The Four Regions in Settlement Space: A Game-Theoretical Approach to Investment Treaty Arbitration. Part II: Cases

Mark Broom, David Collins and Trung Hieu Vu
City, University of London

and
Philip Thomas
Safety Systems Research Centre, Queen's School of Engineering, University of Bristol

Keywords: International Investment Law; Investor-State Dispute Settlement; Game Theory; Litigation Costs

Abstract

Following from Part I of this paper, which introduced the notion of decision-modelling for investor-state arbitration, Part II of the paper uses the game theoretic notions developed in Part I to explore the question of why a relatively large fraction of investor-state disputes proceed to arbitration tribunals. Likely explanations are advanced. The detailed mathematical model derived in Part I of the paper is then used to analyse 31 cases where an investor-state dispute has been judged by an arbitration tribunal. Auxiliary mathematics are developed to identify the relevant averages and variances, which are then calculated from the full data set. Three sample cases are analysed in greater detail, with the model results being compared against the actual awards. It is concluded that applying the mathematical model of the international arbitration process developed in Part I together with the data analysis laid out in Part II will provide useful insight and guidance to both parties involved or likely to be involved in a dispute between investor and state.

1. Introduction

The first Part of this paper considered the application of a decision-model to a specific form of international dispute settlement, the increasingly popular Investor-State Dispute Settlement (ISDS) which consists of claims brought by investors against host states under bilateral investment treaties. Part II of the paper considers first why relatively many disputes between investors and states are not settled between the parties but proceed to arbitration. Then, in the main part of the paper, the modelling laid out in Part I[1] is applied to 31 cases of ISDS that went to arbitration between 2012 and the first half of 2014.

The data and their limitations are discussed before moving on to the auxiliary modelling needed to allow the theoretical results of Part I to be applied. The analysis of the full data set allows average properties, together with variances, to be

[1] M. Broom, D. Collins, H. Vu and P. Thomas, 'The Four Regions in Settlement Space: A Game-Theoretical Approach to Investment Treaty Arbitration. Part I: Modelling', Law, Probability and Risk, Vol. xx, No. yy (20zz)

estimated. These are then used in the detailed consideration of three cases from the sample, where actual outcomes are compared with what the new model would have predicted or recommended. A discussion of the results is provided before drawing conclusions. Further consideration of the “zone of uncertainty” defined in Part I is provided in Appendix B. The workings in this Appendix (and elsewhere in Part II) use symbols previously defined in Appendix A of Part I, as well as a number of new symbols. The latter have been listed, along with their definitions, in Appendix A of this Part.

2. Why do ISDS cases proceed to arbitration?

Our model follows the assumption of a sequence of events culminating in a single offer by the respondent (always the state in ISDS), which is accepted or rejected by the claimant (always the investing firm in ISDS), as illustrated in Figure 1. Assuming risk neutrality, this leads to a unique settlement at the level $v_{\min}$ as previously stated. But we can use the diagram of the settlement space, Figure 2, to explore in outline what could happen if the requirement for a single, “take it or leave it” offer to be made by the respondent were relaxed.

A settlement of $v_{\max}$ would occur if the accepted procedure was for the claimant rather than the respondent to make a single offer, which the respondent had to take or leave. It is also the settlement level when a sequence of offers is permitted, provided it is known and accepted that the claimant will make the final one.

If a period of negotiation were allowed, with offer and counter offer, but without prior specification of the side to make the final offer, then the offer eventually accepted would end up somewhere in Region 4 of the “settlement space” shown in Figure 2. The position would depend on the details of the process and it is hard to predict for a real situation exactly where within the region the settlement would finish up after a prolonged negotiation. Appendix B provides a preliminary consideration and describes some of the issues facing claimant and respondent in this area of the settlement space. A full analysis of such multi-step negotiations is, however, beyond the scope of the current paper.

Nevertheless an important conclusion that we can draw is that whilst such negotiation can change the level of settlement, skilful negotiation should always produce a settlement. So how do we reach a situation where there is no settlement between the parties, so that the case proceeds to arbitration and award, as clearly often happens in real cases? Three possible reasons are discussed below.

Firstly, different attitudes to risk, considered previously in Section 3.5 of Part I of the paper. Different levels of risk-aversion may change the settlement level (which may even lie outside Region 4 of the “settlement space”, as discussed). But unless one or both parties actively prefers risk, different levels of risk-aversion should not lead to the invocation of an arbitration tribunal. This is thus perhaps the least plausible reason.

Secondly, the outcome may be affected by external factors such as reputation. It may be that both parties need to be seen to take the case as far as they can and not compromise, e.g. for the type of political reasons discussed in Section 3.5 of Part I in the case of the respondent state. If immediate monetary factors are not the prime concern, then both sides may be prepared to accept an outcome that is suboptimal from the point of view of our analysis, and there can be a contested case. This can be so even if money is the overriding factor, but when at least one of the parties sees the potential for similar cases in the future, and so needs to be seen to be defending its interests.

Thirdly, and perhaps most importantly, a contest can be caused by differing parameter estimates. The most salient case would arise when the parties come to different estimates of the claimant's success probability *p*. Consider the settlement space characterised by the two dimensions, *p* and *v*, as plotted in Figure 2. We can think of this in terms of the value of *v* selected by the respondent being based upon its estimate of claimant success probability, namely, p_R, where the subscript, 'R', signifies that it is the respondent's estimate. It is not difficult to imagine that this could be different, possibly significantly different, from the estimate of *p* arrived at by the claimant, p_C,where the subscript, 'C', signifies that it is the claimant's estimate.

If the two *p* values differ by a sufficiently large amount, so that the minimum sum judged acceptable by the claimant, $v_{\min}\left(p_C\right)$, is larger than the maximum the respondent would countenance, $v_{\max}\left(p_R\right)$, then clearly there could never be a settlement. Such a situation arises for the values of p_R and p_C shown in Figure 2. This graph (or its equivalent for any real case, for example Figures 4, 5 and 6) could be used to assess, for any given estimate of claimant probability made by one party, the range of different claimant probabilities that, were they believed true by the other party, would lead to a dispute.

Note further that if each party were to assume that the other made the same estimate of claimant success probability, *p*, even a minute difference between the two assessed values would lead to the dispute proceeding to arbitration in the single, "take-it-or-leave-it" case provided that, in addition, $p_C > p_R$. Now the respondent would offer $v_{\min}\left(p_R\right) < v_{\min}\left(p_C\right)$, which would inevitably be rejected. It is possible, of course, that through a period of negotiation the parties would revise their parameter estimates and a dispute could still be avoided. Nevertheless a difference between the estimates of the claimant's probability of success on the part of the two players remains a likely reason why so many cases end up in arbitration before a tribunal.

3. Data and Limitations

The data used in this article were gathered from investor-state disputes that were made publicly available. As such, it is conceded from the outset that the results derived from this study may present a distorted picture of parties' arbitration strategies. This admitted "observational bias" is an inescapable consequence of the private nature of arbitration.[2] Law and economics scholars have identified concerns regarding the use of small samples of cases from which to derive theories or models of general application, noting chiefly again the small minority of all disputes that actually proceed to trial.[3] The difficulty of obtaining a sample that is truly representative of all disputes, including those that are settled between the parties, has been addressed in part through the 50:50 model (developed by Priest and Klein) which argued that where gains and losses to parties from litigation are equal, then claimants should win 50% of the time. In other words, the relative stakes of the parties should influence outcomes for all cases. Accordingly, where stakes among parties are uneven, success rates should differ from the 50% baseline.[4] The extent of to which this rule applies to ISDS is questionable precisely because the relative gains and losses for the parties tend to be highly disparate. As indicated above, defendant states have the potential to lose massive amounts of money and suffer significant adverse reputational effects as repeat players, whereas claimant firms do not face counter-claims nor is there necessarily a high risk that they will be required to pay the state's costs if they lose. For firms, investments are sunk at the point of litigation and a loss should not affect their capacity to invest elsewhere in the future. (As will be seen in Section 4, the findings of this paper provide some limited support for a deviation in the right direction from the 50:50 model. The average investor's chance of success before the arbitration tribunal falls below a half, as would be predicted by its lower possible loss. The effect is rather small, however.)

This study considered only those arbitrations which satisfied the two following conditions. Firstly, only final awards in which substantive claims were resolved were considered. Such decisions are the final decision outlining the outcome of the dispute (whether or not compensation is payable and in what quantum) and are most analogous to the judgment in conventional domestic legal proceedings. This requirement eliminated decisions on jurisdiction as well as interim awards and other procedural matters, which, while often containing data on costs, lacked a final disposition with respect to damages and compensation.[5] The second requirement is that the awards were issued in English. This condition discounted only a handful of awards as English is the dominant language of most published investor-state arbitrations. Finally, in the interests of managing the quantity of data for this small

---

[2] Several academic studies have evaluated the costs and benefits associated with civil procedure (including various cost regimes) in domestic legal systems: e.g. S Shavell, 'Suit, Settlement and Trial: A Theoretical Analysis under the Alternative Methods for the Allocation of Legal Costs' 11:1 Journal of Legal Studies 55 (1981); J Hughes and E Snyder, 'Litigation and Settlement Under the English and American Rules: Theory and Evidence' 38 Journal of Law and Economics 225 (1995); J Donohue, 'Opting for the British Rule: If Posner and Shavell Can't Remember Coase Theorem, Who Will?' 104 Harvard Law Review 1093 (1991); E Carbonara and F Parisi, 'Rent-Seeking and Fee Shifting: The Hidden Virtues of Limited Fee Shifting' 11:2 Review of Law and Economics 113 (2015); A Farmer and M Pecorino, 'Liability Standards with Uncertain Outcomes at Trial' http://mycba.ua.edu/~ppecorin/liability_standards_with_an_uncertain_outcome_at_trial_september_2014.pdf

[3] GL Priest and B Klein, 'The Selection of Disputes for Litigation' 13:1 Journal of Legal Studies 1 (1984)

[4] Investor-to-State-Dispute Settlement: Some Facts and Figures, European Commission Report (12 March 2015) at 8-9. http://trade.ec.europa.eu/doclib/docs/2015/january/tradoc_153046.pdf .

[5] In one sense host states may be seen to have 'won' a dispute when they succeed in establishing that the arbitration tribunal lacks jurisdiction over the dispute, however this may not result in the final disposition of the issue as the investor may still seek remedies in other fora.

study and to depict arbitration strategies based on recent trends observed in ISDS, this article considers only awards issued from 2012 until the first half of 2014.

In total 31 disputes were used for data collection. The aggregate data obtained from these awards is presented in Tables 1 and 2. It should be noted that in some cases specific monetary amounts were not claimed by investors, rather these claimants asked for “full compensation” or “such relief as the tribunal considered just”. Moreover, party costs (which tend to be relatively small) were not always divulged, nor was there always clear differentiation between each party’s legal costs and the tribunal’s own costs. Where this information was made available it is included in Table 1.

4. Data analysis

4.1 General overview

The model equations derived in Part I of the paper may be used to calculate what settlement amount might be appropriate to avoid the cost, time and trouble for both parties of going to arbitration, an exercise that should be of value to both claimants and respondents involved in ISDS.

We derived data from 31 arbitral awards made in 2012, 2013 and 2014 in order to apply the game-theoretical model, as summarized in Table 1. Table 2 identifies the various parties to the disputes and the year in which arbitration occurred. It should be noted in advance that since the monetary values of disputes were given in a range of different currencies, we have converted all cases to US dollars[6] for consistency and ease of comparison. The data do not provide information on the pre-tribunal expenses, $E_{PTi}, i = 1,2$ (where the index, 1, refers to the claimant and the index, 2, refers to the respondent) and we make the assumption, believed to be reasonable, that these are small compared with the legal costs incurred by going before the arbitration tribunal.

At the time when a settlement is being considered, vertex Y for the respondent and vertex Z_v for the claimant on the game tree of Figure 1, neither party can have foreknowledge of which party will win, nor of the extent of the claimant’s award should it be successful. It may be assumed, however, that legal advisers to both claimant and respondent will have access to historic data on previous arbitration decisions by which to judge the likely size of the payoffs, B_1 and B_2 when the claimant wins, and C_1 and C_2 when the claimant loses. In our case, we regard it as permissible to use average values for ratios formed from the sample of decisions contained in Tables 1 and 2 in order to estimate payoff values, which may then be used to generate predicted settlements that may be compared with the awards made by the arbiters in practice. This procedure derives from the assumptions that (i) the sample is random and (ii) the statistical properties of the data are stationary, so that similar averages would be found from analyzing any set of arbitration decisions chosen at random.

[6] We used a conversion date of 30 June 2013, roughly the mid-point of our three-year period 2012-2014. The Euro-USD conversion rate on that date was; 1 Euro=1.30132 USD.

4.2 Average ratios derived from the sample

Average values are computed for six ratios. The fraction, f_1, of the respondent's legal costs borne by the claimant if it loses before the arbitration tribunal may be regarded as the ratio:

$$f_1 = \frac{E_2^{(1)}}{E_2} \qquad (1)$$

where E_2 represents the respondent's total fees (pre-tribunal and at-tribunal), while $E_2^{(1)}$ is the share of the respondent's legal costs borne by the claimant if it loses. This leaves the respondent responsible for the fraction, $1-f_1$, of its costs.

Conversely, if the claimant wins the arbitration, the fraction, f_2, of the claimant's legal costs borne by the respondent may be seen to be the ratio:

$$f_2 = \frac{E_1^{(2)}}{E_1} \qquad (2)$$

where E_1 represents the claimant's total fees (pre-tribunal and at-tribunal), while $E_1^{(2)}$ is the share of the claimant's legal costs borne by the respondent if the claimant wins. Now the claimant is responsible for the fraction, $1-f_2$, of its legal costs.

The fraction, g_1, contributed to the arbitration cost by the claimant when it wins is

$$g_1 = \frac{E_{A1}}{E_A} \qquad (3)$$

where E_A represents the total arbitration costs while E_{A1} is the arbitration cost borne by the claimant. Hence the fraction of the arbitration cost borne by the respondent when the claimant wins is $1-g_1$.

Similarly, when the claimant loses, the fraction, g_2, contributed to the arbitration cost by the respondent is

$$g_2 = \frac{E_{A2}}{E_A} \qquad (4)$$

where E_{A2} is the arbitration cost borne by the respondent. This leaves the losing claimant the burden of paying the fraction, $1-g_2$, of the arbitration cost.

Finally, the ratio, r_{AC}, of the award given by the arbitration tribunal to the claimant when the claimant wins to the sum sought by the claimant is:

$$r_{AC} = \frac{S_C}{S_{CC}} \qquad (5)$$

where S_{CC} is the size of the claim while S_C is the size of the award made by the tribunal, not including legal and arbitration expenses.

Average values, $f_{1ave}, f_{2ave}, g_{1ave}, g_{2ave}$ and r_{ACave}, have been derived for these five ratios as shown at the bottom of Table 1, which also gives estimates of the standard deviations. Consider first the fractions, f_1 and f_2. The data reveal that:

$$\begin{aligned} &f_{1ave} = \overline{f_1} = 0.302;\ \sigma_{f_1} = 0.413;\ \sigma_{\overline{f_1}} = 0.100 \text{ based on the 17 claimant losses} \\ &f_{2ave} = \overline{f_2} = 0.286;\ \sigma_{f_2} = 0.414;\ \sigma_{\overline{f_2}} = 0.111 \text{ based on the 14 claimant wins} \end{aligned} \qquad (6)$$

where σ_X signifies the estimated standard deviation of *X*, while $\sigma_{\overline{X}}$, also known as the standard error, signifies the estimated standard deviation of the average, $\overline{X}$, of *X*. The strong similarity between both f_{1ave} and f_{2ave} and σ_{f_1} and σ_{f_2} suggests that arbitration tribunals tend to treat the award of legal costs equally as regards claimant and respondent, in the sense that the winning party can expect to have roughly 30% its costs paid by the losing protagonist.

In a similar way, the winning party, claimant or respondent, can expect to pay only about a third of the total arbitration costs:

$$\begin{aligned} &g_{1ave} = \overline{g_1} = 0.333;\ \sigma_{g_1} = 0.222;\ \sigma_{\overline{g_1}} = 0.064 \text{ based on the 12 claimant wins, using available data} \\ &g_{2ave} = \overline{g_2} = 0.328;\ \sigma_{g_2} = 0.243;\ \sigma_{\overline{g_2}} = 0.070 \text{ based on the 12 claimant losses, using available data} \end{aligned} \qquad (7)$$

Regarding a 50-50 split as the default position on arbitration costs, equation set (7) implies that the losing protagonist will pick up about a third (33%) of the winner’s default share of arbitration costs. The similarity between the discharge by the losing party of 33% of the winner’s default arbitration costs and its reimbursement of 30% of the winning party’s legal costs indicates that the arbitration tribunals tend, on average, to treat the legal and arbitration costs in a consistent way.

An important deduction from analyzing the data is that the arbitration tribunals tend to award a significantly lower sum than the claimant has professed to seek. The average value of the ratio, $r_{AC} = S_C / S_{CC}$, may be found:

$$r_{ACave} = \overline{r_{AC}} = 0.477;\ \sigma_{r_{AC}} = 0.366;\ \sigma_{\overline{r_{AC}}} = 0.098 \text{ based on the 14 claimant wins} \quad (8)$$

The standard deviation, $\sigma_{r_{AC}}$ is large, however, and does not rule out a tribunal awarding the full amount in particular cases. (This happened in just two of the 31 cases considered, case 18, *Deutsche Bank v. Sri Lanka*, and case 20, *Occidental Petroleum v. Ecuador*, although there were others with high values of r_{AC}, as can be seen from Table 1.)

Finally, the probability, p, may be regarded as the mean of a binary indicator variable, V (for "victory"), that registers 1 when the claimant wins and 0 when the claimant loses, as shown in Table 1. It is possible to estimate an average value, p_{ave}:

$$p_{ave} = \overline{V} = 0.452;\ \sigma_{p_{ave}} = \sigma_{\overline{V}} = 0.047 \quad (9)$$

4.3 Calculation of the payoffs

Using the definitions introduced above, the payoff B_1 may be written:

$$B_1 = r_{AC}S_{CC} - g_1E_A - (1 - f_2)E_1 \quad (10)$$

However, while S_{CC}, E_A and E_1 may be known or estimated by both parties, the values, $r_{AC}, g_1,$ and f_2, will not be known at vertex Z_v on the game tree of Figure 1. Hence our strategy is to subsitute the mean values discussed above to produce an estimate, $\hat{B}_1$, for B_1:

$$\hat{B}_1 = r_{ACave}S_{CC} - g_{1ave}E_A - (1 - f_{2ave})E_1 \quad (11)$$

In an analogous way, we may produce estimates for B_2, C_1 and C_2 as:

$$\hat{B}_2 = -r_{ACave}S_{CC} - (1 - g_{1ave})E_A - E_2 - f_{2ave}E_1 \quad (12)$$

$$\hat{C}_1 = -(1 - g_{2ave})E_A - E_1 - f_{1ave}E_2 \quad (13)$$

$$\hat{C}_2 = -g_{2ave}E_A - (1 - f_{1ave})E_2 \quad (14)$$

The estimated values, $\hat{B}_1$ and $\hat{C}_1$ may be used in place of B_1 and C_1 to estimate the lower limit of condition (38) of Part I:

$$\hat{p}^* = \frac{\hat{C}_1}{\hat{C}_1 - \hat{B}_1} \quad (15)$$

which gives an estimate of the lower limit, $p*$, for claimant success, such that a claim should be pursued only if $p > p*$.

Given the enforced but reasonable assumption that the pre-tribunal costs are small: $E_{PTi} \approx 0$, in equations (22) and (28) of Part I, estimates may be made for $v_{\min}$ and $v_{\max}$ as functions of claimant success-probability, *p*:

$$\hat{v}_{\min}\left(p\right) = p\hat{B}_1 + \left(1-p\right)\hat{C}_1 \qquad (16)$$

and

$$\hat{v}_{\max}\left(p\right) = -pB_2 - \left(1-p\right)\hat{C}_2 \qquad (17)$$

Putting $p = p_{ave}$, as recorded in equation (9), into equations (16) and (17) gives the central estimates, $\hat{v}_{\min}\left(p_{ave}\right)$ and $\hat{v}_{\max}\left(p_{ave}\right)$.

*4.4 Estimating the go-no-go probability, p**

As noted above, the 'go-no-go probability', *p**, may be estimated as $\hat{p}*$ using equation (15). Performing the calculations for the 25 out of 31 cases where the data allow produces the graph of the estimated go-no-go probability, $\hat{p}*$,versus case number shown in Figure 3. The central estimate, 0.452, of the claimant's average probability of success, p_{ave}, is also marked up, together with the 90% confidence interval.

There are four instances where $\hat{p}*$ exceeds even the upper value of the 90% confidence interval, and these are highlighted. Clearly the claimant must feel very sure of its ground to bring forward a case in such circumstances. When $\hat{p}* = 1$, a value that occurs in cases 2 and 22, the implication is that the claimant must be completely certain that the arbitration tribunal will decide in its favour. But while a claimant win occurred in one such case, 22, the other, 2, was lost, which suggests that the claimant's presumed confidence was misplaced. A similar split between winning and losing is revealed in another two instances, where the probability of success needed to be above about 70% for the claimant reasonably to proceed.

Based on general experience, it would seem unwise for the claimant to proceed on the basis of such a high value of *p**, unless either the claimant's case is exceptional or the benefit from winning before the arbitration tribunal consists of more than immediate financial redress –the claimant's reputation being at stake might be one motivator.

To put this in context, consider case 22, *Quasar de Valors v. Russia*. The claimant made a claim for $2.63M, but incurred legal costs of $14.57M as well as arbitration costs of \$0.63M. In the event, the claimant won, but was awarded only \$2.03M, meaning that the whole exercise carried a large net financial penalty to the claimant.

5. Sample Cases

The results derived above will be used to analyse three cases, with the claims spanning the range from about \$10M, through \$100M to more than \$1 bn.

5.1 Anatolie Stati, Gabriel Stati, Ascom Group SA and Terra Raf Trans Trading Ltd v. Kazakhstan[7]

In this dispute, a group of Moldovan investors brought a claim against the Republic of Kazakhstan under the Energy Charter Treaty (ECT) in relation to various interferences, including seizures of assets associated with petroleum investments. The tribunal ultimately ruled in favour of the investor, finding that the host state had breached several provisions of the ECT, including the guarantee of Fair and Equitable Treatment and the failure to pay appropriate compensation for expropriation.

The tribunal awarded the investor US \$506 million (interest not yet included), the largest award in the history of the ECT at that point and one of the largest treaty arbitration awards of all time. Of this figure, the respondent was ordered to pay to the claimant a net amount of US\$ 497,685,101 (subtracting the subtotal of debts owed by the investor to the host state from the subtotal of compensation due). This net amount was to be paid with interest, compounded semi-annually. While unquestionably large, this amount should be contrasted with the initial claim for relief requested by the investor of US \$2.97 billion. In other words, while strictly speaking the claimants 'won' the arbitration, they received only approximately 17% of what they claimed initially. This significant discrepancy can be explained by the tribunal's assessment that the investor exaggerated the value of the assets that had been seized by Kazakhstan. As such, the realignment of asset value represents a major risk to investors when deciding to bring claims when they have suffered an interference under the host state's laws.

Table 1 lists the costs for *Anatolie Stati v Kazakhstan* as Case 7. Estimating the outturn parameters $\hat{B}_1, \hat{B}_2, \hat{C}_1$ and $\hat{C}_2$ enables both $v_{\min}$ and $v_{\max}$ to be calculated as functions of claimant success probability, p, using equations (16) and (17).

It is striking that there will be an incentive for the claimant Anatolie Stati to take the case forward as long as there is the slimmest of chances of success in court: anything greater than a go-no-go probability of $p^* = 0.017$. The government of Kazakhstan should have expected Anatolie Stati to bring the case forward and presumably it did consider settlement as a result. Figure 4 shows the settlement space.

If it is assumed that the probability of success for Anatolie Stati was the claimant average, namely $p = 0.452$, Kazakhstan should have made an offer of $\hat{v}_{\min}\left(p_{ave}\right)$ = \$621M, as calculated from equation (16). If Anatolie Stati et al. had agreed that their

[7] Stockholm Chamber of Commerce, date of award 19 December 2013

chance of success in the arbitration was indeed 45.2%, then it would have been logical for that consortium to have accepted this offer.

The state of Kazakhstan's absolute maximum offer, including allowance for a higher risk-aversion, would have been $\hat{v}_{\max}\left(p_{ave}\right)$ = $658M, an increase of only about 5% above $\hat{v}_{\min}\left(p_{ave}\right)$.

In fact, the case went before an arbitration tribunal, which ultimately awarded the claimants $506M gross, $497,685,101 net, which was about 20% less than the sum predicted for settlement above. Enforcement of this award was successful in US and Swedish courts, however a UK court recently held that enforcement in the UK could be stayed pending the determination of whether the arbitral award had been obtained by fraud, there being a sufficiently strong case that the claimant had withheld vital documents.[8]

5.2 Burimi SRL and Eagle Games SH.A v the Republic of Albania[9]

In this case, numbered 13 on Table 1, it was the respondent host state that won, with the tribunal dismissing all the claims. The dispute arose from investors' activities in the Albanian gambling industry which were harmed by Albania's introduction of a series of new regulations interfering with Burimi's business activities. The claimants sought damages for expropriation under the Italy-Albania Bilateral Investment Treaty (BIT) as well as a breach of the minimum standard of treatment under customary international law. The tribunal held under the auspices of the International Centre for the Settlement of Investment Disputes (ICSID) ruled that the first claimant had failed to comply with requirements of the BIT to make best efforts to negotiate an amicable settlement in light of the changed regulations. The other investor lacked jurisdiction because its activities were considered to be a private loan agreement, not an investment. Consequently, the tribunal unanimously dismissed all of the claimants' claims. The cost parameters are as laid out in Table 1.

The settlement space is shown in Figure 5. In this case the claimant needs a probability of success in the tribunal to be about 1 in 8 in order to proceed ($\hat{p}^* = 0.126$ from equation (15)). The settlement amount suggested by equation (16) is now $\hat{v}_{\min}\left(p_{ave}\right)$ = $2.07M, about a sixth of the claim of $12.6M. It is noticeable that with much lower sums at stake in comparison with the first case, legal and administrative fees are relatively much larger. This results in $\hat{v}_{\max}\left(p_{ave}\right)$ = $3.26M, which is more than 50% greater than $\hat{v}_{\min}\left(p_{ave}\right)$.

However, as noted above, no award was made because the case was rejected by the arbitration tribunal.

5.3 ACHMEA B.V. v the Slovak Republic[10]

[8] Anatolie Stati and others v Republic of Kazakhstan [2017] EWHC 1348 (Comm)
[9] ICSID Case No. ARB/11/18, Award (29 May 2013)
[10] PCA Case No. 2013-12 (UNCITRAL Rules) (Award, 7 December 2012)

This case concerned a claim brought by a Dutch health insurance company against the state of Slovakia because of the government's plan to run a unitary public health care service, a scheme which effectively undermined the investor's stake in a domestic insurance company. It was accordingly framed as an expropriation and was brought under the Netherlands-Slovakia BIT. The claimant sought \$100M in compensation from the Slovak Republic.

High legal fees were incurred by both parties, particularly the respondent, which spent \$17.37M. Meanwhile the claimant incurred legal costs of \$5.96M. Figure 6 shows the diagram of the settlement space.

In this instance, the claimant would need to have been satisfied that its chances of winning before the tribunal were over 21% before bringing the case. For the average claimant success probability of 45.2%, the amount that a risk-neutral respondent ought to offer would have been $\hat{v}_{\min}\left(p_{ave}\right)$ = \$13.04M. The maximum that a respondent could offer before exceeding its expected payoff at the tribunal would have been significantly higher at $\hat{v}_{\max}\left(p_{ave}\right)$ = \$37.24M.

In the event the case went before an arbitration tribunal and the claimant was awarded \$28.42M. This bigger payout, roughly twice $\hat{v}_{\min}\left(p_{ave}\right)$, reflects the fact that the claimant has won its case, removing the reliance on an expected value to assess the level of the claimant's payout. It is no longer necessary to take an average of the two payoffs, B_1 and C_1, with weighting factors, *p* and 1 – *p* respectively (as in equation (16)). The losing payoff, C_1, drops out of consideration, leaving only B_1, which is obviously a factor of $1/p$ larger than pB_1. Assuming $p = p_{ave} = 0.45$, this factor is about 2.0.

6. Discussion

The general solution for the ISDS "game" based on the decision tree shown in Figure 1 has led to the settlement space being partitioned into four distinct regions, in three of which no settlement is possible. An acceptable settlement will be possible along the border line between Region 4 and Region 3 provided both parties remain risk neutral.

Bounded by the two parallel lines $v_{\min}\left(p\right)$ and $v_{\max}\left(p\right)$, the existence of Region 4 may constitute a temptation to the claimant to hope for a higher settlement than simply $v_{\min}\left(p\right)$, on the grounds that the respondent could afford to make an offer up to $v_{\max}\left(p\right)$ as it would still remain within the bounds set by its expected payoff on appearing before the tribunal. And, as the examples evaluated in Section 5 suggest, there can, on occasions, be a significant different between $v_{\max}\left(p\right)$ and $v_{\min}\left(p\right)$. However, the respondent will see no need to do so, and would need to abandon its risk neutrality in favour of a strictly positive risk aversion in order to make a more generous offer than $v_{\min}\left(p\right)$. By the same token, a claimant turning $v_{\min}\left(p\right)$ down would need to have moved from risk neutrality to risk confidence.

Based on the data collected in our sample of 31 disputes, this article proposes that if the claim is known and the likely legal and arbitration costs can be estimated, then a fair settlement offer may be found for both parties under the assumption that the claimant's probability of success is the long-run average, estimated as 45 %, a figure that can be calculated and updated on an objective basis by each party. Should the claimant's chances be assessed as different from the long-run average, then a mutually acceptable settlement sum may still be found if both parties agree the new probability figure.

The advantages of settling are that the extra costs associated with the tribunal fees and expenses are avoided, as well as the time, trouble and, particularly, uncertainty associated with what is likely to be a long drawn out process. It may well be better to invest time and money in negotiating a settlement than in pursuing arbitration in the context of ISDS, consistent with economic analysis of the civil litigation process in domestic courts.[11] The disadvantage for the claimant is that, assuming a success probability of 45%, it can expect to receive in settlement an amount that is only about a quarter of the claim submitted (based on historic figures) and about half the award it would win, should it be successful at the arbitration tribunal. *Pari passu*, the disadvantage for the respondent is that it will need to pay out about a quarter of the claim, whereas it would avoid paying out more than its costs, and possibly rather less, if it were successfully to defend the case. This is the nature of the negotiation process: the parties are looking to agree on a deal that provides certainty, but this involves a splitting of the difference between them.

One reason why such settlements may not occur, is that the different parties have different estimates of the parameter values. If each believes it is likely to win at the tribunal, both could see a positive payoff in carrying on rather than settling at a level that was mutually agreeable. Similarly, if the claimant over estimates (and/or the respondent underestimates) the level of damages that may be awarded in the event of a successful claim. There will always be some uncertainty about parameter values, and so there will always be this danger, and this is likely an important reason why so many cases proceed to arbitration in reality.

The study sheds further light on some of the strategic decision-making that is (or should be) involved when foreign investors and host states choose to engage in ISDS via the calculation of go-no-go probability, p^*, the lowest probability at which an investor could reasonably decide to bring its case forward. Sometimes, as in the case of *Anatolie Stati et al. v Kazakhstan* (Case 7 in Table 1), the figure for p^* emerges as so low that the case should be brought forward even when the chances of success look slim (e.g. 1 in 10 or less). On the other hand, there are some cases where the go-no-go probability reaches 1.0, so that the case should be taken forward only if success is guaranteed – surely an impossibility in any situation that is reliant on human judgment. Case 22, *Quasar de Valors v Russia* exhibited a value of $p^* = 1.0$. Here the claimant won and received an award that was roughly three quarters of its claim, but still incurred a net financial loss. It must be assumed that Quasar de

[11] E.g. Cooter and Ulen, 'An Economic Theory of the Legal Process' in *Law & Economics* (4th ed, Pearson, 2004)

Valors considered that more than the stated financial claim was at stake.

7. Conclusion

While the claimant's chances of success may be disputed by the two parties in any particular case, analysis of the data suggests that the claimant has, on average, a slightly worse than even chance of success – about 45%. Moreover, a claimant that wins at the arbitration tribunal is set to gain, on average, slightly less than half (48%) of the claim it has registered. It has been found that arbitration tribunals tend to award a fraction of the legal costs and the arbitration costs against the loser in a roughly similar way, irrespective of whether the loser is an investor or a state, undercutting the myth that there is an anti-state animus among arbitration tribunals.[12] The losing party, state or investor, will pick up, on average, about 30% of the winning party's legal cost and will be required, on average, to pick up about 66% of the total arbitration cost.

Whilst it may be problematic to expect the parties to come to the same conclusion regarding the strength of the claimant's arguments, and hence the claimant's probability of winning, a more pragmatic procedure is to use the average probability of claimant success in previous arbitration hearings. As noted above, the success rate is about 45%, and it is this figure that the paper has adopted for its calculations of reasonable settlement sums.

The base-line calculational model assumes that both state and investor are risk neutral in the sense that the risk-aversion is zero for each. This is likely to be a good representation for the state, which can normally be expected to have large resources on which to call for the purposes of dispute settlement, and also for the investor when the latter is a very large company. Of course respondent states will also on occasion be developing countries, just as investors may be SMEs. However, the effects of changes to the risk-aversions of both parties have been considered. An argument has been advanced for an upper boundary, with an offer at this level requiring the respondent to become more risk averse (exhibiting a strictly positive risk-aversion) under the single-offer assumption. While it is theoretically possible for a highly risk-averse respondent to make a still higher settlement offer, it would almost certainly be restrained from doing so by its duty as a custodian of public funds. Meanwhile a claimant having a strictly positive risk-aversion will be inclined to accept a settlement sum below the lower boundary advanced, but quantification of this effect would require further research.

As well as calculating the settlement sum on which the parties might reasonably agree, the game-theoretical model provides an estimate of the go-no-go probability, below which the claimant ought not to bring its case forward based on the registered claim and likely expenses. This figure lies well below the average claimant probability of success in most of the cases analysed, which suggests that it was reasonable for the claimant to bring the case forward (although not necessarily as far as the arbitration tribunal – a settlement might have been a better option). However, the figure for the go-no-go probability was found to be significantly higher than the

[12] See e.g. S Franck, 'The ICSID Effect? Considering Potential Variations in Arbitral Awards' 51:4 Virginia Journal of International Law 977 (2011)

long-run average in four of the cases considered, and in two cases the required probability of success was unity, corresponding to a requirement for complete certainty of success. It is conjectured that the rationale for proceeding in such a case must depend on the expectation that victory at arbitration will bring benefits over and above the monetary value of the claim registered. These benefits include emphasizing the financial risk associated with a host state's undue interference with foreign investors. The fear of adverse awards could accordingly improve the business climate within the jurisdiction going forward.

We conclude that the mathematical modelling of the international arbitration process has generated a number of insights of potential value to both claimants and respondents. However, we need to issue some caveats. We acknowledge that the data upon which this analysis rests constitutes a small sample – only 31 cases were studied, with 14 non-zero awards and incomplete data for 6 disputes. Furthermore, it is accepted that the probability of any specific claimant being successful will in general not be known, since it is only an average probability of success that can be inferred from observed successes in past published awards. Perhaps more pertinently, each party may estimate this value differently. We have also not made a comprehensive analysis of the claimant's risk-aversion and how this factors into its decision making. In addition, real cases will likely involve the potential for a longer period of negotiation, rather than a single "take-it-or-leave-it" offer by the respondent. We have carried out a preliminary analysis of such a situation in Section 2 and Appendix B, and have suggested bounding values for any offer from the respondent that follows on from a protracted period of negotiation. Finally, we have not been able to take into account external factors to the process such as reputational effects/ political pressure, which may make settlements more difficult to achieve in practice. We see these areas as suitable subjects for further research (including modelling using the risk-aversion parameter) and hope that the paper will pave the way and encourage others in further analyses of the game theoretic nature of investment arbitration strategies.

References

M. Broom, D. Collins, H. Vu and P. Thomas, 'The Four Regions in Settlement Space: A Game-Theoretical Approach to Investment Treaty Arbitration. Part I: Modelling', Journal of Law, Probability and Risk, Vol. xx, No. yy (20zz)

E Carbonara and F Parisi, 'Rent-Seeking and Fee Shifting: The Hidden Virtues of Limited Fee Shifting' 11:2 Review of Law and Economics 113 (2015)

R Cooter and T Ulen, 'An Economic Theory of the Legal Process' in *Law & Economics* (4th ed, Pearson, 2004)

J Donohue, 'Opting for the British Rule: If Posner and Shavell Can't Remember Coase Theorem, Who Will?' 104 Harvard Law Review 1093 (1991)

A Farmer and M Pecorino, 'Liability Standards with Uncertain Outcomes at Trial' http://mycba.ua.edu/~ppecorin/liability_standards_with_an_uncertain_outcome_at_trial_september_2014.pdf (last accessed July 2016)

S Franck, 'The ICSID Effect? Considering Potential Variations in Arbitral Awards' 51:4 Virginia Journal of International Law 977 (2011)

J Hughes and E Snyder, 'Litigation and Settlement Under the English and American Rules: Theory and Evidence' 38 Journal of Law and Economics 225 (1995)

G Priest and B Klein, 'The Selection of Disputes for Litigation' 13:1 Journal of Legal Studies 1 (1984)

S Shavell, 'Suit, Settlement and Trial: A Theoretical Analysis under the Alternative Methods for the Allocation of Legal Costs' 11:1 Journal of Legal Studies 55 (1981)

Appendix A. Additional nomenclature used in Part II

Symbol	**Meaning**
$E_1^{(2)}$	share of the claimant 's legal fees borne by the respondent when the claimant wins before the tribunal
$E_2^{(1)}$	share of the respondent's legal fees borne by the claimant when the claimant loses before the tribunal
$f_{V_n\|O_n}(v_n\|o_n)$	probability density for the value of the respondent's n^{th} offer, given that the respondent will make such an offer (Appendix B)
g_1	fraction of the arbitration costs borne by the claimant
g_2	fraction of the arbitration costs borne by the respondent
H	claimant's payoff after negotiation in Region 4 (Appendix B)
O_n	(random) indicator value for respondent's n^{th} offer (1 if made, else 0) (Appendix B)
o_n	specified indicator value for respondent's n^{th} offer (1 or 0) (Appendix B)
r_{AC}	ratio of the tribunal award to the claim
S_{CC}	claim
V	binary variable taking the value, 1, when the claimant wins and 0 otherwise
V_n	(random) value of respondent's n^{th} offer (Appendix B)
v_n	specified value of respondent's n^{th} offer (Appendix B)
$\hat{x}$	estimated value of x
x_{ave}	average value of x (equivalent to $\overline{x}$)
π_n	probability of the respondent making n^{th} offer (Appendix B)
σ_X	estimated standard deviation of X
$\sigma_{\overline{X}}$	estimated standard deviation of the average of $\overline{X}$, also known as the standard error.

Appendix B. Preliminary consideration of Region 4, the "zone of uncertainty"

Suppose that the rules or convention allow the respondent to make a second offer if the claimant rejects the respondent's first offer, $v_{\min}(p)$, in anticipation of a further, better offer. The respondent now has a choice on whether or not to make a second offer, V_2 , where $v_{\min}(p) \leq V_2(p) \leq v_{\max}(p)$, or the respondent may decide to go straight to the tribunal. V_2 must be regarded as a random variable by the claimant – it cannot predict it with any certainty in advance.

Let $O_2 = 1$ if the respondent makes a second offer and $O_2 = 0$ if the respondent decides to proceed to arbitration instead. Let there be a probability, $\pi_2 = P(O_2 = 1)$, that a second offer be made, so that the probability of going before the tribunal is $1 - \pi_2$.

Let the probability density for the size of the respondent's second offer, given that it is made, be $f_{V_2|O_2}\left(v_2|o_2\right)$. Thus the expected size of the respondent’s second offer, if it is made, will be between $v_{\min}$ and $v_{\max}$:

$$E\left(V_2|O_2\right)=\int_{v_2=v_{\min}}^{v_{\max}} f_{V_2|O_2}\left(v_2|o_2\right)v_2dv_2 \qquad \text{(B.1)}$$

where

$$\int_{v_2=v_{\min}}^{v_{\max}} f_{V_2|O_2}\left(v_2|o_2\right)dv_2=1 \qquad \text{(B.2)}$$

The claimant's payoff, *H*, given that a second offer is made (and accepted), is:

$$H\left|\left(O_2=1\right)=A_{V1}\right|\left(O_2=1\right)=V_2-E_{PT1} \qquad \text{(B.3)}$$

Applying the expectation operator, $E\left(.\right)$, to both sides of equation (B.3) gives:

$$E\left(H|O_2=1\right)=E\left(V_2|O_2\right)-E_{PT1} \qquad \text{(B.4)}$$

The claimant’s payoff, *H*, given a second offer is not made, will depend on the outcome of the arbitration, namely either B_1, with probability, *p*, or C_1, with probability $1-p$. The expected payoff in this case is:

$$E\left(H|O_2=0\right)=pB_1+\left(1-p\right)C_1 \qquad \text{(B.5)}$$

The overall expected value of *H* is given by

$$\begin{aligned}
E\left(H\right)&=E\left(E\left(H|O_2\right)\right)\\
&=\pi_2E\left(H|O_2=1\right)+\left(1-\pi_2\right)E\left(H|O_2=0\right)\\
&=\pi_2\left(E\left(V_2|O_2=1\right)-E_{PT1}\right)+\left(1-\pi_2\right)\left(pB_1+\left(1-p\right)C_1\right)\\
&=\pi_2\left(E\left(V_2|O_2=1\right)-E_{PT1}\right)+\left(1-\pi_2\right)\left(v_{\min}-E_{PT1}\right) \qquad \text{(B.6)}\\
&=\pi_2E\left(V_2|O_2=1\right)+\left(1-\pi_2\right)v_{\min}-E_{PT1}\\
&=\pi_2\int_{v_2=v_{\min}}^{v_{\max}} f_{V_2|O_2}\left(v_2|o_2\right)v_2dv_2+\left(1-\pi_2\right)v_{\min}-E_{PT1}
\end{aligned}$$

Comparing equation (B.6) with equation (1) of Part I, repeated below:

$$A_{V1}=v-E_{PT1} \qquad \text{(Part I – 1)}$$

the agreed settlement, A_{V1}, will match the expected value of the outturn, $E(H)$, provided the settlement offer, V_2, is given by:

$$v_2 = \pi_2 \int_{v_2=v_{\min}}^{v_{\max}} f_{V_2|O_2}\left(v_2|o_2\right) v_2 dv_2 + \left(1-\pi_2\right) v_{\min} \qquad \text{(B.7)}$$

Clearly $v_2 = v_{\min}$ only if

- $\pi_2 = 0$, i.e. if there is no chance that a second offer will be made,
- or the expected value of the second offer is equal to $v_{\min}$:

$$\int_{v_2=v_{\min}}^{v_{\max}} f_{V_2|O_2}\left(v_2|o_2\right) v_2 dv_2 = v_{\min} \qquad \text{(B.8)}$$

Equation (B.8) would imply that the probability density function would be a Dirac impulse of unit strength and the only second offer that could be made would be deterministic and equal to $v_{\min}$, meaning that the respondent will simply repeat its offer. In all other cases, $v_2 > v_{\min}$.

If the probability density, $f_{V_2|O_2}\left(v_2|o_2\right)$ is positive over some finite portion of the range, $v_{\min}$ to $v_{\max}$, and π_2 is strictly positive: $0 < \pi_2 \le 1$, then in rejecting the first offer, the claimant is preferring an uncertain outcome, but with a higher expected value, to the certain offer. Superficially such a stance might seem reasonable for even a risk averse organisation. However, neither the probability density function, $f_{V_2|O_2}\left(v_2|o_2\right)$, nor the probability, π_2, will be known beyond the general requirements that equation (B.2) should hold for $f_{V_2|O_2}\left(v_2|o_2\right)$, while π_2 is bounded by:

$$0 \le \pi_2 \le 1 \qquad \text{(B.9)}$$

Hence Region 4 represents a zone of uncertainty.

Furthermore, real-world experience suggests that if the claimant should decide to reject successively the respondent's offers, 2, 3, ..., *n*, in the hope of pushing the respondent closer to offering $v_{\max}$, then at some intermediate point, $v_{\min}(p) \le v_n(p) < v_{\max}(p)$, the probability of the respondent making any further offer will have reached zero: $\pi_n = 0$. In such a case the claimant will have been in the position of rejecting a guaranteed sum, $v_{n-1}(p)$, in favour of the risky option of appearing before the tribunal, with its associated lower expected payoff (given by the right hand side of equation (B.5) above). The claimant would then be displaying risk confident or risk seeking behaviour: $\varepsilon < 0$.

It is, of course, possible that the respondent will not make a second offer, in which case $n = 2$, and $\pi_2 = 0$. In this case the claimant will effectively have rejected a certain offer, $v_{\min}$, in favour of a risky option with the same expected value, suggesting marginally risk seeking behaviour.

If we assume that all parameters are known exactly, both players are risk neutral, and that there is some maximum number of allowable offers, then logically the claimant should not go to the tribunal for any offer marginally over $v_{\min}$, and thus effectively the respondent should just repeat this offer (i.e. choose the Dirac distribution mentioned above) until the end of the process, when it will be accepted. However, if we added some possibility of parameter estimates being different, an offer rejection by the claimant might be interpreted by the respondent that the claimant has a higher estimate of *p* than the respondent has, and so encourage a higher offer. Note that such a rejection might be a tactical move by the claimant, even if this was not actually the case.

Table 1. Summary of case data (All costs and awards in USD); CW = claimant wins, CL = claimant loses

Case No.	Claimant Cost, E_1	Respondent Cost, E_2	Claimant Win $V = 1$	Claim S_{CC}	Award to Claimant S_C	Arbitration Cost, E_A	CL f_1	CW f_2	Claimant share Arb.Cost, E_{A1}	Resp share Arb. Cost, E_{A2}	CW g_1	CL g_2	CW Award to claim ratio, R_{AC}
1	2,594,404	1,866,421				331,267	0.00		165,634	165,634		0.50	
2	9,874,653	4,574,990		8,700,000			1.00						
3	2,229,829	5,238,568		6,989,000			0.00						
4	1,571,858	5,299,978				1,150,000	0.30		575,000	575,000		0.50	
5	664,997	414,797	1	142,300,000	28,927,582	1,022,462		0.00	511,231	511,231	0.50		0.203
6	9,277,500	4,500,000	1	243,600,000	21,100,522	1,500,000		0.75	375,000	1,125,000	0.25		0.087
7	17,950,992	17,625,116	1	2,970,000,000	497,685,101	1,400,000		0.50	350,000	1,050,000	0.25		0.168
8	24,478,538	15,273,967	1	805,581,502	113,138,596	2,995,000		0.00	1,497,500	1,497,500	0.50		0.140
9	2,184,456	5,602,042					0.00						
10	1,112,000	7,410,954		173,962,625		1,150,000	0.00		575,000	575,000		0.50	
11	532,800	2,004,190				307,029	0.00		153,515	153,515		0.50	
12		705,814		8,000,000		277,863	1.00		138,932	138,932		0.50	
13	540,596	463,367		12,600,000		186,450	1.00		186,450	0		0.00	
14	8,000,000	10,750,000		185,385,084			0.00						
15				149,546		19,706	0.00		19,706	0		0.00	
16			1	1,144,930,000	935,000,000	1,940,000		1.00	0	1,940,000	0.00		0.817
17	5,961,109	17,365,479	1	100,000,000	28,421,677	873,455		0.75	436,727	436,727	0.50		0.284
18	7,995,127	2,822,435	1	60,368,993	60,368,993	960,928		1.00	480,464	480,464	0.50		1.000
19	1,018,825	917,021		514,604,506		607,890	0.17		303,945	303,945		0.50	
20			1	1,769,625,000	1,769,625,000			0.00					1.000
21	4,221,427	5,312,107					1.00						

Case No.	Claimant Cost, E_1	Respondent Cost, E_2	Claimant Win $V = 1$	Claim S_{CC}	Award to Claimant S_C	Arbitration Cost, E_A	CL f_1	CW f_2	Claimant share Arb.Co st, E_{A1}	Resp share Arb. Cost, E_{A2}	CW g_1	CL g_2	CW Award to claim ratio, R_{AC}
22	14,572,671	9,412,260	1	2,625,810	2,026,480	1,264,096		0.00	632,048	632,048	0.50		0.772
23	2,170,084	3,657,121	1	24,451,645	450,117			0.00					0.018
24			1	63,778,212	11,306,741	384,854		0.00			0.00		0.177
25	5,185,928	6,297,557		56,100,000		1,005,325	0.32		502,663	502,663		0.50	
26	6,923,000	15,675,000		1,149,000,000		1,725,000	0.19		975,000	750,000		0.43	
27	15,786,490	3,640,566	1	147,800,000	136,138,430	1,631,297		0.00	815,649	815,649	0.50		0.921
28	3,407,687	1,647,969	1	8,800,000	4,065,900	876,815		0.00	438,408	438,408	0.50		0.462
29	2,714,966	16,511,889		344,353,074		1,114,379	0.16		1,114,379	0		0.00	
30	2,829,688	1,283,872		459,700,000		904,403	0.00		904,403	0		0.00	
31	2,913,786	728,207	1	61,525,950	39,025,950	673,923		0.00	0	673,923	0.00		0.634
			14				17	14			12	12	14
Mean			**0.452**				**0.302**	**0.286**			**0.333**	**0.328**	**0.477**
s.d.							**0.413**	**0.414**			**0.222**	**0.243**	**0.366**

Table 2. List of ISDS cases

Case No.	Parties	Year
1	Emmis International Holding et al. vs. Hungary	2014
2	Tulip Real Estate and Development vs. Turkey	2014
3	Renee Rose Levy de Levi vs. Peru	2014
4	Renee and Gramcital vs. Peru	2014
5	Guaracachi America and Rurelec vs. Bolivia	2014
6	TECO Guatamala Holdings vs. Guatemala	2013
7	Anatolie Stati et al. vs. Kazakhstan	2013
8	Ioan Micula et al. vs. Romania	2013
9	KT Asia Investment Group vs. Kazakhstan	2013
10	Metal-Tech vs. Uzbekistan	2013
11	Omer Dede and Serdar Elhuseyni vs. Romania	2013
12	Apotex vs. USA	2013
13	Burimi SRL and Eagle Games vs. Albania	2013
14	Rompetrol Group vs. Romania	2013
15	Bogdanov and Bogdanova vs. Moldova	2013
16	Abdulmohsen Al-Kharafi and Sons vs. Libya	2013
17	ACHMEA vs. Slovak Republic	2012
18	Deutsche Bank vs. Sri Lanka	2012
19	Bosh International et al. vs. Ukraine	2012
20	Occidental Petroleum vs. Ecuador	2012
21	Iberdrola Energia vs. Guatemala	2012
22	Quasar de Valors vs. Russia	2012
23	Swisslion vs. Republic of Macedonia	2012
24	Railroad Development Corporation vs. Guatemala	2012
25	Ulysseas vs. Ecuador	2012
26	Caratube International Oil vs. Kazakhstan	2012
27	EDF International et al. vs. Argentina	2012
28	Unglaube and Unglaube vs. Costa Rica	2012
29	Oostergetel and Laurentius vs. Slovak Republic	2012
30	Sax et al. vs. The City of St Petersburg	2012
31	Societe Generale vs. Paraguay	2012

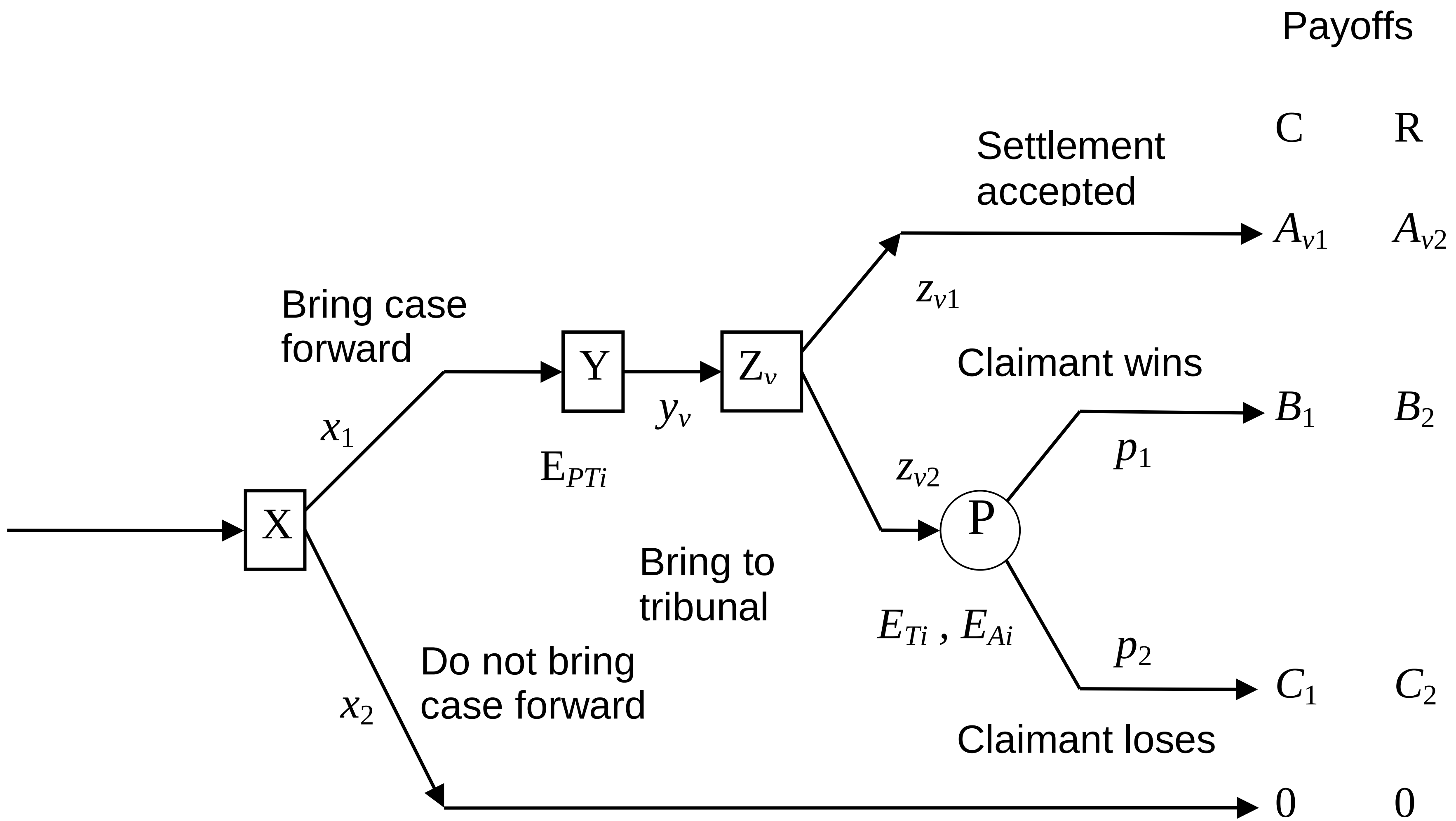
Payoffs
C
R
Settlement accepted
A_{v1}
A_{v2}
z_{v1}
Bring case forward
Y
Z_v
Claimant wins
B_1
B_2
x_1
y_v
p_1
E_{PTi}
z_{v2}
X
P
Bring to tribunal
E_{Ti} , E_{Ai}
p_2
Do not bring case forward
C_1
C_2
x_2
Claimant loses
0
0

Figure 1. Game tree for arbitration. (C = claimant, R = respondent). The range of offers the respondent may make at vertex Y is very large. The analysis will show that there will a unique offer that the respondent would make that will be acceptable to the claimant.

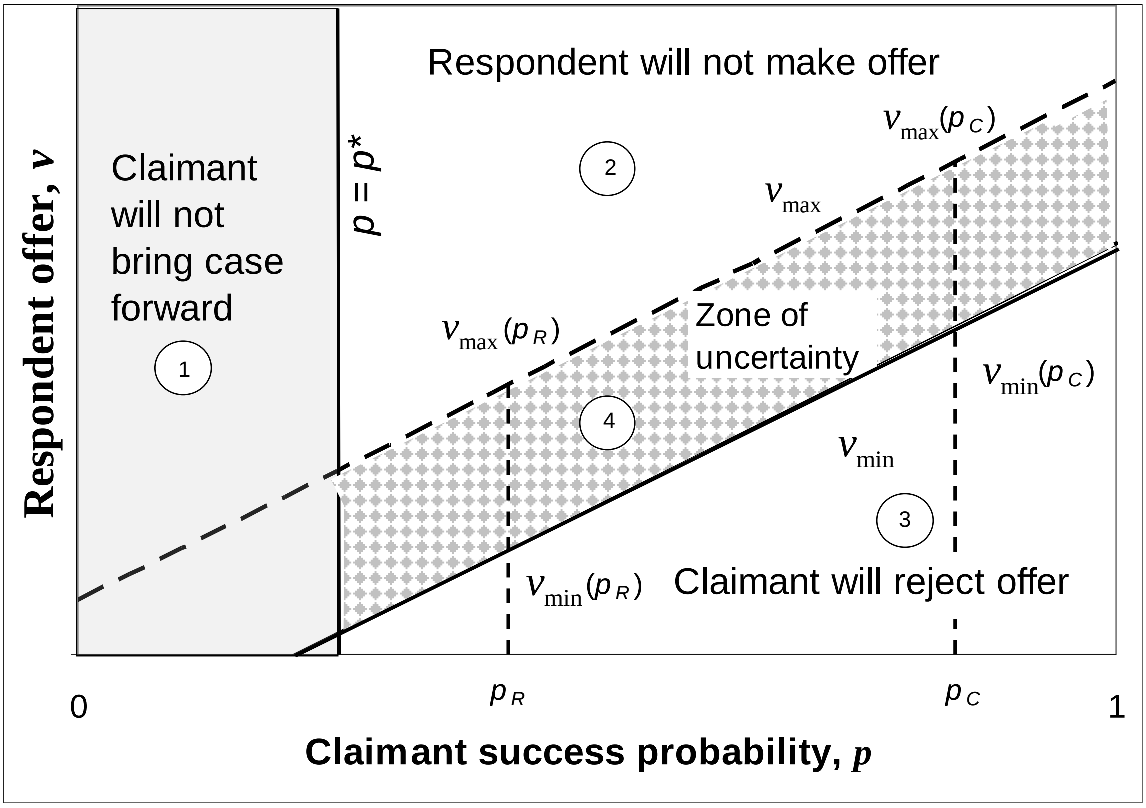

Figure 2. The settlement space in the plane of (*p, v*). The figure illustrates also the case where claimant and respondent have estimated claimant success probability, *p*, differently: the claimant's estimate is p_C while the respondent's is p_R.

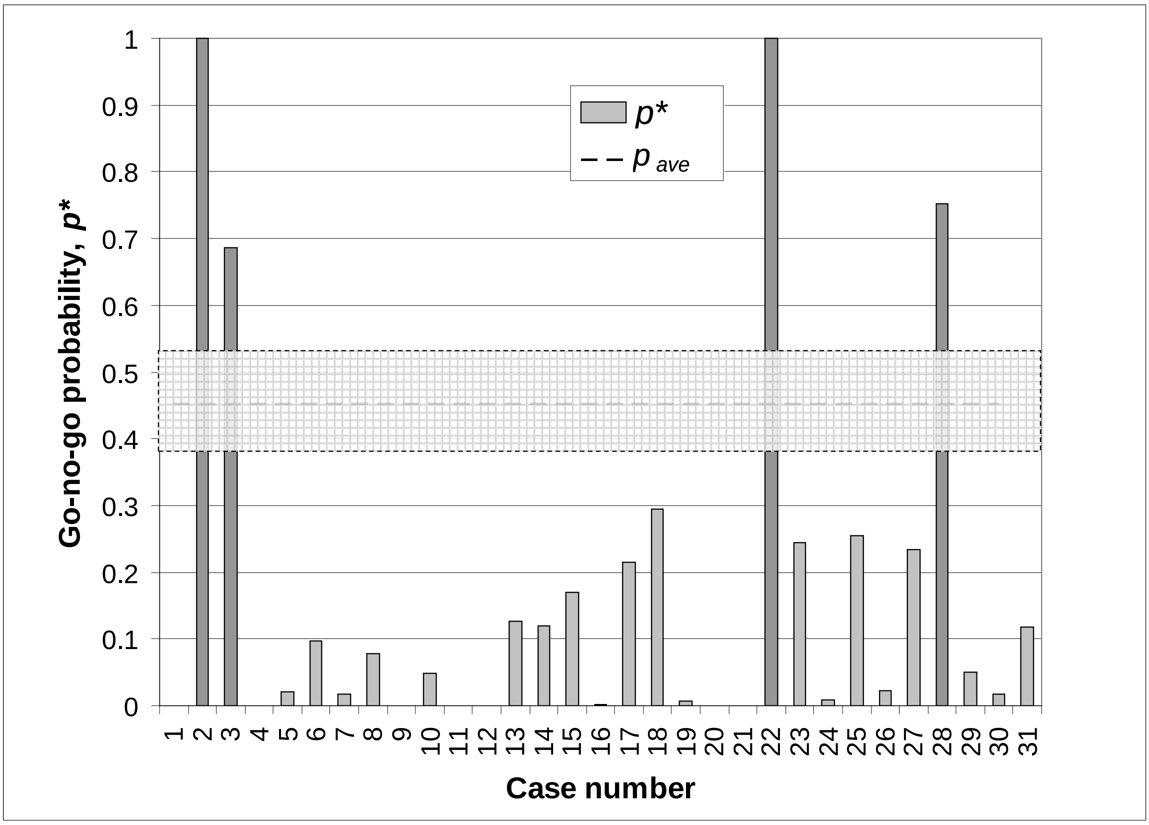

Figure 3. Go-no-go probability, p^*, for the 31 cases in the study. Also shown is the estimated probability of success for the claimant, p_{ave}, with the 90% confidence interval marked up.

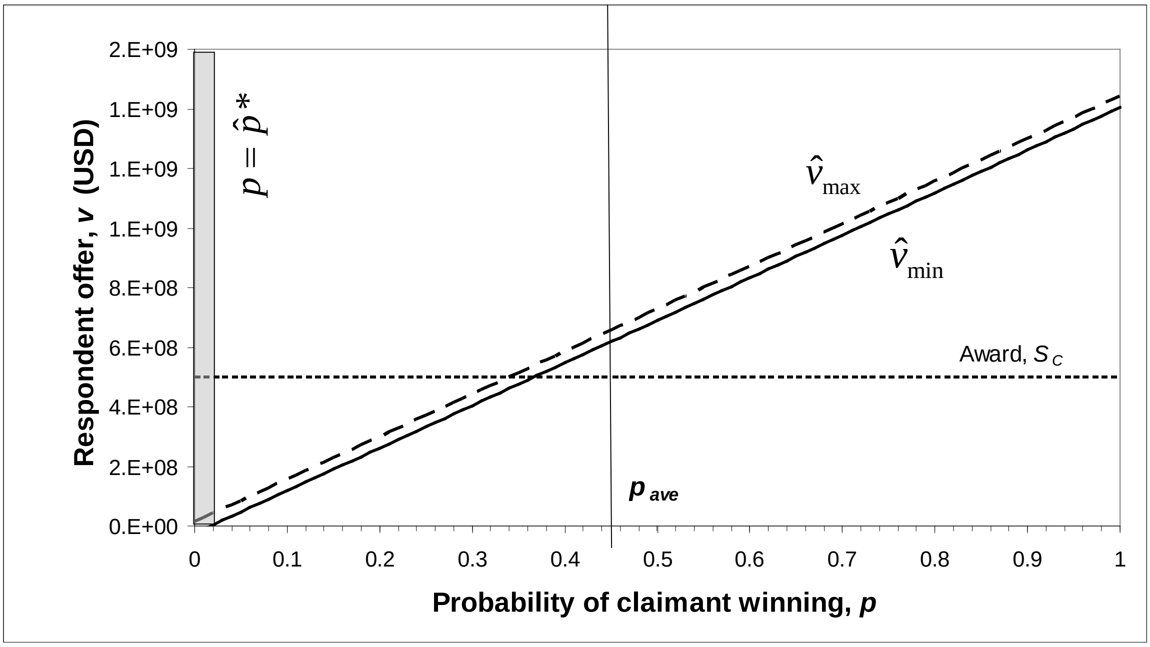

Figure 4. Settlement space for *Anatolie Stati and others v Republic of Kazakhstan*, December 19 2013 (Case 7 in Table 1)

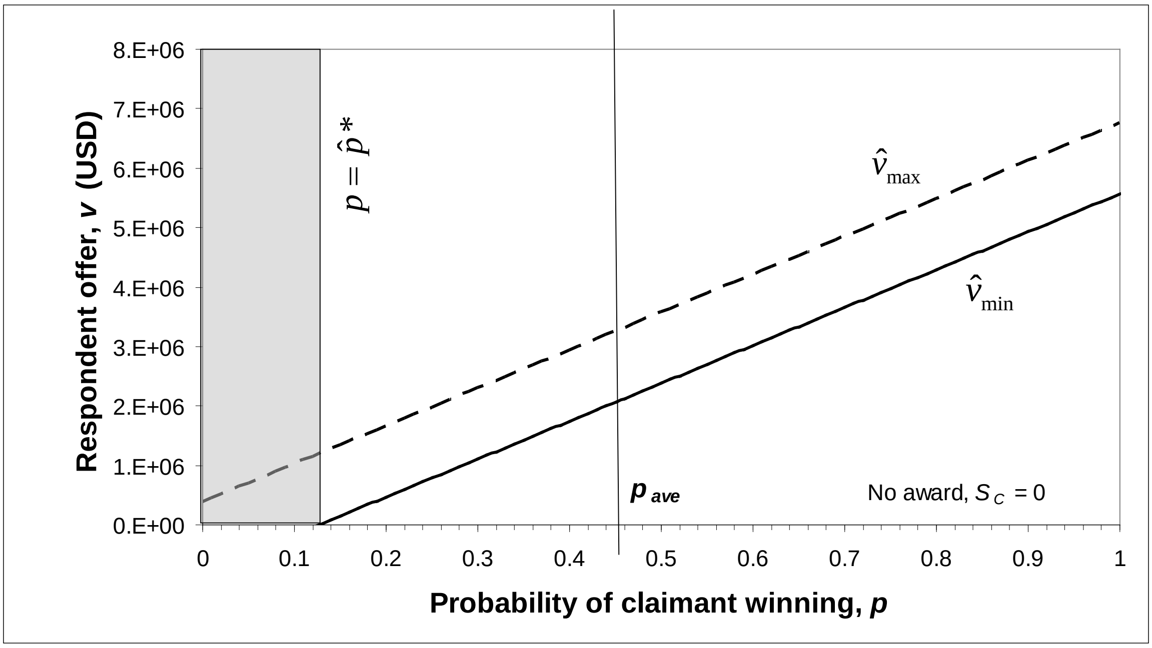

Figure 5. Settlement space for *Burimi SRL and Eagle Games v Republic of Albania*, May 29 2013 (Case 13 in Table 1)

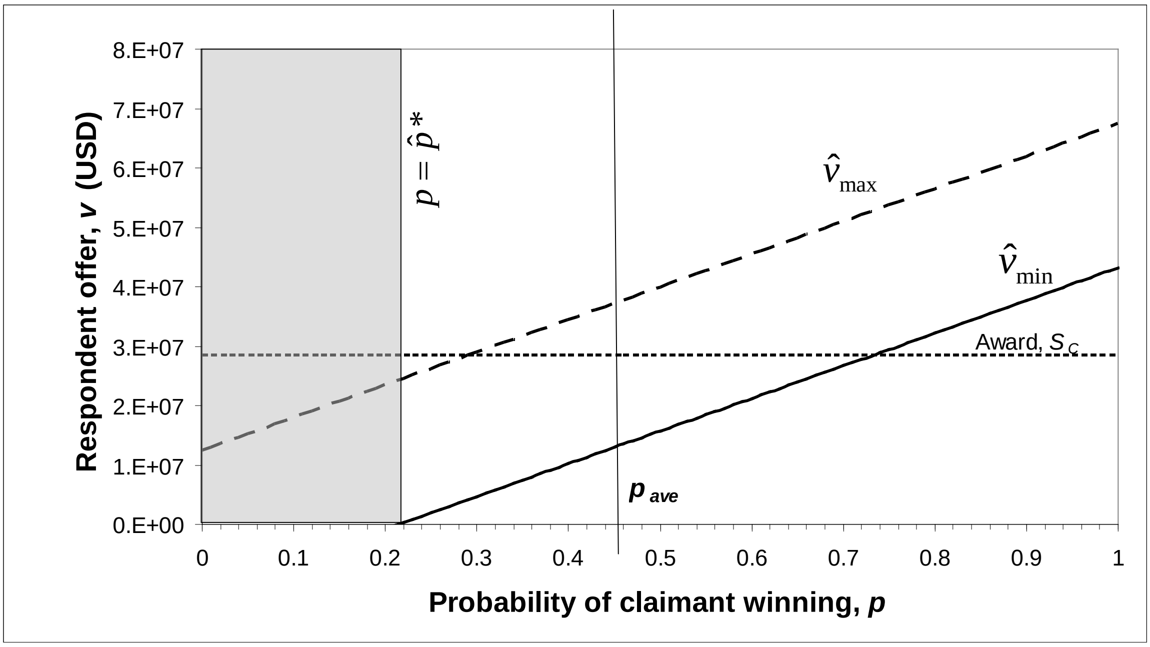

Figure 6. Settlement space for *ACHMEA v Slovak Republic*, December 7 2012 (Case 17 in Table 1)