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A Pareto-Improving Compensation Rule for Investment Treaties

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ABSTRACT

Investment treaties grant foreign investors legal rights to compensation for losses caused by certain host state conduct. Many states are reconsidering their involvement in these treaties because they perceive the risks to outweigh the benefits. We start from the normative premise that participation in investment treaties should benefit both 'host' and 'home' states. Using a law and economics approach, we model a variety of common fact scenarios that arise in investment treaty arbitration. Our modelling demonstrates that being party to an investment treaty does not necessarily benefit a host state. The objective of mutual benefits would be achieved if investment treaties were modified to provide only the minimum protection necessary to solve time inconsistency problems for the host state and, thereby, deter opportunistic conduct. The treaties should not place wider constraints on legal and policy change. Our specific proposal is that a state should only have to compensate the investor if it breaches or modifies the domestic legal regime governing the investment and that compensation should be the lesser of the investor's loss and the host state's gain from the host state not having had the new legal regime in place when the investment was made.

I. INTRODUCTION

Investment treaties protect foreign investors from adverse conduct by the states in which they invest.[1] Foreign investors have used these treaties to demand compensation for a wide range of government actions, including changes to tax policy, the imposition of new environmental and public health regulations, and financial measures taken in response to economic crises. The amount of compensation awarded in such disputes has dramatically increased over the past two decades. For example, in the recent case

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1 We do not examine economic arguments for investment liberalization provisions, found in a growing minority of investment treaties. For discussion of distinct economic rationales for investment treaties protection and liberalization provisions, see Alan O Sykes, 'The Economic Structure of International Investment Agreements with Implications for Treaty Interpretation and Design', 3 American Journal of International Law 113 (2019), at 482.

of *Tethyan Copper v Pakistan*, Pakistan was required to pay USD 5.9 billion to a mining company for failing to issue a mining lease necessary for the development of a planned copper mine to proceed. This amount was based on the expected future value of the mine, even though the mine was never actually built.[2] Both the amounts of money at stake and the wide range of government action implicated have raised concerns that investment treaties provide too much protection to foreign investors.[3] The investment treaty regime is facing widespread challenges to its legitimacy,[4] and numerous countries are reconsidering or reducing their participation in the treaties.[5]

As instruments of economic governance, the underlying policy rationale for investment treaties rests on their ability to generate economic benefits. More specifically, such treaties are justified to the extent that they benefit *all* state parties to them.[6] Many investment treaties make this policy rationale explicit. For example, the Preamble to the UK–Argentina bilateral investment treaty explains that its purpose is to 'increase prosperity in both states.'[7] We take improvement in the welfare of all state parties—i.e. 'Pareto improvement'—as the central design goal of investment treaties.[8]

In this context, we pose the following two questions:

i. In what circumstances should an investment treaty require a host state to pay compensation for interference with foreign investment?
ii. In such circumstances, how much compensation should be required?

Although lawyers tend to deal with these questions separately, we show that they are intimately connected and deal with them together. Using the tools of law and economics, we show that investment treaties are likely to generate mutual benefits for both host and home states to the extent they address the risk of opportunism that arises from

2 *Tethyan Copper v Pakistan*, ICSID Case No. ARB/12/1, Award (12 July 2019), para 1824.
3 David Gaukrodger, 'The Balance between Investor Protection and the Right to Regulate in Investment Treaties: A Scoping Paper', 2017, https://www.oecd-ilibrary.org/content/paper/82786801-en (last accessed on July 21, 2020).
4 See, for example, Malcolm Langford and Daniel Behn, 'Managing Backlash: The Evolving Investment Treaty Arbitrator?', 2 European Journal of International Law 29 (2018), at 551; Thomas Dietz, Marius Dotzauer, and Edward S Cohen, 'The Legitimacy Crisis of Investor-State Arbitration and the New EU Investment Court System', 4 Review of International Political Economy 26 (2019), at 749.
5 For developing countries' responses, see Fabio Morosini and Michelle Ratton Sanchez Badin, *Reconceptualizing International Investment Law from the Global South* (Cambridge University Press, Cambridge, 2017). As of July 2020, the US-Canada investment relationship is no longer covered by the investor-state dispute settlement (ISDS) mechanism. United States-Mexico-Canada Agreement, https://ustr.gov/usmca (visited 19 December 2019).
6 This reflects states' 'participation constraint'. States are unlikely to become or remain parties to investment treaties that do not benefit them; see Anne van Aaken, 'International Investment Law between Commitment and Flexibility: A Contract Theory Analysis', 2 Journal of international Economic law 12 (2009), at 509; and Sykes, above n 1, at 485.
7 Similar language is found in other investment treaties, including the Preambles to the Germany-Thailand BIT and the 2012 US Model BIT.
8 Note that both Pareto improvement and global welfare maximization are goals commonly used in legal and economic analyses. Pareto improvement is particularly acknowledged in the contract literature as necessary to meet participation constraints. Unlike many private contracting settings, Pareto improvement in investment treaties must be achieved through rule design, as there are limited opportunities for the host state to extract compensatory *ex ante* transfers.

time inconsistency in the host state's optimal conduct.[9] However, the same cannot be said insofar as investment treaties constrain states' ability to respond to new information or change their policy priorities. For this reason, we argue that investment treaties should be narrowly targeted to solving problems caused by time inconsistency of the host state's optimal conduct.

A central challenge in designing targeted treaty rules is that while time inconsistency and new information are conceptually distinct drivers of host action, many investment disputes involve elements of both. We contribute a model that formalizes and clarifies the differences between time inconsistency and new information across a range of scenarios that arise in investment treaty arbitration. This formal analysis allows us to develop a specific proposal for reform of investment treaties that targets the opportunistic element of host action, even in complex scenarios.

Our proposal is that a state should only have to compensate the investor if it breaches or modifies the domestic legal regime governing the investment and that compensation should be the lesser of the investor's loss and the host state's gain from the host state not having had the new legal regime in place when the investment was made.[10] One implication of our proposal is that much government conduct for which compensation is currently required should not be compensable. Another implication is that, insofar as compensation is required, it should generally be less than is currently the case under investment treaties. In practical terms, our proposal points to the need for amendment of investment treaties. Such questions relating to the operationalization of our proposal are addressed in considerable detail in a companion paper.[11]

This paper focuses on our core contribution: the development of our proposal and economic analysis that justifies it. It is organized as follows. Section II situates our analysis in relation to existing scholarship on the law and economics of investment treaties. It clarifies key concepts and terminology and explains and justifies our methodological choices, including our modelling approach. Section III is the analytical core of the paper, where we develop a basic model of the relationship between legal change due to time inconsistency and new information. To do this, we formalize a variety of stylized 'scenarios' that arise in investment treaty arbitration and highlight the nature of the economic problems present in each scenario. We use this modelling to illustrate the operation and implications of our proposal alongside alternative legal rules that approximate the content of existing investment treaties. An Online Appendix contains proofs of the propositions in Section III and summary of our modelling results. Section IV concludes.

9 Where optimal conduct for the host is time inconsistent, it will act opportunistically *ex post*. Knowing this, investors will be deterred from investing and the level of investment will be sub-optimal. This is also known as the 'hold-up' problem.

10 The 'domestic legal regime' and other key concepts are defined in Section II.B of this paper.

11 Jonathan Bonnitcha and Emma Aisbett, 'Against Balancing', 42 Michigan Journal of International Law 42 (2021) at 1.

II. CONCEPTS AND TERMINOLOGY

A. Time inconsistency and new information

The distinction between new information and time inconsistency—with its associated problems of opportunism and hold-up—is well-known and uncontroversial in law and economics scholarship. In the context of a bargain between two parties, opportunism occurs when one party makes a relationship-specific investment and the other party then reneges on the bargain and appropriates some, or all, of that investment.[12] The risk of opportunism arises when incentives for the reneging party—the host state, in our case—are time inconsistent. Before the investment is made, the host state has an incentive to encourage new investment; once the investment is made, it may be in the host state's self-interest to extract as much benefit as possible from the investment, including by seizing the investor's assets.

New information about the state of the world that emerges over the life cycle of a foreign investment can also cause investment disputes due to the practical impossibility of two parties agreeing in advance on their respective rights and obligations in every possible situation that might arise in the future.[13] In the context of foreign investment, new information encompasses a diverse range of changing circumstances, including new knowledge about an investment's impacts, changes in commodity prices, unanticipated viral pandemics, and underlying shifts in citizens' political preferences.[14] New information creates a problem, at least from the perspective of a foreign investor, because the host state retains the authority to change the rules governing the investment in response to new information and may ignore the investor's interests when doing so.

Early scholarship on the economics[15] and politics[16] of investment treaties assumed that their purpose was to solve problems caused by time inconsistency, principally by guaranteeing that the investor would be compensated in the event of expropriation by

12 Benjamin Klein, Robert G Crawford, and Armen A Alchian, 'Vertical Integration, Appropriable Rents, and the Competitive Contracting Process' 21 Journal of Law and Economics 297 (1978), at 298; see generally, Oliver E Williamson, *Markets and Hierarchies: Analysis and Antitrust Implications* (New York: Free Press, 1975), 26–30.

13 The assumption that it is impossible to write complete contingent contracts is uncontroversial in law and economics scholarship on investment treaties, see, for example, Susan Rose-Ackerman and Jim Rossi, 'Disentangling Deregulatory Takings', 7 Virginia Law Review 86 (2000), at 1435; van Aaken, above n 6; Henrik Horn and Thomas Tangerås, *Economics and Politics of International Investment Agreements*, IFN Working Paper 1140 (Rochester, NY: Social Science Research Network, 2016) https://papers.ssrn.com/abstract=2924740 (last accessed on March 13, 2020). For a discussion on the literature on incomplete contracting, see Jean Tirole, 'Incomplete Contracts: Where Do We Stand?', 4 Econometrica 67 (1999), at 741; Eric Maskin and Jean Tirole, 'Unforeseen Contingencies and Incomplete Contracts', 1 Review of Economic Studies 66 (1999), at 83.

14 Prior to the investment there is not only quantifiable and (theoretically) contractible uncertainty (i.e. risk), but also ambiguity and even possible unforeseen circumstances.

15 James R Markusen, 'Commitment to Rules on Investment: The Developing Countries' Stake', 2 Review of International Economics 9 (2001), at 287.

16 Andrew T Guzman, 'Why LDCs Sign Treaties That Hurt Them: Explaining the Popularity of Bilateral Investment Treaties', Virginia Journal of International Law 38 (1997), at 658.

the host state. The assumption that investment treaties are designed to restrain opportunism remains deeply ingrained in the literature.[17] However, as they are currently drafted and interpreted, investment treaties do not focus specifically on problems of time inconsistency.[18] For example, in *Tecmed v Mexico,* a Spanish investor successfully sued Mexico for shutting down a hazardous waste facility in response to community opposition and alleged non-compliance with environmental operating standards;[19] in a series of cases arising out of the Argentinian financial crisis, foreign investors successfully sued Argentina for unilaterally revising the terms of gas concession contracts. These examples clearly involve at least some element of new information.[20]

We are not the first to argue that legal rules that protect private property from government interference should focus on resolving problems of opportunism without constraining government's discretion to respond to new information. In a foundational article on US constitutional protections of private property, Sax argued that governments should be required to compensate for *use* of private property but not for regulation of private property.[21] Rose-Ackerman and Rossi pursue a similar intuition in distinguishing between 'government as purchaser' and 'government as policymaker'.[22] Van Aaken argues that investment treaties should require the host state to compensate foreign investors for governmental action that is opportunistic but not for governmental action that responds to unanticipated contingencies.[23] Sykes argues that time inconsistency problems provide a key rationale for investment treaties, while also noting that 'it is undesirable in general for investors to be insured against harm due to changes in government policy.'[24] Although the terminology used in each of these articles is different, they all grapple with the same underlying distinction between problems of time inconsistency and new information.

With the exception of Sykes,[25] each of these scholars shares the implicit assumption that government action can be characterized as *either* the result of a time inconsistency in optimal government policy *or* as a response to new information. In reality, however, the two are often interwoven. For example, in *Crystallex v Venezuela*, the foreign investor had made a series of payments to the Venezuelan government and to a Venezuelan state-owned enterprise to acquire mining rights for 'Las Cristinas' site. Venezuelan authorities subsequently rejected the investor's application to develop the site citing 'concerns for the environment and the [Indigenous Peoples] of the Imataca

17 See, e.g., Sergio Puig and Anton Strezhnev, 'The David effect and ISDS', 28 European Journal of International Law 731 (2017), 732.

18 Emma Aisbett, Larry Karp, and Carol McAusland, 'Police Powers, Regulatory Takings and the Efficient Compensation of Domestic and Foreign Investors', 274 Economic Record 86 (2010), at 367; Jonathan Bonnitcha, Lauge N Skovgaard Poulsen, and Michael Waibel, *The Political Economy of the Investment Treaty Regime* (Oxford; New York: Oxford University Press, 2017).

19 *Tecnicas Medioambientales Tecmed v. Mexico*, ICSID Case No. ARB(AF)/00/2, Award (29 May 2003).

20 The first of these cases was *CMS Gas v. Argentina*, ICSID Case No. ARB/01/8, Award (12 May 2005).

21 Joseph L Sax, 'Takings and the Police Power', Yale Law Journal 74 (1964), at 1/2.

22 See Rose-Ackerman and Rossi, above n 13, at 1478.

23 See van Aaken, above n 6, at 519.

24 Alan O Sykes, 'The Economic Structure of International Investment Agreements with Implications for Treaty Interpretation and Design', 3 American Journal of International Law 113 (2019), at 530.

25 Sykes recognizes the two problems are intertwined in practice but does not seek to resolve issues that arise from this inter-relationship. Ibid, at 513.

Forest Reserve'.[26] The fact that Venezuela had benefited from the sale of mining rights that were later effectively cancelled reveals an element of time inconsistency. The fact that Venezuela sought to justify its action based on an impact assessment conducted after the investor's acquisition of the mining rights suggests policy change in response to new information.

Our paper develops this literature by dealing with scenarios involving elements of *both* time inconsistency and new information. Our method involves formal (mathematical) modelling of different legal rules across different stylized scenarios that regularly arise in investment treaty arbitration. The development of these scenarios is grounded in our knowledge of existing case law; their formalization through modelling brings clarity and precision to the relationship between the conceptually distinct, but empirically intertwined, problems of time inconsistency and new information. Most importantly, our formal modelling goes beyond previous legal scholarship because it allows us to design a liability and compensation rule which cleanly targets time inconsistency problems without the need for courts or arbitral tribunals to determine which motivation was driving the government's behaviour.

B. Other concepts and terminology

As this paper is an interdisciplinary exercise, we clarify our use of jargon. We use the term *host state* to refer to the entire governmental apparatus of the *host country*. This is consistent with legal scholarship. As a matter of legal doctrine, the host state is understood as a unitary entity that is liable for breaching investment treaties as a matter of international law.[27]

Regardless of whether an investment treaty is in place, we assume that the foreign investment is governed in the first instance by the host state's *domestic legal regime*. The concept of the 'domestic legal regime' is an abstraction: it comprises the entire set of rights and obligations relating to a foreign investment as a matter or domestic law. As such, the 'domestic legal regime' includes:

- the combination of rights and obligations created by any contract negotiated between the foreign investor and the host state, and
- the powers of the host state to tax and regulate the investment under laws in force at the time the investment is made.

The domestic legal regime governing the investment will ordinarily cover issues including permissible uses of land and other assets, mandatory regulatory requirements, and tax, royalty, and pricing arrangements.

We conceptualize an investment treaty as a set of compensation rules that provides an additional layer of legal protection to foreign investment over and above the domestic legal regime. These compensation rules provide protection against host state

26 *Crystallex v. Venezuela*, ICSID Case No. ARB(AF)/11/2, Award (4 April 2016), para 44.

27 Articles on the Responsibility of States for Internationally Wrongful Acts, [2001] 2 Y.B. Int'l L. Comm'n 2, UN Doc. A/56/10, Article 4.

conduct that is inconsistent with its own domestic legal regime as it stood at the time the investment was made, either through.

- *Change* to the domestic legal regime; or
- *Breach* of the domestic legal regime.

This conceptualization of investment treaties as constraints on breach or change of the domestic legal regime reflects our understanding of the underlying economic rationales for investment treaties. Problems of time inconsistency and policy change in response to new information arise because the host state retains the power to ignore or change its own legal regime to the detriment of the investor. We acknowledge that this conceptualization of investment treaties is not a fully accurate restatement of the treaties' legal content. There are circumstances in which a state can breach an investment treaty despite acting consistently with the domestic legal regime as it stood when the investment was made—for example, when extant laws authorize uncompensated expropriation. However, the vast majority of investment treaty claims to date stem from allegations of breach or change in the domestic legal regime.[28] Moreover, existing jurisprudence endorses the basic principle that investors are not entitled to complain about conduct that is consistent with the domestic legal regime in force when the investment was made.[29]

A compensation rule specifies both when a state should be required to compensate an investor for change or breach of the domestic legal regime governing the investment, and how much compensation should be required. 'No compensation rule' is synonymous with the absence of an investment treaty for our purposes.

The strict compensation rule refers to a hypothetical rule that requires the host state to pay full compensation for losses arising from a breach of or change to the domestic legal regime. Although principally used as an analytical tool for comparison in the economic literature,[30] this rule is a good approximation of the content of existing investment treaties, insofar as cases of direct expropriation are concerned.

The Miceli–Segerson (MS) rule refers to a hypothetical rule that requires the host state to pay full compensation if, and only if, the breach/change of the domestic legal regime was globally inefficient from an *ex post* perspective.[31] This is another

28 Zoe Williams, 'Risky Business or Risky Politics: What Explains Investor-State Disputes?', 2016, PhD Thesis. Hertie School, Berlin. https://opus4.kobv.de/opus4-hsog/frontdoor/index/index/docId/2369 (last accessed on May 12, 2020). Similarly, Krzysztof J Pelc, 'What Explains the Low Success Rate of Investor-State Disputes?' International Organization 71 (2017) at 560. For present purposes, we ignore the minority of claims arising from procedural misconduct.

29 See, for example, *GAMI v. Mexico*, Final Award (15 November 2004), para 91.

30 See, for example, Lawrence Blume, Daniel L Rubinfeld, and Perry Shapiro, 'The Taking of Land: When Should Compensation Be Paid?' Quarterly Journal of Economics 99 (1984), at 71; Aisbett, Karp, and McAusland, above n 18. The strict compensation rule reflects the insight of early law and economics scholarship on the 'efficient breach' of contracts, in that it conforms to the principle that a contracting party (here, the host state) should always be entitled to breach a contract (here, an investment treaty) provided it pays full compensation: seminally, Robert Birmingham, 'Breach of Contract, Damage Measures, and Economic Efficiency', Rutgers Law Review 24 (1970) at 292.

31 Thomas J Miceli and Kathleen Segerson, 'Regulatory Takings: When Should Compensation Be Paid?' 2 Journal of Legal Studies 23 (1994), at 749.

canonical rule in the literature. It is a good approximation of the content of existing investment treaties, insofar as cases of indirect expropriation and application of the 'fair and equitable treatment (FET)' standard are concerned.[32]

We assume that an investment treaty covers multiple investments made by investors from one state party, the home state, in the other state party, the *host state*. This assumption reflects the fact that investment treaties were historically negotiated between developed and developing countries and that most investment treaties continue to govern bilateral relationships in which investment flows are highly asymmetric. The welfare implications of an investment treaty for the home state depend on the treaty's implications for its investors.

Pareto improvement occurs when at least one party is made better off without any other party being made worse off. If the welfare implications of a rule are ambiguous for one party, then it is not necessarily Pareto improving. *Global welfare* (or efficiency) refers to the sum of the welfare of all actors. A compensation rule that benefits one party at the expense of another party will entail a global welfare improvement[33] if the gains to the former exceed the loss to the latter. For this reason, global welfare improvement does not necessarily entail Pareto improvement. Importantly, however, a Pareto improvement will always increase global welfare.

III. THE LOGIC BEHIND OUR PROPOSAL

The challenge we face is to develop a compensation rule that solves the problem of under-investment due to the risk of host state opportunism, while still leaving host states the flexibility to change the domestic legal regime governing investments in response to new information. To solve the problem of under-investment due to opportunism, a compensation rule must either:

- remove the incentive for host states to engage in opportunistic conduct by making optimal policy time consistent; or
- ensure that, if an investor invests in a mutually beneficial project, it is not at risk of opportunistic state conduct, leaving it worse off than if it had not invested.

The minimum compensation required to achieve the first objective is the amount the host state gained by allowing the investment to go ahead and then changing the domestic legal regime governing the investment;[34] the minimum compensation required to achieve the second objective is the amount the investor lost by making the investment. Note that in both cases, the relevant counterfactual for calculating compensation is

32 Jonathan Bonnitcha and Emma Aisbett, 'An Economic Analysis of the Substantive Protections Provided by Investment Treaties', In: Sauvant, Karl P., (ed.) *Yearbook on International Investment Law and Policy 2011–2012*. Oxford University Press, New York, USA. ISBN 9780199983025 (Oxford University Press, New York, USA, 2013).

33 We are using a utilitarian welfare definition. A gain in global welfare is thus equivalent to a Hicks-Kaldor welfare improvement.

34 Time inconsistency of optimal policy arises when (in the absence of new information) the host can gain from changing their approach to the investment after the investor's costs are sunk. The time inconsistency problem can be solved by requiring the host to repay any such gains to the investor.

a hypothetical situation in which the new domestic legal regime was already in place at the time when the investment was initially made. This is a different counterfactual to that used for calculation of compensation under existing investment treaties, where compensation equals the investor's loss compared to a hypothetical future situation in which the host state had not breached the investment treaty. This innovation allows our rule to target time-inconsistency problems without punishing host states for responses to new information.

This leaves the question of whether compensation should be based on the host state's gain or the investor's loss from the host state not having had the new domestic legal regime in place when the investment was made. In our view, compensation should be the lesser of the two amounts. There are three reasons for this approach. First, investment treaties are the only instruments of international law that provide private actors with the ability to sue states before international tribunals without first exhausting domestic legal remedies.[35] Such treaties should provide no more protection than is necessary to solve clearly-defined policy problems.

The second and third reasons relate to limitations of each measure of compensation taken individually. Requiring the host state to compensate the investor's loss may leave it worse off, potentially violating our Pareto improvement criterion (i.e. the host state's participation constraint).[36] Meanwhile, requiring the host state to reimburse any gains it has made from not having had the new domestic legal regime in place when the investment was made would discourage host states from taking actions *ex post*, which bring it great benefits (e.g. in the form of public goods) at small cost to the investor. Our approach avoids both these problems.

On this basis, we propose the rule that: when a host state breaches or modifies its domestic legal regime, the host must compensate the investor for the lesser of the investor's loss and the host state's gain from the host state not having had the new domestic legal regime[37] in place when the investment was made.

IV. WELFARE EFFECTS

In this section, we formally model the operation of our proposed rule and prove that it provides Pareto improvements under a wide range of stylized scenarios that are common in investment treaty arbitration. To illustrate the operation of existing investment treaties and provide a point of reference to the broader academic literature, we also model the effects of the strict compensation rule and the MS rule for each scenario. This analysis of existing rules neatly illustrates well-known results about the ambiguity of benefits to host states of both the strict and MS compensation rules when there is

35 Bonnitcha, Poulsen, and Waibel, above n 18, at 65.

36 Though not central to our Pareto-improvement focus, it is also well-known in the law and economics literature that a rule always requiring compensation equal to the investor's loss from having relied on the host's original domestic legal regime induces inefficient investment: Steven Shavell, 'Damage Measures for Breach of Contract', 2 Bell Journal of Economics 11 (1980), at 466.

37 In cases involving breaches of the domestic legal regime, the new domestic legal regime refers to a domestic legal regime that would have permitted the host state to engage in the conduct of which the investor complains.

new information. It also highlights lesser-known ambiguity and sub-optimality of these rules from a global welfare perspective.[38]

We try to keep our model as simple as possible while capturing key policy-relevant features—especially the distinction between new information and elements which drive time-inconsistency problems. We include the standard model features used by proponents of compensation rules in investment treaties[39] and constitutional protection of private property in national legal systems.[40] We define host country welfare as an unweighted sum of everything except investor welfare. As such, host country welfare includes costs and benefits to the host state itself (e.g. the benefit of increased tax revenue) as well as costs and benefits for communities affected by the investment (e.g. the cost of environmental pollution associated with the operation of an investment). We assume that the host state maximizes national welfare but completely ignores the impacts of its decisions on foreign investors. By assuming that the host state completely ignores the welfare of the foreign investor, we are making a conservative and not necessarily realistic assumption. This assumption tends to overstate the need for investment treaties and understate the benefits of our approach relative to the content of existing investment treaties.

Our model also favours the need for investment treaties by assuming a 'one-shot game' between the host and investor. That is, we assume the host state does not consider the possibility of future investment, by the same or other investors, being affected by its actions. This assumption means that the host state in our model acts more myopically than host states likely act in reality.

A. General model set up

Our model has two periods. In the first period, the investor chooses whether to sink costs and make an investment in the host state. In the second period, the host state levies taxes, which are known to the investor in period 1, and may choose to take an additional action that is harmful to the investor. To make the investment, the investor must sink project cost, including the full opportunity costs (e.g. normal risk-adjusted return) of K.

In the second period, the host state chooses whether to act consistently with the domestic legal regime as it stood in period 1 when the investment was made. In each of the six scenarios, if the host state chooses to maintain and comply with the domestic legal regime that was in place at the time the investment was made, the investment enters operation and generates a return. This gives the investment a present discounted value in period 2 of π. The host levies taxes on π at an agreed rate t; thus, the (after-tax) value to the investor of the investment under the domestic legal regime in place at the time of investment is $\pi(1-t)$.

We assume that $\pi(1-t) - K > 0$—i.e. that the investor's net return in the absence of any breach or change of the domestic legal regime is positive; otherwise, it would not

38 See summary tables in the Online Appendix for an overview of results.
39 See, for example, Markusen, above n 15.
40 See, for example, Miceli and Segerson, above n 31.

have invested. Reflecting the heterogeneity of profitability in the real world, we assume there is an underlying distribution of present discounted values for investments from which π is drawn. We assume that the value of π for any given investment is known *ex ante* (i.e. in the first period) and observable by all parties, including the investor, the host state, and the arbitrators who decide any claims arising under an investment treaty. In the following sub-sections, we expand upon this basic set up to describe simplified versions of empirically relevant cases. The six scenarios differ in the type of adverse action that the host state may take against the investor and, therefore, in the consequences for both the investor and the host state.

Where an investment treaty is in place, we assume that it is perfectly enforceable such that there are no dispute costs or uncertainty. If the rule requires the host state to pay compensation, it simply complies. This simplifying assumption is justified both on the grounds of analytic clarity and because the implications of relaxing the assumption are ambiguous. On one hand, the possibility of delay and expense to the investor in enforcing an arbitral award against a recalcitrant state means that an entitlement to compensation is less valuable to the investor than our assumption would suggest. On the other hand, the fact that losing an investment treaty arbitration—and even, it seems, just being subject to investment treaty arbitration—entails a significant reputational cost to the host state[41] means that a requirement to pay compensation likely constitutes a greater cost to the host state than our assumption would suggest.

B. Time inconsistency and expropriation of investments (case 1)

We begin with a simple scenario in which the host state seizes the foreign investor's assets. Such instances of outright expropriation played an important role in historical justifications of the need for investment treaties. Although only a minority of disputes today involve allegations of direct expropriation,[42] such disputes remain important to the functioning of the regime. For example, the recent investment treaty case *ConocoPhillips v. Venezuela* arose out of Venezuela's expropriation of the foreign investor's oil projects.[43]

In the second period, the host state may choose to seize the investor's investment in its entirety, in breach of the domestic legal regime. This direct expropriation generates net benefits for the host state, R. We allow for heterogeneity in R, just as there is in π. The distributions of the random variables R and π overlap, so for some investments $R < \pi$ and for others $\pi < R$. In order to ensure we remain in a situation where there is no new information, we assume—as we did for π—that the realized value of R is known to both investor and host state *ex ante*.

41 Todd Allee and Clint Peinhardt, 'Contingent Credibility: The Impact of Investment Treaty Violations on Foreign Direct Investment', 03 International Organization 65 (2011), at 401; Emma Aisbett, Matthias Busse, and Peter Nunnenkamp, 'Bilateral Investment Treaties as Deterrents of Host-Country Discretion', 1 Review of World Economics 154 (2018), at 119.

42 UNCTAD data suggests that direct expropriation is alleged in slightly more than 20%—120 out of 582—of all known disputes. UNCTAD, 'Investment Dispute Settlement Navigator| UNCTAD Investment Policy Hub', https://investmentpolicy.unctad.org/investment-dispute-settlement (visited 2 September 2020).

43 *ConocoPhillips v. Venezuela*, ICSID Case No. ARB/07/30, Decision on Jurisdiction and the Merits, 3 September 2013.

Maintaining our simple and conservative modelling approach, we assume the distributions of R and π are such that $R > t\pi$, so the host state will always choose to expropriate. Knowing this, the investor will not invest. This is the classic time inconsistency problem. Both the investor and host country are worse off because the host state's optimal conduct *ex ante* and *ex post* diverge, and it cannot commit credibly to not expropriating.

Existing investment treaties require compensation for direct expropriation equivalent to the fair market value of the investment.[44] The fact that a state may have a policy justification for its seizure of the investor's property does not remove the requirement to pay compensation.[45] As such, the strict compensation provides a good approximation of the legal content of investment treaties in this scenario. The online appendix shows that the strict compensation rule completely resolves the time inconsistency problem for the host state, leading to welfare gains for both host states and investors compared to a baseline in which there is no investment treaty.

Our proposal also completely resolves the time-inconsistency problem, achieving the same benefits as the strict compensation rule, while requiring lower amounts of compensation in the event of expropriation. To calculate the compensation required under our rule, we need to know the gain for the host state and the loss to the investor that results from the host not having had the new legal regime (i.e. laws allowing uncompensated expropriation) in place at the time the investment was made. In the current case, if the host state expropriates the investment, the investor has a net return of $-K$. If, at the time the investment was made, the host state's domestic legal regime had permitted unilateral expropriation, the investor would not have invested, so would have a net return of zero. Hence the investor's loss as result of a domestic legal regime permitting unilateral expropriation not being in place from the outset is K, the investor's project cost. Meanwhile, the host state has a payoff of R resulting from its failure to observe its commitment not to expropriate.

If $R > K$, our compensation rule says that the host must compensate the investor K. In this case, the investor is left indifferent between having invested or not. Since there is a positive probability in general that host states will not expropriate, the expected value of investing for the investor is still positive. Hence, the investor will always invest. If $R < K$, our rule says that the host must compensate R, so the host is left with a zero payoff if it chooses to expropriate *ex post*. If it does not expropriate, it gets the positive payoff of $t\pi$. Hence, the host state will never choose to expropriate in this situation; knowing this, the investor will invest. In this way, our rule completely solves the problem of time inconsistency in this scenario.

C. New information and shut down of harmful investments (case 2)

We now consider a 'pure' new information scenario in which there is no time inconsistency problem. In this scenario, investments can be shut down by the host state if they are found to be causing harm (e.g. polluting the environment or damaging public

44 See, e.g., 2012 US Model BIT, above n 7, Article 6(2).

45 *Santa Elena v. Costa Rica,* ICSID Case No. ARB(AF)/00/01, Final Award (17 February 2000), para 72.

health). If shut down, the investment retains no residual value for either the investor or the host state. Formally, we maintain the same set up as above, except we replace the possibility that the investment generates a potentially valuable residual upon expropriation (R) with the potential that it generates harm (H) if left in operation. We assume the distribution, but not realization, of H is known to both investor and host prior to investment. The *ex post* realization of H introduces an element of new information to the model.

To build intuition, we assume for this scenario that the host's only options are to put up with the harm or shut down the investment. Cases fitting within this fact pattern have been both common and controversial within the investment treaty regime. An example is *Tecmed v Mexico*. The dispute concerned a hazardous waste disposal facility in Mexico owned and operated by a Spanish investor. As a result of pollution leaks, community opposition to the facility began to grow. In response, the Mexican environmental agency refused to renew the facility's operating permit, forcing the facility to close.[46] However, the Mexican government did not seize the facility, and the investor retained ownership of all the physical assets. Under existing investment treaties, such cases are normally analysed under the rubric of indirect expropriation. To determine whether a compensable indirect expropriation has occurred, tribunals balance the adverse impact on the investor against the strength of the justification for the host state's conduct.[47] If a tribunal finds that indirect expropriation has occurred, compensation equal to the fair market value of the investment is required.[48]

In the absence of an investment treaty, the government will choose to shut down the investment whenever the harm revealed after investment exceeds its potential revenue-generating benefits (i.e. whenever $H > \pi t$). In order to again keep our exposition simple, our model conservative (in the sense of favouring the need for an investment protection), and the current case as similar as possible to the Case 1, we assume that the distributions of H and π are such that this is almost always the case.

From the perspective of the investor, this scenario looks similar to Case 1. As in Case 1, the investor foresees that its investment will be lost in its entirety if the host state acts inconsistently with the legal regime that was in place when the investment was made. As in Case 1, this risk arises because the host state is indifferent to the impact that its actions will have on the investor's welfare. As in Case 1, the certain loss of its investment means that, in the absence of an investment treaty, the investor will not invest in the first place. Nevertheless, there are also crucial differences between direct expropriation (Case 1) and the harm/shut down scenario (Case 2).

In the current scenario, not all investments that might be foregone in the absence of an investment treaty would have generated global welfare improvements, only those for which $H + K < \pi$. Furthermore, there is no time inconsistency in the host state's

46 *Tecmed v. Mexico*, above n 19, paras 35–51.

47 See, e.g., *LG&E Energy v. Argentina*, ICSID Case No. ARB/02/1, Decision on Liability (3 October 2007), para 189; *PL Holdings v. Poland*, SCC Case No V2014/163, Partial Award (28 June 2017), para 355. Many treaties make this requirement to engage in balancing explicit, for example, in the Annex B to the 2012 US Model BIT, above n 7.

48 For example, 2012 US Model BIT, above n 7, Article 6(1).

optimal conduct in the current case. Both before and after investment took place, the host's optimal conduct would be to shut down/not allow the investment if it knew the investment would cause $H > \pi t$. This means that the host state has no need for an external commitment device. As we show in the online appendix, many of the foregone investments were of negative value to the host country.

The question of whether governments should be required to pay compensation for shutting down investments has been widely debated in the academic literature. It is well understood that the strict compensation rule—a requirement that the host state compensate the investor in this scenario, regardless of the scale of the harm caused by the investment's operation—encourages investors to proceed with investments that reduce global welfare.[49] This is because such legal protection fully insures investors against the possibility that their investment is harmful and might be shut down.

The most well-known solution to the problem of simultaneously redressing the host state's assumed tendency to undervalue foreign investors' interests while avoiding inducing globally inefficient projects is the MS rule.[50] Recall that the MS rule requires compensation if the host state's decision is globally inefficient from an *ex post* perspective (i.e. if the loss to the investor exceeds the total benefits resulting from the state's decision to shut down the investment). In circumstances where compensation is required, the MS rule provides for compensation equal to the 'full' value of the investment,[51] equivalent to investment treaties' 'fair market value' standard. For both reasons, the MS rule provides a good approximation of the legal content of investment treaties, insofar as this scenario is concerned.

The online appendix shows that it is technically ambiguous whether the MS rule increases global welfare in this scenario compared to a baseline in which there is no investment treaty. More importantly, for our purposes, the MS rule may decrease host country welfare compared to the situation where there is no investment treaty because the additional investments it encourages are likely to leave the host country worse off. As such, the MS rule cannot guarantee our requirement for Pareto improvements in this scenario.

How does our proposed compensation rule work in this scenario? If harm occurs and the host state chooses to shut down the investment, its payoff is zero, and the investor's payoff is $-K$. If the host state had simply precluded the investment from the outset, the host would have had zero payoff. Our rule does not require a host state to pay compensation in this scenario, because it gained nothing compared to the situation that would have existed if the investment had been precluded from the outset. Because our rule requires no compensation in this case, it has no impact on investor or host state behaviour compared to the baseline in which there is no investment treaty. As such, it avoids the potential reduction in host country welfare associated with strict compensation rule or the MS compensation rule. This is an important application of our rule and a significant departure from existing investment treaty jurisprudence.

49 See Blume, Rubinfeld, and Shapiro, above n 30; Louis Kaplow, 'An Economic Analysis of Legal Transitions', 3 Harvard Law Review 99 (1986), at 509.
50 See Miceli and Segerson, above n 31.
51 Ibid, at 750.

D. Mixed time inconsistency and new information (case 3)

The vast majority of investment treaty disputes do not fit neatly into the archetypes of Cases 1 and 2. This is partly because the majority of investment treaty disputes do not involve complete deprivation of the investor's investment, whether by way of seizure or by way of shut down.[52] It is also because, insofar as investment treaty disputes do involve complete deprivation of investment, problems of time inconsistency and new information are often intertwined in practice. One important and original contribution of our paper is the analysis of the implications of compensation rules in these more complicated, mixed cases. This section describes and analyses stylized versions of four of the most common of these mixed scenarios: shut down of harmful investments where there is a residual benefit retained by the host state (Case 3a), regulatory change (Case 3b), changes in fiscal transfers (Case 3c), and uncertain expropriation (Case 3d).

1. *Shut down with residual host state benefit (case 3a)*

We begin with a scenario that adds further complexity and realism to Case 2. As in Case 2, the host state decides in the second period whether to shut the investment down in response to new information. In contrast to Case 2, however, we assume that the host state obtains some benefit from the investor's initial decision to invest and retains this residual benefit if it decides to the shut the project down. An important class of such cases occurs when the host state *sells* a foreign investor a concession to make an investment—as is common in sectors like mining, infrastructure, and telecommunications—and then subsequently cancels the investment. An example is the case *Crystallex v Venezuela* discussed previously.

To model this scenario, we assume that the investor's decision to invest generates residual benefits, R, for the host state. In the current scenario, R is equal to the sale price of concessions, permits, etc. paid to the host state. As in Case 2, the investment is subsequently revealed to cause harm, H. If the host state chooses to shut down the investment in the second period, it sacrifices tax revenue, πt, avoids H, and retains R. Thus, we have a scenario where the host state's optimal conduct is time inconsistent, *and* the host state is responding to new information.

In the absence of an investment treaty, the host state will shut the investment down in the second period if the realized value of $H > \pi t$. As in Case 2, we assume that the distributions of H and π are such that the host state will almost always choose to shut down the investment, and hence the investor will choose not to invest. In contrast to Case 2, some of the forgone investments (namely those for which $R + \pi t > H$) would have been of net benefit to the host.

Existing investment treaties deal with such cases under the rubric of indirect expropriation. As explained in our discussion of Case 2, the MS rule provides a good approximation of existing jurisprudence on indirect expropriation. Our analysis of the

52 The majority of successful investment treaty claims—112 out of 209—involve neither direct expropriation (i.e. asset seizure) or indirect expropriation (i.e. total or substantial evisceration of the investment). UNCTAD, above n 42.

application of the MS rule to this scenario is similar to Case 2. This rule unambiguously increases investment volume and investor welfare but has ambiguous effects on host country welfare because some of the induced investments may not benefit the host state. That said, the application of the MS rule is more likely to be beneficial for the host state in the current scenario than in Case 2, as residual benefits for the host state mean induced investment is more likely to be beneficial.

How does our rule perform in this more complex scenario? The host state's gain from allowing the project to proceed and then shutting it down is R; the investor's loss from making the investment is K. Since the cost of making the investment, K, includes the amount the investor has paid to the host state, it will always be greater than R. Therefore, in this scenario, our rule will always require the host state to pay compensation R (i.e. to reimburse the payment the investor made to acquire the concession). The guarantee of some compensation in the event the investment is shut down means that our rule increases investment (and investor welfare) compared to the baseline with no compensation rule. Since the host state never has to compensate more than it has gained from having allowed the investment to occur, host country welfare has also unambiguously increased. This is an empirically important example of our rule's operation in practice and a significant departure from existing investment treaty jurisprudence.

2. *Regulatory change (case 3b)*

Consider now a different variation on Case 2, in which the host state has the option to regulate in a way that avoids the harm without necessarily shutting down the investment. One well-known case that illustrates this scenario is *Vattenfall v Germany (II)*. In response to the Fukushima nuclear disaster, Germany introduced an accelerated timetable for the phase-out of nuclear power.[53] This accelerated phase-out significantly reduced the expected future income of existing plants, while also reducing the perceived risk of environmental harm associated with the plants' ongoing operation. Other examples of cases that fall within this scenario might include new environmental regulations imposing expensive back-filling requirements on an open-pit mine already in operation, and requirements that an investor operate to higher technical standards than were required when the investment was originally approved.

We model the possible regulatory change in the second period as avoiding harm, H, to the host state, while causing loss, L, to the investor. To keep the exposition as simple as possible, we assume that this loss does not reduce the investor's prospective tax liability to the host state. Our assumption has the effect of overstating the need for a compensation rule, as the host state will ignore any impact L might have in reducing the tax revenue received from the investment. We focus on the situations where L is less than the revenue the investor earns from continuing to operate the investment (i.e. the domain $L < \pi(1 - t)$). If $L > \pi(1 - t)$, the investor will shut down the investment and walk away, and we are back in Case 2.

53 Hardy Graupner, 'German Government Approves Nuclear Phaseout Compensation' Deutsche Welle, 23 May 2018, https://www.dw.com/en/german-government-approves-nuclear-phaseout-compensation/a-43892394 (visited 10 September 2020).

Because the regulatory change does not cause the investment to shut down, regulating the investment comes at no cost to the host state *ex post*. Hence, in the absence of an investment treaty, the host state will choose to regulate whenever $H > 0$. Knowing this, the investor will not invest if $L > \pi\,(1 - t) - K$. However, unlike in Case 2, the host state in this scenario would have gained $t\pi$ from allowing and subsequently regulating the investment, were an investment to occur.

The provision of investment treaties most relevant to this scenario is the FET standard. Although jurisprudence relating to the FET standard is not entirely consistent, a common thread running across arbitral decisions is that application of the FET standard requires a tribunal to balance the harm state conduct causes to a foreign investor against other policy justifications for the state's action.[54] If the FET standard is breached, tribunals award compensation according to the principle of 'full reparation' (i.e. compensation equal to the investor's loss relative to the counterfactual situation that would have existed 'but for' the breach of the treaty).[55]

Under the MS rule, liability also turns on a balance between the harm caused by the state's conduct and the strength of the justification for that conduct; compensation, if required, equals the full value of the loss caused by the state's measure. In both respects, the MS rule provides a useful approximation of the legal content of investment treaties, insofar as this scenario is concerned.[56] In this scenario, as in the previous one, application of the MS rule increases investment volume and investor welfare but has an ambiguous impact on host country and global welfare.[57]

Our rule once again provides Pareto improvements. Retaining our focus on the situations in which the investor would not have invested if it had known the regulatory change would occur, the host state gains $t\pi$ from not having had the new regulations in place when the investment is originally made. The corresponding loss for the investor is $L - (\pi\,(1 - \mathrm{t}) - \mathrm{K})$. The required compensation is the lower of these two values, and the host state will choose to regulate only if the value of the avoided harm is greater than the required compensation. The combination of decreased probability of regulation and guaranteed compensation in the case of regulation means that investment volume (and investor welfare) will increase compared to a baseline in which there is no investment treaty. Since the host state never has to compensate more than it has gained from an investment, *ex ante* host country welfare has also unambiguously increased. Since both investor and host state are better off, our rule has also unambiguously improved global welfare.

54 See, for example, Stephan Schill and Benedict Kingsbury, 'Public Law Concepts To Balance Investors' Rights With State Regulatory Actions In The Public Interest-The Concept of Proportionality', In. Stephan Schill, (ed.) *International Investment Law and Comparative Public Law* (Oxford University Press, Oxford, 2010), 75–104; Caroline Henckels, *Proportionality and Deference in Investor-State Arbitration: Balancing Investment Protection and Regulatory Autonomy* (Cambridge University Press, Cambridge, 2015); David Gaukrodger, 'Addressing the Balance of Interests in Investment Treaties', 2017, https://www.oecd-ilibrary.org/finance-and-investment/addressing-the-balance-of-interests-in-investment-treaties_0a62034b-en (last accessed on September 21, 2019).

55 Irmgard Marboe, *Calculation of Compensation and Damages in International Investment Law*, 2nd ed. (Oxford; New York: Oxford University Press, 2017) 83.

56 Similarly Bonnitcha and Aisbett, above n 32.

57 See Online Appendix for further exposition.

3. *Fiscal transfers (case 3c)*

A mixture of time inconsistency and new information may also be involved when the host state changes the tax treatment or regulated pricing arrangements governing a foreign investment. These cases form a significant proportion of known disputes under investment treaties and link to longstanding concerns about investors' vulnerability to 'obsolescing bargains'.[58] One example is the series of disputes relating to gas distribution concessions arising out of Argentina's financial crisis. Argentina privatized the gas distribution sector in the 1990s. This process involved tendering a series of gas supply concessions to investors. The concessions entitled foreign investors to gas tariffs based on the US Producer Price Index, calculated in US dollars, and adjusted twice annually. Successful investors paid hundreds of millions of US dollars to acquire these concessions from the Argentine government. In late 2001, Argentina entered a period of profound economic crisis. The government responded with a range of measures, including removal of the peg that had tied the Argentina peso's value to the US dollar since 1992. As many of the concessions' local operating costs were denominated in pesos, continued payment of tariffs tied to the US market and calculated in US dollars would have constituted a significant windfall gain for the investors. Instead, Argentina unilaterally deindexed gas tariffs, over-riding the agreed terms of the concession contracts.[59]

This scenario involving fiscal transfers is similar to the scenario of regulatory change examined in the previous section. Let the new fiscal transfer that the host state imposes on the investor be T. To capture the fact that most increases in net fiscal transfers to the host required of investors are justified by the host on some public interest grounds, we again allow for a revealed harm from the investment of $H > 0$. Recall our assumptions that the host completely ignores investor welfare and that there are no reputational costs. Under these assumptions, the host state will always choose to demand an increased fiscal transfer once the investment is made, just as the host state will always choose to change the regulations governing the investment in Case 3b. Knowing this, investors will decline to invest in the absence of an investment treaty.

As with Case 3b, the FET standard is the key provision for assessing this scenario under existing investment treaties. However, tribunals have struggled to develop a consistent approach to questions about the extent to which the FET standard protects investors from unanticipated changes to the fiscal regime governing an investment. The series of cases arising from Spain's changes to the tariff regime governing solar electricity generation provide a recent example.[60]

58 R Vernon, 'The Obsolescing Bargain: A Key Factor in Political Risk', International Essays for Business Decision Makers 5 (1980), at 281.

59 *LG&E v. Argentina*, ICSID Case No. ARB/02/1, Decision on Liability (3 October 2006), paras 34–71. For discussion of these cases as examples of a state's response to new information, see van Aaken, above n 6.

60 Lisa Bohmer, 'Analysis: Majority in *Stadtwerke Munchen v. Spain* Considers That Investors in Spanish CSP Plants Could Not Legitimately Expect Legislative Stability; Kaj Hober Disagrees', International Arbitration Reporter, 5 December 2019, comparing *Stadtwerke München v. Spain,* ICSID Case No. ARB/15/1, Award (2 December 2019) to OperaFund Eco-Invest v. Spain, ICSID Case No. ARB/15/36, Award (Sept. 6, 2019), among others.

Our economic modelling provides some hints as to why tribunals may find this scenario especially challenging. First, as our formal modelling shows, problems of time inconsistency and new information are intertwined in this scenario. It is not possible to classify cases as simple instances of one or other phenomena. Second, in the Online Appendix, we show that application of the MS rule is indeterminate in the scenario of fiscal transfers, while application of the strict compensation rule leads to the troubling implication that *any* change to the agreed tax or tariff regime governing an investment requires compensation.[61] As with Cases 3a and 3b, we also show that both rules have ambiguous implications for host country welfare.

Our rule offers a different approach. If the fiscal change, T, is sufficiently large that the investor would not have invested if the new regime had already been in place when the investment was originally made, our rule will require some compensation. However, compensation will be significantly less than is the case under existing investment treaty jurisprudence. In this way, our rule allows a host state some flexibility to unilaterally vary the agreed fiscal regime governing the investment and ensures that the host state is never left worse off from allowing an investment to proceed. This minimal protection provided to the investor has an important effect in encouraging mutually beneficial investment. In this scenario, as in all the others, our rule achieves a Pareto improvement in welfare compared to a situation with no investment treaty.[62]

Until now, we have assumed that the investor would not have invested if the new, more onerous, fiscal regime had been in place from the outset. However, in scenarios 3b and 3c, in which the investment is not fully expropriated or shutdown, it is possible the investor would have invested anyway. In such situations, the host state has not gained anything by belatedly imposing new regulations or taxes compared to the situation that would have existed if these regulations and taxes had been in place when the investment was made. Hence, our rule implies that no compensation is due.

An empirically important application of this analysis is when mineral prices rise more than expected, leaving investors with windfall gains. Host states typically respond by trying to reclaim some of these windfall gains through higher taxes. For example, in *Paushok v Mongolia*, a foreign gold mining company sought compensation for Mongolia's introduction of a new windfall profits tax on gold sales. The tax was a response to the boom in commodity prices during the 2000s and was calculated at 68% on the portion of the sale price exceeding a base price of USD 500 an ounce.[63] There was no suggestion that the tax increase made the investment unprofitable from an *ex ante* perspective. In this case, the tribunal did not award compensation to the investor, partly because the investor had not negotiated a specific agreement with the host state to freeze the tax rate on gold sales over the life cycle of the investment. Our rule would not require compensation even if the host state were in breach of such an agreement, so long as the investor remained better off than if it had not invested in the first place. This outcome reflects our view that investment treaties should focus on solving problems of under-investment arising from time inconsistency.

61 See proofs in Online Appendix.
62 See proofs in Online Appendix.
63 *Paushok v. Mongolia*, Award on Jurisdiction and Liability (28 April 2011), para 104.

4. Uncertain expropriation (case 3d)

In Cases 3a, 3b, and 3c, there was uncertainty around the harm caused by the investment. Disputes to date show that the host state may initially be uncertain about the benefits of capturing the investment for itself. For example, in *Tethyan Copper v. Pakistan*, the investor had spent over 200 million US dollars on exploration and project planning related to a proposed copper mine in Balochistan. Following this initial investment, the investor submitted a detailed proposal to the host state to develop the mine. The host state then refused to issue the mining lease required for the project to proceed. The tribunal held that the host state's refusal to allow the project to proceed was motivated by the state's decision to develop and implement the project itself.[64]

To model this scenario, we return to a situation like Case 1, only this time we assume that the benefit to the host of capturing the investment, R, is uncertain *ex ante*. To keep the analysis clear and our model as simple as possible, we continue to assume that π is known *ex ante* and observable by all parties. This assumption focuses our analysis on the key variable R that creates time inconsistent optimal conduct and hence drives the host state's opportunistic action *ex post*. It is also conservative. If we had assumed that both π and R were uncertain and correlated, the host state's incentive to expropriate investments in the second period would be reduced. This is because high realized values of R in the second period would occur in the same cases for which the realized value of the unexpropriated investment to the host state—πt—is also high.

As with Case 1, this scenario would be assessed under the rubric of direct expropriation under existing investment treaties, for which the strict compensation rule provides a good approximation. The application of the strict compensation rule in this scenario increases the amount of investment that occurs and investor welfare. Because the host state is now dissuaded from expropriating some investments and is required to pay compensation on those it does expropriate, the impact on host country welfare is ambiguous once again. However, unlike Cases 3a, 3b, and 3c, in this scenario, all the additional investments that occur because an investment treaty is in place are globally beneficial. Hence, the strict compensation rule unambiguously raises global welfare in this case.

For our rule, the analysis of Case 3d is identical to that of Case 1. The only difference between this scenario and Case 1 is that the value to the host of expropriating the investment, R, is uncertain at the time of investment and only revealed once the investment has been made. This uncertainty, however, has no impact on the application or implication of our rule. Hence as in Case 1, our compensation rule fully solves the host state's time inconsistency problem and achieves a Pareto improvement.

5. Implications of our results for investment treaties in the real world

In the preceding sections, we have modelled the implications of different compensation rules across a series of different scenarios. For any given state, the aggregate welfare effect of any investment treaty depends on the proportion of investor–state interactions

64 *Tethyan Copper v. Pakistan*, ICSID Case No. ARB/12/1, Decision on Jurisdiction and Liability (10 November 2017), para 1155.

falling within each scenario, as well as the distribution of the values of variables such as π, R, and H across these interactions. We have avoided making any assumptions about the relative frequency of particular types of interaction or the distribution of these variables for two reasons. The first is to keep our analysis as general as possible. The second is that the extraordinary variety of known investor–state disputes points to the diverse and unpredictable nature of underlying investor–state interactions across sectors and countries.

The absence of assumptions about the distribution of key variables is reflected in our conclusion that the welfare effects of strict compensation rule and the MS rule are ambiguous in many scenarios. The aggregate welfare effects of investment treaties containing these rules in the real world may well differ for different states, depending on the specific characteristics of investments (and potential future investments) that happen to exist in the state in question. What our analysis demonstrates, however, is that our proposal generates Pareto improvement across all types of investor–state interactions and any possible distribution of variables. This conclusion has immense practical importance for policymakers, who draft investment treaties under conditions of uncertainty about the range of future investments and investment disputes to which the treaty might apply.

V. CONCLUSION

Questions about the design and reform of investment treaties should be grounded in the analysis of the underlying economic rationale for these treaties and the extent to which they are effective in achieving the policy objectives of the states that sign them. With this proposition as our starting point, we argue that investment treaties should be designed and interpreted to solve problems arising from time inconsistency of optimal conduct for host states, but they should not restrain how states respond to new information. Using a law and economics approach, we develop and justify a proposal for the reform of investment treaties that is focused exclusively on solving time inconsistency problems. Our analysis is grounded in an understanding of the wide variety of scenarios that give rise to disputes under investment treaties.

Our proposal addresses the circumstances in which a state should be held liable for breach of an investment treaty and the amount of compensation that should be required in such circumstances. Our proposal is that a state should only have to compensate the investor if it breaches or modifies the domestic legal regime governing the investment and that compensation should be the lesser of the investor's loss and the host state's gain from the host state not having had the new legal regime in place when the investment was made. The principles governing the amount of compensation do much of the work in our proposal. If either the investor's loss or the host state's gain from the host state not having had the new legal regime in place when the investment was made is zero, no compensation is required, and other legal arguments are thereby rendered moot. We show that, in contrast to well-known alternatives considered in the law and economics literature, our proposal generates welfare improvements for both home and host countries across a wide variety of common scenarios.

In practical terms, our analysis shows that existing investment treaties provide more protection to foreign investors than can be justified from an economic perspective. It raises particularly urgent questions about existing approaches to compensation under investment treaties, which are much more generous to foreign investors than can be justified.[65] In October 2019, the question of compensation was added to the agenda of the multilateral discussion on reform of the investment treaty regime currently underway at the United Nations Commission on International Trade Law.[66] Our proposal speaks directly to this reform debate.

Our proposal also responds to other criticisms of the status quo that we have not discussed here. One of the most telling criticisms of investment treaties is that they constrain the ability of democratic governments to respond to the demands of constituents.[67] At a more prosaic level, existing investment treaty jurisprudence is bedevilled by a series of practical problems, including the difficulty facing a tribunal in identifying a state's 'motive' for the conduct under challenge, the problem of verifying whether new information cited by a host state as a justification for regulatory change is genuinely new, and the complexity of valuation evidence required to calculate compensation under existing doctrine. Leaving aside considerations of efficiency and distribution discussed in this paper, there are serious concerns about the workability of existing jurisprudence as a practical matter. Our proposal's ability to address these concerns, among others, is examined in our companion paper.[68]

SUPPLEMENTARY MATERIAL

Supplementary material is available at *JIELAW* online.

65 While not the focus of this paper, our analysis raises the question of why existing approaches to compensation and liability have persisted up until now. In our view, this is likely explained by the political economy of investment treaties, including the role of template agreements drafted by capital-exporting states and the approach of arbitral tribunals when interpreting the treaties. See, generally, Bonnitcha, Poulsen, and Waibel, above n 18.

66 Anthea Roberts and Taylor St John, 'UNCITRAL and ISDS Reform', EJIL Talk, 23 October 2019, https://www.ejiltalk.org/uncitral-and-isds-reform-in-sickness-and-in-health/ (visited 31 August 2020).

67 David Schneiderman, 'Tocquevillian Reflections on International Investment Law: Tocquevillian Reflections on International Investment Law', 2 University of Chicago Law Review 85 (2018), at 585.

68 Bonnitcha and Aisbett, above, n 11.