Spatial Spillover Effects in Civil Litigation: Evidence from Chinese Provinces

Douglas Bujakowski

Abstract

There is a rich literature that utilizes state, province, and other sub-regional data to evaluate the causes and effects of civil litigation. Yet, issues of spatial dependence are often neglected in this context. In the current study, we argue that civil litigation may be subject to spatial spill-overs, in which litigation in one region influences litigation in nearby regions. We then test for spatial effects using six years (2011–2016) of province-level data from China. Our results provide strong evidence of jurisdiction-level spillovers, even after controlling for spatially correlated regressors and shocks. Additionally, we find that ignoring spatial pro-cesses can lead to a systematic underestimation of the influence of civil litigation determinants.

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I. Introduction

Empirical research on the determinants of civil litigation has generally followed two schools of thought. One perspective considers the litigation process from the standpoint of litigants, focusing on select individuals, households, and organizations. These studies benefit from their ability to observe detailed information about the progression of disputes, parties involved, and case outcomes. The other perspective considers litigation more broadly, examining patterns within and across jurisdictions. This field of research finds motivation in policy issues pertaining to legal systems and economies, while also being of interest to legal scholars, practitioners, and potential litigants.

Jurisdiction-level studies of civil litigation typically employ state, province, or other subregional data. This can be seen in research conducted in Austria, China, India, Italy, Japan, Portugal, Spain, and the U.S., among other countries.[1] Subregional data allow researchers to assess

1. For Austria, *see, e.g.*, Gerhard Clemenz & Claus Gugler, *Macroeconomic Development and Civil Litigation*, 9 Eur. J. L. & Econ. 215, 215 (2000). For India, *see, e.g.,* Theodore Eisenberg, Sital Kalantry & Nick Robinson, *Litigation as a Measure of Well-Being*, 62 DePaul L. Rev.247, 265–67 (2013). For Italy, *see, e.g.*, Paolo Buonanno & Matteo M. Galizzi, *Advocatus, et non Latro? Testing the Excess of Litigation in the Italian Courts of Justice*, 10 Rev. L. & Econ. 285, 285 (2014); Amanda Carmignani & Silvia Giacomelli, Banca D'Italia Working Papers, No. 745, Too Many Lawyers? Litigation in Italian Civil Courts 1, 5 (2010). For Japan, *see, e.g.,* Tom Ginsburg & Glen Hoetker, *The Unreluctant Litigant? An Empirical Analysis of Japan's Turn to Litigation*, 35 J. Legal Stud. 31, 32 (2006); J. Mark Ramseyer, *Litigation and Social Capital: Divorces and Traffic Accidents in Japan*, 11 J. Empirical Legal Stud. 39, 40 (2014). For Portugal, *see, e.g.*, Manuel Coutinho Pereira & Lara Wemans, Banco de Portugal Economic Studies, Determinants of Civil Litigation in Portugal, 21, 23 (Banco de Portugal, 2015). For Spain, *see, e.g.*, Michael W. Giles & Thomas D. Lancaster, *Political Transition, Social Development, and Legal Mobilization in Spain*, 83 Am. Pol. Sci. Rev. 817, 817 (1989); Juan S. Mora-Sanguinetti & Nuno Garoupa, *Do Lawyers Induce Litigation? Evidence from Spain, 2001–2010*, 44 Int'l Rev. L. & Econ. 29, 30 (2015); Virginia Rosales & Dolores Jiménez-Rubio, *Empirical Analysis of Civil Litigation Determinants: The Case of Spain*, 44 Eur. J. L. & Econ. 321, 322 (2017). For the U.S., *see, e.g.*, Burton M. Atkins & Henry R. Glick, *Environmental and Structural Variables as Determinants of Issues in State Courts of Last Resort*, 20 Am. J. Pol. Sci. 97, 97 (1976); Joel B. Grossman & Austin Sarat, *Litigation in the Federal Courts: A*

changes in litigation over time while holding fixed unobserved heterogeneity across regions. Yet, the use of such data raises questions of spatial spillover, the notion that litigation rates in one region may influence those in neighboring regions.[2] Despite the prevalence of subregional data in litigation research, spatial effects are often neglected.[3]

In this paper, we argue that civil litigation may be subject to spatial spillovers, given that litigants, information, and social norms have the potential to cross administrative borders. We then test for spatial spillovers using six years (2011–2016) of province-level litigation data from China. In doing so, we provide strong evidence of spatial spillovers and show that spatial effects have a notable effect on parameter estimates. Moreover, we show that failure to properly model spatial dependence can result in a fundamental misunderstanding of the mechanisms driving legal claims.

We know of only one other study to incorporate spatial correlations into models of civil litigation, that by Pereira and Wemans (2015).[4] Using data from Portuguese comarcas, Pereira and Wemans find that error terms and certain explanatory variables are spatially correlated. This result suggests that litigation rates in nearby regions are subject to similar shocks—both observed and unobserved. However, the study does not test for spatial correlations in the dependent variable, and thus does not consider the possibility that litigation changes in a given jurisdiction induce litigation changes elsewhere.

The current analysis addresses this possibility and extends the literature in several ways. First, we motivate the existence of spatial spillover in the context of civil litigation and discuss three channels through which spatial spillovers may arise: (1) cross-border disputes, (2) social learning, and (3) diffusion of norms. Second, we provide strong empirical evidence of spatial spillovers in litigation rates even after controlling for spatially

Comparative Perspective, 9 L. & Soc'y Rev. 321, 322 (1975); F. Andrew Hanssen, *The Effect of Judicial Institutions on Uncertainty and the Rate of Litigation: The Election versus Appointment of State Judges*, 28 J. Legal Stud. 205, 206–07 (1999); Tonja Jacobi, *The Role of Politics and Economics in Explaining Variation in Litigation Rates in the U.S. States*, 38 J. Legal Stud. 205, 206 (2009); Richard A. Posner, *Explaining the Variance in the Number of Tort Suits across U.S. States and between the United States and England*, 26 J. Legal Stud. 477, 478–79 (1997); Jeff Yates, Holley Tankersley & Paul Brace, *Assessing the Impact of State Judicial Structures on Citizen Litigiousness*, 63 Pol. Res. Q. 796, 796 (2010).

2. Litigation rates are generally defined as generally defined as the number of first-instance civil lawsuits per capita.

3. Bujakowski and Kamiya (forthcoming) observe a similar neglect of spatial effects in subregional studies of insurance consumption. The authors demonstrate the presence of spatial spillover effects in insurance consumption, quantify their influence on insurance consumption determinants, and investigate the source of spatial spillovers. The current study utilizes a similar approach in analyzing civil litigation rates. *See* Douglas Bujakowski & Shinichi Kamiya, Estimating Spillover Effects in Property and Casualty Insurance Consumption (forthcoming) (available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3594910).

4. Pereira & Wemans, *supra* note 1, at 32.

correlated determinants. Third, we decompose the marginal influence of regressors into direct and indirect effects, where direct effects derive from changes in a given province and indirect effects derive from changes in nearby provinces. This analysis allows us to observe the relative influence of a region's conditions on litigation rates in other, nearby regions. Fourth, we show that accounting for spatial spillovers improves model fit and better reflects the influence of litigation determinants. Specifically, we find that explanatory variables likely have a greater impact on litigation rates than previously understood.

The paper is organized as follows. In section two, we discuss economic phenomena that may produce spatial spillovers in civil litigation and explain the implications for litigation determinants. In section three, we review the litigation literature and relevant aspects of China's legal environment to identify factors to include in our analysis. In section four, we describe the data used to conduct our analysis. In section five, we develop our econometric model and interpret spatial parameters. In section six, we present our results and quantify the effects of spatial spillover in China's civil litigation rates. In section seven, we discuss our findings and provide suggestions for future research.

II. Motivation

Spatial spillover is the notion that dependent variable outcomes in one region influence dependent variable outcomes in nearby regions. In the context of civil litigation, this is to say that litigation rates in a given jurisdiction shape litigation rates in neighboring jurisdictions. When all pairs of neighbors are linked in this way, the result is an autoregressive process in litigation rates. Changes in one jurisdiction spill over to neighboring jurisdictions, which spill over to neighbors of neighbors, and back to the original jurisdiction.[5] This process has profound implications for our understanding of civil litigation determinants, as a jurisdiction's characteristics indirectly affect litigation rates in other jurisdictions. In the following subsections, we discuss three aspects of civil litigation that may give rise to spatial spillovers. These mechanisms are not mutually exclusive nor are they exhaustive. They are simply intended to motivate empirical investigations into the existence of spatial spillovers.

A. *Cross-Border Disputes*

Lawsuits in one region may involve litigants and disputes from other regions. In many jurisdictions including China, civil procedural laws stipulate where litigation is to occur when litigants reside in different administrative regions. In China, the general rule is that litigation occur in the jurisdiction in which the defendant is domiciled.[6] Thus, when

5. *See* Bujakowski & Kamiya, *supra* note 3.

6. *See* Civil Procedural Law of the People's Republic of China, (promulgated by the Standing Comm. Nat'l People's Cong., Apr. 9, 1991, rev'd June 27, 2017, effective June 27, 2017), art. 21 (China), http://cicc.court.gov.cn/html/1/219/199/200/644.html

a party travels, commutes, or conducts business across administrative borders, claims against that party must be litigated in the party's province of origin. Importantly, civil procedural laws that permit or require plaintiffs to litigate in their own jurisdiction would have a similar effect, as litigation would sometimes occur in a jurisdiction different from that of the dispute.

The potential for cross-border disputes implies that litigation rates in one region may be a function of litigation rates in surrounding regions. If one region is particularly litigious, we naturally expect that region to have above average litigation rates, all else equal. But cross-border travel and business ensures that surrounding regions will also be impacted by the region's litigiousness, given that the legal claims brought will sometimes accrue to those regions. Hence, changes in litigiousness in one region may drive litigation rate changes in neighboring regions.

B. *Social Learning*

Pursuing a legal claim is often a complicated process. Studies have shown that knowledge of one's rights and of the legal process are important determinants of the decision to file a lawsuit.[7] This knowledge can come from a variety of sources, including education, media usage, and travel. Shen and Wang (2009) find evidence that rural Chinese residents who had traveled outside of their home village or county expressed a greater preference for litigation than those who had not traveled.[8] They suggest that exposure to the outside world may increase one's awareness of litigation as a mechanism for dispute resolution.[9] We anticipate that when neighboring regions have higher litigation rates, increases in legal knowledge from cross-border travel and communication will be more pronounced. In short, litigation in one province may serve as an educational device for those in neighboring provinces.

C. *Diffusion of Norms*

Historically, litigation in China has been viewed as a contentious process that hinders economic growth and undermines social harmony. As a result, plaintiffs often suffered reputational costs for their decision to pursue a lawsuit.[10] This is particularly true of China's rural areas, where community members are more likely to know the litigants.[11] Yet,

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[https://perma.cc/Y26G-A2R7]. *See also* Haitian Lu, Hongbo Pan & Chenying Zhang, *Political Connectedness and Court Outcomes: Evidence from Chinese Corporate Lawsuits*, 58 J. L. & Econ. 829, 836 n.11 (2015).

7. *See, e.g.*, Eisenberg, Kalantry & Robinson, *supra* note 1 at 256–57, 286; Pereira & Wemans, *supra* note 1 at 38; Rosales & Jiménez-Rubio, *supra* note 1 at 332–33; Yates, Tankersley & Brace, *supra* note 1 at 803.

8. Mingming Shen & Yuhua Wang, *Litigating Economic Disputes in Rural China*, China Rev., Spring 2009, at 97, 114.

9. *Id.* at 112.

10. *Id.* at 107.

11. *See*, *e.g.*, Ethan Michelson, *Justice from above or below? Popular Strategies for Resolving Grievances in Rural China*, 193 China Q. 43, 61 (2008).

as litigation has become more prevalent, norms have started to change, and reputational costs have begun to diminish.[12] We anticipate that norms against litigation are shaped not only by the volume of litigation in a given province, but also by the volume of litigation in neighboring provinces. In this case, rising litigation rates in one province may expedite the breakdown of anti-litigious social norms in surrounding provinces, leading to more litigation in those regions.

III. Determinants of Civil Litigation Rates

The objective of the current study is to measure spatial spillovers in civil litigation rates and to quantify their influence on litigation determinants. In this section, we identify litigation determinants through a review of the litigation literature. This research reveals that economic, demographic, and legal factors each contribute to the evolution of civil litigation rates. As such, we utilize these three categories to organize our discussion.

A. *Economic Factors*

The relationship between economic development and civil litigation has been studied across the globe, leveraging data from Austria, China, India, Italy, Japan, Portugal, Spain, and the U.S., among other countries.[13] All of these studies account for aggregate levels of economic activity and income in their analyses, as measured by gross domestic product (GDP) per capita, purchasing power, or poverty rates.[14] In addition to purely economic measures, Eisenberg (2013) considers the Human Development Index, which also incorporates non-economic measures of wellbeing such as education and life expectancy.[15]

Measures of aggregate output, such as GDP, may be important given that civil litigation is often a consequence of economic activity. In a study of state-level civil litigation in the U.S., Jacobi (2009) explains that as economic activity increases, businesses may face more lawsuits

12. *See*, *e.g.*, Aaron Halegua, *Reforming the People's Mediation System in Urban China*, 35 H. K. L.J. 715, 719 (2005).

13. For Austria, *see, e.g.*, Clemenz & Gugler, *supra* note 1, at 221. For India, *see, e.g.*, Eisenberg et al., *supra* note 1, at 286. For Italy, *see, e.g,* Buonanno & Galizzi, *supra* note 1, at 301; Carmignani & Giacomelli, *supra* note 1, at 20. For Japan, *see, e.g.*, Ginsburg & Hoetker, *supra* note 1, at 49; Ramseyer, *supra* note 1, at 68–69. For Portugal, *see, e.g.*, Pereira & Wemans, *supra* note 1, at 38. For Spain, *see, e.g.*, Giles & Lancaster, *supra* note 1, at 829; Mora-Sanguinetti & Garoupa, *supra* note 1, at 38; Rosales & Jiménez-Rubio, *supra* note 1, at 332. For the U.S., *see, e.g.*, Atkins & Glick, *supra* note 1, at 106; Grossman & Sarat, *supra* note 1, at 338–339; Hanssen, *supra* note 1, at 224; Jacobi, *supra* note 1, at 222–223; Posner, *supra* note 1, at 484; Yates et al., *supra* note 1, at 803.

14. For GDP per capita, *see, e.g.*, Clemenz & Gugler, *supra* note 1, at 226. For purchasing power, *see, e.g.*, Pereira & Wemans, *supra* note 1, at 332. For poverty rates, *see, e.g.*, Yates et al., *supra* note 1, at 803.

15. Eisenberg et al., *supra* note 1, at 257.

against former comrades, market rivals, and the general public.[16] Additionally, measures of income may be important given that income may enable parties to cover costs associated with litigation.[17]

These arguments lead many scholars to anticipate a positive relationship between civil litigation and economic activity. Yet, the empirical evidence is mixed. Some studies find a positive correlation, while others find a negative correlation, and still others observe no significant correlation.[18] Additionally, some evidence suggests that the relationship between civil litigation and economic activity and civil litigation may vary across jurisdictions, the type of litigation studied, or a jurisdiction's initial level of economic prosperity.[19]

Bujakowski and Schmit (2021) propose an explanation for the mixed results—that "prior research has focused exclusively on the *volume* of economic activity and has neglected the *nature* of economic activities."[20] The authors explain that economic development often involves structural changes may relate the changes in civil litigation. They test two types of economic structural change, changes in the composition of GDP across economic sectors and the privatization of assets and jobs, and find that the latter is positively associated with civil litigation.

Several studies have also considered the impact of short-run economic fluctuations. For instance, Ginsburg and Hoetker (2006) examine civil litigation rates in Japan and find that litigation increased as Japan's economy slowed in the 1990s.[21] The authors contend that recessions result in unemployment and weaken business relationships, leading to more litigation.[22] This conclusion is echoed by Rosales and Jiménez-Rubio (2017), who show that Spain's 2008–2014 recession was associated with rising civil litigation rates.[23]

Following the literature, we incorporate measures of economic activity, income, sectoral composition, privatization, and economic

16. Jacobi, *supra* note 1 at 206.

17. Litigation costs include court filing and acceptance costs and fees for attorneys, notaries, and interpreters.

18. For a positive correlation, *see, e.g.*, Buonanno & Galizzi, *supra* note 1, at 301; Giles & Lancaster, *supra* note 1, at 829; Eisenberg et al., *supra* note 1, at 286; Pereira & Wemans, *supra* note 1, at 38; Rosales & Jiménez-Rubio, *supra* note 1, at 332. For a negative correlation, *see, e.g.*, Hanssen, *supra* note 1, at 224; Mora-Sanguinetti & Garoupa, *supra* note 1, at 38. For no significant correlation, *see, e.g.*, Carmignani & Giacomelli, *supra* note 1, at 20; Posner, *supra* note 1, at 484; Yates et al., *supra* note 1, at 803.

19. For a non-linear relationship, *see, e.g.*, Ginsburg & Hoetker, *supra* note 1, at 49. For variations across jurisdictions, *see, e.g.*, Jacobi, *supra* note 1, at 222–23. For variations by type of litigation, *see, e.g.*, Atkins & Glick, *supra* note 1, at 106; Grossman & Sarat, *supra* note 1, at 336; Ramseyer, *supra* note 1, at 68–69.

20. *See* Douglas Bujakowski & Joan Schmit, *Economic Structural Transformation and Litigation: Evidence from Chinese Provinces,* DePaul Bus. & Com. L.J. 97, 98 (forthcoming 2021)

21. Ginsburg & Hoetker, *supra* note 1, at 49.

22. *Id.* at 42.

23. Rosales & Jiménez-Rubio, *supra* note 1, at 332.

recessions in our analysis. Specifically, we include GDP per capita and urban and rural disposable income per capita as measures of economic activity and income. To proxy sectoral shifts, we include the proportion of economic activity generated from service sector industries. To proxy privatization, we include measures of private investment and private employment utilized by Bujakowski and Schmit (2021), defined as the percentage of fixed asset investment and urban employment belonging to the private sector.[24] Finally, we utilize unemployment rates as an additional measure of recessionary environments.

B. *Demographic Factors*

Prior research has also shown that demographic characteristics have the potential to shape civil litigation rates.[25] For instance, several authors find that litigation is more common in densely populated, urban areas when compared with sparsely populated rural areas. It may be that individuals in urban communities experience more frequent economic and social interactions, increasing the potential for disputes. Another possibility is that rural communities may have stronger social norms against litigation. In this case, plaintiffs in rural areas may face higher reputational costs to litigation than those in urban areas.

Eisenberg et al. (2013) examine litigation rates across India and find that state-level litigation rates relate more closely to states' Human Development Index (HDI) than to their GDP per capita. The HDI incorporates both economic and non-economic measures of wellbeing, including living standards, education, and life expectancy. The authors explain that higher education may increase knowledge of one's rights, while higher life expectancy may provide more time to sue.

The influence of education has also been studied by Buonanno and Galizzi (2014), Pereira and Wemans (2015), Rosales and Jiménez-Rubio (2017), and Yates et al. (2010), who examine civil litigation rates in Italy, Portugal, Spain, and the U.S., respectively. Rosales and Jiménez-Rubio (2017) and Yates et al. (2010) uncover a positive relationship between civil litigation and education, while Buonanno and Galizzi (2014) and Pereira and Wemans (2015) find a negative relationship. It may be that education not only serves to increase knowledge of one's rights, but also their aversion to risk. Halek and Eisenhauer (2001) and Hersch (1996) show that risk aversion tends to be higher among more educated individuals.[26] The prospect of litigation involves risk and thus may be viewed unfavorably by risk-averse individuals.

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24. *See* Bujakowski & Schmit, *supra* note 20 (manuscript at 8–9).

25. *See*, *e.g.*, Buonanno & Galizzi, *supra* note 1, at 295; Eisenberg et al., *supra* note 1, at 257.

26. Martin Halek & Joseph G. Eisenhauer, *Demography of Risk Aversion*, 68 J. Risk & Ins. 1, 15 (2001); Joni Hersch, *Smoking, Seat Belts, and Other Risky Consumer Decisions: Differences by Gender and Race*, 17 Managerial & Decision Econ. 471, 481 (1996).

The role of social capital has also received notable attention in the empirical litigation literature. Social capital generally refers to the strength of community networks in society. In a study of divorce and auto accident litigation in Japan, Ramseyer (2014) examines 13 different proxies of social capital, including crime rates, voter turnout, and volunteering, and finds that the majority are negatively related to civil litigation rates.[27] High social capital may be indicative of a culture that promotes the social good and limits harms. As a result, communities may experience fewer disputes and associated lawsuits.

Following the literature, we account for population density, urbanization, education, and social capital in our analysis. Population density and urbanization are measured using population per square mile and urban population relative to the total population, respectively. Education is proxied using the percentage of people aged 20–24 enrolled in normal higher education courses. Finally, social capital is proxied using divorce rates. Our dataset does not include any of Ramseyer's 13 proxies of social capital, yet we make use of one of Ramseyer's central results—that divorces are more common in regions with low social capital. Hence, we anticipate social capital to be higher in regions with lower divorce rates.

C. *Legal Factors*

Legal factors, including access to representation, alternatives to litigation, and legal rules, are also expected to impact the development of civil litigation rates. Access to representation is widely considered in the litigation literature and is typically proxied using numbers of lawyers and law firms per capita. More lawyers and law firms may increase competition in the legal services market, driving down the cost of representation. Additionally, some lawyers may promote litigation out of self-interest.

Empirical evidence is generally consistent with the notion that lawyers induce litigation. Studies from Italy, Japan, Portugal, Spain, and the U.S. each find that litigation rates are positively correlated with lawyer density.[28] While some studies leave open the possibility that causality runs in the opposite direction (i.e., litigation spurs demand for lawyers), Buonanno and Galizzi (2014), Carmignani and Giacomelli (2010), and Mora-Sanguinetti and Garoupa (2015) reach a stronger conclusion.[29] All three studies use an instrumental variables approach to assess the causal impact of lawyer density of litigation rates and find evidence of a positive effect.

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27. Ramseyer, *supra* note 1, at 39.

28. For Italy, *see, e.g.*, Buonanno & Galizzi, *supra* note 1, at 301; Carmignani & Giacomelli, *supra* note 1, at 20. For Japan, *see, e.g.*, Ginsburg & Hoetker, *supra* note 2 at 49; Ramseyer, *supra* note 2, at 69. For Portugal, *see, e.g.*, Pereira & Wemans, *supra* note 1, at 38. For Spain, *see, e.g.*, Mora-Sanguinetti & Garoupa, *supra* note 1, at 38; Rosales & Jiménez-Rubio, *supra* note 1, at 332. For the U.S., *see, e.g.*, Hanssen, *supra* note 1, at 225.

29. Buonanno & Galizzi, *supra* note 1, at 301; Carmignani & Giacomelli, *supra* note 1, at 20; Mora-Sanguinetti & Garoupa, *supra* note 1, at 38.

The extent to which parties opt to litigate directly corresponds with the availability and effectiveness of litigation alternatives. In China, the most widely utilized alternative is people's mediation. People's mediation is a voluntary process in which parties attempt to resolve a dispute with the assistance of a mediator. Mediation is conducted at the village level and is free of charge. If a mediated agreement is reached, parties may opt to draw up and sign a legally binding agreement that states the terms of the settlement. If mediation proves unsuccessful or if any party chooses not to participate, other channels of dispute resolution, including litigation, remain available to the parties.

Shen and Wang (2009) show that rural Chinese residents tend to prefer mediation to litigation. The authors note that compared with litigation, mediation is often cheaper, more flexible, and less reputationally damaging.[30] Yet, Bujakowski (2021) does not find a significant relationship between mediation and civil litigation, even during a 20-year period of mediation decline.[31] It may be that mediation sometimes serves as a precursor to litigation, with disputants choosing to litigate if mediation fails. In this case, mediation may act as a complement to litigation, rather than a substitute.

A final element of China's legal system that we consider is the amendment of laws governing civil procedures and legal protections. During our study period, at least three laws were amended that have reshaped procedures and protections: China's Civil Procedural Law in 2012, Consumer Protection Law in 2013, and Environmental Protection Law in 2014. Given that these laws were passed on a national-scale, we cannot leverage province-level variation to evaluate their influence on civil litigation rates. Nevertheless, we are able to account for them using year fixed effects. Year fixed effects provide for a changing legal environment in each year of our study, subject to laws and regulations in effect in that year among other factors.

Following the literature, we account for legal services, litigation alternatives, and relevant laws in our analysis. Legal services are measured using the number of full-time lawyers per 10,000 people and the number of law firms per 10,000 people. We measure people's mediation, China's primary alternative to litigation, using the number of people's mediation claims per 10,000 people. People's mediation claims do not include other types of mediation, such as judicial mediation and arbitral mediation. Finally, year fixed effects are used to control for relevant laws and amendments.

30. Shen & Wang, *supra* note 8, at 107.

31. *See* Douglas Bujakowski, *The Decline and Resurgence of People's Mediation in China: An Empirical Analysis of Chinese Provinces,* 17 J.L. Econ & Pol'y (forthcoming 2021) (manuscript at 20) (available at http://jlep.net/home/wp-content/uploads/2021/10/Bujakowski-17.1-To-Publish.docx.pdf)[https://perma.cc/2RNL-UBKD].

IV. Data

We utilize six years (2011–2016) of province-level data from China to assess spatial spillovers in civil litigation rates. Data are compiled by China's National Bureau of Statistics and reported in the China Statistical Yearbooks Database (CSYD), an annual publication that includes a host of socioeconomic and legal data. The CSYD contains case counts from courts and case counts from law firms. Court data reflect all first-instance civil cases in a given jurisdiction, while law firm data reflect first-instance civil cases in which the plaintiff used an attorney. While law firm case counts represent only a subset of court case counts, law firm data are much more complete than court data. Only 9 of China's 31 provinces, municipalities, and administrative regions report court data, and those values are only available in certain years. Conversely, law firm data are available for 24 regions and in all study years.[32]

Both data sources are also available at the national level, allowing us to compare their evolution over time, as shown in Figure 1. The two litigation measures display similar growth in each year. From 2011 to 2016, total civil litigation rates increased by 56.7 percent and civil litigation rates involving a plaintiff attorney increased by 56.1 percent. Additionally, the share of civil lawsuits in which the plaintiff used an attorney was incredibly stable over time, ranging from 24.3 percent to 25.6 percent. These figures suggest a high degree of correlation between court data and law firm data. In their study of economic structural transformation and litigation in China, Bujakowski and Schmit (2021) also note the incompleteness of court data and high correlations between court data and law firm data over time.[33] For these reasons, they opt to use law firm data in their analyses. We follow suit in the current study.

Figure 2 shows province-level civil litigation rates over time. Values are expressed in natural logs, allowing us to observe relative, rather than absolute, changes in litigation rates. We note that over the timespan, civil litigation rates increased in all regions except Jilin and that most provinces appear to have similar growth rates.

Figure 3 is a choropleth map of province-level civil litigation rates in 2016. The figure reveals that civil litigation rates are not randomly assigned with regard to location; rather, we observe clusters of adjacent provinces with similar litigation rates. For instance, southern coastal provinces appear to have the highest litigation rates, while northern and inland provinces appear to have lower litigation rates. Such clustering will occur whenever positive spatial correlations are present.

32. Court data are available for Anhui, Beijing, Chongqing, Henan, Hubei, Jilin, Jiangsu, Shandong, and Shanghai. Law firm data are available for Anhui, Beijing, Chongqing, Fujian, Guangdong, Guizhou, Henan, Hubei, Hainan, Heilongjiang, Hunan, Jilin, Jiangsu, Jiangxi, Liaoning, Ningxia, Qinghai, Sichuan, Shanghai, Shaanxi, Shanxi, Tianjin, Xinjiang, Tibet, Yunnan, and Zhejiang.

33. Bujakowski & Schmit, *supra* note 20 (manuscript at 25).

Moran's I statistics reported in Table 1 further highlight spatial similarities between neighboring regions. Moran's I is a measure of spatial dependence that is constructed by comparing the spatial assortment of litigation rates with a distribution of spatial assortments under random assignment. We observe that Moran's I values are positive and statistically significant at the one percent level in all years, suggesting that civil litigation rates are positively correlated across provinces. Additionally, values exhibit little change from year to year, suggesting similar levels of spatial dependence across time.

The CSYD also contains socioeconomic data, which we use to create our independent variables. Table 2 provides definitions of all variables included in our analysis and Table 3 shows summary statistics for those variables. All measures are taken at the end of each year and monetary values are deflated to 2016 yuan. To correct for skewness, all variables except those that are percentages are expressed in natural logs. After taking logs, most variables have small standard deviations relative to their mean, indicating that values are likely symmetric. While our sample only includes litigation rate data from 24 of China's 31 provinces, summary statistics reveal that those 24 provinces appear to be representative of China's experience generally. For instance, litigation rates average 15.4 cases per 10,000 people in our sample and 15.5 cases per 10,000 people nationally. Similarly, lawyer density and law firm density average 1.8 lawyers per 10,000 people and 0.2 firms per 10,000 people in our sample and 1.9 lawyers per 10,000 people and 0.2 firms per 10,000 people nationally.

V. Econometric Model

To investigate the possibility of spillovers in civil litigation rates, we follow the work of Bujakowski and Kamiya (forthcoming), who conduct a spatial analysis of auto insurance consumption in China.[34] The authors employ a flexible panel model, known as a spatial autocorrelation model, that distinguishes between spatial correlations in the dependent variable and spatial correlations in the error term.[35] As we will show, the former has implications for litigation determinants, while the latter does not. Let denote the natural log of the litigation rate for the ith $(i = 1, \cdots, N)$ province in the tth $(t = 1, \cdots, T)$ year. Define $y_t = (y_1, \cdots, y_N)'$. The spatial autocorrelation model can be written as follows:

$$y_t = \rho W y_t + X_t \beta + \mu + \gamma_t + v_t$$

$$v_t = \lambda W v_t + \epsilon_t \qquad (1)$$

34. Bujakowski & Kamiya, *supra* note 3 (manuscript at 2).

35. *See*, *e.g.*, Luc Anselin, Julie Le Gallo & Hubert Jayet, *Spatial Panel Econometrics*, *in* The Econometrics of Panel Data: Fundamental and Recent Developments in Theory and Practice 625, 630 (László Mátyás and Patrick Sevestre eds., 2008).

where X_t is a vector of explanatory variables, W is a spatial weight matrix, μ is a vector of province fixed effects, γ_t is a year fixed effect, and ϵ_t is a random error term.

Given that we utilize data from 24 regions, the spatial weight matrix W is a 24 by 24 matrix, where each entry is a binary variable indicating whether or not two regions are adjacent to one another.[36] This adjacency matrix is then normalized with row and column sums equal to one. It is important to note that litigation rates in all regions are related, even when those regions are not contiguous neighbors. This stems from the fact that spatial spillovers propagate outward, eventually reaching all continuous regions.

The term $\rho W y_t$ specifies an autoregressive relation in the response variable, where litigation rates in each region (y_t) are a function of litigation rates in all neighboring regions ($W y_t$). If spatial spillovers exist, estimates of ρ should be positive and significantly different from zero. The term $\lambda W v_t$ incorporates spatial dependencies in the error term and helps to alleviate bias from spatially correlated omitted variables. To see this, suppose that an unmeasured shock (e.g., a large-scale liability event) causes litigation rates to rise simultaneously in several neighboring jurisdictions. In this case, the regions will exhibit positive spatial correlations. Yet, those positive correlations are not due to spatial spillover—one region's litigation rates influencing other regions' litigation rates. Rather, a third variable (the shock) is responsible for the increase in all regions. By allowing for spatial dependence in the error term, we clearly distinguish between spatially correlated shocks and spatial spillovers in our estimates.

Our empirical model also includes province fixed effects (μ) and year fixed effects (γ_t).[37] Province fixed effects control for unmeasured, jurisdiction-level characteristics that are constant across time. Year fixed effects perform a similar function but for year-level characteristics. The combination of these effects is expected to pick up the influence of relevant laws, norms, and other unobserved attributes that may shape civil litigation rates. Both can be thought of as regression intercepts that provide for different baseline levels of litigation in each province and year.

VI. Results

A. *Analysis of Civil Litigation Rates*

Regression results are shown in Table 4. The aspatial model (Model 1) does not allow for spatial correlations in the dependent variable or in the error term. As such, it assumes spatial independence and is equivalent

36. Regions are not considered to be adjacent to themselves.

37. We utilize the Hausman specification test to select between province fixed and random effects. The results reveal a chi-squared statistic of 186.1 (p-value of less than 0.001), which suggests the inclusion of province fixed effects. Furthermore, a multiple F test for the year fixed effects reveals an F-statistic of 17.4 (p-value of less than 0.001), indicating the inclusion of year fixed effects.

to a traditional two-way fixed effects specification. The spatial lag model (Model 2) incorporates a spatially lagged dependent variable but not spatially correlated errors. Finally, the spatial autocorrelation model (Model 3) accommodates both types of spatial dependence. Models 1 and 2 serve as special cases of Model 3, in that Model 1 assumes that ρ and λ are equal to zero, while Model 2 assumes that λ is equal to zero. All models include the same set of regressors as well as province and year fixed effects.

Results indicate that civil litigation rates exhibit spatial spillovers. The spatial lag of the dependent variable, ρ, is positive and statistically different from zero in both the spatial lag model and spatial autocorrelation model. The model fit statistics, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), tell a similar story. Both the spatial lag model and the spatial autocorrelation model outperform the aspatial model, indicating the presence of spatial dependence. Likelihood ratio tests reveal that these improvements are statistically significant.[38] Among the three models, the spatial autocorrelation model performs the best according to AIC, while the spatial lag model performs the best according to BIC. Once again, we make use of likelihood ratio tests to select among the spatial models. Results suggest that after accounting for spatial lags, the inclusion of spatial errors does not significantly improve model fit.[39] Hence, we favor estimates from the spatial lag model and find that the inclusion of the spatial lag parameter ρ is sufficient to account for spatial effects in civil litigation rates.

Contrary to our expectations, the spatial error parameter λ is negative and statistically significant in the spatial autoregressive model. Recall that we anticipated positive given the potential for positively correlated shocks to litigation rates in nearby jurisdictions. It may be that the two spatial parameters play similar roles, such that the inclusion of both results in overfitting and volatile estimates. Subsequent tests support the possibility of overfitting. In the aspatial and spatial lag model, estimates of λ and ρ are highly robust to the omission of various groups of regressors. However, when those same regressors are omitted from the spatial autocorrelation model, estimates of λ and ρ are more sensitive, often switching in both sign and magnitude. In most cases, one of the estimates is positive and significant, while the other is negative and significant. This result bolsters the notion that the inclusion of a spatial lag parameter is sufficient to account for the spatial processes observed.

Explanatory variable coefficients are highly similar across all models. We find that civil litigation rates are positively related to private investment, urbanization, lawyer density, and law firm density and negatively related to GDP. These results are consistent with those of

38. Likelihood ratio tests can be used given that Models 1 and 2 are special cases of Model 3. The p-values from the likelihood ratio tests are as follows: 0.005 for Model 1 versus Model 2, 0.006 for Model 1 versus Model 3, and 0.121 for Model 2 versus Model 3.

39. The p-value from the likelihood ratio test is 0.121.

Bujakowski and Schmit (2021), the only other study we know to examine civil litigation rates in China.[40] The authors explain that negative coefficients on GDP may stem from a higher frequency of disputes in impoverished areas and note that Michelson (2007) finds support for this proposition in a survey of almost 3,000 Chinese households.[41] Coefficients on other variables have the expected sign and are generally consistent with prior research findings, as discussed in section three.

B. *Marginal Effects with Spatial Spillovers*

The existence of spatial spillover (i.e., non-zero ρ) alters the marginal effects of regressors. In the aspatial model, a variable's marginal effect is simply its estimated coefficient. However, in the spatial lag and spatial autocorrelation models, the presence of a spatial lag introduces a series of spillover effects onto other regions and back onto the region of origin. In this case, a variable's marginal effect can be divided into direct and indirect components, where direct effects accrue to the region that experienced the variable change and indirect effects accrue to other regions. Together, a variable's direct and indirect effects comprise its total effect.

Table 5 shows the marginal effects of each explanatory variable for each of our three models.[42] Marginal effects in the aspatial model are identical to the coefficient estimates from those regressions. Marginal effects in the spatial lag and spatial autocorrelation model are divided into direct and indirect components. As an example, consider the lawyer density variable in the spatial lag model. The direct effect of 0.646 implies that a one percent increase in lawyer density in a given region is associated with a 0.646 percent increase in civil litigation rates in that region, on average. This effect slightly exceeds the regression coefficient of 0.634 reported in Table 4 due to the feedback from all other regions onto the region of origin. One region's increase in civil litigation (a direct effect) increases civil litigation rates in other regions (an indirect effect), which in turn, increases civil litigation rates in the original region (a direct effect). Given that different regions have different numbers of neighbors, feedback effects vary by region. Lawyer density's direct effect of 0.646 is an average across all regions.

A variable's indirect effect represents the degree to which explanatory variable changes in certain regions shape civil litigation rates in other regions. Using the example of lawyer density in the spatial lag model again, the indirect effect of 0.164 indicates that when lawyer density in all other regions increases by one percent, litigation rates in the given region increase by 0.164 percent, on average. This indirect effect arises from the fact that lawyer density in a given region influences litigation rates in that

40. Bujakowski & Schmit, *supra* note 20 (manuscript at 26 tbl.3).

41. *Id.*; Michelson, *supra* note 11, at 54.

42. Bujakowski and Kamiya undertake a similar analysis. *See*, Bujakowski & Kamiya, *supra* note 3.

region, which in turn, influence litigation rates in surrounding regions. Like feedback effects, indirect effects vary by region given that different regions have different numbers of neighbors. Lawyer density's indirect effect of 0.164 is an average across all regions.

If a variable's value were to increase by one-unit in all regions, each region would be subject to both direct and indirect effects, causing an increase in civil litigation rates equal to the total effect. In the case of lawyer density in the spatial lag model, the total effect of 0.811 reflects the average percentage increase in litigation rates in each region when lawyer density increases by one percent in all regions.

In many cases, a variable's total effect may be more informative than its direct effect. When a variable (e.g., GDP) increases in one province, it typically increases in other provinces as well. Figure 4 demonstrates this phenomenon. The figure shows changes in statistically significant variables over time and suggests that provinces tend to experience similar shifts. This result can also be seen numerically. The bottom right panel of Figure 4 shows correlations between year-over-year percentage changes for a given province and average year-over-year percentage changes for all other provinces.[43] All of these correlations are positive, and most are quite high, e.g., 0.85 for GDP, 0.76 for law offices, 0.74 for lawyer density, and 0.68 for urbanization.

When a variable's values move in tandem across regions, all regions are subject to that variable's total effect. As such, a variable's total effect may be our best indicator of its impact on civil litigation rates. In examining the total effects of statistically significant variables in the spatial lag model (our best fitting model), we see that those effects are roughly 29 percent larger than total effects from the aspatial model.[44] Thus, failure to properly model spatial dependence has the potential to seriously understate the influence of litigation determinants. The degree of downward bias depends on the value of the spatial dependence parameter . Higher values of imply greater indirect and feedback effects, leading to greater bias when spatial independence is assumed.

VII. Conclusion

There is a rich literature that seeks to understand the evolution and determinants of civil litigation rates. In many cases, researchers employ subregional data, leveraging the ability to control for unobserved heterogeneity across jurisdictions. Yet, the use of such data presents issues of spatial dependence, a topic rarely considered in this framework. In the current study, we offer economic rationale for the presence of spatial

43. For instance, GDP's correlation of 0.85 is calculated as follows: 1. For each province, calculate the correlation between year-over-year percentage changes in GDP for that province and average year-over-year percentage changes in GDP for all other provinces. 2. Average the resulting correlations.

44. 29 percent is an average across the five statistically significant variables, GDP, private investment, urbanization, lawyers, and law firms.

spillovers in civil litigation rates and test for spatial effects using six years of data from Chinese provinces. Our results provide compelling evidence of jurisdiction-level spillovers, even after accounting for spatially correlated determinants and shocks.

Spatial spillovers are particularly important given that they alter the marginal effects of regressors. Changes in one region's socioeconomic and legal conditions not only shape litigation rates in that region, but also induce a series of spillover effects which propagate to other regions and back to the original region. The sum of these effects is likely more informative than direct effects alone, given that socioeconomic and legal conditions appear to be positively correlated across regions.

We find that marginal effects from models that accommodate spatial dependence are approximately 29 percent larger than marginal effects from models that assume spatial independence. This result suggests that failure to account for spatial spillovers can lead to biased estimates and misleading inferences. It also suggests that litigation determinants may be more impactful than previously thought.

The results of this study demonstrate that properly modeling spatial dependence is critical to accurately assess the influence of civil litigation determinants. Yet, questions remain. First, what is the source of the spatial dependence? While we discuss three possible mechanisms from which spatial spillovers might arise, we cannot be sure which of the three (if any) are responsible for the large spillover effects observed in the data. Second, does spatial dependence exist in other jurisdictions outside of China? While we suspect the answer is yes, we cannot be certain, given that we are the first to investigate the possibility of spatial spillovers in the context of litigation. These questions and others are sure to provide interesting avenues for future research.

Table 1: Moran's I by Year

Year	i_i	SD(i_i)	z	ρ-value
2011	0.499	0.185	2.935	0.002
2012	0.474	0.185	2.800	0.003
2013	0.415	0.185	2.483	0.007
2014	0.473	0.185	2.791	0.003
2015	0.489	0.185	2.880	0.002
2016	0.542	0.185	3.170	0.001

The table provides Moran's I statistics for litigation rates by year. Litigation rate refers to the natural log of the number of civil lawsuits in which the plaintiff used an attorney per 10,000 people.

Table 2: Variable Definitions

Variable	Definition
Litigation Rate	Natural log of the number of civil lawsuits involving a plaintiff attorney per 10,000 people
GDP	Natural log of regional real gross domestic product per capita (yuan)
Urban Income	Natural log of average real disposable income for urban residents
Rural Income	Natural log of average real disposable income for rural residents
Service Sector	Percentage of GDP associated with tertiary sector activities
Private Invest.	Percentage of fixed asset investment in non-publicly/collectively owned enterprises
Private Emp.	Percentage of urban employees working outside of publicly/collectively owned enterprises
Unemployment	Percentage of the urban workforce that is unemployed
Pop. Density	Natural log of the number of people per square mile (in 1,000s)
Urbanization	Percentage of the population living in urban areas
Education	Percentage of people aged 20–24 enrolled in normal higher education courses
Divorces	Natural log of the number of newly divorced persons per 10,000 people
Lawyer Density	Natural log of the number of full-time lawyers per 10,000 people
Law Offices	Natural log of the number of law firms per 10,000 people
Mediation Rate	Natural log of the number of mediation claims per 10,000 people

The table lists and defines the variables included in our study. All variables are measured at the province level and at the end of each year.

Table 3: Summary Statistics by Year

Variable	2011		2012		2013		2014		2015		2016	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Litigation Rate	2.52	0.58	2.56	0.53	2.66	0.58	2.71	0.65	2.87	0.63	2.99	0.62
GDP	10.53	0.42	10.63	0.41	10.71	0.40	10.79	0.39	10.86	0.39	10.92	0.39
Urban Income	9.92	0.28	10.03	0.28	10.11	0.27	10.20	0.26	10.30	0.25	10.38	0.24
Rural Income	8.90	0.38	9.03	0.37	9.17	0.34	9.28	0.33	9.39	0.32	9.47	0.31
Service Sector	41.24	9.96	42.25	9.90	43.97	9.75	44.87	9.61	47.73	9.36	49.64	9.27
Private Invest.	68.63	8.36	69.61	8.13	70.88	8.23	71.19	8.69	70.27	10.36	77.13	9.81
Private Emp.	69.61	10.73	71.33	10.04	76.12	8.83	77.99	8.66	79.34	9.03	79.98	8.70
Unemployment	3.43	0.72	3.32	0.67	3.33	0.69	3.30	0.67	3.29	0.67	3.28	0.70
Pop. Density	-0.39	1.31	-0.38	1.31	-0.38	1.31	-0.37	1.31	-0.36	1.31	-0.36	1.31
Urbanization	55.23	14.08	56.46	13.70	57.43	13.39	58.46	12.91	59.42	12.28	60.52	11.83
Education	12.08	4.80	13.25	4.96	14.26	5.06	15.71	5.38	17.62	5.85	19.01	6.14
Divorces	3.08	0.37	3.16	0.34	3.28	0.33	3.30	0.31	3.36	0.30	3.44	0.29
Lawyer Density	0.36	0.64	0.44	0.63	0.52	0.61	0.61	0.60	0.68	0.59	0.77	0.58
Law Offices	-1.94	0.57	-1.90	0.57	-1.84	0.56	-1.79	0.57	-1.72	0.55	-1.62	0.54
Mediation Rate	4.15	0.43	4.14	0.47	4.13	0.46	4.13	0.46	4.10	0.48	4.06	0.52

The table shows annual summary statistics for each variable included in our study. The sample period is 2011-2016. Variable definitions can be found in Table 2.

TABLE 4: MODEL ESTIMATES

	Aspatial (1)		Spatial Lag (2)		Spatial Auto (3)	
	Est.	**S.E.**	**Est.**	**S.E.**	**Est.**	**S.E.**
Spatial lag (ρ)			0.218	0.075 ***	0.442	0.101 ***
Spatial error (λ)					-0.423	0.154 ***
GDP	-1.879	0.546 ***	-1.892	0.526 ***	-1.221	0.542 ***
Urban Income	0.121	0.300	0.362	0.301	0.201	0.295
Rural Income	-0.333	0.316	-0.505	0.310	-0.346	0.305
Service Sector	-0.010	0.007	-0.009	0.006	-0.004	0.007
Private Invest.	0.008	0.003 **	0.009	0.003 ***	0.006	0.003 **
Private Emp.	0.005	0.005	0.004	0.005	0.001	0.005
Unemployment	0.029	0.041	0.023	0.040	0.043	0.041
Pop. Density	0.232	0.744	0.113	0.718	0.634	0.640
Urbanization	0.053	0.014 ***	0.053	0.013 ***	0.038	0.014 ***
Education	0.012	0.016	0.017	0.015	0.020	0.013
Divorces	-0.019	0.120	-0.070	0.117	-0.037	0.108
Lawyer Density	0.713	0.242 ***	0.634	0.234 ***	0.728	0.226 ***
Law Offices	0.573	0.158 ***	0.607	0.152 ***	0.472	0.171 ***
Mediation Rate	0.032	0.062	0.041	0.059	0.078	0.062

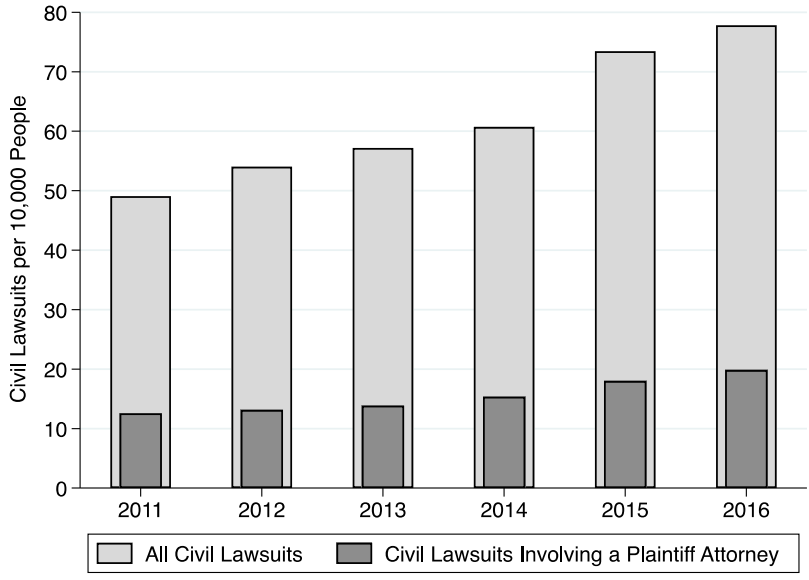
The table shows regression results for three specifications. The aspatial model (Regression 1) assumes that $\rho = \lambda$, and spatial lag model (Regression 2) assumes that $\lambda = 0$. Both are limiting cases of the spatial autocorrelation model (Regression 3), which is unconstrained. The dependent variable is province-level litigation rates, defined as the natural log of the number of civil lawsuits in which the plaintiff used an attorney per 10,000 people. The sample period is 2011-2016. All models include socioeconomic and legal variables and province and year fixed effects. Variable definitions can be found in Table 2. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 5: Marginal Effects

	Aspatial (1)	Spatial Lag (2)			Spatial Autocorrelation (3)		
		Direct	Indirect	Total	Direct	Indirect	Total
GDP	-1.879	-1.930	-0.491	-2.421	-1.338	-0.850	-2.188
Urban Income	0.121	0.369	0.094	0.463	0.220	0.140	0.360
Rural Income	-0.333	-0.515	-0.131	-0.646	-0.379	-0.241	-0.620
Service Sector	-0.010	-0.009	-0.002	-0.011	-0.004	-0.003	-0.007
Private Invest.	0.008	0.009	0.002	0.011	0.007	0.004	0.011
Private Emp.	0.005	0.004	0.001	0.005	0.001	0.001	0.002
Unemployment	0.029	0.024	0.006	0.030	0.047	0.030	0.076
Pop. Density	0.232	0.116	0.029	0.145	0.695	0.441	1.136
Urbanization	0.053	0.054	0.014	0.068	0.042	0.027	0.069
Education	0.012	0.017	0.004	0.021	0.022	0.014	0.035
Divorces	-0.019	-0.072	-0.018	-0.090	-0.041	-0.026	-0.066
Lawyer Density	0.713	0.646	0.164	0.811	0.798	0.507	1.304
Law Offices	0.573	0.619	0.157	0.776	0.518	0.329	0.846
Mediation Rate	0.032	0.042	0.011	0.053	0.085	0.054	0.139

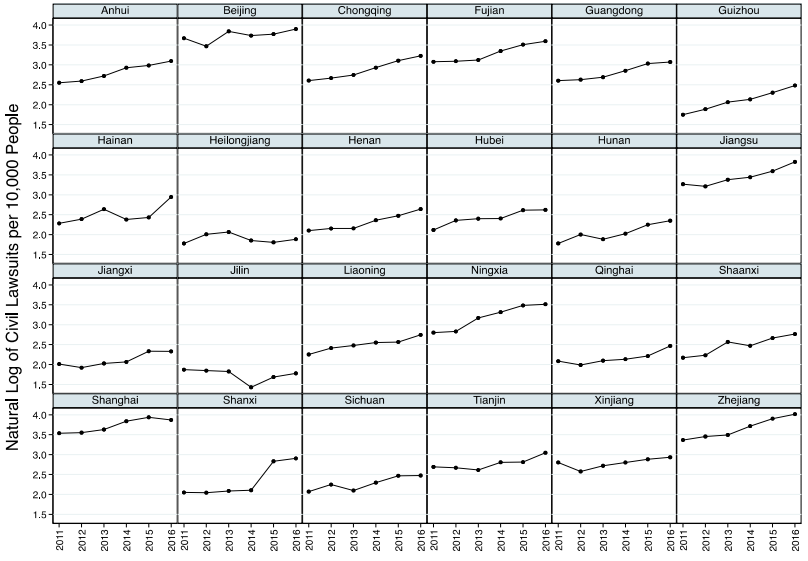
The table shows the marginal effects of regressors on civil litigation rates in the presence of spatial spillovers. Marginal effects for the aspatial model (Regression 1) are equivalent to the estimated coefficients for that model reported in Table 4. Marginal effects for the spatial lag model (Regression 2) and spatial autocorrelation model (Regression 3) differ from the estimated coefficients for those models due to spatial spillover effects. For those models, we report direct, indirect, and total marginal effects.

Figure 1: Civil Litigation Rates in China



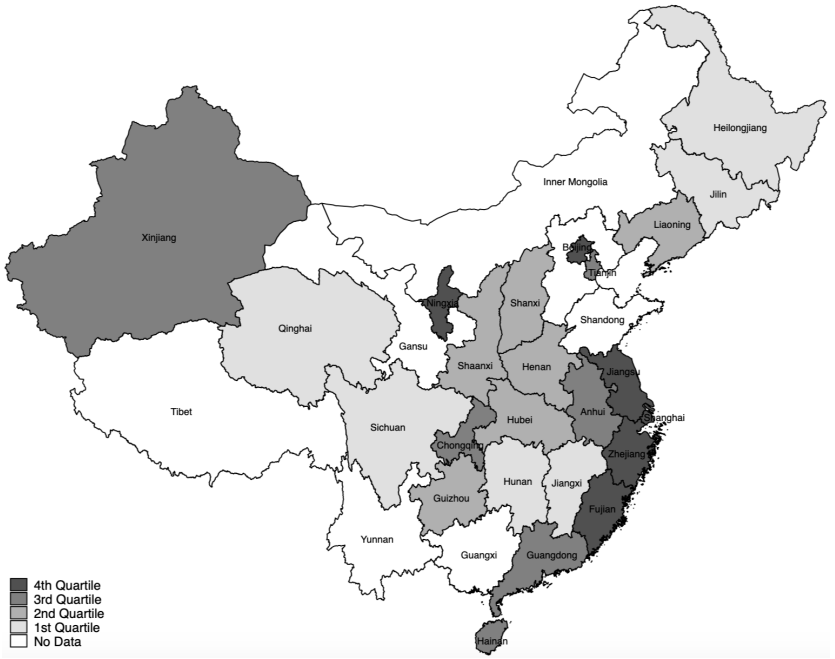
The graph shows nationwide civil litigation rates from 2011 to 2016, as derived from court data and law firm data. Court data include all civil lawsuits, while law firm data include civil lawsuits in which the plaintiff used an attorney.

Figure 2: Litigation Rates over Time



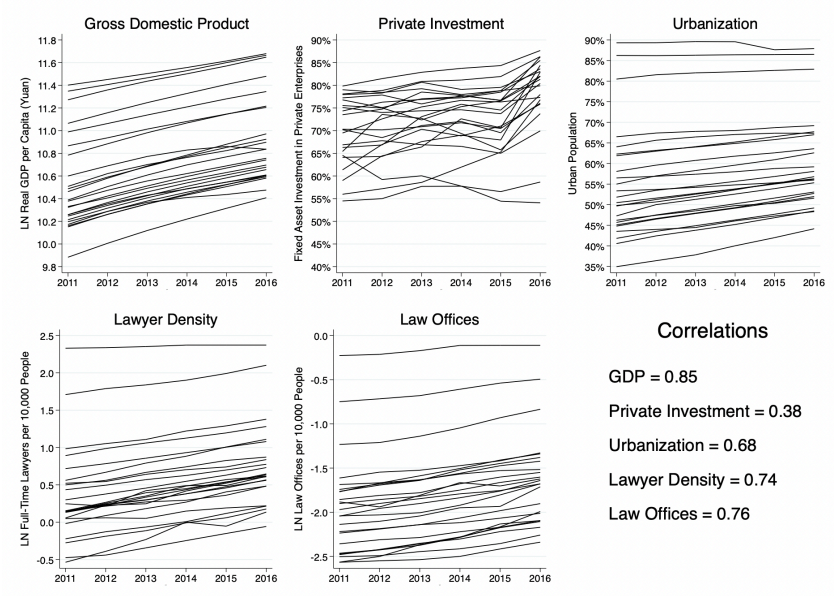
The figure shows litigation rates by province over time. Litigation rates are defined as the natural log of number of civil lawsuits in which the plaintiff used an attorney per 10,000 people.

Figure 3: Choropleth Map of Civil Litigation Rates in 2016



The figure shows litigation rates in 2016 by province. Litigation rates are defined as the number of civil lawsuits in which the plaintiff used an attorney per 10,000 people. Darker shades of gray indicate higher litigation rates.

Figure 4: Changes in Statistically Significant Variables over Time



The figure shows the evolution of statistically significant variables by province over time. Variable definitions can be found in Table 2. A variable's correlation is calculated as follows: 1. For each province, calculate the correlation between year-over-year percentage changes for that province and average year-over-year percentage changes for all other provinces. 2. Average the resulting correlations.