Empirically Mapping Investment Arbitration Scholarship: Networks, Authorities, and the Research Front

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Abstract
Scholarship on international investment arbitration is plentiful. Despite it being a relatively young field, it would be difficult to name one in which more books and articles have been published in recent years. The field is a dynamic one, attracting a diverse range of authors; the stakes are high, the knowledge is limited: scholarly work is necessary and to be welcome. The amount of available literature, however, also provides us for an opportunity to study its relationship with the field it purports to describe: in a nutshell, we do not study investment arbitration scholarship because we are naively surprised that it exists, or that there is so much of it. We know that there must be good reasons for it to do so, and to do so to this extent. It is precisely for these very good reasons that we can resolutely argue that investment arbitration scholarship is worth studying, and that studying investment arbitration scholarship can bring us a step closer to a better understanding of investment arbitration. Accordingly, this chapter seeks to provide a large-scale analysis of investment arbitration scholarship. By combining theoretical insights and big data empirical analysis, we seek to map the field, its actors, and, its dynamics, with a view to revealing latent patterns through citations, topics, and publication dynamics, but also through tribunals” own use of literature.

Keywords
International arbitration; legal scholarship; legal reasoning; literature; scientometrics.

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1 Introduction.................................................................................................................. 2

2 The case for mapping international investment arbitration scholarship................. 3

2.1 Haven’t we been here before? ................................................................................. 3

2.2 Actors, paradigms, identities................................................................................. 4

2.3 Why bother? ............................................................................................................ 12

3 Methodology............................................................................................................... 13

3.1 Scientometrics: scholarly citations ....................................................................... 13

3.2 Citation mining: arbitral citations ......................................................................... 15

3.3 Caveat..................................................................................................................... 16

4 Data ............................................................................................................................. 16

4.1 Investigation 1: scholars citing scholars ............................................................... 16

4.2 Investigation 2: arbitrators citing scholars ............................................................ 23

5 Findings and final reflections...................................................................................... 32

1 Introduction

Let’s cut to the chase. There is a lot of scholarship on international investment arbitration. Despite it being a relatively recent field (but then, for how long? And what was a ‘field’ again? We will come back to it), it would be difficult to name one in which more books and articles have been published in recent years.

True, some may say at this point, the books are many—but so are the cases, the people involved in it, the unresolved problems. The field is a dynamic one, attracting a diverse range of authors; the stakes are high, the knowledge is limited: scholarly work is necessary and to be welcome. And they would be right. It would be hypocritical to contend otherwise in a piece that is, after all, about investment arbitration—be it by way of its scholarship. In a nutshell, we do not study investment arbitration scholarship because we are naively surprised that it exists, or that there is so much of it. We know that there must be good reasons for it to do so, and to do so to this extent. It is precisely for these very good reasons that we can resolutely argue that investment arbitration scholarship is worth studying, and that studying investment arbitration scholarship can bring us a step closer to a better understanding of investment arbitration.

This chapter seeks to provide a large-scale analysis of investment arbitration scholarship. By combining theoretical insights and big data empirical analysis, we seek to map the field, its actors, and, its dynamics, with a view to revealing latent patterns through citations, topics, and publication dynamics, but also through tribunals’ own use of literature. It moves in six parts: Part I refines the case for mapping Investment Arbitration Scholarship; Part II sets out our methodology; Part III looks at the citation patterns between scholarly authorities; Part IV considers the citation of scholars by investment tribunals; Part V discusses the findings in context.
2 The case for mapping international investment arbitration scholarship

2.1 Haven’t we been here before?

Why examine scholarship? While the question, taken generally, has given rise to an entire scientific field, it is almost never addressed by scholars writing on legal scholarship. The reason, we suspect, is quite simple: we are used to legal scholarship being central to our professional or academic lives. The assumption is that posing the question would be the equivalent of asking a person why they are breathing air. We care about legal scholarship—or, at the very least, we know that we have to deal with it in some manner, as either authors, audience, or, as it normally happens, both.

Authorship and audience make legal scholarship interesting: as celebrated Harvard legal scholar Mark Tushnet observed, it is difficult to think of a field with less “intellectual marginality”.1 Regardless of the amount of scholarship we consume within academia, it is difficult to imagine a comparable demand for it outside of it,2 even where questions addressed by academics are to be resolved in a court, or by policy makers.

To be sure, much of this has to do with the growing specialization of legal expertise, but also with the nature of the profession of the academic, who is now more worried about certain metrics than others: as one commentator has observed in relation to the American academic market, it would not be an overstatement to claim that one’s professional trajectory is defined in no small part by one’s ability to impress second-year law students—but the reflection might not be too different when other types of editors are considered—focused on maximising the competitiveness of the periodical they edit by attracting citations and debate around its contents.3 Thus, it would be easy to denounce this form of scholarly output as self-serving and meaningless, with literature forming the basis of academic dialogue, but not of much else. One metric that has been commonly invoked to demonstrate that this is, in fact, the case is the fact that, even where scholarship is traditionally cited by courts, citation is on a downward trend.4

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1 With reference to American scholarship see Mark Tushnet, ‘Legal Scholarship: Its Causes and Cure Symposium on Legal Scholarship: Its Nature and Purposes’ [1980] Yale Law Journal 1205, 1205 (‘I cannot imagine, for example, an intellectual history of contemporary America in which legal thought would play an important part… [t...]he intellectual marginality of legal scholarship is all the more striking in light of 7 the immense role that law plays in American society’).

2 This is not to say that the demand for legal scholarship is low: as in a number of academic fields, it is not, and the business is profitable specifically because ‘demand has the elasticity of cast iron’. See ‘EJIL: Talk! – What a Journal Makes: As We Say Goodbye to the European Law Journal’ <https://www.ejiltalk.org/what-a-journal-makes-as-we-say-goodbye-to-the-european-law-journal/> accessed 6 February 2020.


Undeniably, depending on the relevant legal tradition, scholarly pieces may or may not be cited by judges and other important actors for largely unrelated reasons, ranging from drafting conventions to other motives. But the question that this lack of reliance on scholarship beyond legal academia raises remains the same. In fact, the question becomes even more pressing: if scholarship is invisible outside of scholarly circles, how do we measure its real-world impact? Note that this impact need not be conceived too simplistically: we know all too well that there is no single hard boundary between the communities of scholars and practitioners in more or less any areas of law.

As with most other complicated problems, there is more: when discussing the invisibility of scholarship beyond academia, most critics seem to assume that the impact of scholarship within academia must be absolutely clear and in need of no further explanations. Naturally, this is not the case. It is certainly possible to be aware of some important scholarly output and single out the paradigm-changing ones just by keeping up to date with journal symposia, learned conferences, and the blogosphere. Yet, one cannot escape the impression that approaches of this kind might rely on the force of anecdotes to an excessive degree. Hence the need to draw a more accurate picture.

2.2 Actors, paradigms, identities

Naturally, this is not the first time that the role of scholarship in law has come under scrutiny, although the issue has not attracted a great deal of attention in the context of investment arbitration. It is thus possible to draw some useful parallels.

There is some consensus on the idea that there is an inherent hybrid quality to international investment law and arbitration as a field. Thus, many have compared it to other established areas of specialisation with a view to identifying the best comparator and borrow the soundest analogies. We do not seek here to make a meaningful contribution to the debate, which, in any event, has been tackled far more thoroughly elsewhere. Rather, we concur with the idea that investment arbitration is a hybrid field, a conceptual borderland, and we find it plausible to assume that its scholarship might reflect the intellectual legacies of that of other fields. We consider here the examples of public international law and arbitration scholarship, which, we posit, might be those with which the producers and consumers of Investment Arbitration Scholarship are most familiar.

2.2.1 Public international law scholarship

One key characteristic of international investment arbitration is that it has historically revolved around international law and international lawyers—as in lawyers that are...
experienced in public international law—to a far larger extent than other forms of arbitrations. Investment tribunals apply what is essentially public international law—treaty, custom, general principles.\(^7\) One may note, in addition, that the communities of public international law and investment arbitration overlap to a significant degree. Finally, and of more immediate relevance for our present purposes, international law periodicals are replete with discussions of investment arbitration issues, just as decisions of investment tribunals cite a sizable number of public international law literature—and, of course, cases.\(^8\)

International lawyers have a soft spot for legal scholarship. This is not—or, at least, not only—vain self-referentiality, but rather the result of what amounts to a formal recognition of the role of scientific writing in the legal system. According to Article 38(1)(d) of the Statute of the International Court of Justice (ICJ), the “teachings of the most highly qualified publicists of the various nations” amount to “subsidiary means for the determination of rules of law”, just like judicial decisions.\(^9\) As the ICJ Statute is generally seen as the most authoritative statement of the sources of international law, writers can relish in the formal sanction of their role as capable of influencing or determining—if only in the context of law-ascertaining—what international law is.\(^10\)

From a historical perspective, one may also observe that the role of scholars was ostensibly even greater before the “event” of Article 38.\(^11\) The provision ostensibly built on previous arbitral practice,\(^12\) which nevertheless is, to put it bluntly, not nearly enough to assess the significance of scholarly impact on the development of international law in an era of limited judicialization.\(^13\) As Oppenheim could write in 1908, “The writers on international law, and in especial the authors of treatises, have in a sense to take the place of the judges... It is for this reason that text-books of

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7 Brabandere (n 8).
9 ICJ Statute, Article 38(1)(d)
10 For one such view expressed in a book which is very much on law-ascertainment, see Jean d’Aspremont, Formalism and the Sources of International Law: A Theory of the Ascertainment of Legal Rules (OUP Oxford 2013) 209.
11 For the notion of Article 38 as an important ‘event’ see Thomas Skouteris, ‘The Force of a Doctrine Art. 38 of the PCIJ Statute and the Sources of International Law’ in Fleur Johns, Richard Joyce and Sundhya Pahuja (eds), Events: The Force of International Law (Routledge-Cavendish 2010).
13 For some early reflections on judicialisation see John Bassett Moore, ‘General Introduction General Introduction’ (1929) 1 International Adjudications: Ancient and Modern History and Documents vii.
international law have so much more importance for the application of the law than text-books of other branches of the law'.14

While, even then, approaches to scholarly writing were not all that uncritical,15 we generally assume that our era is a different one: for starters, there are courts, judges, arbitrators—in other words, law-applying authorities which occupy much of the space once reserved to the legal adviser and the diplomat, albeit in an uneven fashion.16 From a result-oriented perspective, their output might be more important of that of scholars, all the more so when their degree of systemic embeddedness in a given regime is higher.17 As Schwarzenberger observed, ‘[t]here is a world of difference between practicing shooting with dummy ammunition on a wooden target and firing in earnest with live ammunition on a living target’.18

Indeed, if one looks at the citations patterns of international courts and tribunals, it will be immediately apparent that “teachings” are not cited nearly as much as judicial decisions,19 and that their relatively scarce relevance decreases as soon as patterns of referring to previous decisions emerge.20 In other words, international courts prefer some “subsidiary means” over other ones, though the justifications may be quite variegated.21 Domestic courts may have different approaches, but they, too, vary in their drafting conventions.22 Yet, this is not to say that doctrine is meaningless: first, not all international adjudicators are so careful not to cite publicists; second, even where doctrine is not directly referred to by the majority, it may have prompted reflection on how to resolve a specific legal question or another: evidence of this trend is easy to

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15 Consider, for example, this passage from Pasquale Fiore’s treatise, which predates Oppenheim’s by about forty years (our translation): ‘We observe, however, that the authority of publicists must be employed with a grain of salt, without ascribing to their opinion such weight capable of displacing the principles of reason’. See Pasquale Fiore, Nuovo dritto internazionale pubblico: secondo i bisogni della civiltà moderna (Milano : Casa Editrice e Tipografia degli Autori-Editori 1865) 42.
21 RY Jennings, ‘The Judiciary, International and National, and the Development of International Law’ (1996) 45 The International and Comparative Law Quarterly 1, 9 (maintaining that ‘[t]he main reason for this convention is, one suspects, not so much based upon any principle concerning a source of law but, rather, to avoid invidious distinctions between publicists cited and publicists not cited’).
22 Consider for example the reliance on scholars in early American cases: The Paquete Habana 175 US 677, 700 (1900). Consider also The Freedom And Justice Party & Ors, R (On the Application Of) v Secretary of State for Foreign and Commonwealth Affairs & Anor [2016] EWHC 2010 (Admin) [EWHC (Admin)].
observe in the individual opinions of many adjudicators, including the ICJ, for this reason, and finally, it is quite possible that widespread academic support or criticism of a specific proposition will affect the way it is relied on, even if its discussion does not make the cut in the final decision.

More fundamentally, the international legal scholar does not live for citation only. Within the international legal system, she acts the important ordering figure of the ‘grammarian’. This intuition, first proposed by Pierre-Marie Dupuy, and further elaborated by Martti Koskenniemi, has been more recently considered by Gleider Hernández. The main thrust of the idea is that international lawyers exercise an important role in defining the structure and systematization of the grammar shared by a community—of language, metaphorically; of practice, in actuality. It may be true, as Hernández contends, that scholars may bring their contribution in the task of distinction between law and non-law—almost as if they were the punctilious “purifiers” of Borges’ Library of Babel, parsing the meaningful content from the inevitable gibberish.

More fundamentally, however, their role is role is normative because “a grammarian shapes the formulation of arguments by other actors, the categories of acts, utterances and practices that will be deemed relevant and indeed contributes to the elaboration of the language”.

Coming full circle, international legal scholars are also deeply embedded in the community of international lawyers. They—often—wear multiple hats and perform different functions. Borrowing, again, the words of Gleider Hernández, “the category of international legal scholar is far from hermetic”.

### 2.2.2 Arbitration literature

Arbitration literature may serve as another paradigm. No formal recognition as “subsidiary means” is offered in this area, unless a specific domestic law—or international law, if relevant—provides otherwise. Rather, the importance of scholarship in the field of arbitration (and, by “arbitration”, we mainly refer to the general category of international commercial arbitration) has perhaps less to do with

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24 For a case in which it did, see Waguih Elie George Siag & Clorinda Vecchi v. Arab Republic of Egypt, ICSID Case No. ARB/05/15, Award, 1 June 2009, paras 498-499 (‘The Loewen decision has been the subject of intense scrutiny and criticism by international law scholars and investment arbitration practitioners… Commentators have also stigmatised the Tribunal’s application of a rule developed in one particular context… Finally, academics and practitioners have questioned the relevance of the Loewen Tribunal’s conclusions’).


28 Hernández (n 28) 162; The author persuasively refers to Pierre Bourdieu, ‘Force of Law: Toward a Sociology of the Juridical Field, The’ (1986) 38 Hastings Law Journal 805, 824 (arguing that academics ‘carry out the function of assimilation necessary to ensure the coherence and the permanence of a systematic set of principles and rules’).

29 Hernández (n 28) 166.
the paradigm of sources and more with that of intelligent design—as a construct, of course, not as an argument.

It would be pointless for the reader and taxing for the authors to engage in a full-length discussion of the usual arguments on the “creation” of arbitration law as a field, as a specialization, as a legal system as whole. Nor do we wish to engage in a discussion about the borders between international arbitration scholarship and scholarship on international arbitration,30 however interesting that might be. We will restrict ourselves to relaying the vulgatae over the last four decades or so, international arbitration has grown increasingly international, and its scholarship had largely celebrated its progressive detachment from the bounds of national law.31

To be sure, one of the very few empirical analyses conducted on the point paints a mixed picture: as Helmersen explains, in the 203 ICC awards published in the Yearbook of Commercial Arbitration between 1976 and 2014, there have been 719 references to scholarship, averaging 3.5 per award—though, in practice, 51% of the awards contain no references.32 Moreover, the approach appears to be relatively conservative, with little reliance being placed on what Helmersen terms “delocalisation scholarship”.33

Beyond the necessary caveats about the fact that many awards remain unpublished, and with their potential use of scholarship well shrouded in mystery, citations in arbitral decisions might not necessarily be the best metric to determine influence. Rather, what we wish to highlight is that it any account of the creation of international arbitration as a field seemingly relies on a narrative that sees scholarly endeavours as laying the groundwork for it. The foundational myth of the scholar-utopian engaged in a struggle for the liberation of arbitration from the bounds of state law is a familiar trope,34 a constant feature in the treatises of the most learned and accomplished authors. For all of the rediscovery of individual influence in the field of public international law, it is arguable that, their respective fields being the frame of reference, the influence of Bruno Oppetit35 or René David is quantitatively and qualitatively greater than that of Lassa...

30 The obvious example is Yves Dezalay and Bryant G Garth, Dealing in Virtue: International Commercial Arbitration and the Construction of a Transnational Legal Order (University of Chicago Press 1998); But one wonders whether the same could be said about other, more ‘juridical’ works. Consider, for example, Emmanuel Gaillard, Legal Theory of International Arbitration (Martinus Nijhoff Publishers 2010).


33 ibid.


Oppenheim or Gerald Fitzmaurice. More than that, scholarly pursuit remains encouraged and dignified in modern treatises. Thus, for example, Paulsson devotes an entire section in his *The Idea of Arbitration* to the prediction of “a resurgent influence of legal scholarship,” and in the context of a process of increased legitimacy for arbitration itself no less.

When authors of this calibre, influential and accomplished as both scholars and practitioners, put forward similar views, it is difficult to remain indifferent. Yet, we might wonder about the types of incentives behind their writing, but also about their audience: if it is true that “[t]he existing world of international commercial arbitration already belongs to a small, mostly closed, cohort of scholars and practitioners… hard to enter, its ideology […] immune to critique,” what is the purpose of an effort to persuade? We might also wonder about their thematic influence: do younger or less accomplished authors write about the same things? And who reads and cite them?

### 2.2.3 Investment arbitration scholarship: authors, audience, end-users

The two models discussed above are of some relevance for our current analysis. It is sometimes said that investment arbitration sits at the intersection of these two fields. Investment law, as a whole, is one of the key examples of the “[e]xpanding domain of international law.” Different authors, as discussed, propose that the field should find its ideal comparator in either the commercial paradigm, or public law and human rights. Different backgrounds may make for different approaches to important issues, some of systemic relevance, and different sensitivities arising from prior experiences have been taken into account by relevant stakeholders as relevant features of the system.

Yet, it is arguable that the peculiar relationship entertained by investment arbitration and its literature might be best explained by reference to the field’s social makeup. Figure 1 provides an even clearer illustration of the current situation by using social network analysis to draw a full network of arbitral appointments in investment tribunals in all of the known investment treaty disputes as to October 2019. The

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37 ibid.
38 Michaels (n 36) 62.
40 For some discussion of the point see Schill, *International Investment Law and Comparative Public Law* (n 8); Roberts (n 8); Vadi (n 8).
41 The usual example is the conflicting approaches to the role of the state Thomas W Wälde, ‘Procedural Challenges in Investment Arbitration under the Shadow of the Dual Role of the State: Asymmetries and Tribunals’ Duty to Ensure, pro-Actively, the Equality of Arms’ (2010) 26 Arbitration International 3.
44 Analysis by Niccolò Ridi, based on data by Daniel Behn, Malcolm Langford, Ole Kristian Fauchald, Runar Lie, Maxim Usynin, Taylor St John, Laura Letourneau-Tremblay, Tarald Berge and Tori Loven Kirkebo, PITAD Investment Law and Arbitration Database: Version 1.0, Pluricourts Centre of Excellence, University of Oslo (31 January 2019). The network analysis has been carried out with the
portion of the graph included here, which shows the core of the arbitration network, provides a representative picture of the social aspect of what has been called the “marriage of public international law and international commercial arbitration”.45 The network algorithm employed here shifts central players (larger) towards the centre; colours represent computationally-identified clusters,46 drawing attention to actors who are more connected among each other than to the rest of the network; finally, the “edges”—the ties connecting the different “nodes” of the networks—are “weighed”, and thus represented as proportionally thicker depending on how often two arbitrators have been appointed together.

Complex network measurements, which have been successfully employed elsewhere,47 are not necessary for our present purposes. The graph below highlights at least two prominent features of the arbitration community:48 the comparatively small number of influential, repeat players, and the strong connections linking some of them. Hence our question: how cannot this peculiar social structure influence investment arbitration as a scholarly field?

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47 See, in particular, Puig (n 45).
48 Although the network deals with arbitrators only, it is submitted that the reflection can be adapted to counsel as well for simple reasons of frequent identity. See Langford, Behn and Lie (n 45).
Figure 1: A social network representation of arbitrators based on co-appointments.

Source: Niccolò Ridi on PITAD data.\(^49\)

\(^{49}\) See n44.
2.3 Why bother?

As we observed in the introduction, a significant amount of scholarship is produced in the field of investment arbitration. In a recent chapter, about arbitration literature in general, we observed that it

... entertains a particular relationship with its own literature—the written knowledge in the field and about the field. This relationship is marked by one big mix, be it in the form of competition or cooperation, of practitioners who use it, legal entrepreneurs who make and change it, and scholars who analyse it, with more or less permanent alternations and confusions of these roles... in arbitration, this relationship (call it, quite normatively, expertise-enhancing cross-fertilisation or rather mind-narrowing dogmatic collusion, as you will) has a strength that would probably appear curious, and worth investigating, in many other fields in which public interests are at stake.50

We stick to our guns: all law is a social construct. And so is arbitration and every other legal institution. They are social constructs in two ways: one the one hand, we construct law and legal institutions in the sense that we shape them, straightforwardly determine what they should be and therefore what they are, what they become. Law is a noetic entity—something we human beings create, something we construct socially. On the other hand, law and legal institutions are also social constructs in the sense that our understanding of them is constructed socially. This is the case of our knowledge production about arbitration for instance—what we understand arbitration to be, to do, what effects it has, our representation and understanding it all. This is something we do, and we do this through all our filters, through all the things we want to see and the things we don’t want to see, through all of our own values and interests.

To be sure, Gaston Bachelard had made the point long ago, showing that even the natural sciences, our understanding of physics and biology and neurophysiology is a social construct, as scientists filter data according to their own convictions, professional needs, and wider views of the world.51 Even more persuasively, Bruno Latour and Steve Woolgar accounted for the role of practices and any day activities in the construction of reality’s building blocks—the scientific facts.52

Thus, if we want to understand the world, we should also understand who produces knowledge about the world: who are the scientists, what is their ethos, what do they believe in, what are their professional constraints, where do their own personal interests lie? This, in a nutshell, is what we try to do for arbitration.

We are asking a simple question: how does knowledge about investment arbitration and investment get produced? By whom? With what effects on whom? What are the epistemic communities (or sub-communities if you believe that everyone who produces knowledge about these matters forms one “common” community)? What do people contribute, in what way, to the production of knowledge in this field, and what are their likely aesthetic prefigurations (by aesthetic we mean not quite metaphysics, but what is “behind the text’, the likely objectives, beliefs, values, interests, wider rational and

emotional framework of those people)? What does this tell us about what we think we know about investment arbitration and investment law and what should become of investment arbitration and investment law?

Somewhat more precisely, if we focus on scholars—those who produce scholarship—on how they produce knowledge: who are they? What is their likely ethos? How do they band together, cluster together in smaller communities? Who is inspired by whose ideas and by whose social reconstructions and images of what is happening and should be happening? Do these understandings of the world actually influence the decision-making of arbitral tribunals?

3 Methodology

3.1 Scientometrics: scholarly citations

There are several ways to look at the evolution of scholarship, and indeed many have been applied to the study of legal scholarship. Because of the unique nature of the field of international investment arbitration, we have opted to resort to an approach that has been rarely employed in the study of legal scholarship: scientometrics.

Scientometrics has been defined as the “quantitative study of science, communication in science, and science policy”. The paternity of the term and the development of scientometrics as a scholarship field is generally credited to Derek de Solla Price. Methodologically, it is a development of bibliometrics, or the “the quantitative methods of the research on the development of science as an informational process’. However, it is specifically concerned with “the exploration and evaluation of scientific research’.

Among the many uses and goals of scientometrics, we are particularly concerned with its potential for finding and understanding the “research front” in a particular theme or discipline, that is to say “an emergent and transient grouping of concepts and underlying research issues”.

In the scientometrics market the citation is the main currency. It serves as a flexible unit of measurements, one that makes good sense in the real world. One of the most striking examples is the fact that high citation counts have been, for a long time, positively associated with the subsequent impact, being correlated, for example, with the awarding of Nobel prizes—a trend that more recent research has confirmed as accurate, if increasingly difficult to predict.

After parsing citations from scholarly works, it is possible to employ a variety of techniques to make sense of the data. First of all, it is possible to simply count the

53 Loet Leydesdorff and Staša Milojević, ‘Scientometrics’ 2.
56 Mingers and Leydesdorff (n 56) 1.
number of citations that are received (or made) by any scholarly work. High citation counts being accurate predictors of impact, this is important in its own right. However, it is possible to go beyond this approach and apply essential notions of network analysis to a scientific field, shifting the core research question to authorship, or, most importantly, to who cites whom or what.59

This can be done through co-authorship analysis, where individual nodes in the network (authors) are given greater connectedness on the basis of the number of works that they have authored together. Or it is possible to consider basic citation analysis, which shifts nodes closer together depending on the number of times two authors tend to cite each other. Still, it is possible to go further, making relatedness a function of how many times two works are cited together (co-citation analysis) or even of the number of times they cite the same works together. Although the possibilities are truly endless, the nature of a field structures affects the data collection process. The nature of the process is particularly well-suited to the discovery of “invisible colleges”,60 and we thus seek to confirm our hypotheses, anticipating encounters with islets, archipelagos, and whole continents.

In order to do so, we gather citation data on international law scholarship. This brings us to a common problem in scientometrics: citation analyses of this kind are only as good as what is fed to the machine. Generally speaking, Clarivate’s Web of Science (WoS)61 and Scopus62 are the preferred sources for extracting citation data, which is thus rendered relatively uniform and may be downloaded in computer-readable format. However, the data so obtained is by no means perfect. Not only are these services not freely accessible, but they can also be fairly underinclusive (though rarely culpably), especially when scholarly works such as books and book chapters are concerned. This may be problematic in the context of investment arbitration scholarship, where different sources, some far less formal than others, all have their place.63 The obvious alternative, Google Scholar, mitigates these problem, being freely accessible, speedy, and more thorough for the counting of sources such as books and SSRN.64 It does, however, suffer from the opposite problem, being prone to over-inclusiveness, duplicate entries, and—most problematically—poor data quality on output.

63 Just like arbitral awards are sometimes sent out to colleagues or mailing lists prior to their formal publishing, the word of academia knows
64 Anne-Wil K Harzing and Ron Van der Wal, ‘Google Scholar as a New Source for Citation Analysis’ (2008) 8 Ethics in science and environmental politics 61; Nabil Amara and Réjean Landry, ‘Counting Citations in the Field of Business and Management: Why Use Google Scholar Rather than the Web of Science’ (2012) 93 Scientometrics 553.
We chose quality over quantity, and thus obtained citation data from Scopus. The results were then processed with the VOSViewer software by Nees Jan van Eck and Ludo Waltman.\(^{65}\)

It should be pointed out that this dataset suffers from an almost inevitable limitation, which has to do with language diversity: in the simplest of terms, it is almost impossible to gather data relating to sources published in languages other than English. This has to do with the way scholarship is published and indexed online, and with the circumstance that the largest and most used indexing services are inevitably biased towards the largest market—the English language one.

If the assumption that scholarship published in different languages must be irrelevant seems too much of a stretch,\(^{66}\) there seem to be enough anecdotal evidence to suggest that the status of English as the lingua franca of scientific communication may make the limitation more tolerable.\(^{67}\)

### 3.2 Citation mining: arbitral citations

As explained above, citation to scholarly authorities is not at all too rare in investment decisions. Thus, we have sought to provide some measurement of the impact of scholarship on investment arbitration. For our present purposes, we eschew contextual analysis and simply rely on citation count, with some variations which will be explained where relevant. In our analysis we focus on the full text of all publicly available investment decisions. After converting the PDF documents in a machine-readable format, we search for results matching a most types of bibliographic referencing formats by using regular expressions.\(^{68}\) We compare our results with those provided by the commercial database Investor-State Law Guide Publication Citator and reach comparable accuracy.\(^{69}\)

In our investigation we are concerned—the point is worth stressing once more—with the identification of a “research front’. This approach, we argue, is designed to be consistent with the general consensus portraying international investment law as a fast-evolving field. In light of these assumptions, we have limited our investigation on arbitral citations to articles appearing in periodicals.\(^{70}\) This is not so much imposed by the laboriousness of the citation collection process, but rather by a number of core assumptions. First, because of their reliable publication cycle, peer review, and editorial

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\(^{68}\) For an early introduction to the concept of regular expressions (and their elegance) see Ken Thompson, ‘Programming Techniques: Regular Expression Search Algorithm’ (1968) 11 Communications of the ACM 419.


\(^{70}\) We have made any effort to eliminate odd chapters that were parsed by overinclusive regular expressions. We decided to include, for the time being, works contained in the collected courses of the Hague Academy of International Law because of their specific type of publication cycle, and as a control variable.
control, we posit that articles may be seen as providing the most reasonable way for a practitioner to stay abreast of recent development. Second, monographs and edited volumes are generally understood to have a different—and longer—citation lifetime, thus rendering comparisons exceedingly problematic.

3.3 Caveat

Although these problems mean that the selection and the analysis of the material will inevitably have some minor shortcomings. We therefore caution against coming to quick conclusions. Our analysis, too, will be somewhat impressionistic at this stage. Yet, we submit that the data we present maintains its overall illustrative value, and we offer it in the hope that our findings will contribute to clarify the complex evolution of international investment arbitration as a scholarly endeavour.

4 Data

4.1 Investigation 1: scholars citing scholars

Our analysis starts from scholarly citations as a proxy for the identification of those “grouping[s] of concepts and underlying research issues” making up the research front, as well as the most influential scholars in it.

4.1.1 The general picture: a concept map

As a first step in our analysis, we used VOSviewer to create a map based on text data—specifically, data extracted from the abstract and title fields. The resulting network, in which two word nodes are closer together based on how often they occur together, while their size reflects the sheer number of mentions, is then overlaid with a colour scheme reflecting publication years.


Figure 2, below, shows a specific snapshot of one such map, capturing the a time window ranging from 2013 to 2017. It provides a clear picture of how the focus on international investment law scholarship quickly shifted from the analysis of arbitral decisions and procedure to the discussion of more complex and variegated issues, such as the interaction between international investment law and European law, as well as questions concerning the reform of the investment law system, as well as the potential role of convergence with trade law—and the analogies resulting thereof—in the context of the rise of mega-regional agreements.\textsuperscript{73}

\textsuperscript{73} As an example, see Tania Voon, ‘Consolidating International Investment Law: The Mega-Regionals as a Pathway towards Multilateral Rules’ (2018) 17 World Trade Review 33.
Figure 2: Concept map based on abstract and title data, overlaid with publication years

Source: The authors’ analysis of Scopus citation data
4.1.2 The general picture, continued: co-citation networks and authors

In keeping with the orthodoxy in scientometrics, we employ co-citation networks to identify the structure of the field. Rather than focusing on articles and themes, we choose to focus instead on author. Accordingly, our analysis retains some impressionistic character in that we focus on what an author is mostly known for, rather than on their entire scholarly production.

The co-citation networks allow us to test this type of heuristic. As a reminder, the size of the nodes is a function of the number of citations, whereas the connectedness of two authors follows from the number of times they have been cited together. As Figure 3 shows, a number of large and well-populated clusters may be identified in the wider international investment law and arbitration scholarship network.

The cluster on the bottom right corner, in red, appears to group a number of scholars whom we can define as being universally recognised authorities: the group is remarkable in that it includes authors of key texts—such as commentaries,\textsuperscript{74} Hague Academy courses, and textbooks\textsuperscript{75}—but also because it largely comprises individuals who have also acted as practitioners, and have who have been celebrated as key figures of both commercial arbitration (consider, for example, the inclusion of Nigel Blackaby and Emmanuel Gaillard) or public international law (such as James Crawford).

On the contrary, the cluster to the right, in blue, provides evidence of a different trend within the research front: this group includes the likes of Susan Franck, Gus Van Harten, and David Schneidermann, as well as Michael Waibel and Sergio Puig. In other words, the cluster includes authors who have been writing not so much of international investment law and arbitration, but rather on it, tackling systemic perspectives on its significance as an institution (often through the use of analogies),\textsuperscript{76} its legitimacy and challenges,\textsuperscript{77} and its general significance—sometimes through empirical analysis.\textsuperscript{78}

A remarkable feature of the network is the centrality retained by certain individuals, whose production may be said to have straddled the line between the systemic dimension and the more doctrinal, black letter analysis of specific legal questions, and who therefore tend to be well-connected to several “camps”—or, to put the matter in different, and not incompatible terms, to be extremely “citable”. Key authors here are Stephan Schill, Jan Paulsson, Jurgen Kurtz, and Anne Van Aaken, who all have tackled

\textsuperscript{75} Nigel Blackaby and others, \textit{Redfern and Hunter on International Arbitration} (Oxford University Press 2015).
\textsuperscript{78} Puig (n 45).
systemic questions, challenging existing paradigms through bold comparisons, but also largely retained a role as writers of more to-the-point commentaries.

Figure 3: The main co-citation network (full network and enhanced close-up)

Source: The authors' scientometric analysis of Scopus citation data
4.1.3 Ranking authors: citation and PageRank scores

Co-citation networks of this kind can also be employed to draw inferences as to the most influential authors in it. We do so by adopting two types of measurements: citation weight as a raw measure, and PageRank.

The first measurement is a pure function of the number of citations of a given author within the network, and is therefore highly correlated with a basic type of network centrality known as degree centrality, the second type of scores are computed using a more complex algorithm, PageRank, which has been developed for the purposes of ranking web pages and is still one of the foundations of the Google search engine.\textsuperscript{80} It provides for a better ranking of nodes by accounting for a more developed notion of importance: with inevitable oversimplification, PageRank scores depend not just on the number of links from a node to the other, but also on the quality of these links. The latter is in turn determined largely on the basis of the quality of the linking nodes—in other words, a node is more important if important nodes link to it, and so on, with PageRank scores being calculated recursively. The PageRank algorithm also accounts for an element of randomness and the possibility that a “random surfer” reading the works included in the citation network will, at some point, stop following a chain of links.\textsuperscript{81}

Interestingly, the PageRank algorithm has found some use in the analysis of co-citation networks too, providing for a better measure of a “lifetime contribution” to the field.\textsuperscript{82} Its application to our dataset yields interesting results in that the picture painted by PageRank scores is more variegated than that obtained through mere citation counts. Figure 4 and Figure 5 show the same co-citation network in a dual circle layout in order to highlight the contribution of the 25 highest-ranked authors. As the two figures show, there are significant overlaps between the two measurements, in line with the findings made by Ding and others on this methodology.\textsuperscript{83} However, the first figure clearly shows the relatively repetitive citation trends of certain authorities, while the second provides more variation, reflecting the different trends discussed above. In other words, a ranking of this kind reflects the importance of different authors for different sub-areas of the field.

\textsuperscript{80} Lawrence Page and others, ‘The PageRank Citation Ranking: Bringing Order to the Web.’ (Stanford InfoLab 1999).
\textsuperscript{81} For a critique of certain applications of PageRank see Gourab Ghoshal and Albert-László Barabási, ‘Ranking Stability and Super-Stable Nodes in Complex Networks’ (2011) 2 Nature Communications 394.
\textsuperscript{82} Ying Ding and others, ‘PageRank for Ranking Authors in Co-Citation Networks’ (2009) 60 Journal of the American Society for Information Science and Technology 2229.
\textsuperscript{83} ibid.
Figure 4: Co-citation network with a citation-weighted ranking.

Source: The authors’ scientometric analysis of Scopus citation data.
4.2 Investigation 2: arbitrators citing scholars

As anticipated in the introductory sections, scholarship may well be cited by arbitrators when “writing judicially”. The citation of legal scholarship by adjudicatory bodies is, of course, a well-investigated subject both in the context of domestic jurisdictions and international courts.\(^4\) In the context of international investment arbitration, however, while a role for scholarship is acknowledged by the several citations that appear in tribunals’ decisions, no serious attempt has been made to engage in a more analytical observation of what and who, precisely, is cited.

There are good reasons to ask this question: first, understanding what arbitrators find important might give us some insight into which issues are still open, or wholly settled, in their line of work; by the same token, their citation patterns can also elucidate how...
their arguments from authority—and, thus their citations to both precedent and scholarship—take advantage of specific works, and on which topics.

4.2.1 General findings

We start with two general observations concerning the extent to which international investment tribunals tend to cite scholarship. Our data broadly confirms the trend already identified in Fauchald’s 2008 empirical survey, confirming that scholarship is cited frequently.

The graph in Figure 6 plots the number of unique citations (that is to say, excluding repeated citations within a same document) to scholarship contained in periodicals in international investment decisions in the period 2000-2019. It is possible to observe that the number of citations has dipped, but only to a small extent. When the number of citations is considered in context, however, it is possible to observe that the number of citations to literature pales in comparison to that of citations to arbitral precedent (Figure 7 below), which keeps outpacing the number of decisions issued each year. An increase in references to precedents, rather than literature, has been documented elsewhere—for example, in the practice of the WTO Appellate Body.

Figure 6: Average number of unique citations to journal articles in international investment arbitration decisions (2000-2019)

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86 Helmersen, ‘The Use of Scholarship by the WTO Appellate Body’ (n 22).
4.2.2 The shelf life of scholarship: How sensitive is the international bench to an evolving research front?

Another important question to be asked is the following: having considered the extent to which scholarship is cited in general, can we establish just how much recent scholarship is referenced? A measurement of this type might allow us to gain additional insights into the mindset of arbitrators, quantifying their need for up-to-date literature assuming depreciation of the source material, and, taking a look at the other side of the coin, gauging their general responsiveness to an evolving research front.

Interestingly, when a comparison is made with citations to precedent, the picture painted by the data is quite different from the scenario discussed in the previous section. Indeed, as Figure 8 shows, the average age of articles cited by arbitrators is just over 15 years. While this value might appear high at first sight, especially for a relatively young field such as international investment law, it is in fact far from an excessive number, especially when considering that rather old articles continue to be cited, thereby distorting the average. Indeed, the most striking feature of the practice is the fact that, after an initial increase, the average age of cited articles is not growing significantly—and, in fact, a reverse trend might be observed.

This particular aspect of the citing practice does not mirror the trends concerning the use of precedent across not just investment tribunals, but international courts and

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87 Ridi, ‘Doing Things with International Precedents: The Use and Authority of Previous Decisions in International Adjudication’ (n 87); Ridi, ‘The Shape and Structure of the “Usable Past”’ (n 87).
tribunals writ large. As Figure 9 shows, the average age of precedents is consistently increasing across international adjudicators.90 The resulting picture is relatively clear: arbitrators have been rather responsive to an evolving research front, often choosing to cite relatively recent scholarship. Undoubtedly, the case of international investment law is a rather extraordinary one, as the numbers of decisions and scholarly outputs have grown side by side. Yet, arbitrators do not seem so tied by either reverence to the past or availability heuristics91 in the citation of literature as they are when selecting citable precedents.

![Average Age of Citations Over Time](image)

*Figure 8: Average age of citations over time (with moving average, period of 4)*

Source: The authors’ scientometric analysis of Scopus citation data

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4.2.3 The most cited authors

Finally, it is fitting at this point to identify the authors who have received the highest number of citations in investment arbitration decisions, with a view to determine, in particular, what type of scholarship arbitrators seek to rely on, and whether or not success in terms of arbitral and scholarly citations have any degree of correlation.

The tables below, provide a breakdown of the number of citations (to unique outputs and cumulative) made in investment decisions. Table 1 comprises all published decisions available as of October 2019, while Table 2 only focuses on the period 2013-2019.

The results are, once again, quite striking. Authorities such as Christoph Schreuer, Emmanuel Gaillard, and Rudolf Dolzer feature prominently in both lists, as do authors with an institutional connection such as Aaron Broches. Yet, important changes can be observed, for example in the rising importance of voices from a new generation, such as Zachary Douglas (far more prominent in the second list than in the first), Michael Waibel, and Stephan Schill. At the same time, one can easily observe the decline in citation of older sources, often produced by experts in public international law: two notable examples may be seen in the works of Dame Rosalyn Higgins and C.F. Amerashinghe. Of course, it goes without saying that views on the taking of property

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92 Ridi, ‘Doing Things with International Precedents: The Use and Authority of Previous Decisions in International Adjudication’ (n 87); Ridi, ‘The Shape and Structure of the “Usable Past”’ (n 87).
in international law have evolved,\textsuperscript{93} as has the debate on the jurisdiction of ICSID tribunals.\textsuperscript{94} What matters, however, is that new authors are entering the field, as is natural in any evolving research front.

\textbf{Table 1: Most cited authors in arbitral jurisprudence - all time}

<table>
<thead>
<tr>
<th>Author</th>
<th>COUNTUNIQUE of Source</th>
<th>COUNTA of Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christoph Schreuer</td>
<td>54</td>
<td>58</td>
</tr>
<tr>
<td>Aron Broches</td>
<td>42</td>
<td>48</td>
</tr>
<tr>
<td>Emmanuel Gaillard</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Georges R. Delaume</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Frederick Alexander Mann</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Rudolf Dolzer</td>
<td>16</td>
<td>16</td>
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<tr>
<td>Pierre Lalive</td>
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<td>16</td>
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<tr>
<td>John Y. Gotanda</td>
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<td>16</td>
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<tr>
<td>Gabrielle Kaufmann-Kohler</td>
<td>16</td>
<td>17</td>
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<tr>
<td>Jan Paulsson</td>
<td>15</td>
<td>16</td>
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<tr>
<td>Zachary Douglas</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Chittharanjan Felix Amerasinghe</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Rosalyn Higgins</td>
<td>11</td>
<td>11</td>
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<tr>
<td>Louis B. Sohn and R.R. Baxter</td>
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<td>11</td>
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<tr>
<td>Antonio R. Parra</td>
<td>11</td>
<td>11</td>
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<tr>
<td>Stephen Vasciannie</td>
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<td>10</td>
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</table>

\textsuperscript{93} Higgins Rosalyn, ‘The Taking of Property by the State: Recent Developments in International Law’ [1982] 176 Recueil Des Cours 259 338.

<table>
<thead>
<tr>
<th>Author</th>
<th>COUNTUNIQUE of Source</th>
<th>COUNTA of Source</th>
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<td>18</td>
</tr>
<tr>
<td>Aron Broches</td>
<td>15</td>
<td>16</td>
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<tr>
<td>Zachary Douglas</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>John Y. Gotanda</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Rudolf Dolzer</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Filip De Ly and Audley Sheppard</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>James Crawford</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Francisco Orrego Vicuña</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Emmanuel Gaillard</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Stephen M. Schwebel</td>
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<tr>
<td>Natasha Affolder</td>
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<td>3</td>
</tr>
<tr>
<td>Michael Waibel</td>
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<tr>
<td>Mark B. Feldman</td>
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<tr>
<td>Irmgard Marboe</td>
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<td>3</td>
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<tr>
<td>Gerald Fitzmaurice</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Georges R. Delaume</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>
4.2.4 The most cited works

As a final point, it might be worth considering, however briefly, which works specifically are cited by investment tribunals. Table 3, below, provides one such list, including—once again—unique and cumulative citations. For reasons of space, and due to the impressionistic nature of our analysis, we restrict ourselves to a single reflection: it is virtually impossible to spot in this list any work with a systemic or critical ambition—at least in the sense that we discussed in the context of scholarly “clusters”. Rather, most of the scholarship listed here appears, with some possible exceptions, to target specific, real world problems, and to be citable with a view to solving them. Further research will be needed to determine whether this is necessarily the case.

Table 3: Scholarly works with the most arbitral citations

<table>
<thead>
<tr>
<th>Target</th>
<th>COUNTUNIQUE of Source</th>
<th>COUNTUNIQUE of DateDecision</th>
</tr>
</thead>
</table>

95 For example, one may wonder if this is the case with regard to Paulsson, ‘Arbitration Without Privity’ (n 81); Kaufmann-Kohler (n 36).
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Journal</th>
<th>Volume/Issue/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann</td>
<td>&quot;British Treaties for the Promotion and Protection of Foreign Investment&quot;</td>
<td>52 British Yearbook of International Law</td>
<td>1982</td>
</tr>
<tr>
<td>Lalive</td>
<td>&quot;The First &quot;World Bank&quot; Arbitration (Holiday Inns v. Morocco) - Some Legal Problems&quot;</td>
<td>51 British Yearbook of International Law</td>
<td>1980</td>
</tr>
<tr>
<td>&quot;Draft Convention on the Responsibility of States for Damage done in their Territory to the Person or Property of Foreigners&quot;</td>
<td>23 American Journal of International Law</td>
<td>1929</td>
<td></td>
</tr>
<tr>
<td>Sohn and Baxter</td>
<td>&quot;Responsibility of States for Injuries to the Economic Interest of Aliens&quot;</td>
<td>55 American Journal of International Law</td>
<td>1961</td>
</tr>
<tr>
<td>Vasciannie</td>
<td>&quot;The Fair and Equitable Treatment Standard in International Investment Law and Practice&quot;</td>
<td>70 British Yearbook of International Law</td>
<td>1999</td>
</tr>
<tr>
<td>Higgins</td>
<td>“The Taking of Property by the State: Recent Developments in International Law”</td>
<td>176:3 Recueil des Cours</td>
<td>1982</td>
</tr>
<tr>
<td>Reisman and Robert D. Sloane</td>
<td>&quot;Indirect Expropriation and its Valuation in the BIT Convention&quot;</td>
<td>74 British Yearbook of International Law</td>
<td>2004</td>
</tr>
<tr>
<td>Dolzer</td>
<td>&quot;Fair and Equitable Treatment: a Key Standard in Investment Treaties&quot;</td>
<td>39:1 The International Lawyer</td>
<td>2005</td>
</tr>
<tr>
<td>Sacerdoti</td>
<td>&quot;Bilateral Treaties and Multilateral Instruments on Investment Protection&quot;</td>
<td>269 Recueil des Cours</td>
<td>1997</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Title</td>
<td>Year</td>
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<td>---------------------------------------------------</td>
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<tr>
<td>Bowett, <em>&quot;Estoppel before International Tribunals and Its Relation to Acquiescence&quot;</em></td>
<td>33 British Yearbook of International Law 176 (1957).</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Delaume, <em>&quot;Le centre international pour le règlement des différends relatifs aux investissements&quot;</em></td>
<td>109 Journal du Droit International 775 (1982).</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Christie, <em>&quot;What Constitutes a Taking Under International Law?&quot;</em></td>
<td>33 British Yearbook of International Law 308 (1962).</td>
<td>7</td>
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</tr>
</tbody>
</table>

5 Findings and final reflections

Our research paints a complicated picture. On the one hand, our data provides a clear representation and mapping of the research front in international investment law and arbitration literature. As our scientometric analysis shows, we can identify distinct clusters of authors and the trends and methodologies they follow, and point to the most influential and “central” players in the field. On the other hand, the comparison between scholarly citations and arbitral ones shows that a rift exists between what scholars on one side, and practitioners on the other, find useful—or are, at any rate, comfortable citing. As discussed above, the observation that the lectern and the bench
may well find support and solace in different literature is nothing new. It is the extent to which it is true that is striking.

This point leads us to our final conclusion: while presenting this paper at a splendidly organized and extremely well-attended conference, we concluded—mostly, but not quite entirely, joking—by observing the following:

Do you want to be cited? Write doctrinal scholarship.
Do you want to be an authority? Write doctrinal scholarship.
Do you want to please everyone? Write empirical and theoretical scholarship.

Through the analysis of our data, we are now a little wiser, but these three axioms seem to hold. True, they are likely going to be of little help to a scholar wishing to direct her efforts towards a marketable result. It is our hope, however, that our analysis will nevertheless retain its value, and help in the navigation of a quickly evolving field and its research front. And hopefully, just hopefully, prompt some reflection on what it means for scholarship to be useful.