Settling under disagreement

A game theory analysis of settlement in international investment disputes

Thesis

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Abstract

The aim of this paper is to extend the application of game theory to the process of investment arbitration and to examine the strategies and the ability of the parties of a dispute to settle under different assumptions regarding their estimations of the probabilities at trial. In particular the research will focus on the extent and factors which determine the maximum settleable disagreement in investment disputes when the parties exhibit relative optimism. The article will close with an empirical application of the findings and some policy options for increasing the settleability of investment disputes as suggested by the game theory analysis.

Table of contents

1. Introduction

As arbitration decisions over investment disputes start to capture the public imagination, the questions around the structure of its framework are becoming increasingly important. International investment law is transforming from a niche legal field, where foreign investors can claim against states based on interpretative challenging provisions provided by international treaties[1], to a subject of frequent political controversy where its actors seem to prefer secretive arbitration over settlement.

In order to study the behaviour of these actors and examine whether investment disputes can accommodate settlements, this paper will try to model the process of investment arbitration under the theoretical framework of game theory. While game theory has been extensively applied in the bibliography of law and economics[2] especially in domestic legal systems[3] and public international law[4], its application in investment law seems to be still limited[5]. The research will thus attempt to bring the perspectives of this academic discourse to the largely unexplored process of investor-state dispute settlement (ISDS) aiming to focus mainly on the ability of the parties to settle when they disagree on their chances at trial.

In particular, in Chapter 2 the research will try to examine the framework of investment arbitration by first modelling its process so as to determine the strategies available to the parties and their ability to settle under a basic assumption where the players agree on their probabilities of winning or losing the trial. The analysis will then move forward to examine settlement under the more realistic scenarios where the parties will be either relative

[1] Most often Bilateral Investment Treaties (BITs) but also multilateral treaties and general treaties containing investment provisions. See for example Dolzer and Schreuer (2012).

[2] See Baird et al. (1998).

[3] For an extensive overview of the literature see Polinsky and Shavell (2007).

[4] See for example Ohlin (2012).

[5] For an application of game theory in the process of signing and the function of Bilateral Investment Agreements see for example Sasse (2011). However, besides the existing literature on BITs, the academic commentary seems to be very limited when it comes to investment arbitration. For the only identified article on the thematic, which consisted also motivation for this research see Collins et al. (2016).

pessimistic or relative optimistic regarding their respective chances. In order to better understand settlement under the latter optimism framework[6], the paper will then attempt to create an equation to quantify the maximum settleable disagreement in each specific case and to understand the factors that determine it.

Chapter 3 will then continue with an examination of the maximum settleable gap in real cases through an empirical application of data collected from published arbitration awards. Finally, the analysis will close with some policy consideration aimed at increasing the possibilities of settlement according to the findings of both the theoretical and the empirical part of this research.

2. Applying game theory

Based on a complex system of International Investment Agreement (IIAs), international investment law provides foreign investors with an additional legal protection for their investments in the host state. In particular, provided that they can satisfy the legal thresholds of some relative treaty, which is in force between their country of origin and the host country of their investment, foreign investors can pursue claims against the host state before institutions of international arbitration[7].

This ISDS procedure presents however some unique characteristics compared to domestic jurisdictions. In particular and contrary to domestic legal systems, claims can be presented only by one side of a dispute (the investor) while the parties are expected to engage in a

[6] Frameworks where disagreement of the parties over the probabilities at trial and mutual optimism is assumed have been widely used in the academic literature to examine a wide range of issues in domestic legal system but not in investor state dispute settlement. Some characteristic examples include: Landes (1971); Posner (1973); Gould (1973).

[7] According to Dolzer and Schreuer (2012) the majority of these cases have been brought under the Convention on the Settlement of Investment Disputes (ICSID). Although ICSID has become the main forum for international investment law arbitration, other ISDS bodies with largely similar procedural framework include the International Chamber of Commerce, the London Court of International Arbitration, the Permanent Court of Arbitration in the Hague and the UNCITRAL Rules of Arbitration for the creation of ad hoc tribunals.

relatively flexible but expensive judicial procedure with important financial commitments. Investment disputes involve, in addition, significant reputational risks for the parties since, especially the host state, can face severe consequences regarding its appreciation as a foreign investment destination.[8]

However, given the difficulties in quantifying these indirect reputational costs of the parties, which could affect their strategic behaviour in an ISDS procedure, the present article will rather try to examine investment arbitration in a more simple context. Like other researches before, investor-state arbitration will be understood as a process where the two players can take a series of strategic decisions in response to the actions and options of their counter party and in order to maximise their payoffs which are directly connected with the arbitration. The arbitration procedure will be thus a dynamic game where the players will be called to take their decisions sequentially and which will follow both standard economic theory[9] and game theory[10]. This kind of dynamic game can be best represented with the introduction of a game tree (figure 1).

In particular, the game will involve two rational participants who will try to maximise their wealth through their payoffs: the claimant or player 1 (the investor) and the respondent or player two (the state). The two players will have a set of strategies and payoffs for each outcome which will be both discussed extensively in the following paragraphs. In a general overview the claimant will have to decide whether to pursue the claim while the respondent will then make a settlement offer which will be in turn accepted or rejected by the claimant in order to drop the claim or proceed to arbitration (figure 1).

[8] This latter particularity can be partly mitigated though, since the parties in ISDS can agree on a confidential arbitration. This option in turn reduces the attractiveness of settlement compared to domestic jurisdictions where the benefit of opting for a confidential trial is usually not as extend.

[9] See, for example, Samuelson and Nordhaus (2009); Lipsey and Chrystal (1995).

[10] For applied game theory and the necessary characteristics of games see Gibbons (1992).

All the information regarding the players[11] will be common knowledge making it a game of complete information. Each players will be also perfectly informed in every stage of the game of all the events that have been previously occurred. Finally, the players will be expected to be risk neutral and to have, at first, the same estimation of probabilities regarding the outcome of the trial. These two assumptions will be further relaxed, though, in order for the analysis to address the main research questions of the paper.

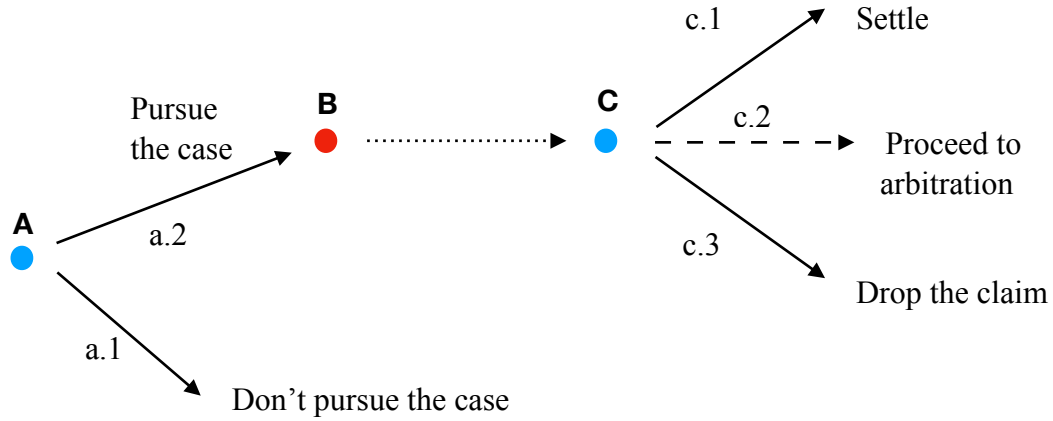

Figure 1. The arbitration game tree

2.1 Modelling the game

a. Root node and settlement offer

The game begins at point ***A*** which consists the root node and first stage of the game tree. At this point the claimant has to make the decision to either pursue the claim (a.2) or choose to abstain from any aspiration within the framework of investment arbitration (a.1). In this latter

[11] such as their payoffs, legal costs, aversion to risk and their estimation of the probabilities at trial.

scenario there will be no transfer or change of wealth and the payoffs of both players will be zero.

If, however, the claimant decides to bring the claim forward[12] the sequence of moves will lead to point ***B*** while we assume that both parties will incur pre-trial legal costs[13], depicted with $\boldsymbol{LC_{pt1}}$ for the claimant and with $\boldsymbol{LC_{pt2}}$ for the respondent[14].

At point ***B*** the respondent will now have to decide on whether to try to pursue a settlement or move straight to the adjudication of the claim. In contrast with the other decision nodes of the game, Player 2 will not be restricted in choosing among a set of predetermined options but he will rather decide the amount of the settlement offer ***O*** from a set of infinite possible offers. At this stage the game is restricted for simplicity in a single settlement offer by the respondent to the claimant.[15]

b. Acceptance of settlement offer and payoffs

After the respondent's offer, the game moves on to point ***C*** where the claimant is called to choose among accepting the amount offered (path c.1), rejecting the offer to pursue the claim through arbitration (c.2) or even abandoning the claim altogether (c.3). If this first scenario is

[12] No distinction will be made between presenting formally the claim and making a notification of intentions to the counter party of the dispute. What is important is the willingness and the understanding of the parties that this happens inside or in the shadow of the framework of investor-state arbitration. Therefore, the notion of presenting a claim will be also used for notification of intentions or any other similar act which could initiate the negotiation stage under the umbrella of international investment law.

[13] The pre-trial legal costs can involve, among others, the costs related to presenting the claim or the informal notification, hiring lawyers and making an initial legal research with the collection of basic evidence. Some small legal costs will exist even before node A, such as those for a preliminary legal counselling, but they are not included in the analysis since they exist regardless the choice at A and at an earlier stage than the arbitration game.

[14] For the purposes of the present paper the subscript 1 will be used to indicate reference to qualities and characteristics of the claimant and correspondingly subscript 2 will be applied for reference to the respondent.

[15] This restriction for a single offer is adopted in order to simplify the analysis and focus on the points of interest of this research. As it will be clear in the unraveling of the game, the restriction does not affect the main observations since we will be here mostly concerned with the extreme cases of disagreement where just one possible offer is left for the parties to settle on. Any second higher or lower offer would not lead to settlement for any specific case unless the disagreement gap is smaller than the maximum settleable gap. In any case, even if we would allow for an extended negotiation period, the parties would most likely reach eventually settlement provided rationality and skilful negotiators.

realised (c.1) the payoffs for players one and two resorting from settlement will be S_1 and S_2 respectively. In particular, the claimant will have a payoff equal to the positive value of the offer minus the pre-trial legal costs:

$$S_1 = O - LC_{pt1} \quad (1)$$

while the respondent will experience a negative change compared to his wealth at node A (W_2) and equal to the settlement offer which he will have to pay to player one plus the legal costs:

$$S_2 = -O - LC_{pt2} \quad (2)$$

c. The payoffs when dropping the claim

In the eventuality where the claimant chooses to drop the claim (c.3) the payoffs for both players will equal to the pre-trial legal costs[16] :

$$D_1 = -LC_{pt1} \quad (3)$$
$$D_2 = -LC_{pt2} \quad (4)$$

As it will be elaborated further in the chapter, by comparing the payoffs of paths c.1 and c.3 it is evident that the claimant would never consider to drop the claim unless both the respondent chooses not to make an offer for settlement (O = 0) and the expected value of pursuing the

[16] We will not examine here the scenario where the tribunal could attribute part of the legal costs of the respondent to the claimant after dropping the claim. This could be the case for example if the claimant would drop the claim after the initiation of an ICSID arbitration (although it is rather unclear, due to limited case law, the procedural cut off point after which there is judicial cost allocation) under the conditions of Article 58 ICSID Arbitration (Additional Facility) Rules and Article 61(2) ICSID Convention. Since at this stage there is no initiation of the trial and the claim against the respondent can consist, as it was already discussed, just of an informal notice (provided that it would set the dispute in the shadow of the consequences of a possible arbitration) judicial allocation of the costs will not be examined. The historically rare possibility of dropping the claim after the formal initiation of the trial is not examined in this model which treats proceeding to trial as an alternative of dropping the claim.

claim to trial (at c.2) is negative and smaller than the pre-trial litigation costs (since the payoff $D_2 = -LC_{pt2}$ is in any case negative).

This latter scenario is introduced in the analysis in order to take account of a suit brought mainly to obtain a positive settlement from the defendant even though the claimant's case is so weak that he would be in principle unwilling or unlikely to pursue it to trial (suit brought for its nuisance value, hereafter 'nuisance suits')[17]. The article thus aims to incorporate in the analysis an issue that has been explored in the general bibliography of law and game theory[18] but hasn't yet been examined in the context of investment arbitration. The examination of the issue seems even more important if we take into account the public criticism around international investment law and in particular the assertion that, besides its institutional safeguards[19], it can often function as vehicle for corporations to pursue absurd claims in order to pressure states and in the hope of achieving significant rewards out of settlements. The paper will try to assess, in the limits of its assumptions, whether international arbitration can be abused with nuisance suits which can undermine the legitimacy of the system.

d. Proceeding to arbitration and player rewards

Finally, if the claimant decides to pursue adjudication the payoffs of the players are characterised by uncertainty since the outcome of an arbitration can be neither foreseen a priori nor controlled totally by the parties[20]. In particular, the outcome and the distribution of

[17] For research on nuisance suits see Rasmusen (1998).

[18] See Rosenberg and Shavell (1985).

[19] For example Article 41 (5) of the ICSID Arbitrations Rules states: "Unless the parties have agreed to another expedited procedure for making preliminary objections, a party may, no later than 30 days after the constitution of the Tribunal, and in any event before the first session of the Tribunal, file an objection that a claim is manifestly without legal merit". Nevertheless the provision can be proven difficult to apply given the vague interpretative lines of legal rules in investment treaties.

[20] The parties can partly influence the arbitration outcome through, for example, with the strength of their legal claims, their litigation strategies, the spending on research and the selection of legal counsels and tribunals. In this paper financial strategies to affect the possibilities such as investments in evidence collection will not be taken into account.

the probabilities will depend on numerous and largely unpredictable factors[21]. The arbitration tribunal will be thus understood to decide in favour of the claimant with probability ***p*** and in favour of the respondent with probability ***1-p.***

Moreover, in the scenario where the claim moves to adjudication, the parties will also have to share the arbitration costs ($LC_{A1} + LC_{A2} = LC_{A1,2}$) and also pay their respective legal costs associated with the stage of the trial ($LC_{t1} + LC_{t2} = LC_{t1,2}$)[22]. The tribunal can in addition decide to charge the losing party with a fraction of the legal costs ($LC_i = LC_{pti} + LC_{ti}$)[23] of the winning party, f_i: $0 \leq f_i \leq 1$ leaving to the winner a residual cost burden $(1-f_i)LC_i$. The arbitrators can also decide for a similar allocation regarding the arbitration costs with the successful party paying only part of the costs which are attributed to him from the arbitration procedure $(1-h_i)LC_{Ai}$ and his counter party bearing the rest of the fees (h_i: $0 \leq h_i \leq 1$).

Therefore, if the claimant wins the arbitration, his payoff (V_1) will consist of the awarded monetary compensation , ***M***[24], which the respondent will have to pay to the claimant, minus the cost of arbitration that he has to bear and the fraction of his total legal costs which will not be paid by the respondent:

$$V_1 = M - (1-h_2)LC_{A1} - (1-f_2)LC_1 \qquad (5)$$

The respondent's negative payoff will then be:

$$V_2 = -M - LC_{A2} - LC_2 - f_2LC_1 - h_2LC_{A1} \qquad (6)$$

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[21] For some factors that can affect arbitral and judicial decisions see for example: Franck et al. (2016); Guthrie et al. (2007).

[22] It is not in the scope of this research to account for indirect costs from the arbitration such as political risk and reputational costs.

[23] The subscript i will be used for properties and characteristics that refer to both the claimant and the respondent.

[24] In reality the award of the tribunal could be better approximated stochastically with a probability distribution where there would be a different possibility for each value to be awarded. For simplicity we assume here that the monetary compensation will have a predetermined value with certain probability to be awarded.

On the contrary, if the claimant loses the arbitration, he will have to bear, besides his legal costs, his share of the arbitration costs and the fraction of the legal costs of the respondent that could be charged by the tribunal. The negative payoff of the claimant in this case will then be:

$$L_1 = -LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2} \quad (7)$$

while, the payoff of the winning respondent will be:

$$L_2 = -(1-h_1)LC_{A2} - (1-f_1)LC_2 \quad (8)$$

Furthermore and since the decision of the arbitration is an uncertain outcome, the players will obtain expected payoffs[25]. The expected value of the arbitration (EVA_1) for the claimant will thus be determined by the possibilities that the claim will be upheld times the respective payoff, plus the possibility to be defeated in the arbitration multiplied by the costs he will incur:

$$EVA_1 = p(V_1) + (1-p)(L_1) \quad (9)$$

Similarly also for the respondent:

$$EVA_2 = p(V_2) + (1-p)(L_2) \quad (10)$$

2.2 Solving the game

A game represented in extensive form with a game tree like the arbitration procedure of this research can be analysed by *backward induction*. This technique solves the game by first

[25] We already, since the introduction of the chapter, assumed that the parties are risk neutral, so that they have zero risk-aversion. Risk neutrality implies that the parties' change in utility will be the same as the change in their wealth. This can be a reasonable assumption for the respondent given the size of the wealth of a state relative to the claims pursued. The assumption might be less convincing for the claimant, although big corporations could be expected to take decisions based on impartial financial calculations.

considering the last possible decision nodes and it will be applied also here to accommodate better the time-element and sequential nature of this dynamic game.

In the following subchapters the game will be solved first for the scenario where the expected value of the arbitration is positive for the claimant but a settlement could be achieved nevertheless. Next the research will solve the game for the cases when the expected value of the claim is negative for the claimant and thus he is motivated to bring the claim forward only in order to achieve a positive reward through a possible settlement (nuisance value claim).

2.2.1 Solving the game for a suit with positive expected value of arbitration

Starting from the latest stage in the sequence of the game, at point C, the claimant will first never choose to drop the claim since this option is dominated by the strategy to pursue adjudication[26] ($EVA_1 > 0$ and therefore $EVA_1 > D_1$). Player 1 will further choose settlement over arbitration only if this will lead to a bigger or equal payoff[27] than the expected value of the trial. This constrain for choosing settlement can be demonstrated by the equations:

$$S_1 \geq EVA_1$$
$$O - LC_{pt1} \geq EVA_1$$
$$O \geq EVA_1 + LC_{pt1} \qquad (10)$$

Therefore, as it is suggested by equation (10), player 1 will not choose to settle at C unless he receives an offer bigger or equal to the minimum offer, O_{min} :

$$O > O_{min} = EVA_1 + LC_{pt1} \qquad (11)$$

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[26] for risk neutrality provided.

[27] When the two payoffs are equal and since we assume risk neutrality for the players, the claimant will be in fact indifferent between the choices. Here we accept that the claimant would choose the certain outcome of the settlement over the uncertain arbitration to account for the reasonable scenario that the claimant will be even marginally risk averse.

After determining the strategies at point C the sequence continues at node B where the respondent will have to choose the value of the settlement offer he is going to propose to the claimant. Since there is no possibility that the claim will be dropped at C, the respondent will choose to make an offer which will lead to a settlement under the constrain that this settlement will provide him a better or equal[28] payoff compared to arbitration. The strategy constrain of player 2 in making the offer will thus be:

$$-O - LC_{pt2} \geq EVA_2 \qquad (12)$$

The maximum amount, $\boldsymbol{O_{max}}$,therefore that the respondent will be willing to offer according to (12) is:

$$O < O_{max} = -EVA_2 - LC_{pt2} \qquad (13)$$

The respondent will choose to offer an amount smaller or equal to $\boldsymbol{O_{max}}$. In order, however, to achieve a favourable settlement he will also choose to make an offer that satisfies the constrain for the claimant's acceptance and therefore propose an amount in the space between $\boldsymbol{O_{min}}$ and $\boldsymbol{O_{max}}$.

We can compare further the values of $\boldsymbol{O_{min}}$ and $\boldsymbol{O_{max}}$ when the players agree in the possibilities of the claim by including the two variables in one equation. This can be achieved by stating mathematically the fact that while any potential payments will take place from the one to the other party, the total legal costs ($LC_{total} = LC_{pt1} + LC_{t1} + LC_{pt2} + LC_{t2} + LC_{A1} + LC_{A2}$) will be paid by the parties to external recipients which in turn requires that:

$$EVA_1 + EVA_2 + LC_{total} = 0 \qquad (14)$$

Combining now the equations (13) and (14) we get that:

[28] Although in equality the respondent would be indifferent under the assumption of risk neutrality, here we also accept a preference for the certain outcome of settlement to account for marginal risk aversion at the moment of decision making.

$$O_{max} = EVA_1 + LC_{total} - LC_{pt2} \quad (15)$$

$$\begin{aligned} O_{max} &= EVA_1 + LC_{pt1} + LC_{t1} + LC_{pt2} + LC_{t2} + LC_{A1} + LC_{A2} - LC_{pt2} \\ &= EVA_1 + LC_{pt1} + LC_{t1} + LC_{t2} + LC_{A1} + LC_{A2} \\ &= EVA_1 + LC_{pt1} + LC_{t1} + LC_{t2} + LC_{A1} + LC_{A2} \\ &= EVA_1 + LC_{pt1} + LC_{t1,2} + LC_{A1,2} \quad (16) \end{aligned}$$

In order to compare the two constrain offers we can further insert equation (11) to equation (16) to get:

$$O_{max} = O_{min} + LC_{t1,2} + LC_{A1,2} \quad (17)$$

As it is clear from (17), provided that the parties have the same estimations regarding the arbitration outcome, there will always be a range of offers between O_{min} and O_{max} upon which the parties can always agree on a settlement. The respondent will thus in point B choose an offer from this settlement space.

Concluding the analysis at the root node A, the claimant will always choose the positive payoff of pursuing the claim over the zero payoff of avoiding the arbitration mechanism. If the assumptions of this model hold true, the claimant will therefore pursue the claim only to settle with the respondent on an offer from the settlement space $\boldsymbol{O_{min}}$ and $\boldsymbol{O_{max}}$.

2.2.2 Solving the game for a suit brought for its nuisance value

The analysis moves now forward to the consideration of possible nuisance suits which could undermine the legitimacy of the arbitration framework. Solving again here with backward induction the claimant at point C will have to decide whether to accept the settlement offer of the respondent, to proceed to arbitration or to drop the claim altogether. Meanwhile, since the

claim in this scenario is brought for its nuisance value, the expected value of the arbitration will be negative:

$EVA_1 < 0$ (18)

Moreover the expected value of the arbitration can be either smaller than the payoff from dropping the claim:

$EVA_1 < D_1 < 0$ (19)

$EVA_1 < -LC_{pt1} < 0$ (20)

or negative but bigger or equal[29] than D_1:

$D_1 \leq EVA_1 < 0$ (21)

$-LC_{pt1} \leq EVA_1 < 0$ (22)

The exact estimation of the negative EVA_1 creates therefore two scenarios which for clarity and convenience will be analysed separately in the following paragraphs.

a. Solving for $EVA_1 < D_1 < 0$

In the first scenario, the claimant will never choose to bring the case to arbitration at point C since pursuing adjudication is dominated by the strategy of dropping the claim ($EVA_1 < D_1$). Furthermore, the claimant will choose to settle instead of abandoning the claim for any positive[30] offer of settlement since:

[29] We can relatively safely assume that in equality the claimant will prefer to bring the case forward while exhibiting marginally risk seeking behaviour since he must have arguably been relatively optimistic in order to bring a nuisance suit in the first place. If the claimant would showcase risk aversion, he would prefer the certain outcome of dropping the claim over the uncertain arbitration and an analysis similar to the first scenario ($EVA_1 < D_1 < 0$) would apply.

[30] Negative offers will not be considered in the paper.

$D_1 < S_1$ (23) and

$-LC_{pt1} < O - LC_{pt1}$ (24)

for any $O > 0$.

Moving now at point B, and since in this game of complete and perfect information the payoffs of the players are common knowledge, the respondent will never choose to make an offer as the case will not go to arbitration and his payoff from abandoning the case is bigger than the payoff with any settlement offer of positive value:

$-O - LC_{pt1} < -LC_{pt1}$ (25)

for any $O > 0$.

Finally at point A, the claimant will have to choose whether to bring the claim forward in the first place or abstain. Since no positive offer will be made by the respondent at point B, the claimant could only expect to choose to drop the claim at a later stage. Therefore, player 1 will never present the claim altogether in order to avoid paying the pre-trial legal costs at the end of the game (since $D_1 < 0$ and $-LC_{pt1} < 0$).

b. Solving for $D_1 \leq EVA_1 < 0$

In this second scenario the claimant will exclude at point C the option of dropping the case since it is dominated by the strategy of pursuing arbitration which has a bigger or equal[31] expected value as it is shown in the equations (21) and (22). Having excluded dropping the

[31] See infra, no. 29.

claim, the claimant would further prefer to settle the case under the constrain that his payoff would be bigger or equal[32] than the payoff from arbitration:

$$O - LC_{pt1} \geq EVA_1 \qquad (26)$$

As equation (26) suggests the claimant will thus choose to settle at point C only if he receives an offer larger or equal to the minimum acceptable offer $\boldsymbol{O_{min}}$:

$$O > O_{min} = EVA_1 + LC_{pt1} \qquad (27)$$

After determining the strategies at point C we move to node B where the respondent will have to choose the value of the settlement offer he is going to propose to the claimant. Since there is no possibility that the claim will be dropped at C, the respondent will choose to make an offer which will provide a settlement under the constrain that, if it is accepted, he will enjoy a better or equal[33] payoff compared to not making an offer leading to arbitration. The strategy constrain of player 2 in making the offer will thus be:

$$-O - LC_{pt2} \geq EVA_2 \qquad (28)$$

The maximum offer $\boldsymbol{O_{max}}$ therefore that the respondent will offer according to (28) is:

$$O < O_{max} = -EVA_2 - LC_{pt2} \qquad (29)$$

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[32] To account for marginal risk aversion. In fact the claimant is expected in this game to be at least marginally risk seeking since he is pursuing a risky nuisance suit. This does not preclude though that the claimant will showcase marginal risk aversion at the moment of taking the final decision. In any case marginal risk aversion in this point is also assumed for notation purposes. If this assumption would not hold true nothing substantial would change in the analysis that follows. The only change would imply that the minimum acceptance offer for the claimant would have to be at least marginally bigger than $EVA_1 + LC_{pt1}$ and in any case bigger enough to satisfy for the extent of the risk seeking behaviour.

[33] See infra, no. 27.

By applying equations (14), (15), (16), (17) in this case as well, the respondent will choose also here to make an offer in the settlement space O_{min} - O_{max} in order to achieve a preferable settlement.

Moving at point A, the claimant will decide whether to bright the claim forward depending on the final offer of the respondent at point B. Although a minimum offer $\boldsymbol{O_{min}}$ will be enough to deem settlement preferable to arbitration at point C, it will not be enough for the decision to pursue the case in the first place since the payoff of this settlement could be negative compared to the zero payoff of the alternative ($S_1 = O_{min} - LC_{pt1} = EVA_1 + LC_{pt1} - LC_{pt1} = EVA_1 < 0$). In order for the claimant to decide to bring the claim forward he must be confident to obtain a better offer than O_{min} at node B and in particular an amount $\boldsymbol{O_{claim}}$ which is equal to:

$$S_1 \geq 0$$
$$O - LC_{pt1} \geq 0$$
$$O_{claim} \geq LC_{pt1} \qquad (30)$$

By taking into consideration equations (16)(17), (22) and (30) it would be safe to assume that the respondent will be able to offer this amount and achieve a preferable for his interest settlement. In order for this to be the case it should hold true that:

$$O_{max} \geq O_{claim}$$
$$O_{min} + LC_{t1,2} + LC_{A1,2} \geq LC_{pt1}$$
$$EVA_1 + LC_{pt1} + LC_{t1,2} + LC_{A1,2} \geq LC_{pt1}$$
$$EVA_1 + LC_{t1,2} + LC_{A1,2} \geq 0$$
$$EVA_1 \geq - LC_{t1,2} - LC_{A1,2} \qquad (31)$$

Equation (31) holds true since we already assumed that $-LC_{pt1} \leq EVA_1 < 0$ and the costly total tribunal and arbitration costs must be bigger than the pre-trial legal costs for the claimant:

$|LC_{t1,2} + LC_{A1,2}| > |LC_{pt1}|$

The claimant could therefore pursue to the claim with the hope that, only in a prolonged period of negotiations at point B, the parties would agree on an offer at the eventual settlement space between the O_{claim} - O_{max}. It is not in the scope of this paper to analyse how a negotiation process would take place and whether the claimant will achieve an offer greater than O_{claim}. Though this could be possible, the respondent will still try to push for an offer between O_{min} - O_{claim} after the claim it is filed. Especially in cases where the respondent makes a single final offer, a favourable settlement for the claimant is still more unlikely. Player 1 has the most hopes for a satisfying offer when the respondent does not agree or does not know the exact possibilities at arbitration that the claimant attributes. In this case he might agree to an offer closer to O_{max}.

Therefore and since the claimant can not be sure, but he can only hope, for an offer above $O_{claim,}$ in order to pursue the claim at point A he should arguably showcase at least marginal risk-seeking behaviour and optimism. Otherwise player one will choose to avoid the risky nuisance claim and never pursue arbitration.

2.3 Determining the Maximum settleable disagreement

As it has been demonstrated in the analysis of the arbitration game, if a claim is brought forward, the two parties will be able to agree at the end on a settlement. This is the case only under the strong assumption that the two players agree on the estimation of the probabilities at the stage of the trial. This assumption can be unrealistic in the real world where the countless factors affecting the decision of the arbitrator can not be leveraged with complete certainty and precision. In fact the decision of a trial can depend on anything from political considerations[34] to the arbitrators' egocentric biases[35]. Besides some information which can

[34] Koskenniemi M. (2009).

[35] See infra, no. 21.

bring closer to a consensus[36], the parties are therefore likely to estimate differently some or all the parameters.

The questions that follow naturally are whether a settlement can be possible at all if the parties disagree in their estimations of the trial probabilities, how much different can their estimations be to still allow for settlement and what are the factors that determine the extend of the settleable disagreement in each particular case. In order to address these questions the paper will analyse the arbitration games under two different scenarios and assumptions: first that the players are relative pessimistic for their expected payoff of arbitration and second that both the parties hold a relative optimistic outlook.

2.3.1 Settlement when the parties are relatively pessimistic ($\pi_1 < \pi_2$)

As we saw at the preliminary analysis of the arbitration game if the players agree on the possibilities of the claim to be upheld, $\boldsymbol{p}$, a settlement can always be reached since the maximum offer that the respondent can propose is bigger than the minimum offer that the respondent would accept ($O_{max} > O_{min}$). What still remains to be examined is whether this would also hold true if the players are relatively pessimistic.

In particular, relative pessimism will exist when the claimant's estimation of the probability that he will win the arbitration (π_1) will be smaller than the estimation of the respondent regarding the potentialities of the claim ($\pi_1 < \pi_2$). In other words, the respondent will consider more likely the scenario that the claim will be upheld compared to the expectations of the claimant.

In order to find out now whether settlement can be reached under the assumption of relative pessimism of the parties, we have to compare the minimum offer that the claimant would accept ($O_{pes\text{-}min\text{-}p1}$) to the maximum offer that the respondent would be willing to give ($O_{pes\text{-}max\text{-}p2}$) according to their respective estimations. These two values can be analysed as follows:

[36] Such as an established jurisprudence on the issues of the dispute.

$O_{pes\text{-}min\text{-}p1} = \pi_1 M + \pi_1 h_2 LC_{A1} + \pi_1 f_2 LC_1 + \pi_1 f_1 LC_2 + \pi_1 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2}$

and

$O_{pes\text{-}max\text{-}p2} = O_{pes\text{-}min\text{-}p2} + LC_{t1,2} + LC_{A1,2}$

$O_{pes\text{-}max\text{-}p2} = \pi_2 M + \pi_2 h_2 LC_{A1} + \pi_2 f_2 LC_1 + \pi_2 f_1 LC_2 + \pi_2 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2} + LC_{t1,2} + LC_{A1,2}$

We can compare $O_{pes\text{-}min\text{-}p1}$ to $O_{pes\text{-}max\text{-}p2}$ by subtracting the first from the latter. If the result is bigger than zero it can be concluded that the there is still a set of offers which would lead to a settlement since the minimum offer that the claimant can accept would be smaller than the amount the respondent estimates that he can offer. We can express the equation as:

$O_{opt\text{-}max\text{-}p2} - O_{opt\text{-}min\text{-}p1} = \pi_2 M + \pi_2 h_2 LC_{A1} + \pi_2 f_2 LC_1 + \pi_2 f_1 LC_2 + \pi_2 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2} + LC_{t1,2} + LC_{A1,2} - [\pi_1 M + \pi_1 h_2 LC_{A1} + \pi_1 f_2 LC_1 + \pi_1 f_1 LC_2 + \pi_1 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2}]$

$O_{opt\text{-}max\text{-}p2} - O_{opt\text{-}min\text{-}p1} = \pi_2 M + \pi_2 h_2 LC_{A1} + \pi_2 f_2 LC_1 + \pi_2 f_1 LC_2 + \pi_2 h_1 LC_{A2} - \pi_1 M - \pi_1 h_2 LC_{A1} - \pi_1 f_2 LC_1 - \pi_1 f_1 LC_2 - \pi_1 h_1 LC_{A2} + LC_{t1,2} + LC_{A1,2}$

$= (\pi_2 - \pi_1)(M + h_2 LC_{A1} + f_2 LC_1 + f_1 LC_2 + h_1 LC_{A2}) + LC_{t1,2} + LC_{A1,2}$

But since $\pi_1 < \pi_2$ from the basic assumption of relative pessimism:

$O_{opt\text{-}max\text{-}p2} - O_{opt\text{-}min\text{-}p1} = (\pi_2 - \pi_1)(M + h_2 LC_{A1} + f_2 LC_1 + f_1 LC_2 + h_1 LC_{A2}) + LC_{t1,2} + LC_{A1,2} > 0$ (32)

From equation (32) we can conclude therefore that if the parties are relatively pessimistic there will always be a set of values for an agreement to be reached and a settlement to take place.

2.3.2 Settlement when the parties are relatively optimistic ($\Pi_1 > \Pi_2$)

The potentiality of settlement is very different if we assume that the parties are relatively optimistic. Relative optimism exists when the parties disagree regarding the probabilities at the trial but hold optimistic beliefs about their chances of a positive adjudication. In this scenario the claimant would estimate as more likely the possibility of the claim to be upheld (Π_1) than the respondent would do ($\Pi_1 > \Pi_2$).

In order to determine whether settlement can be always reached when we assume relative optimism of the parties, we have to compare the minimum offer that the claimant would accept ($O_{opt\text{-}min\text{-}p1}$) to the maximum offer that the respondent would be willing to give ($O_{opt\text{-}max\text{-}p2}$) and which will be both based in their respective different estimations. These variables could be broken down as follows:

$$O_{opt\text{-}min\text{-}p1} = \Pi_1 M + \Pi_1 h_2 LC_{A1} + \Pi_1 f_2 LC_1 + \Pi_1 f_1 LC_2 + \Pi_1 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2} \quad (33)$$

and

$$O_{opt\text{-}max\text{-}p2} = O_{opt\text{-}min\text{-}p2} + LC_{t1,2} + LC_{A1,2}$$

$$O_{opt\text{-}max\text{-}p2} = \Pi_2 M + \Pi_2 h_2 LC_{A1} + \Pi_2 f_2 LC_1 + \Pi_2 f_1 LC_2 + \Pi_2 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2} + LC_{t1,2} + LC_{A1,2} \quad (34)$$

Comparing these two values can take place by subtracting $O_{opt\text{-}min\text{-}p1}$ from $O_{opt\text{-}max\text{-}p2}$ with a result bigger than 0 indicating that the there is still a set of values for which settlement is

possible since the minimum offer that the claimant can accept would be bigger than the amount the respondent estimates that he can offer. In particular:

$$O_{opt\text{-}max\text{-}p2} - O_{opt\text{-}min\text{-}p1} = \Pi_2 M + \Pi_2 h_2 LC_{A1} + \Pi_2 f_2 LC_1 + \Pi_2 f_1 LC_2 + \Pi_2 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2} + LC_{t1,2} + LC_{A1,2} - [\Pi_1 M + \Pi_1 h_2 LC_{A1} + \Pi_1 f_2 LC_1 + \Pi_1 f_1 LC_2 + \Pi_1 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2}]$$

$$O_{opt\text{-}max\text{-}p2} - O_{opt\text{-}min\text{-}p1} = \Pi_2 M + \Pi_2 h_2 LC_{A1} + \Pi_2 f_2 LC_1 + \Pi_2 f_1 LC_2 + \Pi_2 h_1 LC_{A2} - \Pi_1 M - \Pi_1 h_2 LC_{A1} - \Pi_1 f_2 LC_1 - \Pi_1 f_1 LC_2 - \Pi_1 h_1 LC_{A2} + LC_{t1,2} + LC_{A1,2}$$

$$= (\Pi_2 - \Pi_1)(M + h_2 LC_{A1} + f_2 LC_1 + f_1 LC_2 + h_1 LC_{A2}) + LC_{t1,2} + LC_{A1,2} \qquad (35)$$

As it can be observed from (35), when we assume relative optimism of the parties there can be cases where a settlement is not possible. In particular if Π_1 is enough bigger than Π_2 to accommodate for $LC_{t1,2} + LC_{A1,2}$ then equation (35) will be negative. There is therefore a maximum disagreement gap/difference between Π_1 and Π_2 where a settlement can still take place and beyond which there will not exist anymore a settlement space for the parties to settle.

This finding raises more questions regarding games with relative optimism. From (35) it is already clear that the ability of the parties to settle in each particular case will depend on a number of variables involving the extent of the difference between Π_1 and Π_2 and the legal costs. The research will move forward to discover and underline the factors that determine the extent of the maximum settleable disagreement in each specific case.

2.3.3 Maximum settleable disagreement

The parties can often be optimistic about their standing either, for example, due to confidence or due to one sided knowledge of the facts of the trial. According to the analysis of the arbitration game, disagreement between relatively optimistic parties can preclude settlement while this will depend, among others, on the extent of the disagreement. While the parties can

revise their estimation and bridge part of the disagreement gap during their negotiations for the settlement offer, it can be considered unlikely that they will merge their beliefs completely. It is therefore particularly important to understand what is the maximum disagreement on estimations that the parties can maintain but be able to reach a settlement (hereafter: maximum settleable disagreement).

In order to determine the maximum settleable disagreement for its case, as well as the factors that affect it, we can start by equating $O_{opt\text{-}min\text{-}p1}$ to $O_{opt\text{-}max\text{-}p2}$. If we assume that $O_{opt\text{-}min\text{-}p1}$ is indeed equal to $O_{opt\text{-}max\text{-}p2}$ we can study the last disagreement point before settlement is deemed impossible[37]. The equation can be further analysed taking into consideration (33) and (34) as follows:

$O_{opt\text{-}min\text{-}p1} = O_{opt\text{-}max\text{-}p2}$

$\Pi_1 M + \Pi_1 h_2 LC_{A1} + \Pi_1 f_2 LC_1 + \Pi_1 f_1 LC_2 + \Pi_1 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2}$
$= \Pi_2 M + \Pi_2 h_2 LC_{A1} + \Pi_2 f_2 LC_1 + \Pi_2 f_1 LC_2 + \Pi_2 h_1 LC_{A2} + LC_{pt1} - LC_{A1} - LC_1 - f_1 LC_2 - h_1 LC_{A2} + LC_{t1,2} + LC_{A1,2}$

,which can be in turn simplified:

$\Pi_1 M + \Pi_1 h_2 LC_{A1} + \Pi_1 f_2 LC_1 + \Pi_1 f_1 LC_2 + \Pi_1 h_1 LC_{A2} - \Pi_2 M - \Pi_2 h_2 LC_{A1} - \Pi_2 f_2 LC_1 - \Pi_2 f_1 LC - \Pi_2 h_1 LC_{A2} + = LC_{t1,2} + LC_{A1,2}$

If we know solve for the difference between Π_1 and Π_2 we get:

$(\Pi_1 - \Pi_2)(M + f_2 LC_1 + f_1 LC_2 + h_1 LC_{A2} + h_2 LC_{A1}) = LC_{t1,2} + LC_{A1,2}$

$$(\mathbf{\Pi_1 - \Pi_2}) = \frac{\mathbf{LC_{t1,2} + LC_{A1,2}}}{\mathbf{M + f_2 LC_1 + f_1 LC_2 + h_2 LC_{A1} + h_1 LC_{A2}}}$$

[37] This holds true since $O_{opt\text{-}min\text{-}p1} < O_{opt\text{-}max\text{-}p2}$ would always allow for settlement and $O_{opt\text{-}min\text{-}p1} > O_{opt\text{-}max\text{-}p2}$ would deem impossible an agreement between the parties.

and

$$^{max/}\mathbf{Set}_{/dis} = \frac{\mathbf{LC_{t1,2} + LC_{A1,2}}}{\mathbf{M + f_2LC_1 + f_1LC_2 + h_2LC_{A1} + h_1LC_{A2}}} \qquad (36)$$

Equation (36) can therefore address the questions regarding the maximum settleable disagreement (which is represented by the notation $^{max/}\boldsymbol{Set}_{/dis} = \boldsymbol{\Pi_1 - \Pi_2}$) when the players are relatively optimistic. In particular, the bigger the total legal cost at the trial and the total arbitration costs of the parties, the bigger the gap on divergence of estimations that can be settled. On the contrary, the size of the award seems to relate negatively to the extent of the settleable disagreement gap. The same holds true for the part of the total legal costs of each party that the tribunal can order the respective losing counter party to pay.

The results of this analysis can seem partly counterintuitive at first since the effect of the size of the award could at times not coincide with the legal experience. As a matter of fact, it could be argued that lawsuits which do not involve big claims are many times solved in court while legal disputes over big corporate claims, where even a small disagreement could be crucial, conclude often with a settlement. In addition, the more trivial cases should be rather expected to accommodate disagreements since they involve more extensive case law and therefore legal certainty which can in turn lead closer to a consensus.

On the other hand, the effect of the total trial and arbitration legal costs can be more easily understood. It is natural for the parties to prefer settlement even in the case of large disagreements if they are to avoid large costs at the stage of trial. As for the extra legal costs attributed to the losing party their role can be intuitively explained by the tendency of the parties to prefer arbitration the more they expect that their legal costs will be payed by the losing counter party.

The following paragraphs will provide a more detailed discussion of the findings regarding the factors that affect the maximum settleable gap alongside with a summary of the results of the research that preceded.

2.4 Theoretical findings

Always limited in their interpretative capacity by the validity of the basic assumptions of the model, the findings of this study can provide interesting insights around the strategies and settlement in investment arbitration.

As a basic first conclusion and under the condition that the parties would agree on the probabilities of the trial, a settlement seems to be always possible regardless on the value of the claim. Moreover and perhaps more interestingly, the framework of investment arbitration seems not to favour controversial suits brought forward for their nuisance value. In particular, abusive suits with little or no legal substance do not seem likely to be filed mainly due to the big legal costs associated with arbitration, while only nuisance suits with some threshold legal value and probabilities of success are expected to be presented. This confirms also the empirical findings of researches in investment law and economics which suggest that nuisance suits have not been a major issue, besides the public concerns, in investment law while the safeguard legal provisions against these kind of claims have been invoked only once until now[38].

Furthermore, the study managed to reach conclusions regarding the ability to settle in the more realistic scenario where the parties disagree on the estimation of the probabilities at trial. More specifically, in the cases where the parties are relatively pessimistic a settlement seems to be always possible. This, though, does not hold true for cases where the parties are relatively optimistic. Under this assumption, and depending on a number of other factors, some disputes will not be able to be settled.

[38] Sasse (2011), 99,100.

Finally, and in order to bring more insights on the last finding, the research moved on to identify the maximum settleable disagreement in each specific case and the factors that determine its extent. Among those factors, the discovery of the negative relation between the size of the maximum settleable disagreement and the value of the award seems more interesting. Given the big average value of arbitration awards relatively to their respective legal costs[39] and the scarce, fragmented[40] case law which can hardly provide for legal certainty, the important[41] settlement rate of investment arbitration it is difficult to be conceived in the context of the model. This phenomenon should therefore better attributed among others, for example, to skilful, highly proficient negotiations, relative pessimism of the parties or even more convincingly to indirect costs from the arbitration (such as repetitional costs, political risks), all factors that have not been examined for the purposes of this research.

3. Empirical examination

After the elaboration and presentation of the theoretical model, it is interesting to discover what can its empirical application show in regards to the maximum settleable disagreement in real cases. Such an examination could indicate the settleability of investment disputes limited always to the predictive capacity of the game theoretic model.

In order to determine the maximum settleable disagreement for each specific case the research had to collect information regarding the elements of the equation (36). For this purpose, a total of 177 arbitral decisions issued in 2017, 2016 and 2015 have been examined. From these

[39] See European Commission Report (2015).

[40] Institutional fragmentation of international investment law and the proliferation of treaties make the consultation on previous adjudication completely discretional and some times even arbitrary; See Dolzer and Schreuer (2012).

[41] According to UNCTAD (2017), the settlement rate was approximately 23% until July 2017.

cases, only 33 were final awards on the merits[42] which have been made publicly available and contained the necessary information (table 1) regarding the legal and arbitration costs, the claim and award values and the judicial allocation of the costs of the trial[43]. Although the research managed to gather the data from these published cases it faced many challenges during the collection. These interpretative challenges regarding the collection of the data and the necessary adjustments for their utilisation will be discussed in more detail in Appendix A.

3.1 Data analysis

The empirical application of the equation (36) requires information regarding the legal costs at trial ($LC_{t1,2}$) and total arbitration costs ($LCA_{1,2}$), their total legal costs ($LC_{1,2}$), the percentage of legal ($f_{1,2}$) and arbitration (h1,2) costs of the winning party that the losing party will be called by the tribunal to pay and the value of the award (M).

In particular we need to know the real values that the parties would take into consideration while calculating their settlement strategies (O_{min}, O_{max}). First, the research has been able to identify the data on the respective legal and arbitration costs of each dispute which, under the assumption of perfect information, are expected to be known by the parties[44]. On the contrary, the data disclosed in the public decision awards do not provide information on the value of the pre-trial legal costs. The paper will thus proceed in the analysis by assuming that these are particularly small relatively to the legal costs at trial ($LC_1 \simeq LC_{t1}$ and $LC_2 \simeq LC_{t2}$)[45]

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[42] Awards on the merits are the decisions where the substantive parts of the dispute have been resolved by a final award. The paper did not consider decisions on jurisdiction and procedural issues.

[43] Confidentiality is an important problem in gathering information from decisions in international investment arbitration. Not published decisions and decisions on jurisdiction (where the necessary information on costs are not reported while the decision is not truly ended since it can be brought to another legal forum) form a big part of the case law leading any attempt to collect representative data and make general inferences to important observational biases.

[44] This is a safe assumption also in real cases since most of the times the tribunals recognise the legal and arbitration costs as reasonable for the level of complexity of each particular dispute. The parties, knowing the complexity of the dispute could form therefore convincing estimations regarding the total legal costs even if these are not communicated in detail before the trial.

[45] This assumption can be supported both by real world experience and the reports of the parties which, although did not make a clear distinction of pre-trial and at-trial legal costs, seem to suggest a bigger concentration of costs at the later stages of legal research, evidence collection and adjudication.

Moreover, with respect to the remaining variables, some additional considerations had to be made for the empirical application of the model. More specifically and while the parties are expected to know the legal and arbitration costs of the dispute at the stages of settlement (nodes B and C), this can not be the case in respect to the variables M, $f_{1,2}$ and $h_{1,2}$. Since these values are impossible to be foreseen with certainty before the trial, the parties are rather expected to make estimations based among others on extensive analysis of historical data, information regarding the arbitrators and the quality of the legal arguments.

For the purposes of these paper these variables will be estimated from average values extracted from the data sample[46]. The parties will be expected to adopt, in particular, the average values for f_i and h_i that were calculated from the data sample ($f_{av\text{-}1}$ = 39,38% , $f_{av\text{-}2}$ = 21,6% and $h_{av\text{-}1}$ = 59,61% , $h_{av\text{-}2}$ = 27,04%). These results from the analysis of the data show that the tribunals tend to charge the claimant on average with bigger part of the legal and arbitration costs of the winning respondent than the opposite (both $f_{av\text{-}1} > f_{av\text{-}2}$ and $h_{av\text{-}1} > h_{av\text{-}2}$).

Finally, we will assume that both parties approximate ***M*** with the expected award, $\boldsymbol{M_{exp}}$,variable, which reflects the value of the claim which is reasonably expected to be upheld according to the average award to claim ratio ($r_{a\text{-}c}$) of other investment disputes ($M_{exp} = M_{claim} \times r_{a\text{-}c}$). According to the data of this study the average award to claim ratio is equal to 30,438%[47] as the investment tribunals awarded and recognised on average roughly one third of the values claimed.

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[46] Like in the relative bibliography. See Collins et al. (2016), 19-23.

[47] In reality the parties will likely estimate the awards through a probabilities distribution of possible outcomes. Nevertheless, the present approach does not seem very unrealistic either. As it can be observed in table 1 no arbitration awarded the entirety of the claimed amount with most of the cases resulting in values close to the average award to claim ratio. Indeed the standard deviation of the average claim to award ratio from the sample is relatively small and equal to 0,2134. The value of the standard deviation from the present sample is therefore also smaller than the result in Collins et al. (2016) where the standard deviation for the same ratio was calculated at 0,366. Since the latter result was not considered particularly problematic for the utilisation of the average claim to award ratio we trust that the result of this research can be also applied as a satisfying approximation of the estimations of the parties for the purpose of empirically examining the game theoretic model.

Therefore and since the variables of equation (36) have been identified or can be approximated for the 33 investment disputes under examination we can move forward on the estimation of the maximum settleable disagreement for each specific dispute. Of course it is important to note that the value of the findings of this empirical analysis are notably limited by the relatively small amount of the sample, the observational biases[48] and the, some times strong, assumptions of the game theoretic model (ex. rationality, complete knowledge). The estimated values can thus be mostly indicative and serve as a preliminary examination of this, largely unexplored in the academic commentary, angle of analysis of investment disputes (maximum settleable disagreements).

3.2 Estimation of maximum settleable disagreement

Due to lack of crucial information the empirical application of equation (36) was possible only in 23 out of the 33 disputes which have been reported in this research. These 23 disputes contained the necessary data which together with the assumptions of the previous paragraph allowed the estimation of the maximum settleable disagreement for each specific case. Given that all 23 cases moved to adjudication, the discovery of small values for these settleable disagreements would seem to accommodate more the application of the model and serve as a better explanation for their failure to settle.

Indeed the results of the empirical application seem to confirm the intuitive expectations around these unsettled cases. In particular, the maximum settleable disagreement was found to equal 25,12% on average[49]. If this result was to hold true, it could seem reasonable that these disputes ended up, on average, in arbitration. Given the vague wording of substantial investment provisions, the frequent hurdles in interpretation and the limited case law, the

[48] Cases which have been settled or haven't been made publicly available have been excluded along with decisions on jurisdiction and procedural orders.

[49] While the standard deviation was calculated at 0,269.

parties could arguably be expected to often form even more divergent expectations regarding the outcome of a dispute[50].

Moreover, if we have an even closer look to the results of the empirical analysis, 14 out of the 23 cases (60% of the cases examined) have been found with maximum settleable disagreements below 20% percent and an average of 8,5% and therefore reasonably proceeded to arbitration. The same could be argued for a second group of 6 disputes which involved values between 25 and 50% with an average of 34%.

However, this can not be convincingly argued with regards to the rest of the cases, as the remaining 3 disputes resulted in settleable disagreement values of 83,69%, 69,92% and 100%. While the first two of these cases would be expected to lead to an agreement[51] the last one seems to provide a startling result which worths further consideration.

A first explanation could reassuringly attribute the unexpected result in *Philip Morris Brands Sàrl, Philip Morris Products S.A. and Abal Hermanos S.A. v. Oriental Republic of Uruguay* to the fact that the relatively small monetary claim was proposed as mere alternative to the main claim which requested the revision of, or exception of the claimant from, the health regulations implemented by Uruguay to combat the adverse health effects of smoking tobacco cigarettes.[52] If nevertheless, the second claim should be considered as a monetary equivalent of the main claim then a further examination of the expected value of the trial for the parties could give some interesting insights. More specifically if we calculate the EVA for the claimant using the averages from the data pool (for M_{exp} $f_{1,2}$ and $h_{1,2}$) then we find that it is of negative value (-6.445.056 USD). This could either imply that the claimant sought indirect

[50] This could be expected to be different in other fields of law where the case law is more extensive and the national legislator more responsive and flexible in amending the law when necessary in order to increase legal certainty.

[51] There can be many reasons for a failure to achieve settlement ranging from different attitudes to risk, incomplete information and irrational behaviour to external to the trial incentives or costs (reputational factors, political reasons).

[52] The main claim requested the reform of the health regulation or the exception of the claimant from the prohibition of different packaging and the imposition of profound in size and content pictures portraying health problems caused by cigarets. Only as an alternative it was requested a compensation of at least 22.267.000 USD. It is not also clear if this amount was meant to compensate for future damages from the regulation.

benefits by pursuing the claim[53] or that the suit was brought for its nuisance value.[54] These two latter scenarios would get along with the particular background story of this dispute since the case has been also the subject of big controversy and is being invoked as an example of a corporate attempt to abuse the framework of international investment law undermining the legitimacy of the system.[55]

3.3 Overview of empirical findings

The empirical findings of these research seem to first confirm the intuitive expectations regarding the maximum settleable disagreement of cases which failed to settle. Given the particular nature and characteristics of investment disputes we could expect that the parties could often fail to settle when the permissible disagreement is close to the average of 25,12%.

Limited to its basic assumptions and its relatively small data pool the research, thus, trusts to have produced a useful tool to understand settlement in investment arbitration and assess its structural framework. Based exactly on these empirical results and more importantly in the game theoretic model the paper will now move in the following paragraphs to discuss potential policy considerations which could increase the possibilities of mutually beneficial settlement.

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[53] For example the company might have considered as an indirect benefit the potential discouragement of other governments from enacting similar regulations.

[54] In this case we would assume, based on the game theoretic model, that, since they brought the suit forward, the LC_{pt1} must have been bigger than 6.445.056 USD and therefore bigger or equal than 0,39% of LC_1. In any other scenario the claimant couldn't reasonably expect a settlement offer from a risk neutral respondent with complete information since the latter would expect him to drop the claim before arbitration.

[55] Hawkins and Holden (2016); Crosbie et al. (2017).

4. Policy considerations

According to a recent report by the United Nations Conference on Trade and Development regarding the facts and figures of international investment disputes, investment arbitration seems to maintain an important but still relatively low compared to other legal fields settlement rate, since just 23% of the 503 investment dispute settlement proceedings have been concluded with a settlement until July 2017. This marks a particular difference with other fields of law in domestic legal systems where the settlement ratio, although controversial in each precise estimation in the academic commentary[56], seems to be decisively bigger[57].

Moreover and besides any conclusions by comparisons with domestic legal systems which can be ambiguous and difficult to establish, it can be particularly unconvincing to argue that the settlement rate in investment law does not have margins for improvement. The paper will thus continue with policy options which could increase the settleability of investment law disputes. By considering the equation of the maximum settleable gap two categories of policies can be identified. The first involves measures that could help the parties merge their possibilities estimations and exploit better on average any settleable disagreement margin. The second group involves policies which could increase the average maximum disagreements that can be settled. The two categories of policy measures will be contemplated in more detail in the following paragraphs.

4.1 Policy measures to bridge disagreements

In their attempt to estimate their probabilities of winning a legal dispute the parties are most likely going to take in consideration a number of different factors. A central role in these

[56] Eisenberg and Lanvers (2009).

[57] For research on settlement in the US domestic jurisdiction see indicatively: Hadfield (2004); Kessler and Rubinfeld (2007). Big settlement rates might not be the case though in other jurisdictions. For example for France see Doriat-Duban (2001).

estimations will be reserved for the analysis of previous case law. Based on the assumption that legal arguments and legal interpretations matter in an adjudication and that judges are likely to be affected by previous jurisprudence[58] the parties will try to determine how often their positions are being upheld. Furthermore the parties might consider previous decisions and legal positions of the appointed arbitrators together with the wording of the legal provisions and extent of its interpretative space.

It could be therefore reasonably expected that, among others, scarce and inconsistent case law and vague wording of legal provisions can enhance legal uncertainty[59] and lead to important differences in the expectations of the parties. This could be a typical problem for the international investment law framework where the proliferation of treaties, the vague legal notions and the absence of a centralised system of adjudication (like a permanent court) can create hassles in forming estimations with confidence. The paper will thus try to assess some policy options to mediate these issues for the benefit of settlement negotiations.

a. Multilateral instead of single treaties

Since the the beginning of the 1990s there has been a notable increase and proliferation of BITs in the effort of states to attract bilateral foreign investment. Until today, 2363 BITs are still in force together with 310 treaties with investment provisions[60]. Although the legal provisions of these treaties are considerably uniform, especially in their standards of protection, the specific wording can be often different enough to encourage divergent legal interpretations. The arbitrators further seem more reluctant[61] to adopt interpretations and arguments from case law based on adjudication of different treaties regardless the similarity of the legal provisions. This phenomenon leads to fragmentation of the jurisprudence and slower development of legal certainty through dispute resolution.

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[58] Baker and Malani (2015); Baker and Mezzetti (2012).

[59] Engstad (2017).

[60] See UNCTAD Investment Policy Online Databases.

[61] Guillaume (2011).

A popular solution to this reality could involve the substitution of BITs with multilateral investment treaties that could allow parties to benefit more from the entirety of the jurisprudence and accelerate the process of creating legal certainty[62]. Although some concerns are voiced around multilateral treaties[63] this policy option has been already tested and seems to gain progressively more ground, especially in Europe. Examples of multilateral treaties, which contain, among others, investment provisions, include the NAFTA in North America and the Energy Chapter Treaty with state-parties predominantly from Europe. Meanwhile the European Commission appears to engage in long polemics against both intra-EU and extra-EU BITs with member states as signatories, claiming for more unified regulation of investment protection within the European Union and towards third countries[64].

b. Change the treaties

An alternative policy measure could involve changing the bilateral investment treaties. Besides amending or reforming the treaties, states and policy makers can more simply produce explanatory documents, either legally binding or not, regarding the appropriate interpretation and willing of the signatory parties[65].

In addition, states can choose to be more careful regarding the ambiguity of the legal provisions when signing new treaties. By using a more detailed and elaborative BIT model[66]

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[62] Professor Stephan Schill argues however that this process of 'multilateralization' is already taking place even without substitution of the numerous BITs but through uniform principles and bridging provisions. However this process could also arguably end up in more complexity and increase of the legal uncertainty; For more on the thematic see Schill (2009).

[63] Rai (2001).

[64] Böhm and Motaabbed (2015).

[65] Besides reforms to increase the legal certainty, the bibliography in Law and Economics suggests that a change in the rules of discovery and in the obligations of the parties to reveal their evidence before the trial can increase the possibilities of settlement by giving both parties more insight into the opponent's abilities. Since here we examine a game of complete information the paper will not make an extensive consideration of such policy options. In any case, it could most likely be vey difficult for such provisions to be incorporated and enforced in investment arbitration and international disputes. For an overview of the literature on the issue see: Spier (2007), 300-302.

[66] For a detailed overview of the differences between different BITs see also Brown (2013).

regulators can increase the legal certainty for the potential parties of a dispute. Again here, the introduction of BIT models with more elaborative investment law provisions seems to be gaining ground[67] with major economies engaging in the legal framework while taking into account the weaknesses of older treaties.

c. Creating institutions

A third policy alternative could be to strengthen the investment law framework with the creation of strong and reliable institutions. In particular more centralised and structured institutions could help in the creation of a more stable line of case law through non obligatory judicial communication or even binding legal principles[68]. Furthermore the creation of a permanent strong institution might also increase the impartiality and the quality of the legal qualifications of judges raising in turn their predictability.

As a matter of fact, such options have been already considered by the international community. In particular, in its draft text regarding the negotiations of the Transatlantic Trade and Investment Partnership (TTIP)[69] the European Commission seemed to contemplate the idea of a permanent tribunal consisted either of judges (with the qualifications required in their respective countries for appointment to judicial office) or of jurists of recognised competence. Although the document was published for internal use in the European Union and not as a formal text proposal to the United States in the TTIP negotiations, it can further indicate the intentions of the Commission regarding the priorities for more settlements in investment dispute resolution and higher standards of institutional safeguards[70].

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[67] For such attempts see for example: Model Text for the Indian Bilateral Investment Treaty (2016); Houde (2006).

[68] See Betlem (2002); Maxeiner (2006).

[69] See European Commission draft text of Transatlantic Trade and Investment Partnership.

[70] See in particular articles 9 and 10 of the proposal regarding the standards for the formation of tribunals of first instance and of Appeal; Article 11 on ethics and Annex II for the Code of Conduct for the Members of the Tribunal, the Appeal Tribunal and Mediators; See also subsection 2 regarding new rules for the promotion of alternative dispute resolution through amicable resolution, mediation and consultation (Articles 2,3 and 4).

Finally, there is a lively discussion[71] taking place around the possible merging of the international investment law framework with the strong and centralised system of the World Trade Organisation. While this scenario could enhance the institutional capacity and consistency of investment law, the challenges of merging the two systems are still important and might include prolonged and complex negotiations.

4.2 Policy measures to increase the maximum settleable disagreements

As implied by equation (36) the extent of a settleable disagreement rely partly on factors that do not exclusively depend on the decisions of the parties of the dispute but can also be affected by policy decisions. In particular, the paper will attempt to consider the implications of a change in the policies of arbitration costs and rules regarding the allocation of the costs of litigation.

The model of this research suggests that an increase of arbitration cost in each specific case would increase the maximum settleable gap and therefore the possibilities to avoid arbitration. The effect seems to be much different in regards to the allocation of the legal costs, where settlements seem to benefit from a lower attribution of the winner's costs. Although these findings are theoretical[72] and subject to the limitations of the basic assumptions of the model, they seem to be confirmed by other bibliography in law and economics regarding both the rules on cost allocation[73] and the effect of trial costs on settlement[74].

In order to make an empirical assessment of these theoretical suggestions, the paper has examined four cases in respect to the change in their maximum settleable disagreement under

[71] For a systematic study of the issue see Kurtz (2016).

[72] For empirical research on the effect of cost allocation see Snyder and Hughes (1990).

[73] Bebchuk (1984).

[74] Spier (2007), 300-302.

a given percentage change in arbitration costs and costs allocation. The results are presented in the tables 3-6 (Appendix B) with the vertical axis constituting a given percentage change in arbitration costs and the horizontal a different percentage of legal cost allocation[75] which ranges from zero (the so called American rule) to the losing party being responsible always for the entirety of the legal costs of the winning party (English rule). Of course in order for the change in these policies to have any effect the parties should know a priori the values for each specific scenario.

The results presented in the tables 3-6 indicate that the maximum settleable disagreements are not particularly sensitive in these policy changes. Furthermore, it seems that the extend of the relative effectiveness of these two policy measures will depend on the ratio between arbitration and legal costs. In *Mobil Investments Canada Inc. and Murphy Oil Corporation v. Canada* (case n.31), for example, the arbitration costs are particularly small compared to the rest of the legal costs (only 7% of their value) and therefore their potential increase is not as effective as a transition from the American to the English rule of cost allocation. On the contrary, in *Ivan Peter Busta and James Peter Busta v. Czech Republic* (case n.4) where the arbitration costs are about 56% of the value of the other legal costs, a three-fold increase in the fees of arbitration can double the maximum disagreement gap while a change in the allocation rules seem to little effect.

Finally, as it is clear also from the equation (36) the relative size of the award compared to the legal and arbitration costs and therefore the size of the maximum settleable disagreement will influence the sensitivity of both policy measures. Cases with bigger claims and small maximum settleable disagreements would therefore be less impacted to policy changes.

[75] For illustration purposes we consider the same values for $f_{1,2}$ and $h_{1,2}$ for each specific scenario. The results would not be qualitatively much different if one or some of these variables were to change. Furthermore, the yellow cells represent the values which were closer to the actual average value of the four variables.

5. Conclusion

In order to address its research questions, the present paper started with modelling investment arbitration according to the framework of game theory. The analysis of this model indicated , among others, that the maximum settleable disagreement, under the adopted assumptions, is determined by the ratio of the total arbitration and legal costs of the parties to the expected award plus the total value of the allocation of costs to the losing parties.

This theoretical finding has been further empirically examined with the application of data collected from the 33 available disputes between 2017 and 2015. The results of this empirical study confirmed in general lines the intuitive expectations regarding the maximum settleable disagreement of cases that failed to settle and proceeded to adjudication.

Finally, while investment law disputes were not found to be fundamentally hostile to conciliations some policy proposals to increase the possibilities of settlement based on these theoretical and empirical findings have been also considered. While both the academic commentary and the international actors seem to already strongly contemplate and suggest the implementation of policy options which can increase legal certainty and reduce the reasons for ambivalence and disagreements, the policy proposals regarding a potential increase of the maximum settleable disagreement seem, at a first consideration, to have relatively weak and inconsistent effectiveness.

Bibliography

1. Baird D.G., Gertner R.H. and Picker R.C. (1998), *Game theory and the law*, Harvard University Press, Cambridge, Massachusetts.

2. Baker S. and Malani A. (2015), Do judges actually care about the law? Evidence from circuit split data, Conference on Empirical Legal Studies, Washington University School of Law, St. Louis, Missouri.

3. Baker S. and Mezzetti C. (2012), A Theory of Rational Jurisprudence, *Journal of Political Economy*, **120**, 513–551.

4. Bebchuk L.A. (1984), Litigation and settlement under imperfect information, *RAND Journal of Economics*, **15**, 404–415.

5. Betlem G. (2002), The Doctrine of Consistent Interpretation—Managing Legal Uncertainty, *Oxford Journal of Legal Studies*, **22**, 397–418.

6. Böhm E. and Motaabbed M.C. (2015), *Chapter IV: Investment Arbitration, The European Union and the Unloved BITs of its Member States,* in Klausegger C., Klein P., Kremslehner F., Petsche A., Pitkowitz N., Power J., Welser I. and Zeiler G. (Eds), Austrian Yearbook on International Arbitration, Manzsche Verlags und Universitätsbuchhandlung Verlag: Bern, 2014, 371-392.

7. Brown C. (2013), *Commentaries on Selected Model Investment Treaties*, Oxford University press.

8. m G. (2002), The Doctrine of Consistent Interpretation—Managing Legal Uncertainty, *Oxford Journal of Legal Studies*, **22**, 397–418.

9. Collins D. A., Philip T., Broom M. and Vu T.H. (2016), The Four Regions of Settlement Space: A Game-Theoretical Approach to Investment Treaty Arbitration, Available at SSRN: https://ssrn.com/abstract=2717057 or http://dx.doi.org/10.2139/ssrn.2717057.

10. Crosbie E., Sosa P., Glantz S.A. (2017), *Defending strong tobacco packaging and labelling regulations in Uruguay: transnational tobacco control network versus Philip Morris International,* Centre for Tobacco Control Research and Education (UCSF), https://tobacco.ucsf.edu/defending-strong-tobacco-packaging-and-labelling-regulations-uruguay-transnational-tobacco-control-network-versus-pmi. Accessed 3 January 2018.

11. Dolzer R. and Schreuer C. (2012), *Principles of International Investment Law*, Oxford University Press, Oxford.

12. Doriat-Duban M. (2001), Alternative dispute resolution in the french legal system, in Deffains B., Kirat T. (Eds), Law and Economics in Civil law Countries, Elsevier Science B.V.: Amsterdam, 2001, 183-188.

13. Eisenberg T. and Lanvers C. (2009), What is the Settlement Rate and Why Should We Care?, *Cornell Law Faculty Publications*, Paper 203.

14. Engstad N. (2017), Consistency of the case law as a prerequisite to legal certainty: European and national perspective, Introduction at the High Level conference of the Harmonization of Case Law and Judicial Practice, Athens.

15. European Commission draft text of Transatlantic Trade and Investment Partnership, CHAPTER II - INVESTMENT, at http://trade.ec.europa.eu/doclib/docs/2015/september/tradoc_153807.pdf.

16. European Commission Report (2015), Investor-to-State-Dispute Settlement: Some Facts and Figures, 7-9. http://trade.ec.europa.eu/doclib/docs/2015/january/tradoc_153046.pdf

17. Franck S. D., van Aaken A. and Freda, James and Guthrie, Chris and Rachlinski , Jeffrey J. (2016), Inside the Arbitrator's Mind*, Emory Law Journal*, **66**, 1115-1174.

18. Gibbons R. (1992), *Game Theory for Applied Economists*, Princeton University Press, Princeton, New Jersey.

19. Gould J. (1973), The economics of legal conflicts, *Journal of Legal Studies*, **2**, 279–300, https://doi.org/10.1086/467499.

20. Guillaume G. (2011) The use of precedence by international judges and arbitrators, *Journal of International Dispute settlement*, **2**, 5-23.

21. Guthrie C., Rachlinski J. J. and Wistrich A. J. (2007), Blinking on the Bench: How Judges Decide Cases**,** *Cornell Law Faculty Publications*, paper 917.

22. Hadfield G. K. (2004), Where Have All the Trials Gone? Settlements, Nontrial Adjudications, and Statistical Artifacts in the Changing Disposition of Federal Civil Cases, *Journal of Empirical Legal Studies* , **1**, 705-706.

23. Hawkins B. and Holden C. (2016), A Corporate Veto on Health Policy? Global Constitutionalism and Investor–State Dispute Settlement, *Journal of Health Politics, Policy and Law*, **41**, 969–995.

24. Houde M.F. (2006), Novel Features in Resent OECD Bilateral Investment Treaties, OECD International Investment perspectives, Chaprter 6, at http://www.oecd.org/investment/internationalinvestmentagreements/40072428.pdf.

25. Kessler D. P. and Rubinfeld D. L. (2007), Empirical Study of the Civil Justice System, in Polinsky A.M., Shavell S. (Eds), Handbook of Law and Economics, vol. 1, North-Holland: Amsterdam, 2007, 373–83.

26. Koskenniemi M. (2009), The Politics of International Law – 20 Years Later, *European Journal of International Law,* **20**, 7–19, https://doi.org/10.1093/ejil/chp006.

27. Kurtz J. (2016), *The WTO and International Investment Law: Converging Systems*, Cambridge University Press, Cambridge.

28. Landes, W. M. (1971), An Economic Analysis of Courts, *Journal of Law and Economics*, **14**, 61–107, http://dx.doi.org/10.1086/466704.

29. Lipsey R. G. and Chrystal K. A. (1995), *An introduction to positive economics*, Oxford University Press, Oxford.

30. Maxeiner J.R. (2006), Legal Certainty: A European Alternative to American Legal Indeterminacy, *Tulane Journal of International and Comparative Law*, **15**, 541.

31. Ohlin J.D. (2012), Nash Equilibrium and International Law, *European Journal of International Law*, **23**, 915–940.

32. Polinsky A.M. and Shavell S. (2007), *Handbook of Law and Economics*, Vol. 1, North-Holland, Amsterdam.

33. Posner R.A. (1973), An economic approach to legal procedure and judicial administration, *Journal of Legal Studies*, **2**, 399-458, https://doi.org/10.1086/467503.

34. Rai S. (2001), From Bilateral to Multilateral Investment Treaty, *Foreign Trade Review*, **36**, 66-120.

35. Rasmusen E. B. (1998), Nuisance Suits, In: Newman P. (Eds), *The New Palgrave Dictionary of Economics and the Law,* Palgrave Macmillan, London, 690-693.

36. Rosenberg D. and S. Shavell S. (1985), A model in which suits are brought for their nuisance value, *International Review of Law and Economics*, **5**, 3-13.

37. Samuelson P.A. and Nordhaus W.D. (2009), *Economics*, McGraw-Hill Education, Boston.

38. Sasse J.P. (2011), *An Economic Analysis of Bilateral Investment Treaties*, Springer Gabler, Wiesbaden.

39. Schill S.W. (2009), *The Multilateralization of International Investment Law*, Cambridge University Press, Cambridge.

40. Snyder E.A and Hughes J.W. (1990), The English Rule for Allocating Legal Costs: Evidence Confronts Theory, *Journal of Law, Economics & Organizations*, **6**, 345–380.

41. Spier K.E. (2007), *LITIGATION* , in Polinsky A.M., Shavell S. (Eds), Handbook of Law and Economics, vol. 1, North-Holland: Amsterdam, 2007, 300-302.

42. UNCTAD Investment Policy Online Databases, International Investment Agreements Navigator, at http://investmentpolicyhub.unctad.org/IIA.

43. UNCTAD (2017), Special update on investor-state dispute settlement: facts and figures, Issue 3, 4.

Appendix A - Challenges regarding data collection

The collection of the data faced a series of challenges given the differences in every dispute, the incomplete reporting of information and the ambivalent wording of the tribunal. At first, as it has been already mentioned, only final awards on damages between one claimant and one respondent have been considered. In total one decision with more respondents has been excluded in order to fit the framework of the model and since it could be unclear if the respondents decided in common regarding their strategies and could thus be considered as one party for the purposes of the game.

The decisions had further to be publicly available and include a statement of the parties' costs as it is foreseen by both ICSID and UNCITRAL rules. When the parties did not report publicly their costs, the rest of the data from the case were reported. The same solution was followed when it was ambivalent from the wording of the tribunal if the arbitration costs were included or not in the total legal costs presented by a party. Again, in order to avoid reporting imprecise information, these values have been excluded. When, on the other hand, the tribunal made a distinction between the "legal costs" and the "advancements" to the tribunal then these two values were treated as distinct.

In addition, in the few instances that the tribunal did not recognise the reported costs as reasonable, the estimations of what the tribunal would consider reasonable costs have been adopted for the respective party. This approach was selected in order to avoid reporting misleading informations, exclude from the analysis any investment strategies that a party followed during the arbitration (since they are not the point of examination of this paper) and adopt legal costs that the counter party could reasonably expect as well.

Often the amounts presented at the decisions were denominated in different currencies. In order to elaborate on the data the amounts of each decision have been denominated in the same currency. For this unification of the currencies the historical exchange rates at the day when the decision was published have been used. When it was reported, the exchange rate that the tribunal accepted for its own purposes has been used instead.

Finally, in some cases, the amounts claimed are not revealed since either they are not public or the claims were not monetary (ex. claim for fair compensation). All the amounts have been rounded up to the nearest unit and the interest on legal costs was not calculated nor accounted for.

Appendix B - Data tables

Table 1 - Data of dispute settlements

	LC_1	LC_2	LC_{A1}	LC_{A2}	$LC_{A1,2}$	f_1	f_2	h_1	h_2	M_{claim}	M	M/M_{claim} ratio	Maximum settleable disagreement
1	16.049.03 5 USD	2.444.100 USD	862500 USD	862500 USD	1.725.000 USD	-	0,2	-	0,2	1.590.000.000 USD	320.760.000 USD	0,201735849056604	4,13%
2	4.581.107 EUR	2.406.360 EUR	478.079 EUR	478.079 EUR	956.159 EUR	-	0	-	0	256.000.000 EUR	128.000.000 EUR	0,5	9,9%
3	9.428.006 USD	4.454.734 USD	374.848 USD	374.848 USD	749.697 USD	0,75	-	1	-	375.515.000 USD	-	-	12,37%
4	188.743 EUR	247.301 EUR	124.219 EUR	124.219 EUR	248.438 EUR	0	-	0	-	69.269.343 EUR	-	-	3,21%
5	104.779 EUR	167.781 EUR	66.201 EUR	66.201 EUR	132.402 EUR	0	-	0	-	-	-	-	-
6	5.664.815 USD	1.408.871 USD	452.500 USD	452.500 USD	905.000 USD	1	-	1	-	90.000.000 USD	-	-	27,01%
7	4.617.601 USD	-	304.410 USD	304.410 USD	608.821USD	0	-	0	-	196.300.000 USD	-	-	-
8	2.119.860 EURO	452.350 EUR	414.711 EUR	414.711 EUR	829.423 EUR	-	0,6	-	1	81.633.810 EUR	17.902.790 EUR	0,219306069384732	13,17%
9	3.902.704 EUR	5.099.465 EUR	405.383 EUR	405.383 EUR	810.766 EUR	-	1	-	0	380.899.493 EUR	16.872.742 EUR	0,044297097554813	8,24%
10	- not recognised by tribunal	- not recognised by tribunal	572.500 USD	572.500 USD	1.145.000 USD	-	0,75	-	0	2.318.898.825 USD	967.777.002 USD	0,417343349164878	-
11	2.639.264 USD	5.704.179 USD	531.757 USD	531.757 USD	1.063.515 USD	-	0	-	0	69.700.000 USD	19.447.494 USD	0,279017130559541	38,45%
12	30.493.63 5 USD	14.322.826 USD	1.000.000 USD	974.750 USD	1.974.750 USD	-	0	-	0	3.160.000.000 USD	1.202.000.000 USD	0,380379746835443	4,8%
13	-	-	725.000 USD	700.000 USD	1.425.000 USD	-	0	-	0,5	46.100.000 USD	2.529.900 USD	0,05487852494577	-
14	1.116.000 CAD	6.109.003 CAD	1.116.000 CAD	1.116.000 CAD	2.232.000 CAD	0,3	0	1	0	775.000.000 CAD	-	-	3,95%
15	4.466.306 USD	6.790.361 USD	630119 EUR	630119 USD	1260238 USD	-	0	-	0	399.558.754 USD	19.971.309 USD	0,049983409949266	9,96%
16	7.258.200 USD	6.870.028 USD	462.500 USD	462.500 USD	925.000 USD	-	0	-	0	299.300.000 USD	87.300.000 USD	0,291680588038757	15,73%
17	1.241.133 USD	5.850.857 USD	567.162 USD	567.162 USD	1.134.323 USD	ca. 0,42	-	1	-	22.271.803 USD	-	-	83,69%
18	2.845.303 USD	8.737.605 USD	525.000 USD	525.000 USD	1.050.000 USD	0,2	-	0	-	566.718.784 USD	-	-	7,14%
19	16.163.18 8 USD	9.576.976 USD	742.857 USD	742.857 USD	1.485.714 USD	ca. 0,7	-	1	-	22.267.000 USD	-	-	100%

	LC_1	LC_2	LC_{A1}	LC_{A2}	$LC_{A1,2}$	f_1	f_2	h_1	h_2	M_{claim}	M	M/M_{claim} ratio	Maximum settleable disagreement
20	9.233.758 USD	-	-	-	-	-	0,75	-	0,75	157.200.00 USD	-	-	-
21	12.711.889 USD	5.063.310 USD	675.000 USD	525.000 USD	1.200.000 USD	-	0	-	1	157.363.348 USD	98.145.325 USD	0,62368605045185	35,75%
22	15.080.74 9 USD	7.119.914 USD	449.965 USD	449.965 USD	899930 USD	0,75	-	0,75	-	560.000.000 USD	-	-	13,07%
23	13.405.15 8 USD	-	355.255 USD	355.255 USD	710.510 USD	-	0,65	-	1	358.000.000 USD	80.000.000 USD	0,223463687150 838	-
24	972.735 USD	569.513 USD	495.321 USD*	349.669 USD	844.990 USD	0	-	0	-	23.000.000 USD	-	-	30,73%
25	14.306.31 7 USD	4.754.730 USD	500.000 USD	500.000 USD	1.000.000 USD	-	0,37	-	1	929.544.714 USD	372.461.982 USD	0,400692915994 572	6,96%
26	8.746.369 USD	15.703.912 USD	1.148.884U SD	1.148.884 USD	USD 2.297.768	-	0	-	0	1.323.500.000 USD	10.299.572 USD	0,007782071779 373	6,5%
27	7.036.487 USD	2.270.627 USD	455.007 USD	455.007 USD	910.014 USD	1	0	1	0	120.300.000 USD	-	-	25,94%
28	-	5.347.496 EUR	-	590.191U SD	-	-	-	-	0	-	7.543.176 EUR	-	-
29	7.712.100 USD	9.000.417 USD	-	-	-	-	-	-	0	234.000.000 USD	46.400.000 USD	0,1982905982906	-
30	2.475.871 USD	-	-	-	-	0	-	1	-	679.700.000 USD	-	-	-
31	8.204.365 USD	6.710.472 USD	525.000 USD	525.000 USD	1.050.000 USD	-	0	-	0	59.100.000 USD	13.900.000 USD	0,235194585448 393	69,92%
32	7.685.375 USD	1.844.051 USD	675.000 USD	675.000 USD	1.500.000 USD	-	0	-	0,5	66.000.000 USD	48.619.578 USD	0,736660272727 273	47,23%
33	-	-	-	-	-	-	0	-	0	34.100.000 USD	20.957.809 USD	0,614598504398 827	-

Table 2- Numeration of cases in the present paper

No.	Name
1	Teinver S.A., Transportes de Cercanías S.A. and Autobuses Urbanos del Sur S.A. v. The Argentine Republic, ICSID Case No. ARB/09/1

2	Eiser Infrastructure Limited and Energía Solar Luxembourg S.à r.l. v. Kingdom of Spain, ICSID Case No. ARB/13/36
3	Eli Lilly and Company v. The Government of Canada, UNCITRAL, ICSID Case No. UNCT/14/2
4	Ivan Peter Busta and James Peter Busta v. Czech Republic, SCC Case No. V 2015/014
5	Anglia Auto Accessories Ltd. v. Czech Republic, SCC Case No. V 2014/181
6	WNC Factoring Limited v. The Czech Republic, PCA Case No. 2014-34
7	Blusun S.A., Jean-Pierre Lecorcier and Michael Stein v. Italian Republic, ICSID Case No. ARB/14/3
8	Flemingo DutyFree Shop Private Limited v the Republic of Poland, UNCITRAL
9	Windstream Energy LLC v. Government of Canada, PCA Case No. 2013-22
10	Rusoro Mining Ltd. v. Bolivarian Republic of Venezuela, ICSID Case No. ARB(AF)/12/5
11	Copper Mesa Mining Corporation v. Republic of Ecuador (PCA No. 2012-2)
12	Crystallex International Corporation v. Bolivarian Republic of Venezuela, ICSID Case No. ARB(AF)/11/2
13	Garanti Koza LLP v. Turkmenistan, ICSID Case No. ARB/11/20
14	Mesa Power Group, LLC v. Government of Canada, UNCITRAL, PCA Case No. 2012-17
15	Murphy Exploration & Production Company International v. Republic of Ecuador, PCA Case No. 2012-16 (formerly AA 434)
16	Tenaris S.A. and Talta - Trading e Marketing Sociedade Unipessoal Lda. v. Bolivarian Republic of Venezuela, ICSID Case No. ARB/11/26
17	Peter A. Allard v. The Government of Barbados, PCA Case No. 2012-06
18	İçkale İnşaat Limited Şirketi v. Turkmenistan, ICSID Case No. ARB/10/24
19	Philip Morris Brands Sàrl, Philip Morris Products S.A. and Abal Hermanos S.A. v. Oriental Republic of Uruguay, ICSID Case No. ARB/10/7
20	Hochtief AG v. The Argentine Republic, ICSID Case No. ARB/07/31
21	Vestey Group Ltd v. Bolivarian Republic of Venezuela, ICSID Case No. ARB/06/4
22	Adel A Hamadi Al Tamimi v. Sultanate of Oman, ICSID Case No. ARB/11/33
23	Khan Resources Inc., Khan Resources B.V., and Cauc Holding Company Ltd. v. The Government of Mongolia, UNCITRAL
24	Mamidoil Jetoil Greek Petroleum Products Societe S.A. v. Republic of Albania, ICSID Case No. ARB/11/24
25	OI European Group B.V. v. Bolivarian Republic of Venezuela, ICSID Case No. ARB/11/25
26	Oxus Gold plc v. Republic of Uzbekistan, the State Committee of Uzbekistan for Geology & Mineral Resources, and Navoi Mining & Metallurgical Kombinat, UNCITRAL
27	Vincent J. Ryan, Schooner Capital LLC, and Atlantic Investment Partners LLC v. Republic of Poland, ICSID Case No. ARB(AF)/11/3

28	Mr. Hassan Awdi, Enterprise Business Consultants, Inc. and Alfa El Corporation v. Romania, ICSID Case No. ARB/10/13
29	Tidewater Inc., Tidewater Investment SRL, Tidewater Caribe, C.A., et al. v. The Bolivarian Republic of Venezuela, ICSID Case No. ARB/10/5
30	Electrabel S.A. v. Republic of Hungary, ICSID Case No. ARB/07/19
31	Mobil Investments Canada Inc. and Murphy Oil Corporation v. Canada, ICSID Case No. ARB(AF)/07/4
32	Quiborax S.A., Non Metallic Minerals S.A. and Allan Fosk Kaplún v. Plurinational State of Bolivia, ICSID Case No. ARB/06/2
33	AWG Group Ltd. v. The Argentine Republic, UNCITRAL

Table 3 - Case n.1

$f_{1,2}$ & $h_{1,2}$	0	20	40	60	80	100
400%	5,25%	5,19%	5,14%	5,09%	5,04%	4,99%
300%	4,89%	4,84%	4,80%	4,75%	4,71%	4,66%
200%	4,53%	4,49%	4,45%	4,41%	4,38%	4,34%
150%	4,36%	4,32%	4,28%	4,25%	4,21%	4,17%
100%	4,18	4,14%	4,11%	4,08%	4,04%	4,01%
$LC_{A1,2}$						

Table 4 - Case n.4

$f_{1,2}$ & $h_{1,2}$	0	20	40	60	80	100
400%	6,78%	6,69%	6,61%	6,52%	6,44%	6,35%
300%	5,61%	5,54%	5,48%	5,42%	5,36%	5,31%
200%	4,43%	4,39%	4,35%	4,31%	4,27%	4,24%
150%	3,84%	3,81%	3,78%	3,75%	3,72%	3,69%
100%	3,25%	3,22%	3,20%	3,18%	3,16%	3,14%
$LC_{A1,2}$						

Table 5 - Case n.6

$f_{1,2}$ & $h_{1,2}$	0	20	40	60	80	100
400%	39%	36,2%	33,8%	31,6%	29,7%	28,1%
300%	35,7%	33,3%	31,2%	29,4%	27,8%	26,3%
200%	32,4%	30,4%	28,7%	27,1%	25,7%	24,5%
150%	30,8%	29%	27,4%	26%	24,7%	23,5%
100%	29%	27,5%	26,1%	24,8%	23,6%	22,5%
$LC_{A1,2}$						

Table 6 - Case n.31

$f_{1,2}$ & $h_{1,2}$	0	20	40	60	80	100
400%	100%	87,7%	74,6%	64,9%	57,47%	51,5%
300%	100%	83,7%	71,7%	62,7%	55,7%	50,1%
200%	94,7%	79,6%	68,6%	60,3%	53,8%	48,6%
150%	91,7%	77,5%	67,1%	59,1%	52,9%	47,8%
100%	88,8%	75,4%	65,5%	57,9%	51,9%	47%
$LC_{A1,2}$						