

Global Arbitration Review

# The Guide to Damages in International Arbitration

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Editor  
John A Trenor

Third Edition

# The Guide to Damages in International Arbitration

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Editor

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# Preface

This third edition of Global Arbitration Review's *The Guide to Damages in International Arbitration* builds upon the successful reception of the first two 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 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 third edition incorporates updated chapters from various authors and features several new chapters addressing such issues as best practices and issues in discounted cash flow models, full compensation and total reparation, and estimation of harm in antitrust damages actions.

We hope that this revised edition advances the objective of the first two 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**

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# Part III

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Approaches and Methods for the Assessment  
and Quantification of Damages

# 18

## Market Approach or Comparables

**José Alberro and Paul Zurek<sup>1</sup>**

### Introduction

This chapter discusses the market or comparables approach to valuation, also referred to as the relative valuation method because it estimates the value of an asset relative to the observed values of similar assets, typically called ‘comparable assets’ or simply ‘comparables’. When the value of comparable assets is based on observed transactions (e.g., prior acquisitions of companies in the same industry), the approach is also referred to as the guideline transaction method.<sup>2</sup>

Valuing an asset typically involves establishing the value that would be assigned to it by participants in an arm’s-length transaction. The most obvious and simple reference is the price at which the asset most recently exchanged hands. Yet, this method may be unfeasible or impractical if the asset has not traded recently or if such trading does not fit the criteria of an arm’s-length transaction, as may be the case when valuation disputes arise.

Financial economic theory posits that rational, utility-maximising economic agents assign values to assets by discounting expected future cash flows realised from owning them. This idea underlies the discounted cash flow (DCF) valuation model and approach, which entails explicitly spelling out an asset’s expected future cash flows and discounting them using a risk-adjusted discount rate. Comparables valuation is an alternative – and a complement – to the DCF approach. When correctly executed, it too is an implementation of the fundamental insight that economic agents assign asset values based on expectations of discounted future cash flows because the observed values of the comparable assets reflect future cash flow expectations. As we show in this chapter, the comparables valuation

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<sup>1</sup> José Alberro is a senior adviser and Paul Zurek is a principal at Cornerstone Research.

<sup>2</sup> Note that observed values do not need to be derived from transactions on an exchange – it may be sufficient to observe transaction prices or values outside of the public market context.

approach can be used to value assets in international arbitration and litigation in a way that is consistent with more traditional methodologies such as the DCF approach.

The comparables approach measures the value of an asset by reference to the observed values of other assets with similar but not necessarily identical characteristics. The method relies on the proposition that assets with similar characteristics, especially risks and cash flow prospects, will trade at similar prices because otherwise arbitrage profits would be possible.<sup>3</sup> An example of a comparables valuation is when a prospective buyer of a house decides how much to offer by looking at prices paid for similar houses in the same neighbourhood. This approach is reasonable because house prices are generally thought to be driven by common factors that can be enumerated and quantified (e.g., size), and they respond similarly to economic trends, at least within a specific geographical area.<sup>4</sup>

One key difference between the comparables approach and the DCF model is that the former does not explicitly spell out the economic agents' expectations of future cash flows or discount rates. Instead, the expectations and discount rates are embedded in the observed prices of the comparable assets. For example, the market price of a house can be thought of as the discounted value of expected future rents (cash flows) that can be realised by an investor who purchases the house. Because being explicit about expectations and discount rates is not needed to perform a comparables valuation, the method is potentially simpler to implement, but is generally less transparent regarding the underlying assumptions. Still, it is important to recognise that even though the cash flow and discount rate assumptions are not explicitly spelt out in a comparables valuation, they are drivers of the valuation. Thus, to the extent that the assumptions underlying the values of the comparable assets are not appropriate to value the asset at hand, the comparables approach may not yield the correct valuation.

Because even assets that may appear similar can differ in significant respects, the appropriate use of the comparables valuation method requires making adjustments to take into account the impact of those differences on the value of the asset. Valuation ratios (also referred to as valuation multiples), defined as measures of value divided by a scaling factor, are the most direct method of accounting for observed differences along a single dimension, typically some measure of size. For example, the prospective buyer of a house may adjust her offer price to reflect differences in square footage of comparable properties by using a valuation ratio of average price per square foot. If houses in the neighbourhood that were sold in the recent past fetched an average price of \$400 per square foot, a buyer may expect to pay \$400,000 for a 1,000 square foot house.

In addition to adjustments for size, other adjustments may be called for to ensure comparability: the prospective house buyer may want to take into account the age of the house, the size of the property, the presence of a garage, etc. Adjusting the valuation for these characteristics could be implemented by carrying out, for example, a regression of the price-per-square-footage ratio on observed characteristics, such as the age of the house, or

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3 Economists define arbitrage as a trading strategy that yields profits without risk. Arbitrage opportunities are often assumed not to exist in well-functioning markets, because market participants would otherwise trade on these opportunities thereby moving the market price and eliminating them.

4 The impact of property characteristics and economic conditions on house prices is ultimately an empirical matter. In our example, we focus on general findings for the US real estate market.

by focusing only on observed sales of homes that are similar across all dimensions. Such adjustments are ways to transform the implicit and varying assumptions and characteristics underlying the observed values of comparable assets (in our example, prices of recently sold houses in the same neighbourhood) into a valuation ratio that is compatible with the asset being valued (the specific house the buyer wants to purchase).

In addition, because the overall market conditions may change between the time prior transactions are observed and the valuation date, practitioners also consider the recency of comparable prices. In our house sale example, a buyer making an offer during an economic expansion (which generally sees house prices rise) informed by prices observed during an economic contraction may undervalue the house.

Note that the \$400,000 estimate for the value of the house above based on its square footage was computed using an average measure of value.<sup>5</sup> It may be useful to know that actual sales occurred in the range of \$300 to \$500 per square foot, which implies a range of valuations from \$300,000 to \$500,000. In general, even though a valuation may be presented in terms of a single point estimate (\$400,000 based on average sales prices), it can be instructive to understand the range of possible values implied by comparable transactions.

The comparables method may be used to value any asset when information about values of similar assets is available. This includes the entire assets or the equity of companies, as well as other types of assets such as real estate and financial securities. The key to implementing the comparables approach is to identify similar assets with observable values, and use an appropriate valuation ratio and control for relevant differences. What constitutes relevant differences will vary depending on the asset being valued. For instance, older homes with the same square footage may sell for less than otherwise similar newer homes, which implies that either only sales of homes of comparable age should be considered or that age should be explicitly factored into the calculation of the multiple. When valuing companies, expectations regarding the growth rate of future earnings and cash flows must be accounted for.

Next, it is worth remembering that any valuation method that does not directly use an observed arm's-length price incorporates a degree of uncertainty. Unless a transaction price for the exact asset being valued is observed on the valuation date (and potentially even at the exact valuation time in the case of some financial assets), all valuation methodologies involve assumptions and adjustments and, therefore, judgement on the part of the appraiser. This is equally true of both the DCF methodology and the comparables valuation approach.

Finally, because the comparables approach typically relies on market prices of assets, it assumes that the market is valuing them correctly. Thus, if the market is overvaluing comparable firms, the valuation of a firm will be too high relative to its 'fundamental' value.<sup>6</sup> When deciding whether to bid for an asset for investment purposes, one may be concerned about the relationship between the asset's fundamental value and its prevailing market price.

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5 As discussed later in this chapter, valuation ratios based on median valuations may be preferred to average valuations, because averages can be sensitive to outliers.

6 Note that many economists believe that, in the absence of a party having access to value-relevant private information, the market price is the best indication of 'fundamental' value, especially when participants in a well-functioning market are rational economic agents.

However, when deciding how much to bid, one would want to bid an amount informed by the value the market would place on the asset.

This chapter is organised as follows. First, we describe seven steps that will typically be undertaken when performing a comparables valuation and discuss what makes for an appropriate comparable asset. We then discuss in more detail the relationship between a comparables valuation and the DCF approach and conclude with a discussion of when the comparables approach is appropriate and when it is not.<sup>7</sup>

### **Typical steps in performing a comparables valuation**

The process to perform a comparables valuation entails, at a high level, seven distinct but complementary steps:

- 1 Understand the asset being valued and its relevant valuation drivers.
- 2 Identify a set of potentially comparable assets.
- 3 Assess comparability and understand relevant differences.
- 4 Identify valuation ratios or multiples.
- 5 Collect data and perform calculations.
- 6 Apply the comparables-based ratio to the asset being valued.
- 7 Understand key sensitivities and compare results to estimates obtained using alternative methodologies, if available.

While different valuation practitioners may use a different number of steps or a different ordering of the steps, we consider that most comparables valuations will take into account the analyses associated with these seven steps.

#### **Step 1: Understand the asset being valued and its relevant valuation drivers**

The first step in performing a comparables valuation (in fact, any valuation) is to understand the asset being valued, its characteristics and the associated valuation drivers. When valuing a company, for example, one may be interested in knowing the value of the whole enterprise or the value of common equity.<sup>8</sup> While the overall valuation approach may be similar regardless of the particular asset, it is important to be aware of complications that may be present owing to the specific nature of the asset at hand. Suppose that an appraiser wants to value a particular class of equity such as preferred equity. If the valuation methodology

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7 Given the inherent space limitations when writing an overview, readers interested in additional information about the comparables approach (including a more detailed exposition of commonly used valuation ratios) are encouraged to consult a valuation textbook. E.g., 'Valuation: Measuring and Managing the Value of Companies' by Tim Koller, Marc Goedhart and David Wessels; 'Investment Valuation: Tools and Techniques for Determining the Value of Any Asset' by Aswath Damodaran; and 'Corporate Valuation: Theory, Evidence & Practice' by Robert W. Holthausen and Mark E. Zmijewski.

8 The value of the whole enterprise is the value of the company's assets, regardless of ownership. Ownership claims to assets typically belong to a combination of equity holders, debt holders and other claimants; the claims may be distinguished by different priorities and rights. Equity claims are typically junior in payment priority to claims by debt holders. Preferred and common equity claims typically differ in cash flow rights and payment priority, with common equity being the most junior claim on the company's assets. For a company that only has debt and common equity in its capital structure, one can derive the value of the common equity by subtracting the value of debt from the value of the whole enterprise.

used yields a combined estimate of value for all equity classes, additional adjustments may be necessary to account for different rights (e.g., voting or cash flow rights) associated with the different classes of equity; that is, it may not be appropriate to divide the total estimate of value by the total number of shares if all the shares are not identical.

Next, the appraiser should develop a general understanding of the value drivers for the particular asset class or in the particular industry. To value a home, the appraiser would consider macroeconomic trends and individual characteristics of the property such as size and age. To value a business, the appraiser would study the particular segment of the market being served by the company, which may impact its valuation because of differences in, say, profit margins.

As an example, consider two hypothetical companies, LuxuryPC and BeigeBox, both involved in selling computers to consumers. Suppose it is generally understood that LuxuryPC caters to the high end of the computer market while BeigeBox offers more of a commoditised product, which tends to have lower profit margins. If a revenue ratio (i.e., company value divided by revenues) were to be used to value the operations of a computer maker, it may not be appropriate to compare a \$1 billion revenue company in the high-end segment (such as LuxuryPC) to a \$1 billion commodity player (such as BeigeBox) without adjusting for the difference in profit margins. Knowing such fundamental value drivers is useful when selecting comparable assets and valuation ratios to be used, because, as discussed later, certain ratios are more sensitive to certain value drivers than others.

In addition to understanding fundamental economic forces that affect valuations, an appraiser may also become familiar with data on the performance of the asset being valued. Examples include the asset's recent performance metrics, such as trends in revenue growth and costs, as well as management or analyst projections for the performance of the asset in the future, including expectations about the overall asset class or industry. This information can be useful, among other things, in understanding the impact of differences between the comparable assets chosen and the asset being valued.

## Step 2: Identify a set of potentially comparable assets

The second (and arguably most important) step in a comparables valuation is the appropriate identification of assets that are comparable. The goal is to select assets that have observable valuations and are similar to the asset being valued. For assets to be comparable they should be similar across relevant valuation drivers; the key issue is whether the assets under consideration have similar future prospects, that is, expected future cash flows, growth rates and risks. While the exact valuation drivers will vary with the particular valuation ratio being used, growth and discount rates are a common and important general category of drivers.

There are some additional guidelines to consider when selecting comparable assets. First, the comparables must have observed prices or values. Ideally, these assets should trade in a liquid market so that their observed values reflect recent assessments of their future prospects. In practice, one often finds assets that have unique characteristics such that no comparable assets trade in a liquid market. In such cases (or even when there are traded assets that are dissimilar on key dimensions), values derived from comparable private transactions can also be used.

If the comparable transactions are observed only infrequently, they may be less useful as a result of changes in market conditions between the time the transactions occurred and the valuation date. This again is not uncommon in practice. For example, one may observe sales of assets, divisions, or entire companies that are similar in the underlying valuation drivers but relatively far removed in time. Judgement is required to evaluate the trade-off between relevance and recency of valuation information; in some circumstances, non-recent transactions may still provide an adequate estimate of value.

Second, in addition to observed prices or values, adequate information about the financial performance or operations of the comparable assets must be available in order to allow for the calculation of valuation ratios. For example, some analysts compare telecommunication businesses based on enterprise value per subscriber ratios. To perform such a comparison, information about subscribers must be available for the comparable assets as well as for the particular asset being valued.

Although this is certainly circumstance-specific, multiple comparables are generally preferred to a single comparable; yet, it may be the case that a single, truly similar asset would yield a better estimate of value than multiple assets that are dissimilar on important dimensions. There is ultimately no formal rule for the number of comparables needed for a valuation; judgement is often required. We have seen valuations, especially in the context of investor-state arbitration, where the asset at issue is so unique that only a few potential comparable projects exist, and still they differ on some dimension such as the country in which the asset is located. Nevertheless, these comparables may yield an acceptable indication of value.

Finally, different approaches can be taken to the initial selection of candidate comparable assets. For example, an analysis may start with all assets within a certain industry (e.g., all public companies in the same GICS classification)<sup>9</sup> or class (e.g., all publicly traded financial institution retail preferred shares or all subprime mortgage-backed securities of recent vintage). Alternatively, an analysis may focus on a narrower set of potential comparables as identified using the appraiser's industry knowledge, market analyst commentary, or in the case of company valuation, information from the company's management or public filings. Again, a trade-off arises: while a larger number of comparable assets provides potentially more data, the likelihood that all those comparables are truly similar (have similar growth rates and risks) is lower, which requires more effort to account for the differences.

### Step 3: Assess comparability and understand relevant differences

Armed with an understanding of the key valuation drivers (growth rates, discount rates and potentially other factors specific to a given valuation ratio) and having chosen a potential set of comparable assets, an assessment of comparability should be performed to confirm that the chosen comparables are indeed similar on relevant dimensions. This exercise generally requires significant judgement and is circumstance-specific as there are no standard and generally accepted criteria to determine whether a particular comparable asset is similar enough to be used in the analysis. For this reason, it is generally more transparent to apply

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<sup>9</sup> GICS is an industry classification system that classifies companies based on, among other factors, principal business activity. See [www.msci.com/gics](http://www.msci.com/gics). Examples of other industry classification systems are SIC and NAICS.

a set of objective, replicable and disclosed criteria, although subjective adjustments may nevertheless be necessary and should be documented if used.

The particular set of metrics used to assess comparability will depend on the asset being valued. Both quantitative and qualitative factors can be assessed. We next present some commonly applied heuristics when choosing comparables. However, ultimately it is the similarity in expected future cash flows (including their growth and risk) that determines whether a given asset is a good comparable. In practice, when valuing an asset using the comparables approach, it is common to rely on proxies for cash flows and risks.

Quantitative factors that may be considered when choosing comparables are quantifiable characteristics of the asset (e.g., age, size or scale), various measures of historical or expected profitability or performance (e.g., return on equity, return on assets or profit margins), historical and expected growth rates, as well as measures of variability of these variables (e.g., earnings volatility). The quantitative factors could be controlled for by either restricting the choice of comparables to those that match the values of the factors or by modifying the observed multiples for the comparables to account for the differences in factors, by estimating a regression or using other methodologies. In the home purchase example, the quantitative factors could be the number of bedrooms, the number of bathrooms and years since construction or last renovation.

Qualitative factors are characteristics of the asset that cannot be measured using a quantitative variable and include the industry and business model (e.g., products and services, customers or distribution channels), differences in cash flow rights or contractual restrictions on the asset (e.g., control rights, priority in bankruptcy proceedings or liquidation, or ability to dispose of the asset freely without restriction), and the location of the asset or company (e.g., geography, accounting, or regulatory and tax regimes). Qualitative factors cannot generally be easily controlled for by modifying the multiple. However, adjustments such as restating financial quantities under a common accounting treatment are sometimes possible. The qualitative factors in the home buying example may include the quality of the neighbourhood, the desirability and location of the parcel of land upon which the house is built (e.g., a cul-de-sac) and the quality of schools.

An additional diagnostic can be performed once the relevant valuation ratios are chosen and calculated, namely analysing the dispersion in ratios across the comparables set. A wide dispersion may indicate that the comparables have value-relevant differences and therefore are not all comparable to the asset being valued. Understanding the drivers of the dispersion can be useful in making appropriate adjustments or selecting the appropriate ratio.

For example, companies with high fixed costs (high operating leverage) may be vulnerable to economic downturns, in which case understanding differences in cost structure across companies may be important when gauging comparability, because companies with relatively lower operating leverage may trade at higher valuations owing to lower risk.

Having assessed comparability, the decision of whether a comparable will be kept in the analysis or removed needs to be made. If a decision to use the given comparable is made, it should be further ascertained whether adjustments will be needed for relevant differences between the comparable and the asset being valued. At the very least, the impact of including an asset of uncertain comparability may need to be quantified when discussing valuation sensitivities.

#### Step 4: Identify valuation ratios or multiples

After selecting comparable assets, identifying the valuation ratio or multiple is arguably the second most important decision in a comparables valuation. As discussed previously, valuation ratios or multiples are typically measures of value in the numerator divided by a scaling factor such as size in the denominator. In the home valuation example, we mentioned the price-per-square-foot ratio.

The choice of the valuation ratio is a matter of judgement, although there are some general guidelines. First, based on the nature of the asset being valued, there are different valuation drivers, and thus different types of valuation ratios as distinguished by the value in the numerator (e.g., enterprise value or market value of common equity<sup>10</sup>) and the value in the denominator (e.g., different measures of earnings, revenues, or other quantities). For example, when valuing firms and businesses, values can be assessed using ratios based on earnings (e.g., price-to-earnings or PE ratios, and enterprise value-to-EBITDA<sup>11</sup> ratios), based on revenues (e.g., enterprise value-to-sales ratios), based on book value or replacement value (price-to-book ratios), or based on other measures that are specific to firms in a particular sector. Consistent with the intuition that valuations are a function of expected future cash flows, some academic literature has found forward-looking multiples (such as multiples that use forecasted future earnings) to be more accurate in explaining equity prices than multiples based on historical performance. Some academic research also supports the notion that multiples based on measures that are relatively far removed from cash flows (such as revenues) may not perform as well as other measures.

Second, certain ratios are more common in some applications than others. For example, price-to-book ratios such as market-value-to-book-value of common equity multiples are commonly considered when valuing equity in financial institutions.<sup>12</sup> Enterprise-value-to-subscribers ratios are sometimes used by telecom analysts. EBITDA-based ratios are used in recapitalisations, because EBITDA may be considered independent of the capital structure. For asset-backed securities, ratios such as value-to-notional or outstanding principal may be relevant. In the oil and gas industry, ratios based on earnings before interest, taxes, depreciation, depletion, amortisation and exploration expenses (EBITDAX) are used along with ratios based on traditional earnings measures such as EBITDA; in addition, enterprise-value-to-proven (or total reserves or daily production) ratios are utilised to compare companies.

Third, certain ratios, although common for a given industry or asset class, may not apply in every case. For example, earnings multiples (i.e., ratios of value and a measure of earnings) are not well defined when earnings are negative. However, even companies with negative earnings generally have positive valuations since losses are not expected to

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10 As explained previously, enterprise value is a measure that reflects the value of a whole business. It is the sum of values of claims by all claimants: creditors (secured and unsecured) and shareholders (preferred and common). In turn, equity value is the value of the company available to owners or shareholders.

11 EBITDA is defined as earnings before interest, taxes, depreciation and amortisation, and is a measure of earnings commonly used in valuations.

12 Market capitalisation (commonly referred to as market cap) is the market value of the outstanding shares of a publicly traded company, and equals the share price times the number of shares outstanding.

continue indefinitely. In those cases, market analysts often use ratios based on revenues instead of earnings since revenues are generally non-negative.

Fourth, it is important to understand which fundamental drivers impact the multiple and, in particular, how the multiple is expected to vary across firms with differences in characteristics. This knowledge, together with an assessment of comparability and relevant differences between the asset being valued and the comparables set, can then be used to select a multiple that is relatively less sensitive to such differences.<sup>13</sup>

Finally, it may be appropriate to consider more than one valuation ratio to estimate the value of a given asset. In practice, different valuation ratios may yield different valuations. Understanding the reasons for such differences in implied valuations and the relative pros and cons of each multiple chosen can be informative to an overall value assessment.

### Step 5: Collect data and perform calculations

Once comparable assets have been identified, financial and other data on these assets should be collected to assess comparability and calculate valuation ratios. Potential sources of information include primary sources, such as stock exchange feeds, public filings and offering prospectuses, and secondary sources such as data aggregators like S&P, Capital IQ and Bloomberg. When using data from secondary sources and especially when using pre-calculated valuation ratios, it is important to make sure that the secondary source is consistently calculating ratios for each asset, making appropriate adjustments as needed.

Consistency in valuation ratio calculations is a key consideration. First, there often is not one unique, agreed-upon definition for many of the commonly used valuation ratios. For example, PE multiples, broadly defined as share price divided by earnings per share, can be calculated in several different ways using alternative measures of earnings (e.g., trailing, reported historical, forward looking, with and without adjustments for one-time items) and alternative measures of shares outstanding (e.g., measures that do or do not account for dilution because of the exercise of outstanding employee stock options). Abstracting from the relative merits of the various measures, it is critical that the valuation ratios be calculated using the same definition for all assets in the comparables set and for the asset being valued.

Second, ratios should ideally be computed over a common time period, which may not be straightforward. For instance, a trailing measure of 12-month earnings can be challenging to calculate when the comparable assets have different reporting periods. When performing a historical valuation as at some past date, an additional timing issue arises. Suppose that the valuation date is in February of year 2 and the appraiser would like to use a valuation ratio based on historical year 1 earnings, which are not released until March of year 2. It can be argued that year 1 earnings are knowable as at the valuation date. However, market prices may not fully reflect such earnings since they are not public information at the time. Whether actual year 1 earnings can be used or whether an estimate as at the

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13 Note that an argument could be made that the selection of the valuation ratio should be made first, before selecting comparable assets, because different valuation ratios can potentially have different valuation drivers, and the selection of comparable assets should be made with the associated valuation drivers in mind.

Depending on the circumstances, either approach may be acceptable; in fact, the process can sometimes be an iterative one.

valuation date should be used is to some extent a matter of judgement, and the totality of the circumstances surrounding the valuation should be considered.

Finally, inputs used in computing ratios should, to the extent possible, be standardised for differences in accounting standards (e.g., US GAAP versus IFRS). While accounting standards have been converging over time, the treatment of certain items is not always consistent across firms. Failing to account for different accounting treatments and other factors may distort the multiples calculations. Examples of adjustments that are sometimes made when calculating multiples include standardising inputs to consistently account for pension obligations, operating leases, capitalised expenses, one-time items, potential share dilution, minority interests and excess cash.

### Step 6: Apply the comparables-based ratio to the asset being valued

At this point, we have identified a set of potential comparables, assessed their degree of similarity to the asset being valued, and selected and computed valuation ratios. In this step, the valuation ratios are applied to the asset being valued to arrive at an estimated valuation.

An obvious question that arises is how to translate the calculated ratios of multiple comparables into a prediction of value for the asset at issue. Several approaches can be utilised. One may use the median or average ratio to produce a valuation, report the range of valuations associated with the range of observed ratios for the comparables, or estimate a regression to account for observed differences in the comparable assets. In practice, the most commonly used approach is to report a valuation based on the median multiple. Such an approach should generally produce a reasonable estimate of value, as long as the comparable assets are similar to the asset being valued on relevant dimensions such as cash flow, growth and risk expectations.

Valuations based on the median ratio are more commonly used than valuations based on averages (i.e., arithmetic means) because averages can be influenced by outliers and missing data to a larger extent than medians. Outliers that occur as a result of measurement issues are of particular concern. For example, when using multiples based on reported past earnings, companies with recent low earnings may appear to trade at unusually high multiples. In addition, if ratios can be calculated for only a subset of comparables because of lack of data, the average measure may be biased. Again, suppose that a historical earnings multiple is used and that some companies had negative earnings. In this case, one can only use the multiple for companies with positive recent earnings. This may result in an upwards-biased estimate of the multiple if companies with negative earnings have lower relative valuations.

Unless there is reason to believe that the asset being valued is most like the comparable associated with the median multiple, reporting a range of valuations may be informative. Even if the midpoint is the best estimate, a reported range can be useful in quantifying the uncertainty of the estimated valuation.

So far, the discussion has assumed that an assessment of comparability led to the conclusion that the comparables included in the set are similar enough to the asset being valued, such that the median valuation is the best point estimate. However, in practice, it is often the case that there are differences between comparables and the asset being valued that may impact the appropriateness of the median valuation. One possible solution to this problem is to use subjective judgement to restrict the set of comparable assets to those deemed the

most similar to the asset being valued. If this is done, best practice would be to document the basis for such judgement.

Some authors and valuation practitioners describe an alternative approach. They propose using quantitative techniques to control for the impact on valuation ratios of observed differences between assets. One such technique we have already mentioned is regression analysis. Suppose that a PE multiple based on historical earnings is used. This ratio measures the price (in terms of common equity value) that the market assigns to one dollar of reported earnings. Economic theory suggests that, all else being equal, the price paid per dollar of earnings should be higher if the earnings are expected to grow at a faster rate, higher if the company is expected to pay more of its earnings as dividends, and lower if there is more risk associated with the particular company.<sup>14</sup> A regression analysis of the PE ratio could be performed using measures of earnings growth, the payout ratio (how much of the earnings are paid out as dividends) and risk. Results of such a regression for the US stock market are available from Professor Aswath Damodaran's website.<sup>15</sup> Based on the most recent results available as at the writing of this chapter in 2017, there is a statistically significant relationship between PE ratios and the variables described.

Having estimated an appropriate regression for the valuation ratio of interest (with the explanatory variables ideally chosen according to economic theory), the values of the explanatory variables for the asset being valued (the earnings growth, payout ratio and risk) can be 'plugged in' to output an estimated valuation ratio (and an associated confidence interval) that can then be used to perform the valuation (and quantify the uncertainty inherent in the estimate). We do note that while this approach is intuitively appealing, its applicability can be limited by the number of observed valuation ratios for the comparable companies, because coefficients in a regression are estimated less precisely in small samples. However, this is nevertheless a tool that can be helpful, even if only to inform how observed differences across assets impact valuation ratios in terms of direction and magnitude.

Another approach to dealing with differences in comparability is to apply an adjustment directly to the valuation resulting from the application of valuation ratios. Examples of such adjustments are adjustments for marketability, control premiums or minority discounts.

Discounts for lack of marketability are sometimes applied to the valuation of privately held assets when the valuation is based on values of publicly traded assets. The economic intuition is that it is more costly (in terms of time and marketing or search costs) to convert closely held assets into cash than it would be to convert publicly traded assets such as public equity, which can generally be sold quickly in the public market with relatively low transaction costs. Therefore, buyers of closely held assets may demand a discount to compensate for these costs. There is also some evidence that buyers are sometimes willing to pay a premium for a controlling stake in a company but demand a discount for a minority stake. The exact magnitudes of such discounts or premiums vary depending on the particular study and can also vary when using different metrics and across countries.

The requirement for making adjustments is to have an empirical basis for the amount of the adjustment, such as cross-sectional studies in the academic literature. However, even

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14 See the discussion below in the section entitled 'The relationship between the comparables and DCF approaches' for more details on the PE ratio and its fundamental drivers.

15 See [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/MReg17.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/MReg17.html).

if information about average discounts or premiums is available from cross-sectional studies, making an adjustment requires a degree of judgement to account for the particular circumstances of the asset being valued. Therefore, adjustments should be performed with care, as transparently as possible, and probably after considering a range of reasonable adjustments as opposed to relying on a point estimate.

**Step 7: Understand key sensitivities and compare results to estimates obtained using alternative methodologies, if available**

The final step of the comparables valuation process involves ‘sanity checking’ and understanding the results of the valuation exercise and its potential limitations. Key valuation drivers, the comparability of the asset set, as well as reporting a range of possible valuations, when appropriate, have already been addressed.

Having arrived at an estimated valuation, it is often useful to step back and develop some economic intuition for where the asset being valued fits in the valuation range implied by the comparable assets. This can be done by examining the magnitude and direction of differences in valuation drivers between the asset and its comparables. For example, when dealing with a privately held company and valuing it using publicly traded comparables without making explicit adjustments for marketability, a median-based valuation may overstate value. This may imply that, as opposed to being valued at the median multiple, the asset should be valued in the lower end of the multiples’ range or even below it. On the other hand, if the asset being valued is expected to experience a relatively higher rate of cash flow growth than its comparables, its valuation may be more likely to fall in the upper end of the multiples’ range. Note that such a directional analysis is not a substitute for having an adequately comparable set of assets; however, if the remaining differences are small, it does provide some intuition about the result.

When the comparables set is relatively small, it may also be worth examining the effect of removing assets from that set on the median multiple because if there is sufficient variation in multiples, even a relatively small change in the composition of the set can affect the median multiple. For example, consider the following set of multiples: 4.2, 4.7, 5.0, 7.3 and 7.4. Removing the observation with the lowest multiple (4.2) would change the median from 5.0 (the middle value in the original set) to 6.2 (the average of 5.0 and 7.3, the middle two remaining values), which could substantially change the ultimate valuation result. Of course, the observed range of multiples may indicate that the comparables were not truly comparable to begin with and that the observed differences need to be controlled for in some fashion.

Next, if using more than one ratio, the closeness of the valuations implied by the different ratios should be assessed. To the extent that the results are not sufficiently close (the exact threshold being circumstance dependent), it is important to understand the reasons for the difference. For example, a valuation based on a revenue ratio may be higher than one based on an earnings multiple for a company that has relatively higher costs than companies in its comparable set.

Finally, if a DCF valuation was also performed, the appraiser may consider investigating meaningful differences in results between the two approaches.

## The relationship between the comparables and DCF approaches

In the introduction we explained that the comparables approach is an alternative – and a complement – to the DCF approach. When correctly executed, it too is an implementation of the fundamental insight that economic agents assign asset values based on discounted expectations of future cash flows, because, when performing a comparables valuation, those expectations are embedded in the observed values of the comparable assets. We now expand on this intuition. Because DCF analyses are most commonly performed when valuing companies and businesses, we will use company valuation as an example.

Underlying a DCF valuation are assumptions about expected future cash flows and assumptions about the cost of capital and the discount rate. In addition, it is customary to build a model of future cash flows by making assumptions about fundamentals such as net revenues, investment, profit margins and earnings, including their rates of growth.

Several of the previously discussed multiples can be derived from a fully specified DCF calculation. For example, an EBITDA multiple can be computed by dividing the DCF implied value of the company by a measure of EBITDA based on the projected financials used to derive the cash flows. Similarly, the PE ratio can be computed by subtracting the value of debt from the DCF-implied value of the enterprise (to estimate equity value) and then dividing by a measure of earnings used in the cash flow projections. A comparison between DCF-implied multiples and multiples obtained directly from a comparables set can be informative. Finding that the two are close is consistent with the underlying assumptions in the DCF model being compatible with the implicit assumptions embedded in the valuations of the assets in the comparables set. While such a finding may provide a degree of comfort, it does not prove that the valuations are necessarily correct, because assumptions underlying both the DCF valuation and the comparables valuation may nevertheless be inappropriate for the asset being valued. If the DCF-implied value is meaningfully different from that implied by multiples, it may be useful to understand why the difference exists.

An observed multiple may also be expressed as a function of its underlying fundamental components that can then be mapped to DCF inputs. For example, the forward PE multiple (value of equity scaled by expected future earnings) can be shown to be a function of a discount rate ( $r$ ), a growth rate ( $g$ ) and a measure of investment intensity called the ploughback or retention ratio ( $pb$ ). As a general matter, earnings can either be reinvested into the business or paid out as dividends, and the ploughback or retention ratio is defined as the fraction of earnings that is reinvested. These three variables ( $r$ ,  $g$  and  $pb$ ) are also inputs (either directly or indirectly through related assumptions) into a DCF valuation.<sup>16</sup>

The forward PE ratio is defined as:

$$P/E = \frac{\text{Market Price Per Share}}{\text{Expected Forward Earnings Per Share}}$$

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<sup>16</sup> Given that the PE ratio is used to value common equity, we are making a comparison to a DCF valuation of common equity, which is a variation of the DCF methodology for valuing the entire company. Therefore, the discount and growth rates discussed here are rates that are applicable to common equity.

The market price per share can be thought of as the discounted sum of all future dividends.<sup>17</sup> The market price per share can thus be written as follows, under certain assumptions (stable growth and discount rates) and using a perpetuity formula:<sup>18</sup>

$$\text{Market Price Per Share} = \frac{\text{Expected Forward Dividend Per Share}}{r - g}$$

The expected forward dividend per share is the amount of expected forward earnings per share paid out as dividends, that is, not reinvested in the business. Given that the ploughback ratio (pb) is the fraction of earnings that is reinvested, the fraction of earnings that is paid out as dividends is equal to one minus the ploughback ratio. Therefore, replacing expected forward dividends per share (next period's dividend) with the product of forward earnings per share (next period's earnings) and one minus the ploughback ratio (the amount of next period's earnings that is not reinvested but paid out as dividends), yields:

$$\text{Market Price Per Share} = \frac{\text{Expected Forward Earnings Per Share} * (1 - pb)}{r - g}$$

Plugging this expression into the definition of the PE ratio above yields:

$$P/E = \frac{1 - pb}{r - g}$$

This decomposition shows that PE ratios depend on investment policy (pb or how much of earnings is reinvested in each period) and growth  $g$  as well as risk, which affects the discount rate  $r$ .<sup>19</sup> Therefore, when applying PE ratios in a valuation, the assets in the comparables set should embed similar investment policy, growth and risk expectations.

Similar calculations can be performed for other valuation multiples. For example, under certain assumptions, an enterprise-value-to-EBITDA multiple can be expressed as a function of the weighted average cost of capital (WACC), a growth rate, net investment, change in working capital and the tax rate, which are all components or inputs of a DCF valuation.

Finally, it is useful to note that DCF valuations sometimes rely on inputs calculated using comparables. This most often arises in two instances. First, it is customary to calculate inputs to cost of capital calculations using peer companies. Second, some DCF valuations apply terminal exit multiples to calculate the terminal value of cash flows instead of making explicit terminal growth rate assumptions. Such exit multiples may again be based on comparable companies. The caveats when choosing the right comparables set would then apply to the DCF valuation as well.

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17 This is known as the Gordon growth model.

18 Readers interested in a more detailed discussion are invited to consult a corporate finance textbook (e.g., 'Corporate Finance' by Stephen A. Ross, Randolph W. Westerfield and Jeffrey Jaffe). The expression is based on a perpetuity DCF formula using a constant over time growth and discount rate.

19 Note that investment and growth are linked, which is not explicitly shown above.

## **When to use the comparables approach**

The comparables approach can be a useful valuation technique, either stand-alone or in conjunction with other approaches such as the DCF approach. It is widely used by practitioners and can be useful in a number of valuation contexts. As discussed in this chapter, the use of this approach may be suitable when appropriate comparables can be identified and when they have recently observed values. Generally, four conditions need to be fulfilled.

First, comparables that are similar to the asset being valued in terms of future prospects (expected cash flows and discount rates) must be available. To the extent that differences do exist, they must not materially affect the valuation. If the differences do have a material effect, their impact on valuation should be properly controlled for.

Nevertheless, even in instances when there are material differences that cannot be controlled for, a comparables valuation can still provide useful information such as an upper or lower bound on value, as long as the directional impact of the material differences can be determined. For example, a valuation of a private company based on publicly traded comparables that are otherwise comparable would generally overstate its value because private companies may be subject to marketability discounts and thus have lower valuations than otherwise comparable publicly trading companies, which therefore provide an upper bound for the valuation.

Second, comparables need to have observed values. The values can either be observed transaction prices in public markets, values assigned in private transactions, or potentially but less commonly some other measures of value.

Third, the observed values of the comparables should be recent enough so as not to be stale. Assessing this criterion requires judgement regarding how much valuations would be expected to change over time.

Finally, appropriate valuation ratios need to be calculated consistently across the comparable set, using the same definition for each comparable.

When the comparables approach can be applied, its use can be quite appealing. The advantage is that it is intuitive and relatively easier to apply than the DCF method since it does not require making explicit assumptions about cash flows and discount rates. The downside of the approach is that these assumptions are still made, albeit implicitly, in the choice of the comparables set and in the valuation ratios being used. In a sense, the valuation of the asset at issue 'inherits' the assumptions embedded in the valuations and valuation ratios of the comparable assets. For this reason, if feasible, it can be informative to compare a valuation obtained using the comparables approach to a DCF valuation and to attempt to understand or reconcile differences in valuations.

# Appendix 1

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Dr Alberro holds a PhD in economics from the University of Chicago. He was a tenured full professor at the age of 33 and taught economics at universities in the United States, the United Kingdom and Mexico for 15 years. He has published extensively in academic journals; one of his papers was cited in the 1995 Nobel Prize in Economics Lecture. He is a member of the Mexican Academy of Science. His research and analyses have been widely published, including in the *ICSID Review – Foreign Investment Law Journal*, *The Journal of Damages in International Arbitration*, *The International Arbitration Law Review*, *Transnational Dispute Management* and the *International Commercial Arbitration Review*.

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