cases (Years)	4,979	0.04	0.01	-0.00	0.08
Mean age of Decided cases (Years)	4,853	1.37	1.28	-12.00	10.50
Disposition time (Years)	4,853	16.74	99.31	0.01	1,455.06
Clearance rate	4,853	0.01	0.10	0.00	5.83
eCourt District Courts Data (State-Month Level)					
Number of Filings (Thsd.)	6,500	11.92	21.27	0.00	217.72
Decided cases (Thsd.)	5,259	10.96	22.17	0.00	354.24
Pending cases (Thsd.)	6,612	396.59	714.21	0.00	5,286.06
Backlog cases (Thsd.)	6,612	301.64	568.18	0.00	4,123.98
Mean age of Pending cases (Years)	6,612	3.78	1.44	0.60	7.85
Mean age of Decided cases (Years)	5,259	2.13	1.48	0.00	21.70
Disposition time (Years)	5,259	22.73	99.03	0.00	2,541.55
Clearance rate	5,259	0.53	0.51	0.00	7.76
All India Reporter (AIR) Data (Case Level)					
AIR cases citing AIR cases	23,658	0.11	0.39	0	7
AIR cases citing all cases	23,658	4.47	5.80	1	116
AIR cases citing non-AIR cases	23,658	4.36	5.70	0	113
All cases citing AIR cases	948,144	0.03	0.20	0	9
Non-AIR cases citing AIR cases	924,486	0.03	0.20	0	9
Self-citations of AIR cases (same court)	23,658	0.55	1.14	0	25
Outside-citations of AIR cases (different courts)	23,658	1.18	1.72	0	44
Self-citations - Outside-citations	23,658	-0.63	1.90	-44	19

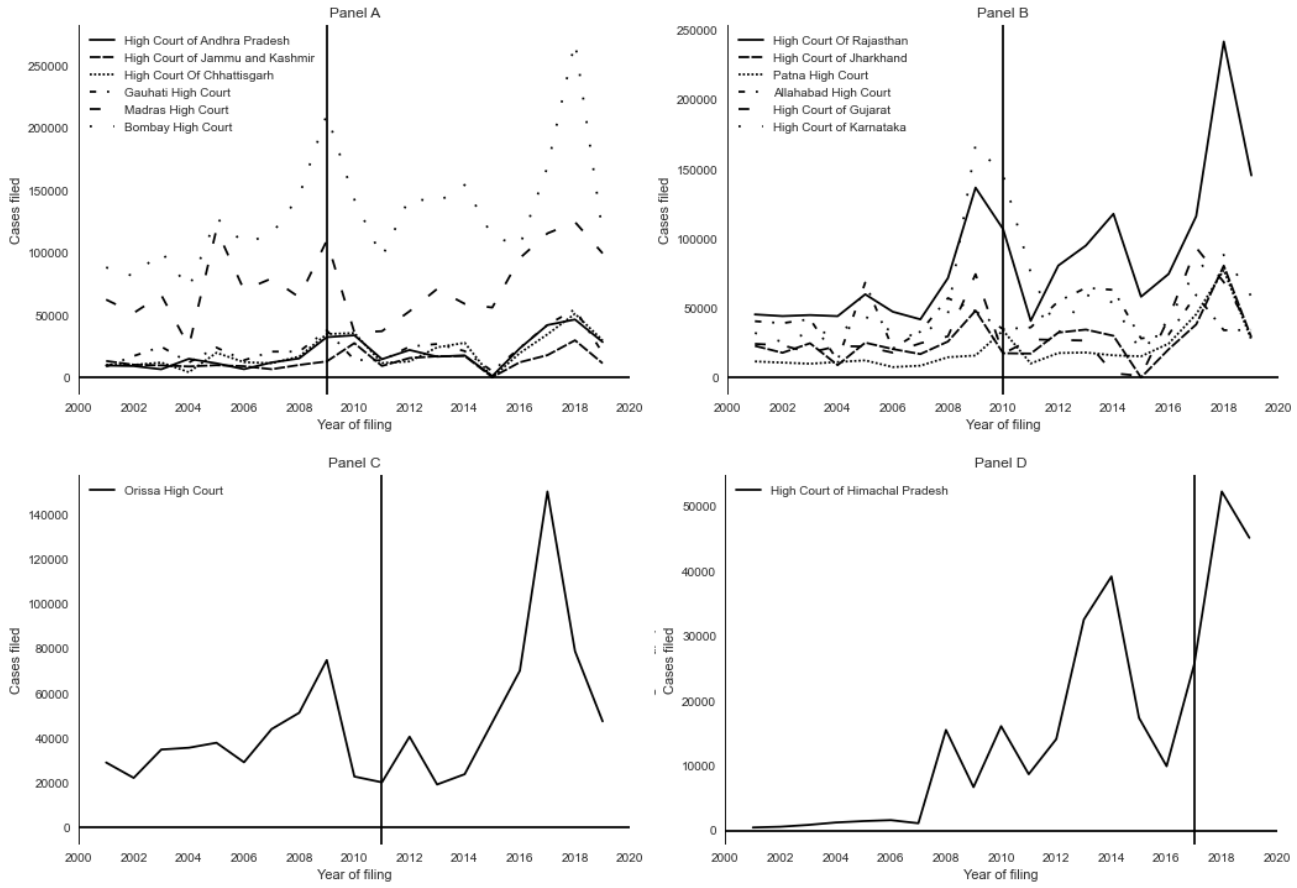


Figure 3: Total number of filings per year by rollout years (eCourts High Court).

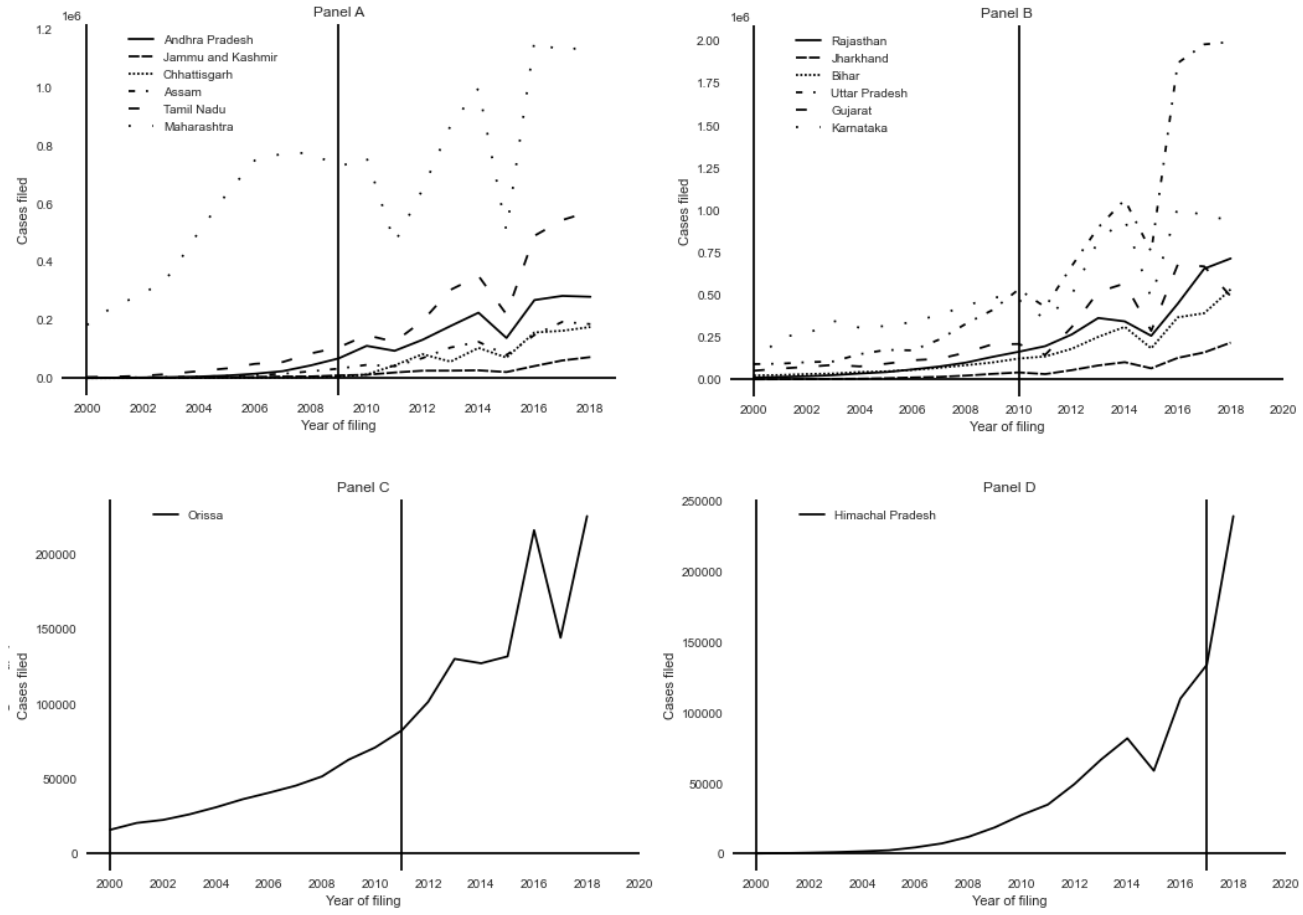


Figure 4: Total number of filings per year by rollout years (eCourts District Court).

Table 2: Effects on Case Characteristics and Outcomes.

	Resolved				Resolved < 1 Year	Government
	(1)	(2)	(3)	(4)	(5)	(6)
Year 3 before Rollout	0.15***	0.0010	-0.0029	-0.0083	0.0064	-0.018
	(0.0281)	(0.0187)	(0.00712)	(0.00768)	(0.0160)	(0.0139)
Year 2 before Rollout	0.14***	-0.00092	-0.0075	-0.012	0.0043	-0.00066
	(0.0251)	(0.0123)	(0.00669)	(0.00745)	(0.0125)	(0.00589)
Year of Rollout	0.13***	0.026	0.0064	0.0092	0.022*	0.010
	(0.0311)	(0.0218)	(0.00689)	(0.00597)	(0.0117)	(0.0142)
Year 1 after Rollout	0.094***	0.022	0.014***	0.017***	0.012	0.0055
	(0.0250)	(0.0246)	(0.00408)	(0.00423)	(0.0213)	(0.0181)
Year 2 after Rollout	0.048	0.0066	0.0048	0.0081	-0.028	0.0091
	(0.0492)	(0.0448)	(0.0215)	(0.0197)	(0.0267)	(0.0191)
Year 3 after Rollout	0.063	0.033	0.023**	0.028***	-0.0096	0.00059
	(0.0362)	(0.0352)	(0.00889)	(0.00769)	(0.0241)	(0.0136)
Court FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes
Court x Year FE			Yes	Yes	Yes	Yes
Month FE				Yes	Yes	Yes
Adj. R2	0.06	0.15	0.18	0.18	0.07	0.11
N	12,791,187	12,791,187	12,791,187	12,791,187	12,791,187	12,791,187

Note: "Resolved" is a dummy variable equal to one if the case is resolved. "Resolved < 1 Year" is equal to one if the case is resolved in less than one year after its filing. "Government" equals one if the petitioner or the respondent is a government organization. The explanatory variables are defined as the difference in days between the filing of a date and the date of Kanoon rollout. E.g. "Year 2 before Rollout" is equal to one for all cases which were filed between 730 and 365 days before Kanoon rollout of their court.

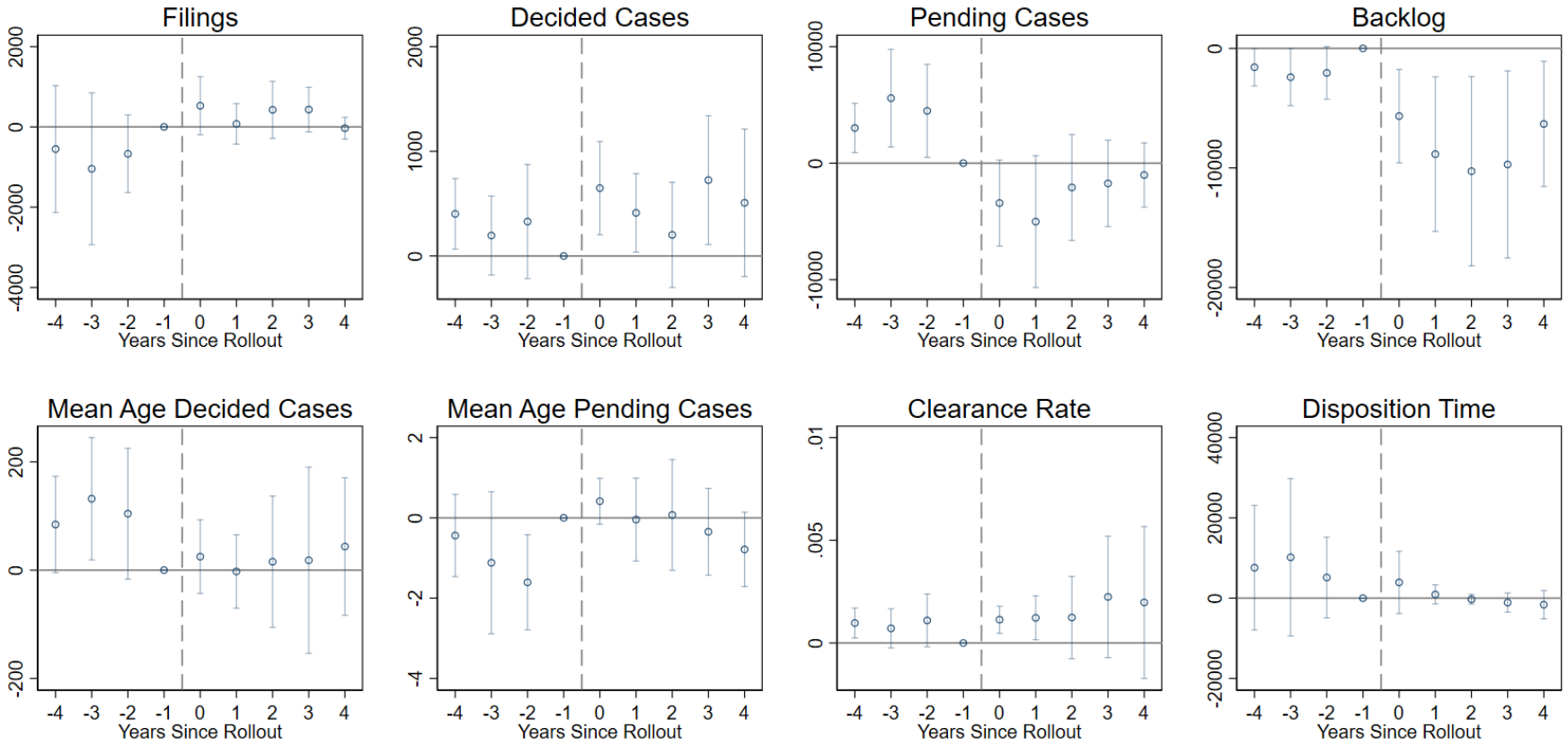


Figure 5: Event Study of Impact of Kanoon Rollout on Aggregate Efficiency Measures of High Courts

Notes: Efficiency measures are calculated at the court-month level. The event studies use the algorithm of Sun and Abraham (2021), where Himachal Pradesh (rollout 04/2017) is defined as control cohort. The estimation controls for state, year, state × year and month fixed effects. Standard errors are clustered at the high court level.

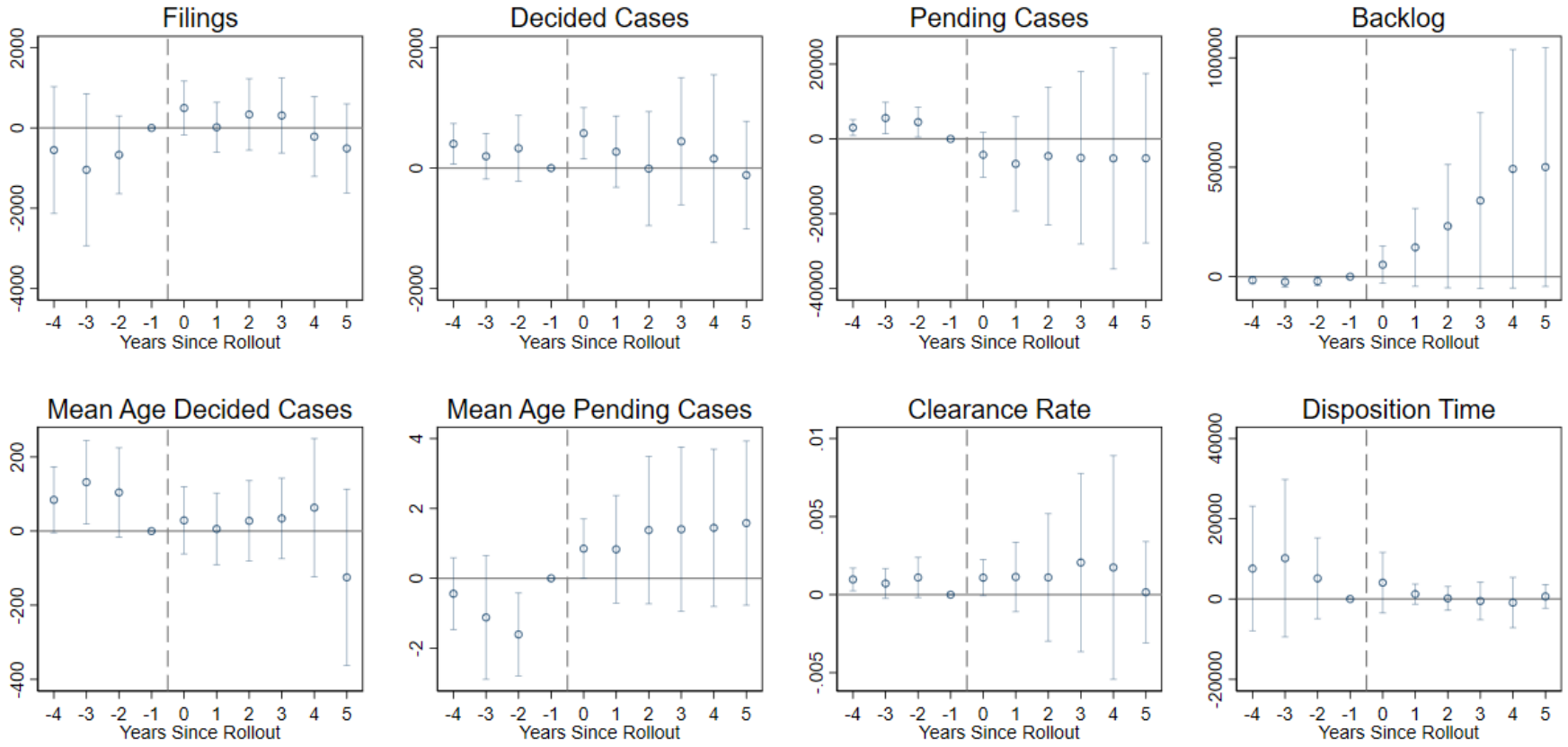


Figure 6: Event Study of Impact of Kanoon Rollout on Aggregate Efficiency Measures of High Courts

Notes: Efficiency measures are calculated at the court-month level. The event studies use the algorithm of Sun and Abraham (2021), where Himachal Pradesh (rollout 04/2017) is defined as control cohort. The estimation controls for state, year, state × year and month fixed effects. Standard errors are clustered at the high court level.

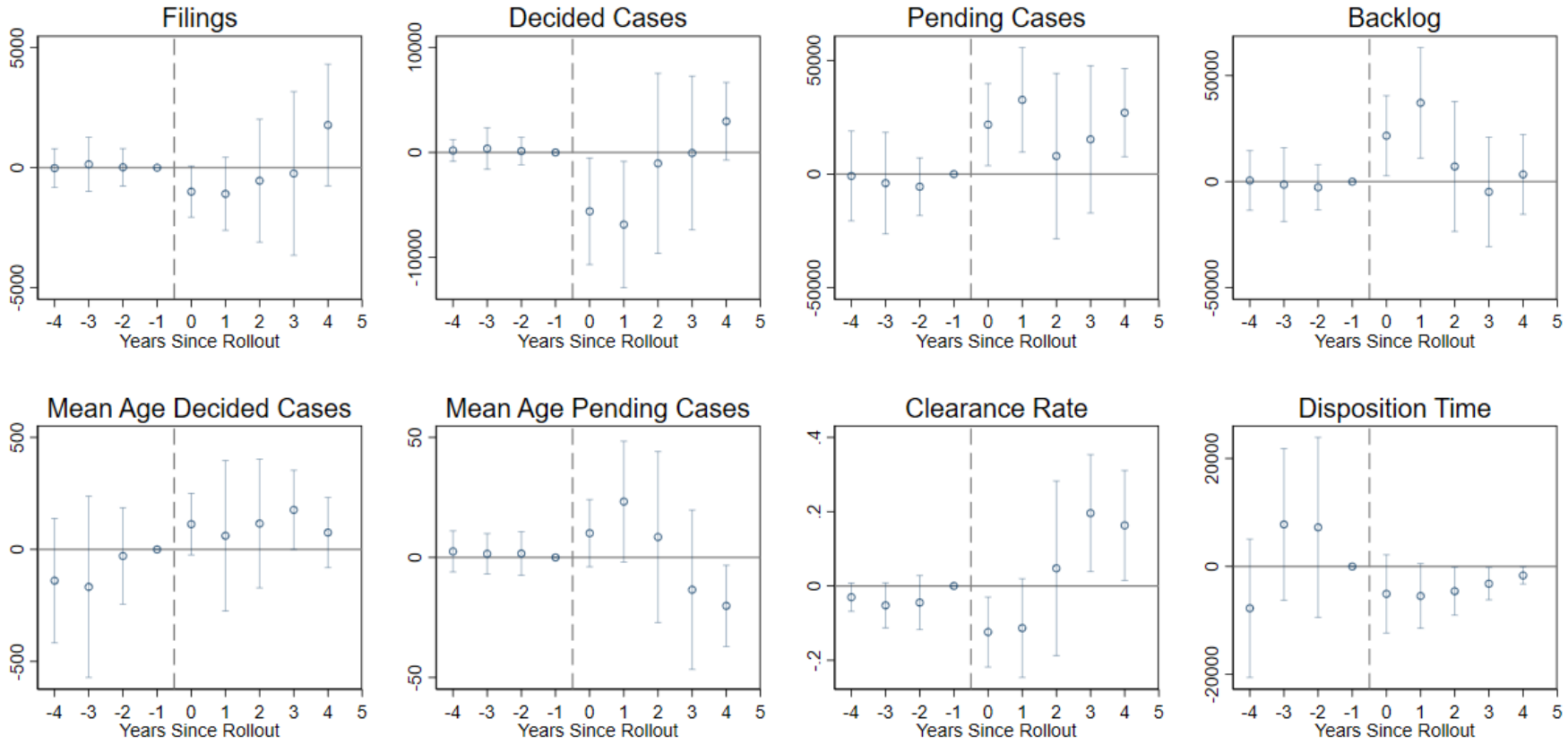


Figure 7: Event Study of Impact of Kanoon Rollout on Aggregate Efficiency Measures of District Courts

Notes: Efficiency measures are calculated at the state-month level. The event studies use the algorithm of Sun and Abraham (2021), where Himachal Pradesh (rollout 04/2017) is defined as control cohort. The estimation controls for state, year, state × year and month fixed effects. Standard errors are clustered at the state level.

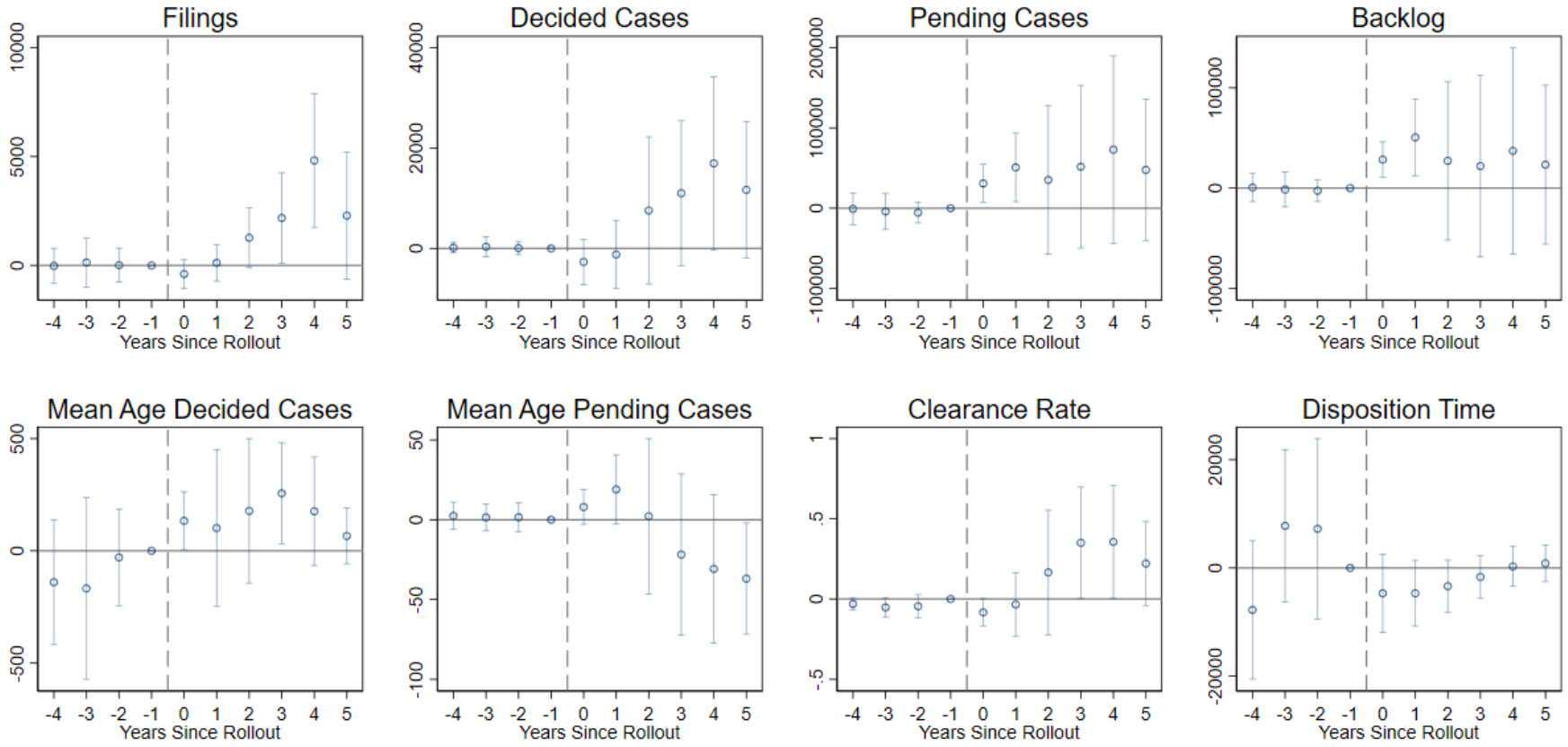


Figure 8: Event Study of Impact of Kanoon Rollout on Aggregate Efficiency Measures of District Courts

Notes: Efficiency measures are calculated at the state-month level. The event studies use the algorithm of Sun and Abraham (2021), where Himachal Pradesh (rollout 04/2017) is defined as control cohort. The estimation controls for state, year, state × year and month fixed effects. Standard errors are clustered at the state level.

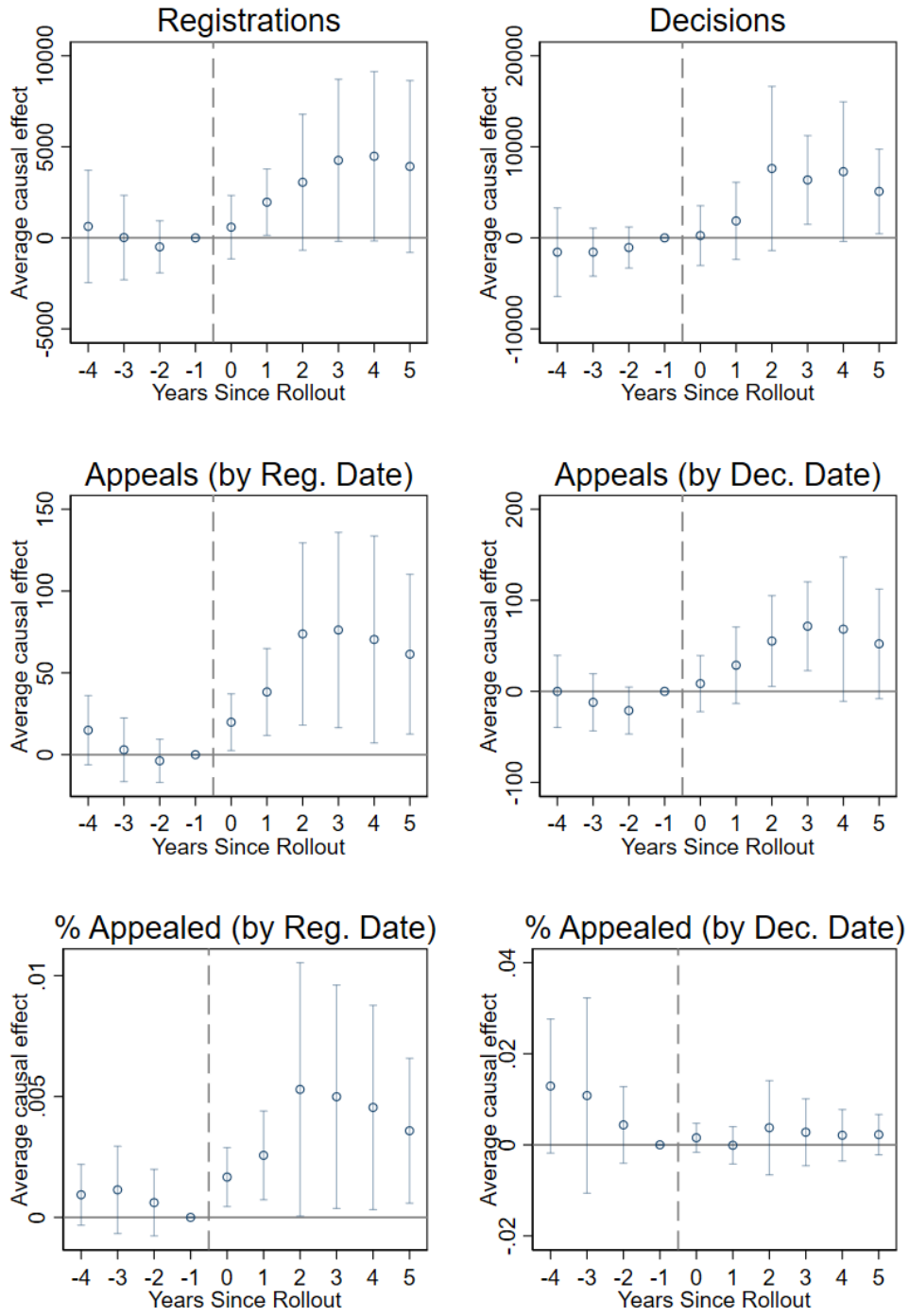


Figure 9: Event study analysis of the impact of Kanoon rollout on Appeals of district court cases.

Notes: All variables are calculated at the state-year–month level. The event studies use the algorithm of Sun and Abraham (2021), where Himachal Pradesh (rollout 04/2017) is defined as control cohort. The estimation controls for state, year, state × year and month fixed effects. Standard errors are clustered at the state level. The panels on the left use the district court registration date to calculate year and month while the panels on the right use the decision date of district court cases.

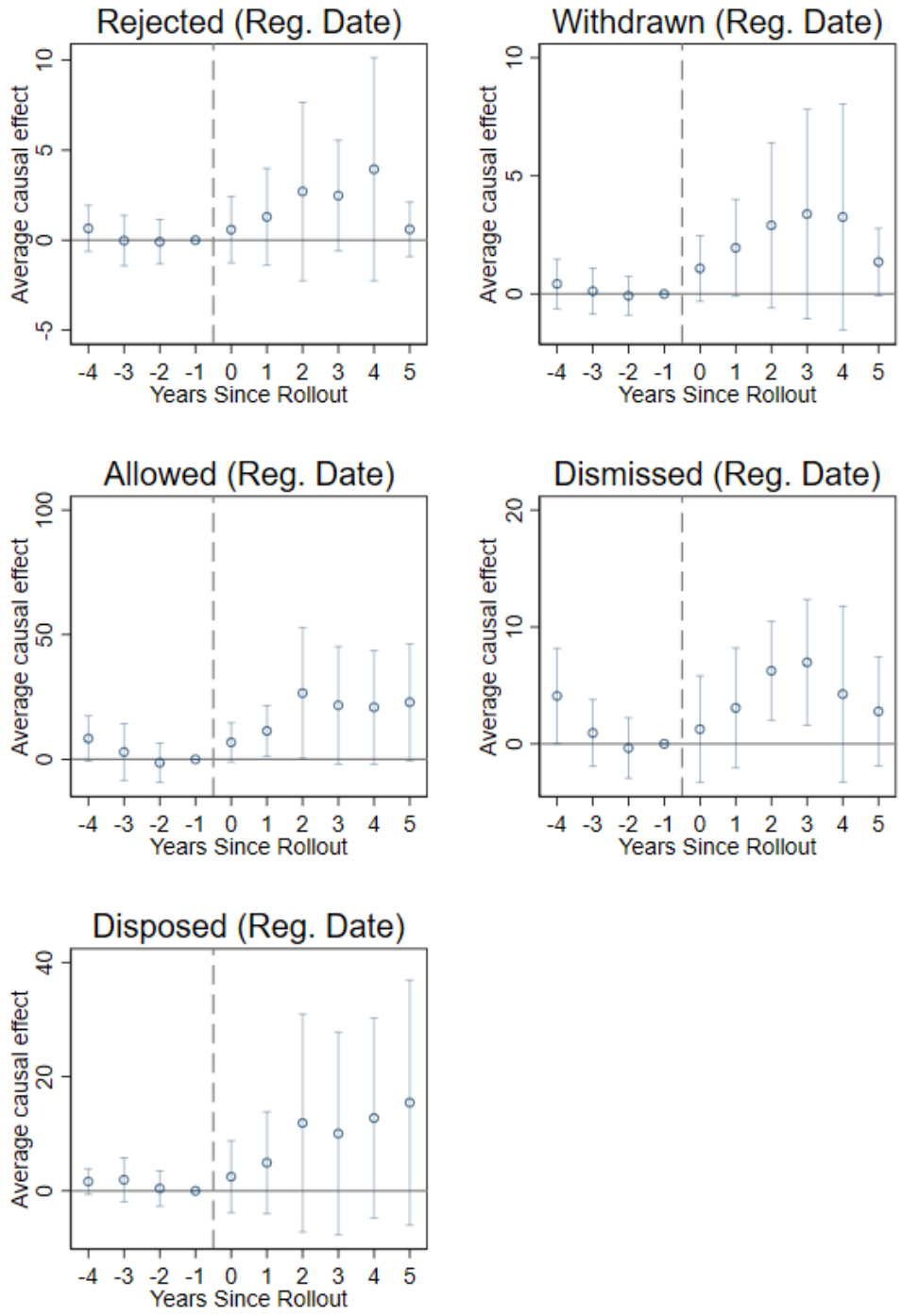


Figure 10: Event study analysis of the impact of Kanoon rollout on appeal outcomes based on the district court registration date.

Notes: All variables are calculated at the state-year–month level. The event studies use the algorithm of Sun and Abraham (2021), where Himachal Pradesh (rollout 04/2017) is defined as control cohort. The estimation controls for state, year, state × year and month fixed effects. Standard errors are clustered at the state level.

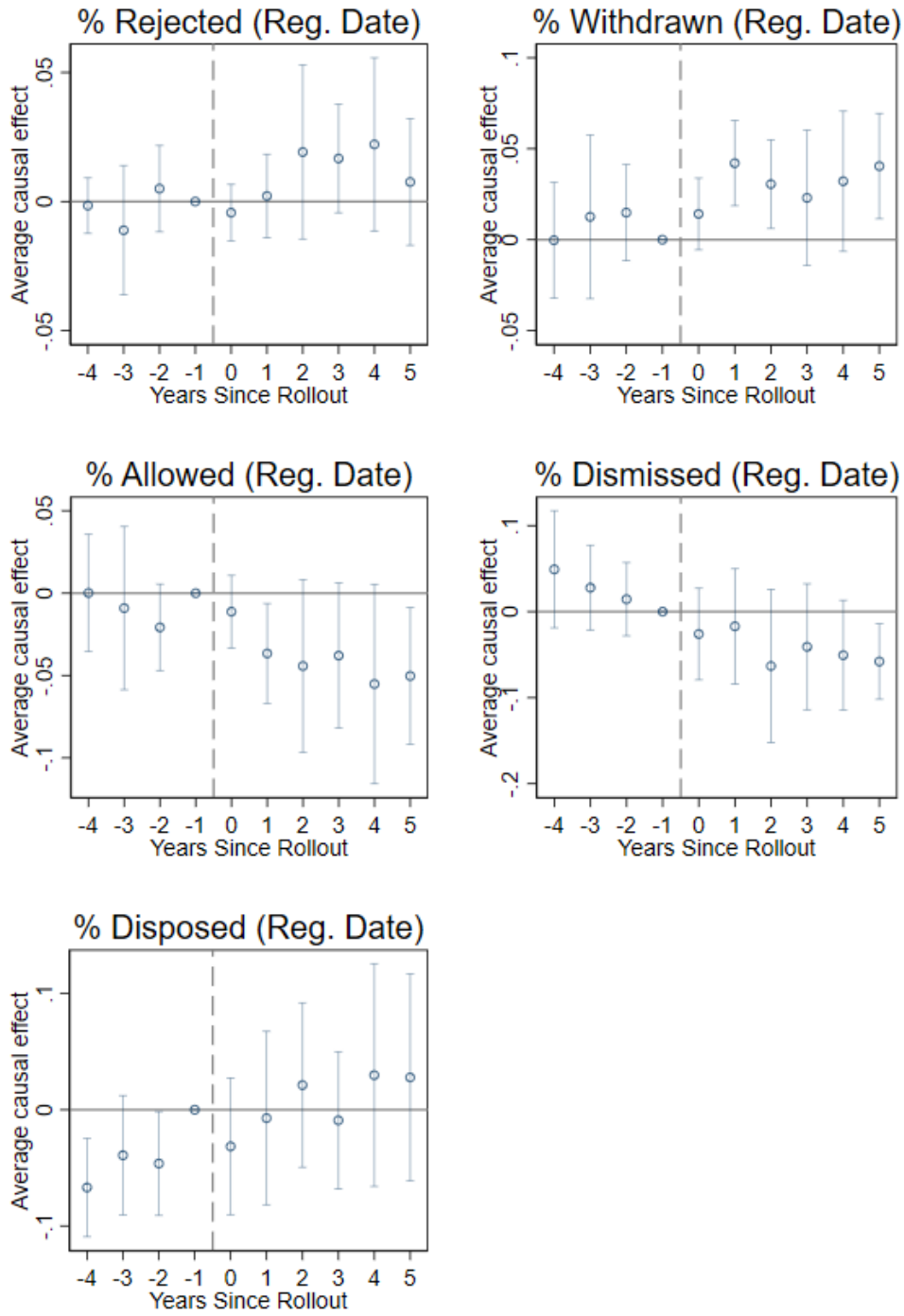
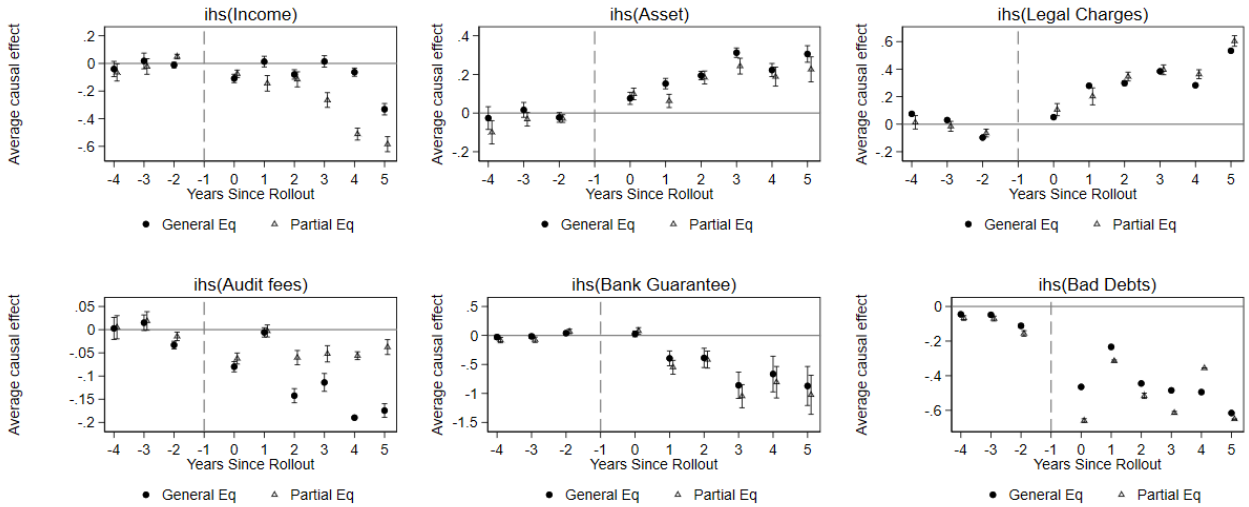


Figure 11: Event study analysis of the impact of Kanoon rollout on appeal outcomes based on the district court registration date.

Notes: All variables are calculated at the state-year–month level. The event studies use the algorithm of Sun and Abraham (2021), where Himachal Pradesh (rollout 04/2017) is defined as control cohort. The estimation controls for state, year, state × year and month fixed effects. Standard errors are clustered at the state level.



Notes: This figure shows the impact of kanoon rollout on various firm outcomes for all firms (General equilibrium) and firms having at least one case during the considered time frame (Partial equilibrium). We have included firm and year fixed effects and clustered at the state level. Each panel represents the estimates of the coefficients for the time period before and after the rollout of Indian Kanoon. The outcome variable in each panel is transformed with the inverse hyperbolic sine function to take care of 0 or negative values of the firm financials. We have used Sun Abraham's eventstudyinteract function to plot these event study graphs.

Figure 12: General and Partial equilibrium effects of Kanoon rollout on Firm Financials.

Table 3: Impact of Kanoon Rollout on Backward Citations.

	(1)	(2)	(3)	(4)
Year 3 before rollout	0.906	0.714	0.971	0.805
	(0.65)	(0.38)	(0.70)	(0.67)
Year 2 before rollout	0.553	-0.208	0.243	0.152
	(0.34)	(0.25)	(0.23)	(0.24)
Year of rollout	0.056	0.187	0.050	0.128
	(0.16)	(0.20)	(0.19)	(0.18)
Year 1 after rollout	0.068	0.515	-0.053	0.138
	(0.30)	(0.40)	(0.21)	(0.19)
Year 2 after rollout	0.357	0.817	0.152	0.456
	(0.30)	(0.41)	(0.30)	(0.23)
Year 3 after rollout	0.384	0.936*	0.326	0.731**
	(0.33)	(0.42)	(0.26)	(0.23)
constant	2.414***	2.106***	2.583***	2.414***
	(0.29)	(0.25)	(0.11)	(0.14)
Court FE	Y	Y	Y	Y
Year FE		Y	Y	Y
Court X Year FE			Y	Y
Month FE				Y
R-sqr	0.061	0.068	0.081	0.082
N	196030	196030	196029	196029
mean Y	2.8136	2.8136	2.8136	2.8136

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Impact of Kanoon on Citations and Centrality.

	backward citations	forward citations	backward self-citations	forward self-citations	eigenvector centrality	degree centrality	square concentration
Year 3 before rollout	0.805	-0.595	-0.007	0.047	0.034	0.030**	27.278
	(0.67)	(0.79)	(0.03)	(1.05)	(0.02)	(0.01)	(20.23)
Year 2 before rollout	0.152	-0.314	-0.042	0.506	0.007	0.011**	22.372
	(0.24)	(0.65)	(0.02)	(0.98)	(0.01)	(0.00)	(19.88)
Year of rollout	0.128	-0.687	0.036	-0.601	0.008*	0.002	1.787
	(0.18)	(0.46)	(0.02)	(0.36)	(0.00)	(0.00)	(4.83)
Year 1 after rollout	0.138	1.034	-0.028	1.024	0.007	0.001	-7.506
	(0.19)	(0.95)	(0.06)	(0.79)	(0.01)	(0.00)	(6.34)
Year 2 after rollout	0.456	0.518	-0.002	0.304	0.000	-0.001	-17.080
	(0.23)	(1.09)	(0.05)	(1.07)	(0.01)	(0.00)	(11.21)
Year 3 after rollout	0.731**	0.855	0.028	0.727	-0.003	-0.004	-20.570
	(0.23)	(1.37)	(0.06)	(1.39)	(0.01)	(0.00)	(12.91)
constant	2.414***	3.188***	0.868***	2.239**	0.057***	0.021***	26.466**
	(0.14)	(0.58)	(0.03)	(0.61)	(0.01)	(0.00)	(7.82)
R-sqr	0.082	0.005	0.106	0.082	0.100	0.239	0.053
N	196029	38,939	46,613	27,498	2,306,231	2,306,231	196,029
mean Y	2.8136	3.2675	1.5555	2.7617	0.0605	0.0232	21.6599
Court FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Court X Year FE	Y	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y	Y

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

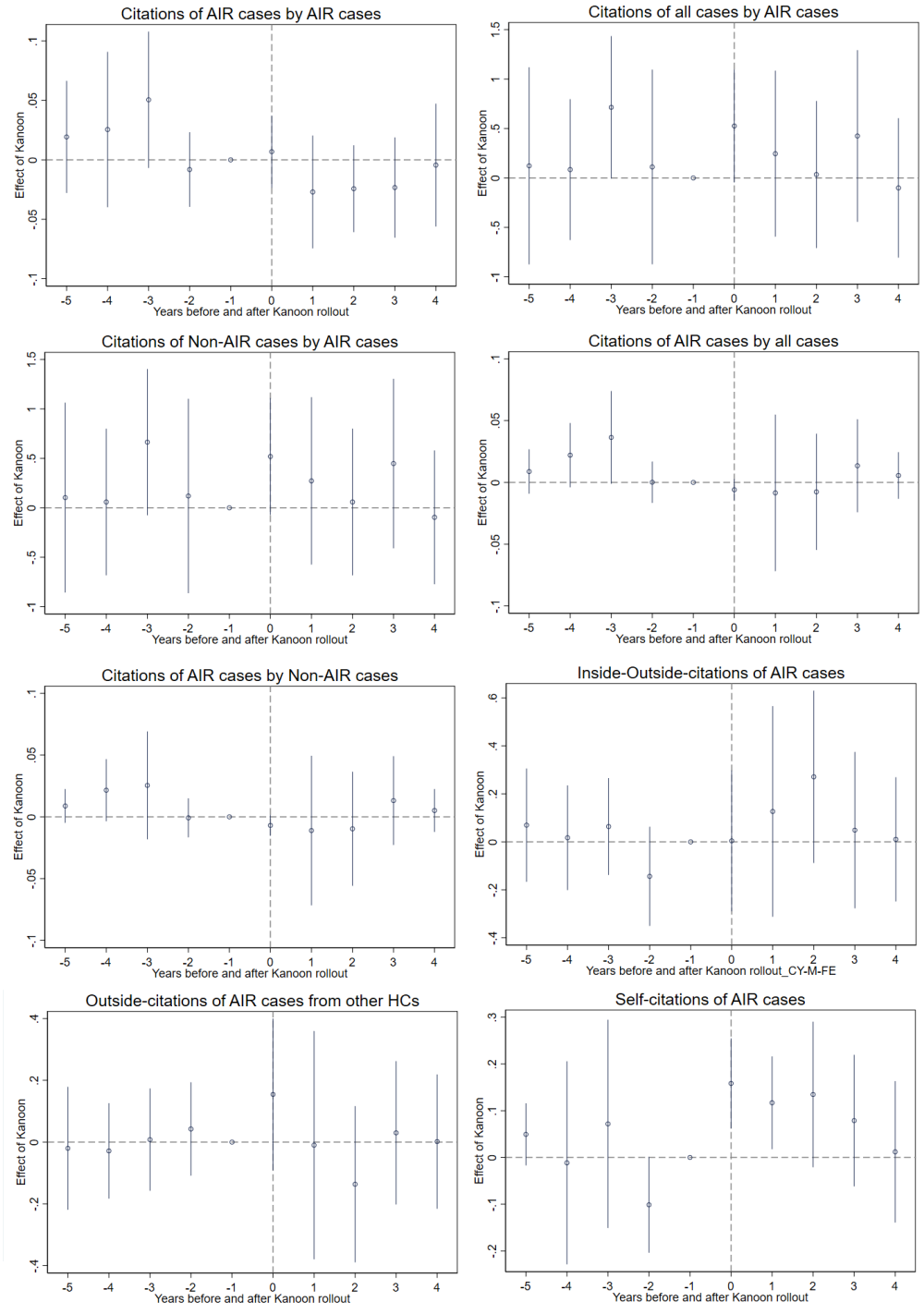


Figure 13: Citation analysis of the AIR cases.

A Appendix

Distinctive Effects on Criminal Versus Civil Cases

A.0.1 Criminal Cases

Criminal cases are filed by the state (prosecutor / attorney / government advocate) as petitioner. These state representatives can be believed to have a generally good access to judicial information and do not, or only marginally, benefit from Kanoon. Therefore, at least in the short term, where there are not yet any general equilibrium effects on courts, filings of criminal cases should not be affected by Kanoon.

Two outcomes can potentially be affected by the availability of Kanoon. First, the time it takes between the filing of a case and its resolution . Arguments can be better, two mechanisms

Kanoon can impact the time to resolution in two opposite ways. (a) If respondent's arguments are better due to the availability of Kanoon, then this could make the decision process for the judge easier. The judge does not need to do their own research and can just chose between the two well founded augmentations. This would imply that the time to resolution decreases with the availability of Kanoon. (b) On the other hand, as both sides now have good reasons, the argument can go the other way round. The case looks less obvious to the judge as if there were only one side with a good reasoning and therefore needs more time to potentially to their own research and to decide. This is, the time to resolution would increase.

The second outcome potentially affected by the availability of Kanoon is the quality and direction of the outcome. One can expect the quality to increase, the better the information at hand is. As for the direction if the decision, as we expect mainly respondents to benefit from Kanoon, we should see more cases decided in favor of respondents.

Once a court decided a case, the two parties have the option to appeal the decision:

- If the quality of the judgement is better (the judge's argumentation is convincing), then there should be less appeals overall.
- If judgements are more in favor of respondents, there should be less appeals from them.
- If respondents have updated their beliefs to the bottom, then they should appeal less.
- If respondents have update their beliefs to the top and the outcome is not shifted towards them, then respondents should appeal more often.
- Petitioners have not updated beliefs but if outcome shifted towards petitioner, they should appeal (weakly) more often.

Altogether, we could test several things for the short term impacts the availability of Kanoon has on criminal cases:

1. No change in filings (state agents do not need Kanoon)
2. Does the time to resolution change? (Are we in case a or b from above?)
3. Are there more appeals from petitioners? That would imply that petitioners have updated beliefs to the top but the decisions do not favor them more often.
4. Are there less appeals from respondents
5. Are there more appeals from petitioners?

In the medium long run, effects can be different. There can be learning effects from the prosecutors, for instance if prosecutors lose their cases more often, they will take this into account for future filings. Also, as in district and session courts both, criminal and civil cases are treated by a single judge, there can be general

equilibrium effects due to spillovers from civil cases. For instance if Kanoon would lead to many more civil cases being filed, then the workload for judges would go up and this can have an impact on the resolution time as well as on the quality of the decisions of criminal cases as well.

A.0.2 Civil Cases

A petitioner P claims value W from a respondent R. The petitioner has three options. First, they can do nothing / stay inactive. In this case the petitioner gets nothing and the respondent keeps value W for themselves. Second, the petitioner and respondent can settle out of court (OOC). This settlement leads to a transfer s from the respondent to the petitioner. Finally, the petitioner can go to court to claim W from the petitioner. Ex-ante, the petitioner and respondent get their respective conditional expected value of going for court. (See Figure A1 for the options of Petitioner P and corresponding outcomes for P and R.)

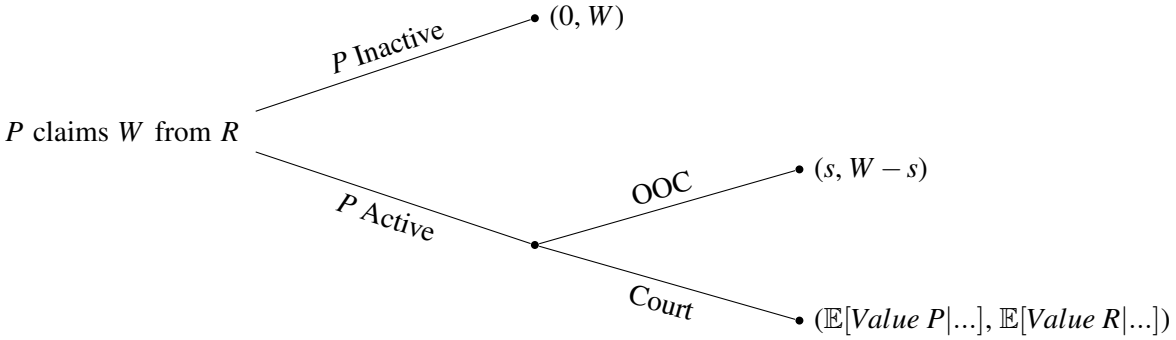


Figure A1: Decision Tree for Petitioner P

The two parties reach an out-of-court settlement if and only if there exists at least one $\tilde{s}$ such that

1. $\tilde{s} \geq \mathbb{E}[Value\ P|...]$
2. $W - \tilde{s} \geq \mathbb{E}[Value\ R|...]$
3. $\tilde{s} > 0$

If no such $\tilde{s}$ exists and the expected value of going to court for P is smaller or equal to zero ($\mathbb{E}[Value\ P|...] \leq 0$), then the petitioner stays inactive. Otherwise, this is if there exists no such $\tilde{s}$ and $\mathbb{E}[Value\ P|...] > 0$, the petitioner goes to court.

If we define p_P^P as being the believed probability of winning a case for petitioner P, the expected utility of going to court for P is:

$$\mathbb{E}[Value\ P|...] = p_P^P W - Court\ Fees - (1 - p_P^P) * Advocate\ Costs - g^P(t)$$

Similarly, we define p_R^P as the believe of R that P would win the case. Then, for respondent R the expected value is:

$$\mathbb{E}[Value\ R|...] = -p_R^P W - p_R^P * Advocate\ Costs - g^R(t)$$

The rollout of Indian Kanoon can impact several of these variables in the short term. Free access to legal cases and a reduced search effort can alter the probability of winning as well as the expectation over this probability. Potentially, Kanoon can also change the initial claim W. Finally, it can also impact the length of cases in the mid run, for instance if it changes the likelihood of an appeal.

Other Electronic Legal Databases

As noted in the paper, Kanoon was not the only electronic source of legal informaton in India. Several other databases were developed during the same time-period as Indian Kanoon. Some of these are described below:

All India Reporter The All India Reporter (AIR) is one of the oldest and most respected publishers of decisions from the Indian Supreme Court as well as various State High Courts. With more than 17 journals and more than 1 million subscribers, it curates, edits, prints and disseminates digests, commentaries and analyses of key cases that are heard at the courts of India.

Manupatra This paid subscription database includes both primary sources (judicial opinions, statutes and other legislative materials, administrative agency materials, etc.) and secondary sources (including treatises and law journals). This company first launched its products in August 2001. The launch however, was via CD ROM. Additional media formats such as the online database, e-mail services, books and journals were added over time.

SCC Online This paid subscription database includes cases from a wide variety of Indian courts, including the Supreme Court, the Privy Council, high courts, district courts, and tribunals and commissions. It also includes selected case law from other jurisdictions in the region, including Bangladesh, Malaysia, Pakistan, and Sri Lanka, and from several African jurisdictions. SCC online also includes other Indian legal materials: acts and rules, articles, secondary sources, treaties, and more. It was introduced in 2010 with limited coverage that expanded over the next three years.

LII of India part of the Free Access to Law Movement, also provides an integrated search platform for primary and secondary sources from over a hundred Legal Information Institute (LII) databases of other countries and territories. This project was established in 2010 with the coordinated efforts of the Asian Legal Information Institute (AsianLII) project, funded by AusAID, and its Commonwealth Legal Information Institute project, funded by the Australian Research Council (ARC). Disruptions in funding however, prevented the database from reaching scale till late in 2012, when it was formally launched at the LII of India.

Additional Tables and Figures

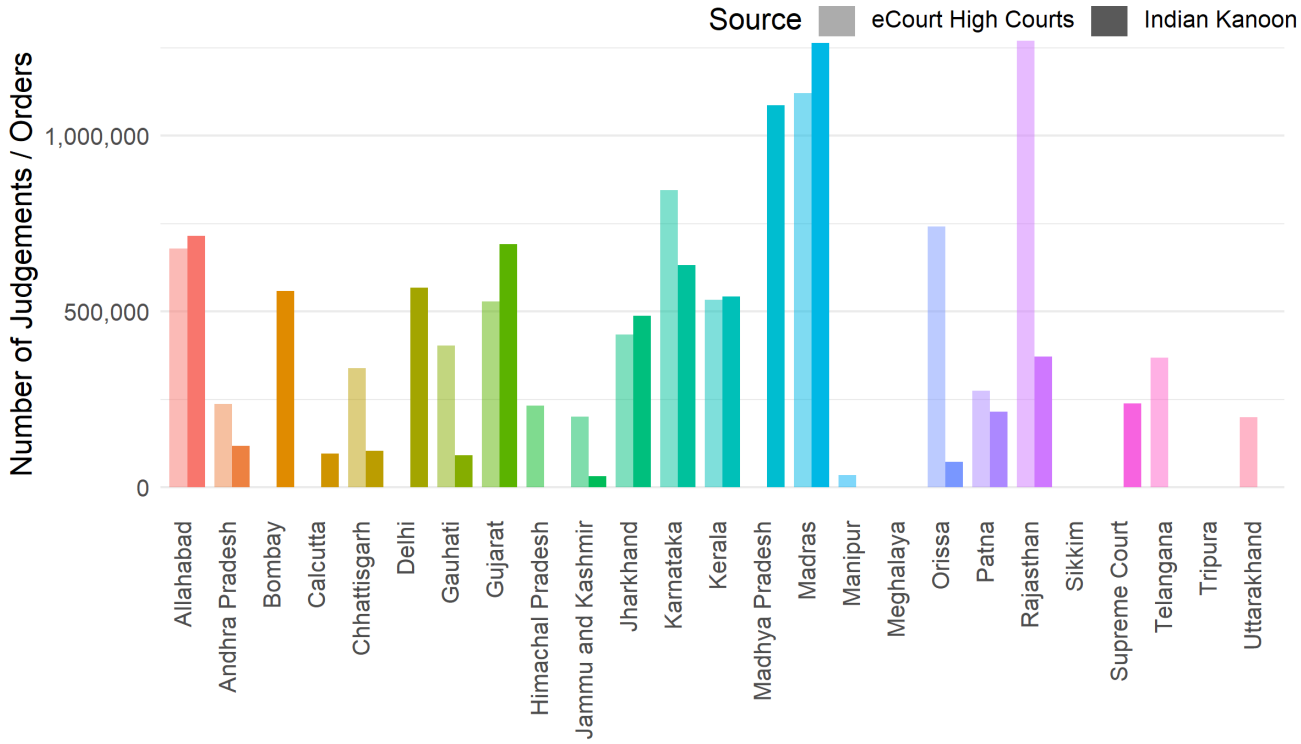


Figure A2: Number of Dispositions (eCourt High Court) and Judgements and Orders (Indian Knaoon) per High Court for the years 2001-2019.

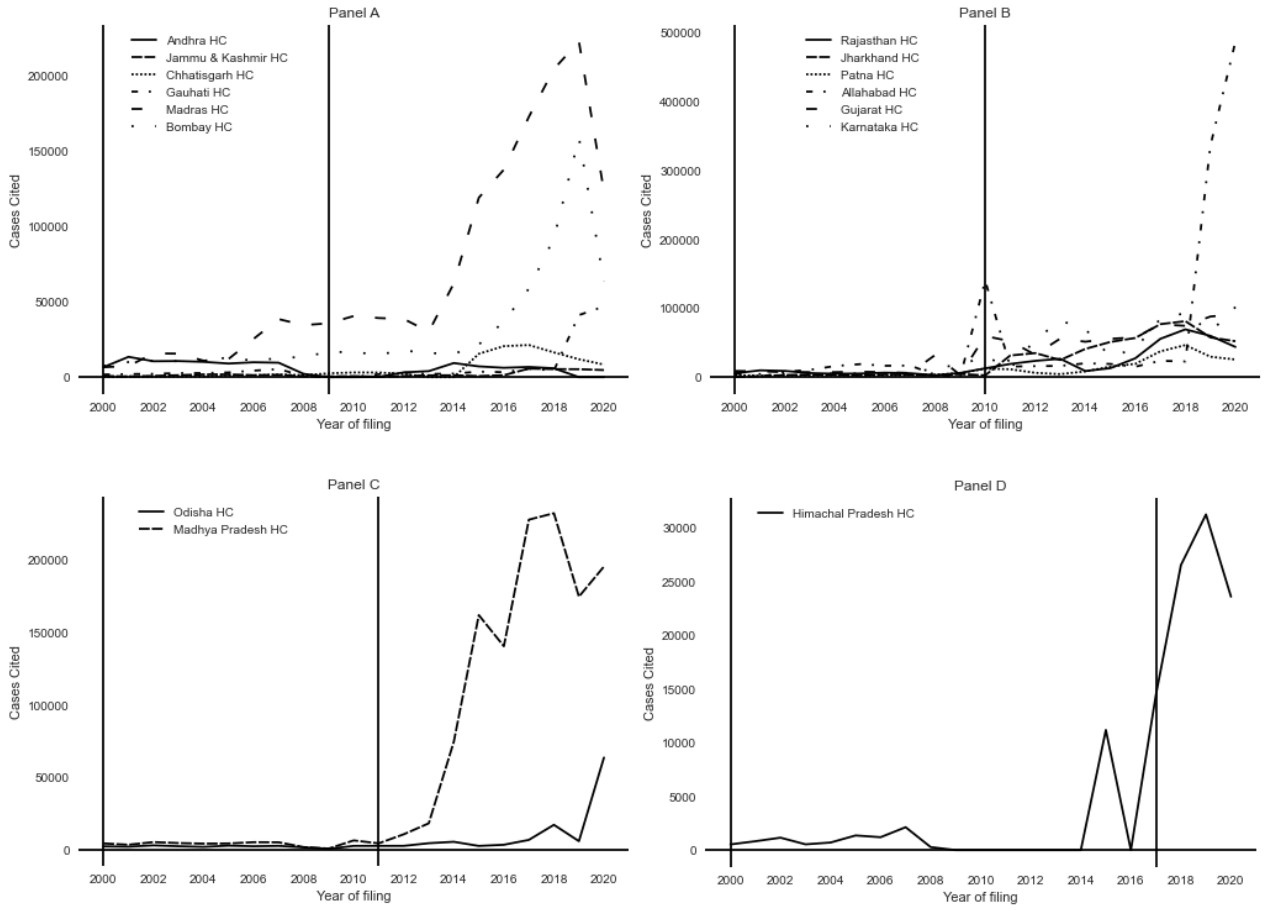


Figure A3: Total citations per year for different rollout years

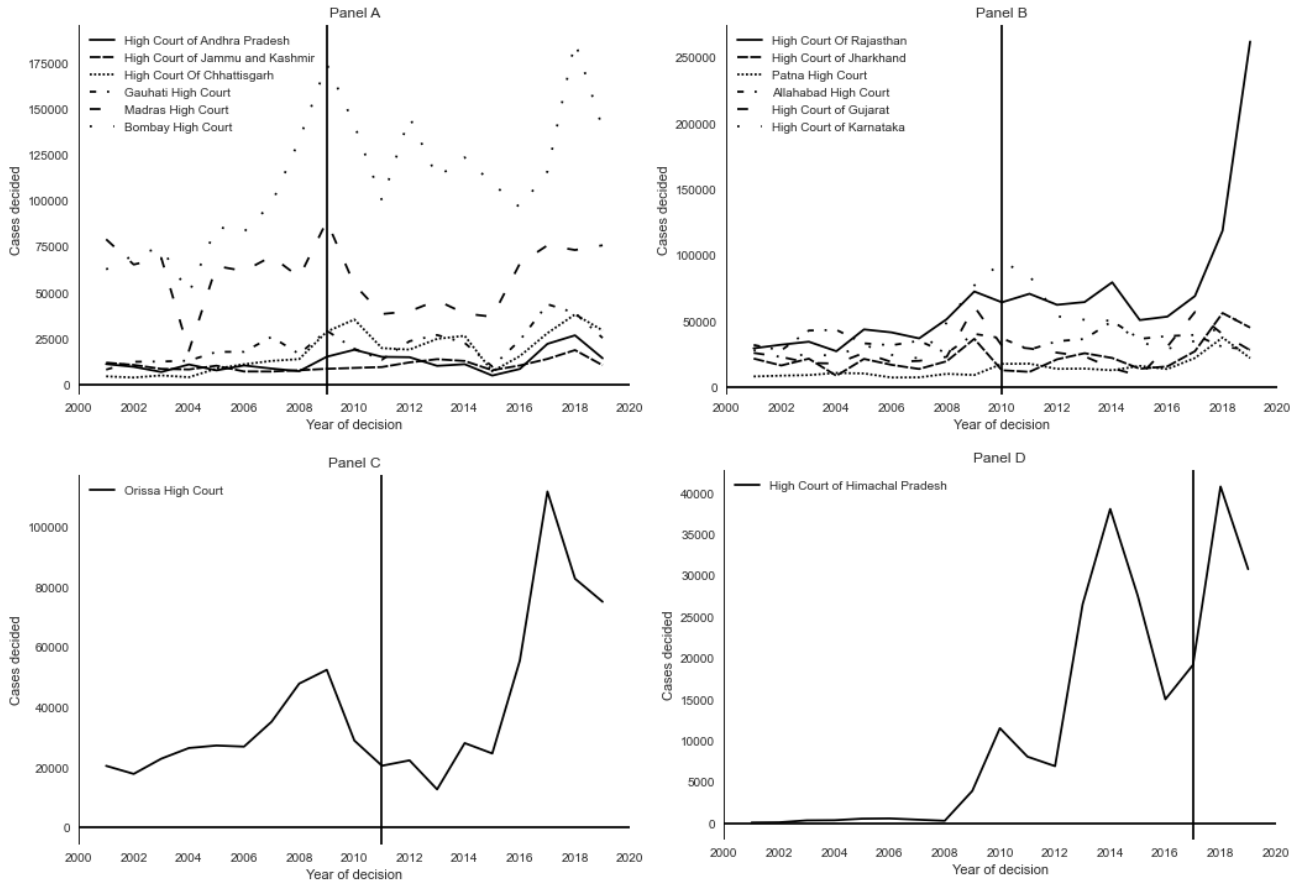


Figure A4: Total number of resolutions per year by rollout years (eCourts High Court)

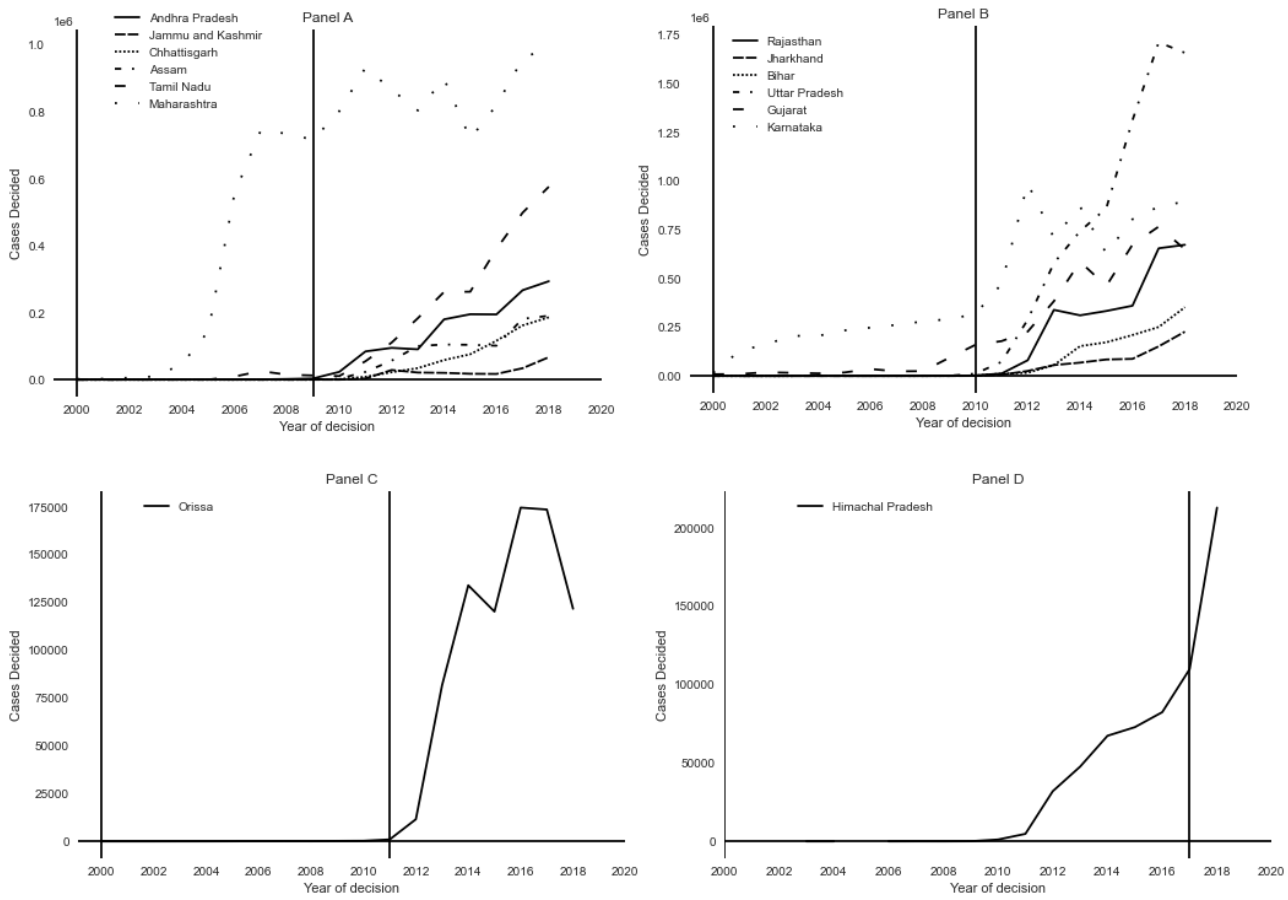
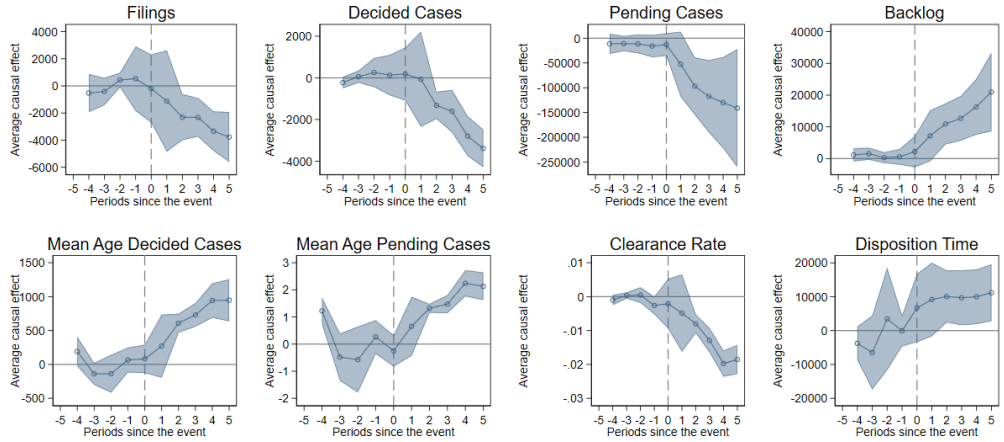
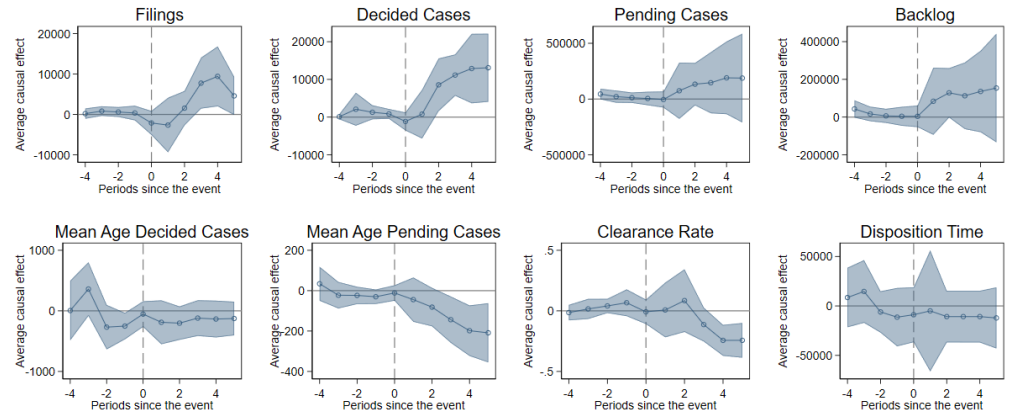


Figure A5: Total number of resolutions per year by rollout years (eCourts District Court)



Notes: This figure shows the results of the Placebo test for checking pre-trends as suggested by Chaisemartin and D'Houltfoeuille, 2020. The Placebo tests are constructed assuming that, for tests whose treatment actually happens at t, treatment occured at the time t-k, for k in {1,2,3,4}

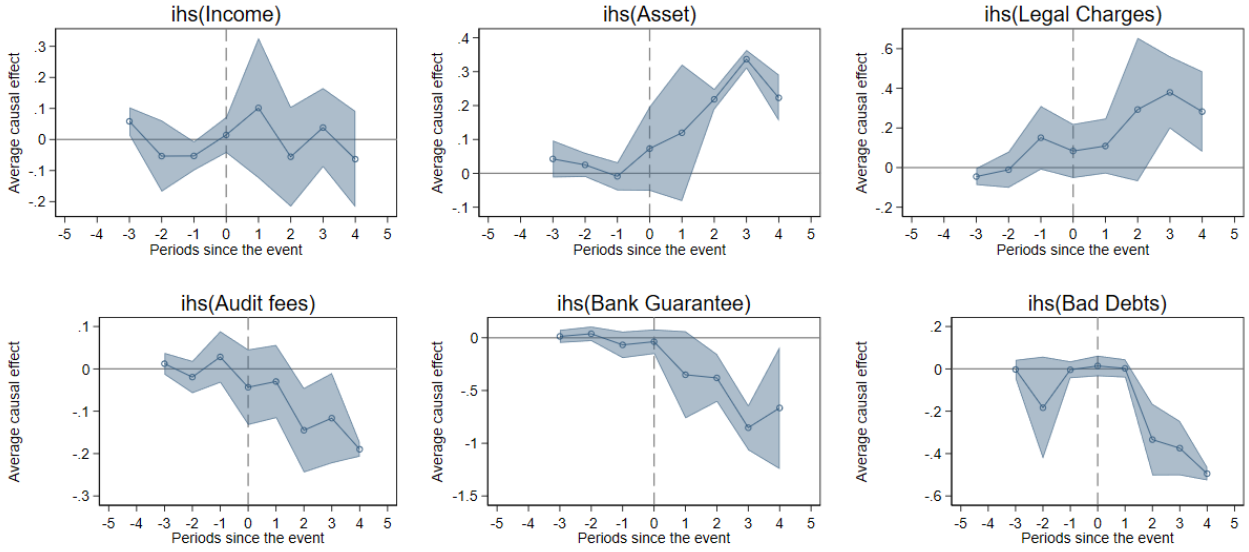
Figure A6: Placebo test to check pre-trends of the Aggregate Efficiency Measures of High Courts



Notes: This figure shows the results of the Placebo test for checking pre-trends as suggested by Chaisemartin and D'Houltfoeuille, 2020. The Placebo tests are constructed assuming that, for tests whose treatment actually happens at t, treatment occured at the time t-k, for k in {1,2,3,4}
Outcomes are normalized in the following way: Filings, Decided Cases, Pending Cases and Backlog are measured in 100,000 cases.
Disposition time divided by 100,000. Mean Age Decided Cases and Mean Age Pending Cases in 100 days.

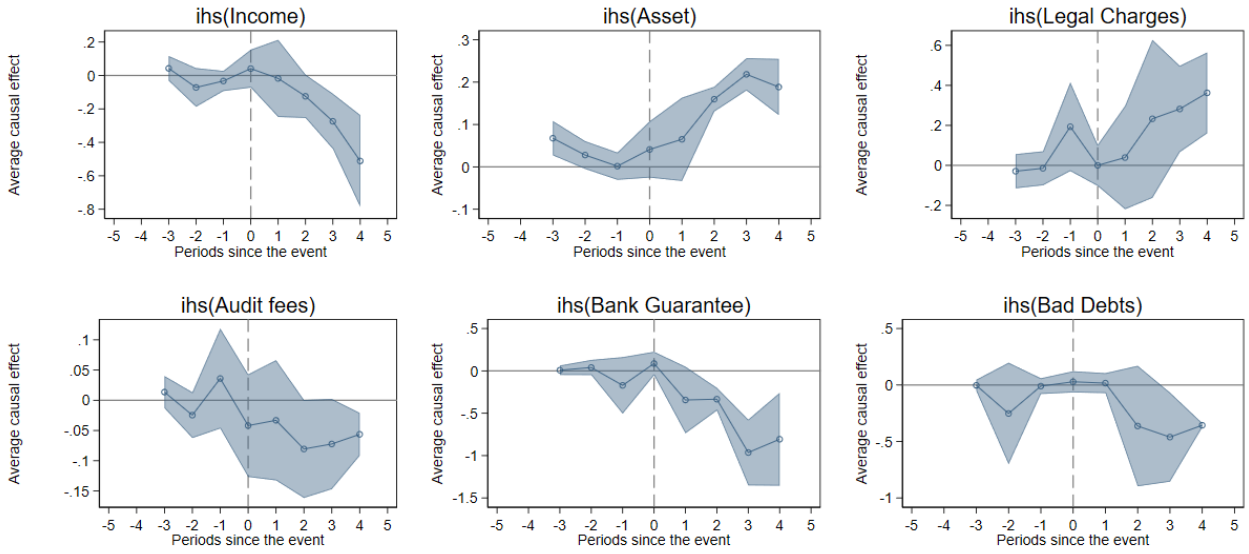
Figure A7: Placebo test to check pre-trends of the Aggregate Efficiency Measures of District Courts

Notes: Outcomes are normalized in the following way: Filings, Decided Cases, Pending Cases and Backlog are measured in 100,000 cases. Disposition time divided by 100,000. Mean Age Decided Cases and Mean Age Pending Cases in 100 days.



Notes: This figure shows the results of the Placebo test for testing pretrends as suggested by Chaisemartin and D'Haultfoeuille, 2020.
The placebo estimates are constructed assuming that, for units whose treatment actually happens at t, treatment occurred at time t−k for k ∈ {1,2,3,4}.

Figure A8: Placebo test to check pre-trends in the General Equilibrium effects of Kanoon rollout on Firm Financials



Notes: This figure shows the results of the Placebo test for testing pretrends as suggested by Chaisemartin and D'Haultfoeuille, 2020.
The placebo estimates are constructed assuming that, for units whose treatment actually happens at t, treatment occurred at time t−k for k ∈ {1,2,3,4}.

Figure A9: Placebo test to check pre-trends in the Partial Equilibrium effects of Kanoon rollout on Firm Financials