DAMAGES IN INTERNATIONAL ARBITRATIONS GUIDE

FIFTH EDITION

Editor
John A Trenor

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Damages in International Arbitration Guide

Fifth Edition

Editor

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Preface

This fifth edition of Global Arbitration Review's *Damages in International Arbitration Guide* builds on the successful reception of the earlier editions. As explained in the Introduction, this book is designed to help all participants in the international arbitration community understand damages issues more clearly and to communicate those issues more effectively to tribunals to further the common objective of assisting arbitrators in rendering more accurate and well-reasoned awards on damages.

The book is a work in progress, with new and updated material being added to each successive edition. In particular, this fifth edition incorporates updated chapters from various authors and contributions from new authors. This edition seeks to improve the presentation of the substance through the use of visuals such as charts, graphs, tables and diagrams; worked-out examples and case studies to explain how the principles discussed apply in practice; and flow charts and checklists setting out the steps in the analyses or the quantitative models. The authors have also been encouraged to make available online additional resources, such as spreadsheets, detailed calculations, additional worked examples or case studies, and other materials.

We hope this revised edition advances the objective of the earlier editions to make the subject of damages in international arbitration more understandable and less intimidating for arbitrators and other participants in the field, and to help participants present these issues more effectively to tribunals. We continue to welcome comments from readers on how the next edition might be further improved.

John A Trenor
Wilmer Cutler Pickering Hale and Dorr LLP
November 2022

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Introduction

John A Trenor[1]

There are three types of arbitrators: those who understand numbers and those who don't.

This old joke, adapted to the international arbitration community and repeated at conferences, typically receives nervous laughter from parties, counsel and experts who may have experienced innumeracy at first hand on the part of a tribunal. Yet this innumeracy is by no means limited to those who serve as arbitrators; the joke could equally be applied to those who appear as counsel and to other participants in the international arbitration community.

This book is aimed at everyone who gets the joke, whether they profess to understand numbers or not. The objective of the *Damages in International Arbitration Guide* is to help all participants in the international arbitration community – from the arbitrators to the parties to counsel and experts – understand damages issues more clearly and communicate those issues more effectively to tribunals to further the common objective of assisting arbitrators in rendering more accurate and well-reasoned awards on damages.

In the vast majority of international arbitrations, one or more parties seek damages. As such, damages are a critical component of most cases. A tribunal that misunderstands the relevant damages issues does not render justice to the parties. An award that effectively resolves the scope of liability but misunderstands, misapplies or miscalculates damages does not put the aggrieved party back in the position it would have been in if the wrongful act had not occurred. An award that seemingly takes a Solomonic approach by 'splitting the baby' or does

1 John A Trenor is a partner at Wilmer Cutler Pickering Hale and Dorr LLP.

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not adequately explain the decision on damages does not typically satisfy either party and does not contribute to a favourable reputation for the arbitrators who issued the award.

Parties, and their counsel and experts, express frustration with awards that offer little reasoning on damages or, worse yet, faulty reasoning or errors in principle or calculation. Arbitrators express frustration with counsel and experts who struggle to communicate often complex damages issues clearly and effectively. Counsel and experts express frustration with each other on how best to present damages cases to tribunals that may lack quantitative backgrounds.

The idea for this book arose from discussions among members of the Global Arbitration Review editorial board, who have heard these frustrations being voiced and identified a void in the market for a guide to damages in international arbitration. This book draws on the insights of leading lawyers, experts and academics in the field to produce a work that will be a valuable desk-top reference tool for arbitrators, parties, and their advisers and counsel, when approaching damages issues in international arbitration.

This book is not intended to provide a comprehensive answer to every question. Frequently, the answer depends on the context – on the contract or treaty language, the applicable law, the arbitration agreement or rules, the facts of the case, etc. Indeed, on some issues addressed in this book, the authors (and the editor) no doubt disagree. Participation in this book is not meant to convey endorsement of the views expressed by others. However, the objective of this book, and indeed the objective of resolving disputes between parties regarding damages, is to understand better why they disagree. Is the disagreement based on differing views on what the contract, treaty or applicable law requires? Is it based on differing assumptions of the parties and their experts? Is it based on differing views of the appropriate methodology to assess and quantify damages? Or is it based on different quantitative models?

The aim of this book is to make the subject of damages in international arbitration more understandable and less intimidating for arbitrators and other participants in the field, and to help participants present these issues more effectively to tribunals. The chapters address key issues regarding various aspects of damages, identify areas of general agreement and disagreement, provide checklists and tips, and describe effective approaches to presenting and resolving damages issues. With a firm understanding of the underlying issues and the reason why the parties disagree, the arbitrators can make informed judgements on how to resolve those differences.

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The book is divided into four parts.

Part I addresses various legal principles applicable to the award of damages. The chapters in this part include overviews of the civil and common law approaches to both compensatory and non-compensatory damages, and cover damages principles under the Convention on Contracts for the International Sale of Goods, contractual limitations on damages, principles for reducing damages, such as mitigation, and damages principles in investment arbitration. The authors of these chapters are counsel from leading international arbitration firms and legal academics.

Part II addresses various procedural issues regarding damages and the use of damages experts, including bifurcation, evidentiary issues such as document disclosure, and techniques and approaches to maximise the effectiveness of expert assistance on damages. The authors of these chapters are also counsel from leading international arbitration firms.

Part III addresses various approaches and methods for the assessment and quantification of damages. It includes an overview of damages and accounting basics, quantifying damages for breach of contract, the income approach (discounted cash flow methodology) and determining the weighted average cost of capital, the market approach (comparables), the asset-based approach, taxation and currency issues, interest, costs, and the use of econometric and statistical analysis. The authors of these chapters are experts from leading expert practices, and economic and financial academics.

Part IV addresses damages issues specific to certain industries or those that cut across multiple industries. These chapters include overviews of damages issues in energy and natural resources arbitrations, construction arbitrations, life sciences arbitrations, mergers and acquisitions and shareholder arbitrations and intellectual property arbitrations. The authors are again experts from leading expert practices and counsel from leading international arbitration firms.

In addition to the hard copy version of this book, the content is also available on the Global Arbitration Review website, with additional online materials identified by the authors. Online access is available to subscribers at www.globalarbitrationreview.com/insight/guides.

Many individuals have contributed to making this book a success and deserve thanks. First and foremost, the authors of the chapters have shared in the vision of helping participants in the international arbitration community understand damages issues better. Their valuable contributions help to achieve this goal.

The professional team at Global Arbitration Review and its publisher, Law Business Research, have worked tirelessly at all stages of the process, from conception of the idea, through the editorial process, to publication.

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This book would also not have been possible without the ideas and support of numerous current and former colleagues at Wilmer Cutler Pickering Hale and Dorr LLP.

Global Arbitration Review's *Damages in International Arbitration Guide* will continue to be updated in future editions. Contributing authors will be encouraged to update existing chapters and new authors will be invited to contribute additional chapters. If readers wish to see further topics included or existing topics addressed in more detail, please bring them to my attention or to the attention of Global Arbitration Review. We also welcome comments from readers on how the next edition might be improved.

I share the hope of Global Arbitration Review that this book and future editions will form a valuable contribution to the field of international arbitration and that, in the future, the joke that there are three types of arbitrators (or counsel, or others) – those who understand numbers and those who don't – no longer resonates.

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Part III

Approaches and Methods for the Assessment and Quantification of Damages

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CHAPTER 16

Assessing a 'Modern' DCF Valuation

Stuart Amor, Jose Alzate and Thomas Maassen[1]

Introduction

Following the *Tethyan v. Pakistan* award,[2] where the tribunal awarded US$4.1 billion in damages, there has been increased interest in the 'Modern' DCF valuation approach by some in the arbitration community.

In this chapter, we first explain what is meant by the 'Modern' DCF, being somewhat of a misnomer given that this valuation approach has been discussed in academic circles for decades. We then explain what makes this valuation approach potentially appealing in theory.

In the remainder of the chapter, we explore some relevant factors to consider when evaluating a valuation performed using the 'Modern' DCF approach. First, we consider the challenges in implementing a 'Modern' DCF valuation and, therefore, how the theoretical appeal of this approach can be difficult to exploit in practice. Second, we explain that this method does not appear to be commonly used by market participants to value companies or projects. This is particularly relevant to damages assessments based on standards of value commonly used in arbitration such as 'market value' and 'fair market value'.

We end the chapter with a summary of the tribunal's decision in the *Tethyan v. Pakistan* award in respect of its reliance on the 'Modern' DCF.

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1 Stuart Amor is a senior managing director, Jose Alzate is a senior director and Thomas Maassen is a director at FTI Consulting LLP.

2 *Tethyan Copper Company Pty Limited v. Islamic Republic of Pakistan*, ICSID Case No. ARB/12/1, Award dated 12 July 2019 (*Tethyan v. Pakistan* Award), ¶ 1858. We refer to the claimant as 'Tethyan', the respondent as 'Pakistan' and the case as '*Tethyan v. Pakistan*'.

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Income approaches and the 'Modern' or certainty equivalent DCF

In general terms, income approaches seek to arrive at the value of an asset by reference to the present value, as at a given date, of the future income stream that is expected to be derived from the asset.[3]

In the most commonly used income approach, the standard DCF approach, the valuer forecasts the expected (that is, probability weighted) future cash flows and discounts these at a risk-adjusted discount rate that reflects both the time value of money (through the risk-free rate) and the systematic risks attached to them (through the incorporation of a risk premium).

An alternative approach is to directly adjust the expected future cash flows for systematic risks and to discount these risk-adjusted cash flows at a risk-free rate that reflects only the time value of money.[4] Under this approach, the expected cash flows are replaced with their 'certainty equivalents'. In terms of financial economics, the concept of a certainty equivalent refers to the certain (that is, risk-free) pay-off that would make a risk-averse investor indifferent about opting for either the certain pay-off or a higher expected pay-off that is subject to risk.[5] In other words, this alternative approach is based on the principle that a risk-averse investor would be indifferent between owning the subject asset with its expected cash flows and owning an alternative asset with lower but certain cash flows.

This latter approach goes by various names, including the 'Modern' and the 'certainty equivalent' DCF. We prefer the latter terminology as it is more descriptive of the approach, and therefore use it in the remainder of this chapter. The

3 International Valuation Standards Council (IVSC), IVS 105: Valuation approaches and methods states that the income approach 'provides an indication of value by converting future cash flows to a single current value. Under the income approach, the value of an asset is determined by reference to the value of income, cash flow or cost savings generated by the asset'. IVSC: ¶ 40.1.

4 In both cases, we refer to 'systematic' risks. By systematic risks, we mean those risks that cannot be diversified away (for example, some of the oil price risk associated with the value of an oil well cannot be fully diversified away by holding a broad portfolio of assets and, therefore, is a systematic risk). This is because, according to financial theory, the market does not compensate investors for taking on risk that they can diversify away.

5 For instance, an investor might be indifferent between receiving $30 with certainty and receiving an uncertain pay-off that can be either $0 or $100 with equal probability. In this example, $30 would be the certainty equivalent of the risky cash flow with expected pay-off of $50 ($0 * 50% + $100 * 50% = $50). The exact value or discount of the certainty equivalent will depend on the investor's degree of risk aversion.

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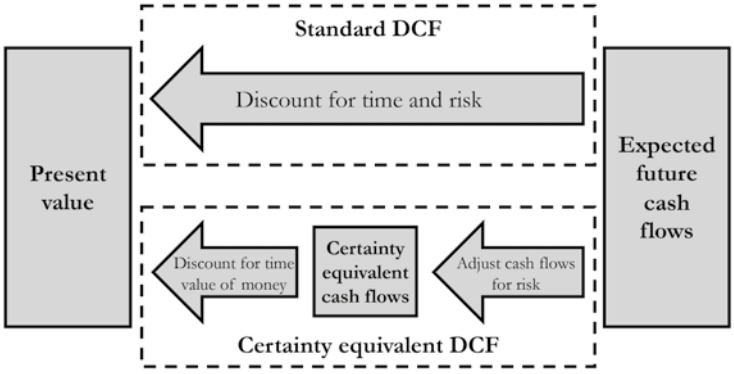
term 'Modern' DCF is also more open to misinterpretation, considering that, as far as we are aware, this method has been discussed in academic circles since at least the 1960s.[6]

The two approaches are summarised in Figure 1, below.

Figure 1: Summary of standard DCF and certainty equivalent DCF



The term 'Modern' DCF is sometimes used to encompass more than just the methodology described above, whereby the subject asset's expected cash flows are replaced with their certainty equivalents and then discounted at a risk-free rate.

First, the term is sometimes used to encompass the incorporation of an additional concept, real options, into a valuation.[7] Real options can be defined as management's 'opportunities to modify projects as the future unfolds'.[8] As an example of a real option, the manager of an oil well may be able to shut-in (stop) production when oil prices decline and restart production if oil prices subsequently increase. In fact, real options can be used to complement any income

6 For example, in Alexander A Robichek and Stewart C Myers, 'Conceptual problems in the use of risk-adjusted discount rates' in *The Journal of Finance*, Volume 21, Issue 4 (December 1966), pp. 727–30.

7 For instance, the claimant in *Tethyan v. Pakistan* submitted that the 'Modern' DCF 'incorporates management's flexibility to choose different options in response to evolving circumstances'. *Tethyan v. Pakistan* Award, ¶ 224.

8 Richard A Brealey, Stewart C Myers and Franklin Allen, *Principles of Corporate Finance*, Chapter 10 (tenth edition, 2010), p. 240.

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approach, including one performed using the standard DCF.[9] In other words, the use of real options is not a necessary element of a 'Modern' or certainty equivalent DCF, and real options can be used in other contexts.

Second, the term is sometimes used to encompass adjustments made to expected cash flows to account for asymmetric risks.[10] An example of an asymmetric risk is the risk of a blowout of an oil well. In fact, asymmetric risks, or indeed any other risks that are not systematic, should be reflected in the expected cash flows under any income approach, including the standard DCF.

Thus, the difference between the 'Modern' or certainty equivalent DCF and the standard DCF approaches is in the way they adjust for systematic risks.

Theoretical appeal of the certainty equivalent DCF

As discussed above, the certainty equivalent DCF has been discussed in academic circles for decades. It is also discussed in the International Financial Reporting Standards (IFRS), which state that both the standard DCF and the certainty equivalent DCF can 'in theory' be used to assess the fair value of a project or company.[11]

To present the theoretical appeal of the certainty equivalent DCF, it can be helpful to consider the arguments presented to the tribunal in the *Tethyan v. Pakistan* award.

In particular, the claimant's expert, who put forward a valuation based on this approach, argued that the certainty equivalent DCF can resort to 'very good market signals as to how the market values [systematic] risks'.[12]

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9 For instance, Van Putten and MacMillan state that 'it seems clear to us that discounted cash flow analysis and real options are complementary and that a project's total value is the sum of their values. The DCF valuation captures a base estimate of value; the option valuation adds in the impact of the positive potential uncertainty'. See Alexander B van Putten and Ian MacMillan, 'Making Real Options Really Work', *Harvard Business Review* (December 2004).

10 For instance, the claimant in *Tethyan v. Pakistan* submitted that '[t]he modern DCF method more accurately discounts future cash flows for . . . asymmetric risks'. *Tethyan v. Pakistan* Award, ¶ 224.

11 International Financial Reporting Standards (IFRS), 13, ¶ B29. As explained below, the IFRS definition of 'fair value' is broadly the same as the IVS definition of 'market value', discussed below.

12 *Tethyan v. Pakistan* Award, ¶ 346. As discussed in footnotes 7 and 10 above, the claimant also submitted that this method more accurately accounts for asymmetric risks and can incorporate management's flexibility. However, as set out above, these are in fact not unique – or necessary – features of the certainty equivalent DCF.

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The reference to market signals is to the price of hedging contracts, such as futures or forward contracts.[13] Futures and forward contracts involve a commitment to sell (or purchase) a given number of units of a product at a contractually agreed future date at a certain price. The use of such contracts eliminates the uncertainty in the price at which the predetermined number of units can be sold at the future date. Therefore, the prices of hedging contracts could, in theory, allow valuers to rely on market signals to assess certainty equivalent future prices of certain traded commodities. These, in turn, could be used to estimate certainty equivalents of select components of an asset's net cash flows.

The claimant's expert also referred to a 2012 letter from the Special Committee of the Canadian Institute of Mining, Metallurgy and Petroleum on the Valuation of Mineral Properties (CIMVal) to the International Valuation Standards Council (IVSC).[14] In this letter, CIMVal explains that its members generally use an income approach 'where there is sufficient information available to estimate future cash flows generated by a metals-related investment',[15] and describes the standard DCF and the certainty equivalent DCF as two income approaches used to value these investments.[16]

CIMVal points to two reasons a valuer might use the certainty equivalent DCF. First, the certainty equivalent DCF allows for the use of targeted risk adjustments for different components of the net cash flows.[17] Second, CIMVal

13 This approach was used by the claimant's expert in *Tethyan v. Pakistan* Award, ¶ 1425.

14 The tribunal considered the letter to be 'good evidence of the valuation methodology likely in practice to have been used by an actual buyer in the limited market for large-scale mining enterprises at the relevant time'. *Tethyan v. Pakistan* Award, ¶ ¶ 347, 348.

15 Letter to IVSC on behalf of CIMVal (Special Committee on the Valuation of Mineral Properties at the Canadian Institute of Mining, Metallurgy and Petroleum), 22 October 2012, available at https://paperzz.com/doc/7603199/012-cimval---international-valuation-standards-council (last accessed 18 October 2022).

16 CIMVal also states that the certainty equivalent DCF is 'a recognized DCF method for fair value estimates under accounting guidelines and well supported in valuation and finance theory literature'. Letter to IVSC, op. cit. note 15. We discuss the academic commentary surrounding the certainty equivalent DCF and the IFRS's recognition of this approach above.

17 CIMVal states: 'A CeQ [certainty equivalent] DCF approach does not make use of an aggregate discount rate though an implied aggregate discount rate can be derived. The CeQ approach uses targeted risk-adjustments for select cash flow components. These adjustments are done within the CAPM [capital asset pricing model] framework. Market-related uncertainties such as metal and energy prices are risk-adjusted with the CAPM while project-specific uncertainties may be modelled directly with no risk-adjustment. A residual risk adjustment may be necessary to adjust previously risk-adjusted cash flows for risk not explicitly recognized in the model before a final adjustment for the time value of money.' Letter to IVSC, op. cit. note 15.

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considers a reason that the certainty equivalent DCF may be used for long-life assets is that it does not assume that risk compounds constantly over time.[18] However, academics and CIMVal acknowledge that, in principle, the standard DCF approach can be adjusted to deal with both these issues, if that were to be desired by the valuer.[19]

Therefore, the main appeal of the certainty equivalent DCF, relative to other income approaches, is that, in theory, it can allow a valuer to rely on market information to adjust expected cash flows for systematic risks. We discuss the practical challenges with achieving this below.

Challenges of implementing the certainty equivalent DCF in practice

As explained above, valuers using the certainty equivalent DCF often rely on futures and forward contract prices as market signals to estimate certainty equivalent cash flows for select cash flow components of an asset's net cash flows.[20]

Futures and forward contracts are most prevalent in commodity markets. Hence some valuers propose that the certainty equivalent DCF can be used to value commodity assets, including projects in the resource and power sectors.[21] In

18 CIMVal states: 'A by-product of using the CeQ [certainty equivalent] DCF method is that [the] effective aggregate discount rate implied by this analysis can change with the variation of cash flow uncertainty as a result of changes in operating leverage and other project characteristics. This may be one reason that this approach is used.' Letter to IVSC, op. cit. note 15.

19 In a standard DCF, different discount rates can in principle be used for different cash flows or time periods, although this is rarely done by market participants in practice. In response to the question 'Do you use multiple discount rates to reflect the changing risk profile as an extractive process moves through its life cycle?', CIMVal states: 'Sometimes. For example, in cases where a static DCF [standard DCF] is being used, higher discount rates may be applied to reflect uncertainties not related to time (such as applying higher discount rates to more geologically uncertain resources)'. Letter to IVSC, op. cit. note 15. Brealey, Myers and Allen (op. cit. note 8, p. 233) state that 'where risk clearly does not increase steadily', one should either 'break the project into segments within which the same [risk-adjusted] discount rate can be reasonably used' or 'use the certainty-equivalent version of the DCF model'.

20 Although there may be other methods by which certainty equivalent cash flows can be obtained from expected cash flows, generally these methods are purely academic, rely on subjective adjustments or are difficult to apply in practice. For example, 'utility functions', which specify the level of 'utility' of an individual for different financial outcomes, can in theory be used to assess certainty equivalent cash flows, but it is not practically possible to accurately assess investors' utility functions. See Professor Aswath Damodaran, 'Risk adjusted value', pp. 10–11.

21 For instance, CIMVal stated in its 2012 letter that the certainty equivalent DCF 'is used for select types of real assets such as natural resource projects'. Letter to IVSC, op. cit. note 15.

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other sectors (for instance, hospitality), such contracts are generally not available to eliminate systematic risks of select cash flow components. Therefore, in the following discussion, we focus on resource projects.

The first challenge with using the certainty equivalent DCF approach is that resource projects typically have a lifespan of several years to a few decades. This can be substantially longer than the maturity of liquid hedging contracts. There is often no market, let alone a liquid market, for futures and forward contracts beyond a few initial years.[22] This is illustrated in the table below, which shows the average daily traded value of front month and longer maturity futures contracts for different commodities.

Table 1: Futures contracts, average daily value of contracts traded in 2021/22 (US$ million)[23]

Commodity	1 month	1 year	2 years	3 years	4 years
Oil	15,861.8	356.8	52.4	6.4	1.0
Copper	2,274.9	49.5	14.7	1.8	0.7
Aluminium	1,367.8	33.6	3.2	0.4	0.0

As Table 1 shows, liquidity drops off steeply the further out the maturity of the futures contract. For example, there is currently limited traded value in futures contracts with expiry beyond three years for oil and copper and beyond two years for aluminium.[24] In such illiquid markets, prices may not act as reliable market signals. Further into the future, there is often no market for futures and forward contracts at all.

22 Another challenge is that publicly traded futures contracts relate to the delivery of a particular commodity (of a particular standard) at a particular location. Therefore, there may be a mismatch between the commodity used in the project and that underpinning the futures contract.

23 Average daily value traded between 1 July 2021 and 30 June 2022. This is based on generic futures contracts expiring in 1 month, 13 months, 25 months, 37 months and 49 months, respectively. Oil is based on futures contracts for Brent oil. Copper and aluminium are based on futures contracts traded on the London Metal Exchange. Source: FTI Consulting analysis of Bloomberg data.

24 In addition, in all three cases, the value of the futures contracts traded with expiry in one year (and thereafter) was dwarfed by the value of one-month contracts, which some analysts use to assess spot prices.

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As a result, valuers using this approach must resort to projecting certainty equivalent prices forward (often for most of the duration of the DCF analysis), for instance by extrapolating from (illiquid) long-term futures and forward prices or by adjusting long-term price forecasts. These forecasts will necessarily involve the valuers' judgement.

As an illustration of this issue, in *Tethyan v. Pakistan*, the claimant's expert relied on the forward curve for commodity prices and extrapolated prices beyond this to estimate certainty equivalent cash flows for years extended into the future. The tribunal observed that '[i]t is undisputed that there is no market pricing of the systematic risk extending over a 56-year mine life'. To account for this, the tribunal in that case applied a residual risk reduction of 25 per cent to the claimant's expert's assessment of the project's cash flows to adjust for this long-term pricing risk.[25]

Furthermore, resource projects' future production and sales volumes are usually uncertain (often highly uncertain in early-stage projects), and these volumes may have a significant systematic risk component.[26] To the extent that there are systematic risk components to forecast future production, a valuer using the certainty equivalent DCF should also adjust expected cash flows for these risks when arriving at the certainty equivalent cash flows.

Another challenge with the implementation of this approach is that, in addition to adjusting cash flows for revenue pricing and volume risk, a valuer using the certainty equivalent DCF needs to adjust the other components of net cash flows for other sources of systematic risk. For instance, resource projects are prone to delays and capital expenditure cost overruns. According to studies from 2014 and 2022, accountancy firm EY found that 73 per cent of large oil and gas projects take longer to complete than forecast and 64 per cent of large mining projects

25 Specifically, the tribunal stated: 'It is undisputed that there is no market pricing of the systematic risk extending over a 56-year mine life and Prof. Davis specifically agreed at the Hearing on Quantum that the cash flows acquired by the buyer would remain "highly uncertain and highly risky." The Tribunal therefore concludes that it is likely that a buyer would have assigned a price to assuming this long-term risk by reducing its expectation of the cash flows that the Reko Diq project would generate over the life of the mine by 25%. This results in a reduction of the value of Claimant's investment by USD 2,430 million.' *Tethyan v. Pakistan* Award, ¶¶ 1425, 1440, 1441, 1521 and 1596.

26 For example, companies may ramp up resource production during periods of high commodity prices, and slow down production during periods of low prices. This would be an issue if a single expected production forecast is modelled, but can be theoretically addressed through the combination of a certainty equivalent DCF approach and a Monte Carlo simulation (real options pricing).

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suffer cost or schedule overruns (or both).[27] To the extent that there are systematic risk components to any such delays and cost overruns, a valuer using the certainty equivalent DCF should adjust expected cash flows for these risks when arriving at the certainty equivalent cash flows.[28]

A valuer also needs to account for any systematic risks associated with the various components of costs in a resource project. Although forward or futures contracts may exist for some of these components, such as the price of steel, markets for these contracts are also illiquid beyond a few years. For the remaining components, such as labour costs and taxes, futures contract prices are not available. These costs can be substantial, are subject to change, particularly over long periods, and these changes may also have a significant systematic component to them. They will need to be adjusted for, therefore, in arriving at certainty equivalent cash flows, without the possibility of relying on any market signals.

As a result, when estimating certainty equivalent cash flows as part of a certainty equivalent DCF, it is not possible to rely solely on market evidence provided by futures and forward prices. Rather, the valuer will need to make further assumptions, which will invariably involve substantial judgement. This is recognised in the CIMVal letter, in which CIMVal states that '[a] residual risk adjustment may be necessary to adjust previously risk-adjusted cash flows for risks not explicitly recognized in the model before a final adjustment for the time value of money'.[29]

The choice of valuation approach is not performed in a vacuum. Rather, valuers will consider what the best valuation approach to apply is, given the evidence available and the specific circumstances that apply to each case. According to the IFRS, whether the certainty equivalent DCF or the standard DCF should be applied 'will depend on facts and circumstances specific to the asset or liability being measured, the extent to which sufficient data are available and the judgment applied'.[30]

As described above, under the standard DCF, rather than adjusting cash flows for systematic risk, valuers will adjust the valuation for systematic risk by estimating a risk premium that is incorporated in the discount rate. Different valuers may assess different risk premiums for the same project at the same date

27 'Spotlight on oil and gas megaprojects', EY, 2014. 'How better project management can boost mining's capital productivity', EY, 2022.

28 For example, initial capital expenditure may include significant labour costs, and those costs may have a systematic component.

29 Letter to IVSC, op. cit. note 15.

30 IFRS 13, ¶ B30.

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if they rely on different evidence. Although the valuer's judgement is required in deciding what evidence to rely on, this evidence is usually based on verifiable market data. For instance, under the capital pricing asset model (CAPM) model (the model most commonly used to estimate risk premiums), valuers of US companies and projects need to determine the equity risk premium and the project or company's beta.[31] These variables can be estimated based on observable data on market returns, prices and correlations.[32]

Therefore, although the certainty equivalent DCF's proposition of relying on market signals to adjust expected cash flows for systematic risks is appealing in theory, in practice these market signals are often unavailable for large components of an asset's expected net cash flows. Adjusting such components to assess their certainty equivalent values typically requires substantial judgement by the valuer, as there is often little or no evidence available of what an appropriate adjustment would be. The standard DCF also requires judgement by the valuer when assessing the risk premium to apply to the discount rate. However, the judgement required in this respect is usually to assess how much weight should be put on different pieces of available market evidence.

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31 There is debate in academic circles regarding the validity or otherwise of the models used to estimate risk premiums, often centred around the CAPM. A summary of this literature is outside the scope of this chapter. For the interested reader, Brealey, Myers and Allen (op. cit. note 8, p. 196) summarise their opinion on the CAPM as follows: 'The capital asset pricing model captures these ideas in a simple way. That is why financial managers find it a convenient tool for coming to grips with the slippery notion of risk and why nearly three-quarters of them use it to estimate the cost of capital. It is also why economists often use the capital asset pricing model to demonstrate important ideas in finance even when there are other ways to prove these ideas. But that does not mean that the capital asset pricing model is ultimate truth. We will see later that it has several unsatisfactory features, and we will look at some alternative theories. Nobody knows whether one of these alternative theories is eventually going to come out on top or whether there are other, better models of risk and return that have not yet seen the light of day.'

32 For example, some valuers estimate the equity risk premium using the historical performance of equity compared with government bonds. Other valuers use current market prices and forecasts to estimate an implied future equity risk premium. The equity risk premium is generally multiplied by the 'beta', which valuers typically estimate using the correlation between the historical returns on equity of similar companies and the historical returns of the market as a whole, although different valuers may calculate this differently (for example, using different market indexes, time periods and time intervals).

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Lack of use of the certainty equivalent DCF by market participants

Market value and fair market value are standards of value commonly used in international arbitration. The International Valuation Standards (IVS) define 'market value' as 'the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion'.[33] This is broadly similar to the Organisation for Economic Co-operation and Development and the US Internal Revenue Service definitions of 'fair market value' and the IFRS accounting standards definition of 'fair value'.[34]

Market value and fair market value should reflect the price agreed 'between a willing buyer and a willing seller in an arm's length transaction'.[35] The IVS explain that to assess market value using an income approach, a valuer should use 'inputs and assumptions that would be adopted by [market] participants'.[36] It follows, therefore, that a relevant factor when evaluating a valuation in the context of an assessment of (fair) market value is whether a valuer's approach reflects the inputs and assumptions that market participants would adopt in the same circumstances. When this is not the case, the likelihood will increase that the subject valuation may not reflect what willing parties would have agreed to in the market.

A potential drawback of the certainty equivalent DCF approach, when used to assess market value or fair market value, is that it does not appear to be widely used by market participants when valuing companies or projects.

In *Tethyan v. Pakistan*, the claimant's expert pointed to one transaction in the mining industry in which it was applied.[37] However, according to the respondent, this transaction was described in the press as 'the worst mining deal ever'.[38] It is

33 IVS 104 Bases of Value, IVSC, ¶ 30.1.

34 The Organisation for Economic Co-operation and Development defines 'fair market value' as 'the price a willing buyer would pay a willing seller in a transaction on the open market', while the US Internal Revenue Service defines it as 'the price at which the property would change hands between a willing buyer and a willing seller, neither being under compulsion to buy or sell and both having reasonable knowledge of relevant facts'. IFRS 13 explains the 'fair value' of an asset or liability 'is a market-based measurement', namely 'the price at which an orderly transaction to sell the asset or to transfer the liability would take place between market participants at the measurement date under current market conditions'. IVS 104 Bases of Value, IVSC, ¶¶ 30.1, 100.1, 110.1; and IFRS 13, ¶ 2.

35 IVS 104 Bases of Value, IVSC, ¶ 30.1.

36 IVS 104 Bases of Value, IVSC, ¶ 30.5.

37 *Tethyan v. Pakistan* Award, ¶ 254.

38 ibid., ¶ 254.

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not clear, therefore, that this transaction reflected the 'inputs and assumptions' normally adopted by market participants. The authors are not aware of any other transactions in which the certainty equivalent DCF was used in mining or in any other sector.[39]

In *Tethyan v. Pakistan*, in response to the respondent's argument that the certainty equivalent DCF is not used in the mining industry, the claimant's expert referred to the 2012 CIMVal letter described above.[40] As summarised above, CIMVal identifies both the certainty equivalent DCF and the standard DCF as appropriate income approaches to value metals-related investment where sufficient information is available to estimate future cash flows, and discusses why a valuer might use the certainty equivalent DCF. In this letter, CIMVal does not suggest that this approach is widely used by market participants.[41]

We are also not aware of any surveys that discuss the assumptions adopted by market participants in the certainty equivalent DCF, which may reflect that this approach is relatively uncommon.

In our experience, when a market participant has used an income approach to value an asset, this has involved the use of the standard DCF approach. There are also many surveys documenting the assumptions used by valuers and managers when assessing the risk-adjusted discount rate that is used in the standard DCF approach[42] and, therefore, of the 'inputs and assumptions' that are being adopted in practice by market participants.

The relative use of the standard DCF and certainty equivalent DCF among market participants is reflected in their relative use in arbitration. For instance, we reviewed the 24 publicly available arbitration awards of damages of more than

39 This includes the experience of one of the authors at various investment banks (between 1994 and 2015, Stuart Amor worked at Credit Suisse, ING, UniCredit and RFC Ambrian) as either an equity analyst covering the oil and gas industry or as a global head of research overseeing the bank's coverage of all sectors, including mining.

40 *Tethyan v. Pakistan* Award, ¶ 347.

41 In its 'Standards and Guidelines for Valuation of Mineral Properties', dated February 2003, CIMVal comments that the certainty equivalent DCF was '[n]ot widely used and not widely understood but gaining in acceptance'. CIMVal refers to the certainty equivalent DCF as an 'Option Pricing' income approach; available at https://mrmr.cim.org/media/1020/cimval-standards-guidelines.pdf (last accessed 18 October 2022).

42 For instance, Professor Pablo Fernandez regularly conducts surveys of the risk-free rate and equity risk premium used by analysts, managers of companies and finance and economics professors. For example, see Survey: market risk premium and risk-free rate used for 95 countries in 2022, Fernandez et al., 24 May 2022.

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US$100 million recorded on the 'italaw' website.[43] We found that, of the 14 awards that identify the valuation approach relied on by the tribunal, the tribunal used the income approach in 11 cases.[44] All 11 of those awards relied on the standard DCF rather than other income approaches.[45] Other than *Tethyan v. Pakistan*,[46] we are not aware of any case in which the certainty equivalent DCF was relied on in some capacity in awarding damages.

As discussed above, the suitability of different income approaches depends on the available evidence and specific circumstances of each case. The evidence of the limited use of the certainty equivalent DCF by market participants, relative to the standard DCF, suggests that in most cases the specific circumstances and available evidence might better support a standard DCF approach.[47] The limited use of the certainty equivalent DCF does not appear to be explained by the purported recency of this methodology, since, as discussed above, this approach has co-existed with the standard DCF for around six decades.

Conclusions

The main appeal of the certainty equivalent approach is that, in theory, it can allow a valuer to rely on market information to adjust expected cash flows for systematic risks, such that these risk-adjusted cash flows can then be discounted

43 We used the filter on the italaw website (https://www.italaw.com/) to identify all awards for which damages of more than US$100 million were recorded as at August 2022.

44 Some of these 11 awards combined the income approach with other approaches. For instance, in ICSID Case No. ARB/13/1, the tribunal relied on the income approach for some heads of claim and the cost approach for others. In the remaining three awards where it did not rely on an income approach, the tribunal instead used a market (comparable) approach, a cost approach and a combination of a market approach and a cost approach.

45 Based on our review, the tribunal relied on a standard DCF approach in the awards in the following 11 cases: SCC Case No. V 2014/163; ICC Case No. 20549/ASM/JPA (C-20550/ASM); ICSID Cases No. ARB(AF)/09/1, No. ARB/13/1, No. ARB/08/6, No. ARB/13/36, No. ARB/13/31, No. ARB/11/25, No. ARB/07/27 and No. ARB/15/44; and MCCI Case No. A-2013/29.

46 The *Tethyan v. Pakistan* award was not included in the results of our italaw search described above as its damages were not recorded on the italaw website.

47 The limited use of the certainty equivalent DCF relative to the standard DCF might also be related to the complexities involved in estimating certainty equivalent cash flows as discussed above. For instance, Professor Damodaran explains that estimating a discount rate using risk and return models such as CAPM is 'a convenient way of adjusting for risk and it is no surprise that they are in the toolboxes of most analysts who deal with risky investments'. Regarding the estimation of certainty equivalent cash flows, he explains that the practical challenges of doing so remain 'daunting'. Damodaran, 'Risk adjusted value', pp. 5 and 10.

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at the risk-free rate. This approach differs from the standard DCF, the most commonly used income approach, in which the systematic risk is accounted for by applying a risk premium to the discount rate, which is then applied to the expected cash flows.

In this chapter, we have explored two relevant factors to consider when evaluating a valuation performed using the certainty equivalent DCF approach.

First, the theoretical appeal of the certainty equivalent DCF can be challenging to exploit in practice. We explain that, in most circumstances, the information that would allow a valuer to rely on market signals to adjust all the components of a project or company's expected net cash flows for systematic risk is usually unavailable or incomplete. As a result, valuers may need to use their judgement to make assumptions for which there is often little or no market evidence. Although valuers applying the standard DCF will also need to rely on judgement to assess the appropriate risk premium, that judgement will usually involve deciding what weight should be applied to several different pieces of available market data.

Second, standards of value commonly used in damages assessments in arbitration, such as fair market value and fair value, explain that the valuation approach should reflect the inputs and assumptions that would be adopted by market participants. This may be problematic for the certainty equivalent DCF approach because this method does not appear to be commonly used by market participants to value companies or projects. It may be difficult, therefore, to assess whether the certainty equivalent assumptions used by a valuer would in fact reflect those of market participants. Despite co-existing with the certainty equivalent DCF for around six decades, the standard DCF remains much more commonly used by market participants, including in the industries that are in theory well suited to the application of the certainty equivalent DCF (namely, mining, oil and gas and power).

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Use of the certainty equivalent DCF in Tethyan v. Pakistan

The *Tethyan v. Pakistan* award, in which the tribunal awarded US$4.1 billion in damages,[1] arose from a dispute between Pakistan and Tethyan, an Australian mining company, in relation to a mining licence application by Tethyan.[2]

The tribunal in this matter expressed a preference for an income approach, stating 'the Tribunal is convinced that in the particular circumstances of this case, it is appropriate . . . to determine [the claimant's] future profits by using a DCF method'.[3]

The claimant's expert used a certainty equivalent DCF to assess damages.[4] The tribunal observed that it had 'not been provided with a traditional [standard] DCF calculation by either Party, or any other income-based calculation' besides the claimant's expert's certainty equivalent DCF.[5] The tribunal had to decide, therefore, whether to rely on the claimant's expert's certainty equivalent DCF or to use an alternative to the income approach.

The tribunal decided to rely on the certainty equivalent DCF prepared by the claimant's expert. However, the tribunal introduced further 'residual risk adjustments' to the certainty equivalent cash flows for systematic risks, which it considered had not been 'fully captured in the available market data' and the extrapolation of such data.[6] In particular, the tribunal concluded that 'it is likely that a buyer would have assigned a price to assuming this long-term risk by reducing its expectation of the cash flows'. The tribunal therefore reduced the cash flows assessed by the claimant's expert by 25 per cent, leading to a reduction in value of US$2,430 million (about 60 per cent of the tribunal's pre-interest award of US$4,087 million).[7]

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1 *Tethyan v. Pakistan* Award, ¶¶ 1601, 1858.
2 ibid., ¶ 86.
3 ibid., ¶ 335.
4 ibid., ¶ 336.
5 ibid., ¶ 1651.
6 ibid., ¶ 1521.
7 ibid., ¶¶ 1600, 1601.

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APPENDIX 1

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Dr Stuart Amor is a senior managing director at FTI Consulting. Stuart acts as a testifying expert witness, focussing mainly on oil and gas matters. He has been engaged as an expert witness in more than 20 disputes and given oral testimony in arbitral hearings on many occasions. Prior to joining FTI Consulting in 2016, Stuart spent more than 20 years as an investment analyst and global head of research at various investment banks, where he valued companies and advised investors and corporates on valuation issues.

Stuart has extensive capital raising experience. He was the sole lead analyst on Lukoil's US$340 million mandatory convertible bond placing – essentially Lukoil's initial public offering (IPO). He was also Credit Suisse's analyst on Gazprom's IPO. While he was the global head of equity research at ING, Stuart oversaw the deal related research and valuation on more than a dozen other transactions in various sectors, including oil and gas, metals and mining, agriculture, cement and banking.

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