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VALUATIONS IN FINANCIAL REPORTING VALUATION ADVISORY 4: VALUATION OF CONTINGENT CONSIDERATION

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VFR Valuation Advisory #4

Valuation of Contingent Consideration

This communication is for the purpose of issuing voluntary guidance on recognized valuation methods and techniques.

Date Issued: February 14, 2019

Application: Business Valuation

Summary: When negotiating the purchase price of a business, contingent consideration is often used to bridge the price gap between what the seller would like to receive and what the buyer would like to pay. More generally, a portion of the purchase consideration may be contingent on the outcome of future events. For example, additional consideration may be paid if the acquired business meets certain targets (such as future revenue, margin, or profit targets), passes regulatory reviews, has successful litigation outcomes, meets covenants, or completes product development.

The valuation of contingent consideration is inherently challenging due to dependence on the occurrence of future events and the often complex structure of the payoff functions. It has also been an area for which limited guidance exists, therefore making it a suitable topic for an undertaking such as this one.

Valuation specialists strive to provide reasonably consistent and supportable fair value conclusions. To this end, it is believed that guidance regarding best practices on certain specific valuation topics would be helpful. The Appraisal Foundation selects topics based on those in which the greatest diversity of practice has been observed. To date, The Appraisal Foundation has issued three prior Valuations in Financial Reporting (VFR) Advisories as follows: VFR Advisory #1, *The Identification of Contributory Assets and Calculation of Economic Rents* (May 31, 2010); VFR Advisory #2, *The Valuation of Customer Related Assets* (June 15, 2016), and VFR Advisory #3, *The Measurement and Application of Market Participant Acquisition Premiums* (September 6, 2017).

The Appraisal Foundation wishes to express its utmost gratitude to the Working Group on *Valuation of Contingent Consideration* for volunteering their time and expertise in contributing to this Advisory. Specifically, sincere thanks to the following individuals:

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The views set forth in this Advisory are the collective views of the members of this Working Group and do not necessarily reflect the views of any of the firms that the Working Group members are associated with.

This Advisory was approved for publication by the Board of Trustees of The Appraisal Foundation on February 14, 2019. The reader is informed that the Board of Trustees defers to the members of the Working Group for expertise concerning the technical content of the document.

Valuation of Contingent Consideration

Table of Contents

Section 1: Introduction

This document (Valuation in Financial Reporting Advisory #4, hereinafter referred to as the Valuation Advisory), entitled *Valuation of Contingent Consideration*, is the result of deliberations by the Working Group on Contingent Consideration (the fourth Working Group in the "Best Practices for Valuations in Financial Reporting: Intangible Asset Working Group" series) and was developed with input received from interested parties.

As part of the initial recognition and measurement requirements under Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 805 – Business Combinations (ASC 805) and International Financial Reporting Standards (IFRS) Standard 3 *Business Combinations* (Revised) (IFRS 3R), contingent consideration included in a business combination must be measured at fair value as of the acquisition date. The purpose of this Valuation Advisory is to outline best practices in the valuation of contingent consideration for financial reporting purposes pursuant to ASC 805 and IFRS 3R. While there may be differences in the accounting related to contingent consideration under ASC 805 and IFRS 3R, the valuation principles for estimating the fair value of contingent consideration described in this Valuation Advisory are the same. The guidance in this document may also be applicable to estimating the fair value of contingent consideration for other purposes, including FASB ASC Topic 946 Financial Services—Investment Companies (ASC 946), as will be discussed in Section 2.

This Valuation Advisory is not intended to provide guidance on the accounting for contingent consideration. References to accounting concepts or rules used to provide context within this Valuation Advisory are specific to United States Generally Accepted Accounting Principles (U.S. GAAP), unless noted otherwise.

ASC 805 and IFRS 3R define contingent consideration as usually being an obligation of the acquirer to transfer additional assets or equity interests to the former owners of the acquiree as part of the exchange for control of the acquiree if specified future events occur or conditions are met (an "earnout"). However, contingent consideration also may give the acquirer the right to claw back previously transferred consideration if specified conditions are met (a "clawback").

1.1 Scope

The following discussion on the valuation of contingent consideration for financial reporting purposes requires an understanding of relevant accounting and valuation concepts. In-depth discussion of these concepts is beyond the scope of this Valuation Advisory and the reader is assumed to have a general understanding of these concepts. Specifically, the reader is assumed to have knowledge of relevant accounting and valuation concepts as they relate to the valuation of assets and liabilities for financial reporting purposes.

The Working Group recognizes professional judgment is critical in effectively planning, performing, and concluding a valuation. Professional judgment requires a process of fact-gathering, research, and analysis to reach well-reasoned conclusions based on relevant facts and circumstances available at the measurement date. Due to the nature of judgments, questioning and skepticism are appropriate. Even then, knowledgeable, reasonable, objective individuals can reach different conclusions for a given set of facts and circumstances.

The following important clarifications regarding this document are also made:

a) These best practices have been developed with reference to U.S. GAAP and IFRS effective as of the date this document was published. While the Working Group believes the best practices

described herein may have application outside of U.S. GAAP and IFRS, valuation specialists should not apply these best practices to valuations prepared under different standards/statutory requirements without a thorough understanding of the differences between those standards and U.S. GAAP and IFRS existing as of the date of this publication.

b) The discussions and examples in this Valuation Advisory make specific assumptions for illustrative purposes only. While general principles have been provided for guidance to assist in the valuation of contingent consideration, assumptions used in the valuation of any asset or liability should be based on situation-specific facts and circumstances.

c) The models used in the sample calculations are for illustrative purposes only and are not intended to represent the only form of model, calculation, or final report exhibit that is generally considered acceptable among valuation specialists.

d) The methods discussed in this Valuation Advisory are not intended to represent an exhaustive list; additional methods exist and may be developed in the future.

This document provides guidance related to valuation techniques that are used to value contingent consideration and includes detailed discussion of the following topics:

a) Fair value of contingent consideration and relevant concepts

b) Identification of typical structures of contingent consideration and key valuation issues

c) Valuation methodologies used to estimate the fair value of contingent consideration that are viewed to be representative of best practice, including

(1) Strengths and weaknesses of each methodology

(2) Applicability of methods

(3) Practical solutions or alternatives where appropriate

d) Methods for assessing the reasonableness of contingent consideration fair value estimates

e) Additional considerations related to any updates of the fair value of contingent consideration at subsequent measurement dates.

This Valuation Advisory include examples of several techniques relevant to the valuation of contingent consideration. Each example provides a set of facts and circumstances to demonstrate the associated valuation techniques discussed.

1.2 Intended Users

The intended users of this document are financial statement issuers, valuation specialists, auditors, and other interested parties.

1.3 Motivations for Structuring Contingent Consideration

As part of a business combination, companies may structure a portion of the purchase consideration contingent on the future performance of the acquired business or post-acquisition events. Contingent consideration can arise out of transaction negotiations for many reasons, including:

- Bridging the valuation gap – The buyer and seller may have differences of opinion regarding the outlook and associated risks for the acquired business or regarding the likelihood of certain post-acquisition events. The buyer may be unwilling to pay for value perceived by the seller's typically more optimistic outlook. This gap can be bridged by agreeing on an upfront price consistent with the buyer's perception of the outlook and risk, while providing for a contingent payment in the future if the seller's more optimistic outlook is achieved.

- Alternative financing – The buyer and seller could use contingent consideration to defer a portion of the purchase consideration to a later date when the buyer will have greater financial ability to pay as the business performs.
- Incentive for management – If the sellers have the opportunity to remain involved with or help contribute to the future success of the business, contingent consideration can be used to help incentivize and motivate the sellers to help the business meet certain targets.
- Sharing of risk and reward – Contingent consideration, whether an earnout or clawback, can provide a mechanism for the buyer and seller to shift and allocate risk by enabling the seller to share in the risk and reward related to future performance.

According to studies in recent years, the percentage of deals for private company targets that include contingent consideration is in the range of 19% to 38%, but can reach as high as 75% in industries such as biotech and pharmaceuticals.[1]

1.4 Motivation for Providing a Guide for the Valuation of Contingent Consideration

Valuation of contingent consideration can be challenging. Contingent consideration assets or liabilities are rarely traded and contingent consideration structures are often unique, making finding comparable traded assets or liabilities impractical. Contingent consideration is often related to the cash flows of the business, but the typical option-like, leveraged structures make it difficult to assess the appropriate discount rate to properly account for the risk of the contingent payments.

As a result, valuation of contingent consideration has been a subject of significant diversity in practice. Some valuation specialists use a simple probability-weighted methodology, but are not able to offer good support for what discount rate to use. Others use option-based models, which may be considered complex, lacking in transparency or difficult to understand.

The Working Group has explored various types of prevailing valuation methodologies and analyzed the strengths and weaknesses of each. In the process, we have gained an appreciation for the complexity of the issues surrounding contingent consideration valuation and a deeper understanding of how fundamental valuation principles should affect the choice and implementation of valuation methodology for contingent consideration.

1.5 Recommendations for Contingent Consideration Valuation Methods

For valuing contingent consideration, the market approach is rarely used due to the lack of an active trading market that provides reliable indications of value. The cost approach is also typically not appropriate, since typically there is no obvious way to estimate a replacement cost and the cost approach does not consider future expectations. The Working Group has observed two income approach methods for valuing contingent consideration commonly used by valuation specialists:

- In the Scenario-Based Method (SBM, see Section 5.3), the valuation specialist identifies multiple outcomes, probability weights these outcomes to arrive at an expected payoff cash flow, and discounts the expected payoff cash flow at an appropriate rate. The SBM discount rate addresses the time value of money (risk-free rate) over the relevant time horizon, Required Metric Risk Premium,[2] the contingent consideration payoff structure, and any counterparty credit risk.

[1] See the American Bar Association's 2017 Private Target Deal Points Study, SRS Acquiom's 2018 M&A Deal Terms Study, and Houlihan Lokey's 2014 Purchase Price Allocation Study.

[2] A "metric" is a quantifiable measurement unit or an event defined in the contingent consideration agreement, the value or occurrence of which will affect the amount of the contingent consideration to be paid (see Section 3.1). The Required Metric Risk Premium is a

- In the Option Pricing Method (OPM, see Section 5.4), the valuation specialist applies an appropriate discount rate to the relevant forecast in order to establish a risk-neutral forecast distribution for the metric underlying the contingent consideration, estimates the expected payoff cash flow in this risk-neutral framework, and then discounts the risk-neutral expected payoff cash flow at the risk-free rate over the relevant time horizon, adjusted for any counterparty credit risk.

Other methods also may exist or be developed in the future.

No single method for valuing contingent consideration appears to be superior in all respects and circumstances. Each method has merits and challenges, the methods differ in level of complexity, and there are trade-offs in selecting one method over the other.

However, the Working Group has concluded that there are contingent consideration types for which each of these income approach methods is typically most appropriate. As described in more detail in the remainder of this Valuation Advisory, the Working Group recommends the following to select a method for valuing contingent consideration:

a) If the risk of the underlying metric is diversifiable (see Section 4.3), e.g., achievement of a product development milestone, choose SBM

b) If the payoff structure is linear (e.g., a fixed percentage of revenues or earnings before interest, tax, depreciation, and amortization (EBITDA) with no thresholds, caps, or tiers, see Section 3.2.1), choose SBM

c) If the risk of the underlying metric is non-diversifiable *and* the payoff structure has thresholds, caps, tiers, or other nonlinearities, choose OPM

d) If the payoff structure is path dependent (e.g., a carry-forward feature, a catch-up provision or a multi-year cap) or is based on multiple interdependent metrics (see Sections 3.2.2 and 3.2.3), choose SBM or OPM as recommended above, using a technique that can handle these complexities (such as Monte Carlo simulation).

The Working Group does not recommend the use of SBM for nonlinear payoff structures involving a metric with non-diversifiable risk. In this situation, the SBM discount rate would have to be adjusted to account for the impact of the nonlinear payoff structure. However, the magnitude of the discount rate adjustment cannot be easily intuited and the Working Group is not aware of any reasonable "rules of thumb" for developing such adjustments. It is for this reason that OPM is recommended over SBM in this situation.

Whether applied to the expected payoff cash flow (as in SBM) or to create a risk-neutral expected payoff cash flow (as in OPM), the discount rate should incorporate a risk premium *associated with and appropriate to the underlying metric* for the contingent consideration. The Required *Metric* Risk Premium will often differ from the risk premium used to value the associated business, due to differences in risk between the underlying metric (such as revenue or EBITDA) and the long-term free cash flows of the business. For example, the long-term free cash flows of the business are generally riskier than revenues, due to a difference in leverage. Thus, even for a linear payoff structure, the contingent consideration discount rate will often differ from the weighted average cost of capital (WACC) and from the transaction internal rate of return (IRR).

measure of the excess return above the risk-free rate, or risk premium, that investors would demand to bear the non-diversifiable risk associated with an investment in the metric over the duration of the earnout, as discussed in Section 5.2.2.

The valuation of contingent consideration considers the value from the perspective of a market participant in a hypothetical sale or transfer of a contingent consideration asset (or liability) on a *standalone* basis post-transaction, i.e., separate from the related business and with the related business under the new ownership of the actual buyer. For this reason, no matter which valuation methodology is selected, all synergies relevant to the calculation of the payoff, *including buyer-specific synergies,* are generally included in the financial projections for the contingent consideration valuation.[3]

The remainder of this Valuation Advisory provides background information, key concepts, reasons for the recommendations above, additional and more detailed implementation recommendations, and examples and illustrations.

[3] Buyer-specific synergies are included unless excluded from or irrelevant to the definition of the metric underlying the contingent consideration.

Section 2: Accounting Background

2.1 Consideration Transferred in Business Combinations

From the acquirer's perspective in a business combination, ASC 805 and IFRS 3R require the recognition and measurement of the fair value (with limited exceptions) of identifiable assets acquired (including financial assets, fixed assets, intangible assets, and contingent assets), liabilities assumed (including financial liabilities and contingent liabilities), any consideration transferred, and any noncontrolling interest and/or previously held equity interest in the acquiree. The consideration transferred includes contingent consideration, which is required to be measured at fair value on the acquisition date. As mentioned previously, while the *valuation principles* for estimating the fair value of contingent consideration should be the same, there are differences between U.S. GAAP and IFRS regarding under what circumstances contingent consideration must be measured at fair value. For example, the guidance in ASC 805 and IFRS 3R require an acquirer to classify contingent consideration as an asset, a liability, or equity based on U.S. GAAP or IFRS, respectively. Differences in the related U.S. GAAP or IFRS might cause differences in the initial classification and, therefore, might cause differences in the subsequent accounting. Discussion of these accounting differences is beyond the scope of this document.

Furthermore, while the details of the acquirer's accounting classification of contingent consideration is beyond the scope of this document, for financial reporting purposes under U.S. GAAP a contingent consideration arrangement that requires payment from the buyer to the seller in cash or assets will generally result in classification as a liability, while settlement required in the acquirer's shares may be classified as either a liability or as equity depending on the structure of the arrangement. Similarly, a contingent consideration arrangement that requires payment from the seller to the buyer in cash or assets will generally result in an asset classification.

From the seller's perspective, estimating the fair value of contingent consideration may also be necessary for financial reporting purposes. For instance, pursuant to ASC 946, an investment company may be required to estimate the fair value of assets it holds related to contractual rights arising from contingent consideration arrangements. Similarly, if a non-investment company sells an investment and contingent consideration is part of the structure, the company may also need to determine the fair value of the contingent consideration. Note that the seller's accounting for contingent consideration and determining whether it will be measured at fair value at initial recognition and at subsequent reporting dates is beyond the scope of this Valuation Advisory.

It should be noted that contingent payments in a business combination sometimes have characteristics (such as being contingent on an employee's continued employment) that might imply that the payments are compensatory for post-combination services. Depending on facts and circumstances, such payments may be accounted for as post-combination employment compensation expense and not as part of the consideration transferred in the business combination. The specific accounting rules for determining whether a contingent payment is considered compensation expense or contingent consideration to be included in the consideration transferred are beyond the scope of this Valuation Advisory.

It is common for a portion of the purchase price in a business combination to be held in escrow to cover items such as working capital adjustments or possible payments related to the seller's satisfaction of representations and warranties. The specific accounting rules for determining whether an escrow payment is contingent consideration are beyond the scope of this guide. However, given that the definition of contingent consideration is an obligation to make a payment "if specified future

events occur or conditions are met," then if the release of the escrow payment is contingent on whether specified *future* events occur or conditions are met, the escrow payment may be considered contingent consideration. On the other hand, if the release of the escrow payment is contingent on verifying conditions *that existed at the acquisition date*, generally, the escrow payment would not be considered contingent consideration. Although typically escrow payments for general representations and warranties and working capital adjustments fall into the latter category and are not considered to be contingent consideration, the specific terms of the agreement should be reviewed before making such a determination.

2.2 Fair Value Concepts

ASC 820 and IFRS 13 define fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

These standards also provide a framework for developing fair value measurements. A fair value measurement assumes that the asset or liability is exchanged in an orderly transaction between market participants to sell the asset or transfer the liability at the measurement date under current market conditions. According to ASC 820 and IFRS 13:

- An orderly transaction is a transaction that assumes exposure to the market for a period prior to the measurement dates to allow for marketing activities that are usual and customary for transactions involving such assets or liabilities; it is not a forced transaction (for example, a forced liquidation or distressed sale).
- The transaction to sell the asset or transfer the liability is a hypothetical transaction at the measurement date, considered from the perspective of a market participant that holds the asset or owes the liability.

Therefore, the objective of a fair value measurement is to estimate the price at which an orderly transaction would take place between market participants under the market conditions that exist at the measurement date.

While contingent consideration typically represents an obligation of the acquirer, it is appropriate to think about valuing the contingent consideration based on the value of the corresponding asset. This is supported by the following guidance:

- ASC 820-10-35-16B states, "When a quoted price for the transfer of an identical or a similar liability or instrument classified in a reporting entity's shareholders' equity is not available and the identical item is held by another party as an asset, a reporting entity shall measure the fair value of the liability or equity instrument from the perspective of a market participant that holds the identical item as an asset at the measurement date."[4]
- ASC 820-10-35-16BB states, "In such cases, a reporting entity shall measure the fair value of the liability or equity instrument as follows:
    a) Using the quoted price in an active market for the identical item held by another party as an asset, if that price is available
    b) If that price is not available, using other observable inputs, such as the quoted price in a market that is not active for the identical item held by another party as an asset
    c) If the observable prices in (a) and (b) are not available, using another valuation technique, such as:

[4] Similar guidance is provided in IFRS 13:37.

(1) An income approach (for example, a present value technique that takes into account the future cash flows that a market participant would expect to receive from holding the liability or equity instrument as an asset; see paragraph 820-10-55-3F)

(2) A market approach (for example, using quoted market prices for similar liabilities or instruments classified as shareholders' equity held by other parties as assets; see paragraph 820-10-55-3A)."[5]

Below is a list of additional considerations pursuant to this fair value framework:

- Fair value hierarchy and level of inputs – ASC 820 and IFRS 13 provide a hierarchy of inputs to be used in fair value measurements. Available observable inputs should be prioritized over unobservable inputs. Level 3 inputs are unobservable inputs, which can include assumptions related to prospective financial information, probabilities of events occurring, and estimated volatility. Given the lack of quoted prices for identical or similar types of arrangements, the fair value measurement of contingent consideration will likely involve a significant number of Level 3 inputs.
- Unit of account – The unit of account is the level at which the asset or liability is aggregated or disaggregated for recognition purposes. Contingent consideration arrangements with multiple elements may be determined to be a single unit of account or multiple units of account depending on facts and circumstances, and such determination may require significant professional judgment. Guidance on the application of this accounting concept to contingent consideration arrangements is beyond the scope of this Valuation Advisory.
- Principal and most advantageous market – Typically, there will be no observable or principal market for the contingent consideration arrangement; thus, the reporting entity will need to identify a most likely market based on assumptions that would be made by market participants (i.e. the most advantageous market).
- Market participants – According to ASC 820 and IFRS 13, market participants are:

  a) Independent of each other (that is, they are not related parties)

  b) Knowledgeable, having a reasonable understanding about the asset or liability and the transaction using all available information, including information that might be obtained through due diligence efforts that are usual and customary

  c) Able to enter into a transaction for the asset or liability

  d) Willing to enter into a transaction for the asset or liability (that is, they are motivated but not forced or otherwise compelled to do so).

  The reporting entity will need to determine the characteristics of the market participants and identify the assumptions that those market participants would consider when valuing the contingent consideration. See Section 4.1 for further discussion of market participant assumptions.

[5] Similar guidance is provided in IFRS 13:38.

Section 3: Characterizing Contingent Consideration

Buyers and sellers commonly use contingent consideration when they cannot reach agreement on the consideration to be paid for the acquired business, to mitigate the risk of the business not meeting future performance expectations, to incent the sellers to help the business meet post-close targets established by the buyer, and/or to allow the sellers to share in the upside potential. While contingent consideration arrangements are often used to achieve similar purposes and exhibit certain common characteristics, contingent consideration structures observed in practice come in many different forms that are designed to address the unique risks associated with each specific transaction. An earnout[6] may be broadly characterized by the choice of the underlying metric or event which triggers the payment, the structure or payoff of the earnout, and the means by which the earnout is ultimately settled.

3.1 Underlying Metric(s)

In this Valuation Advisory, the terms "underlying metric" and "metric"[7] refer to a measurement unit defined in the contingent consideration agreement, the value of which will (in some cases in conjunction with the value of other metrics, occurrence or non-occurrence of specified events, or other terms of the agreement) determine the amount of the contingent consideration to be paid. Typically, an earnout metric will be a quantifiable measure the parties can use to track, monitor and assess the success or failure of the acquired business, post-acquisition.

The metric(s) chosen by buyers and sellers when structuring an earnout is a key consideration when valuing that earnout. Not only does an earnout derive its value from the underlying metric, but the metric may provide the valuation specialist with useful insights as to the rationale for incorporating the earnout in the transaction. For example, the metric may be indicative of the risks that the buyer and seller designed the earnout to mitigate, or of the areas of the business that the seller has the most ability to positively influence post-transaction. Ideally, the chosen metric(s) would represent the future performance of the acquired business in a manner that is easily defined and objectively measurable.

Typical metrics include:

- Financial metrics: revenue (in some cases in conjunction with minimum gross margin conditions), EBITDA, net income, and business metrics such as number of units sold, rental occupancy rates, etc.[8]
- Nonfinancial milestone events: regulatory approvals, resolution of legal disputes, execution of certain commercial contracts or retention of customers, closing of a future transaction, achievement of technical milestones (such as completion of a product launch, a stage of product development, certain software integration tasks, or a construction project), etc.

Occasionally, there are terms or metrics in a contingent consideration arrangement related to employee retention. As noted in Section 2, for financial reporting purposes under ASC 805, payments that are contingent on retention of employees are often classified as post-combination compensation expense

[6] Clawbacks often have similar structures to earnouts but are generally paid by the seller to the buyer in cases of poor performance or occurrence of downside events. To simplify the exposition in this Valuation Advisory, most of the examples and discussion will be couched in terms of earnouts. Section 6 addresses discount rate and counterparty credit risk issues specific to clawbacks.

[7] The terms "underlying metric" and "metric" will be used interchangeably in this Valuation Advisory.

[8] Business metrics such as these, while not typically categorized as "financial metrics," are often closely related to financial metrics. The discussions in the remainder of this Valuation Advisory about financial metrics are also generally applicable to business metrics.

rather than as contingent consideration. The specific accounting rules related to this determination are beyond the scope of this Valuation Advisory.

The choice of the underlying metric will affect the riskiness of the contingent consideration payoff cash flow and therefore the relevant discount rate. For example, as explained in Section 4.3, the risk associated with certain nonfinancial milestone events (such as an earnout contingent on regulatory approval of a pharmaceutical drug) might typically not be influenced by movements in the markets and therefore such risks are diversifiable, leading to the use of a discount rate similar to the cost of debt of the obligor over the appropriate time horizon.[9] In contrast, the risk associated with a financial metric will generally not be fully diversifiable, leading to the use of a discount rate that includes a risk premium for that financial metric's exposure to systematic risk.[10]

3.2 Contingent Consideration Payoff Structures

At one extreme, contingent consideration may be structured in a simple way as a fixed percentage of an underlying metric such as earnings or revenue (i.e., a linear payoff structure). At the other extreme, contingent consideration payoff structures may be complex, nonlinear functions of the underlying metric, including minimum thresholds below which no payment is made, a maximum payment cap, tiers with differing rates of payment per unit of improved performance, and/or carry-forward provisions that link payment in one time period to performance in other time periods.

As discussed in Section 4.4, the contingent consideration structure can have a substantial impact on the risk, degree of leverage, and discount rate to use in the valuation. Furthermore, similar to the distinction between diversifiable and non-diversifiable risk (discussed in Section 4.3), the distinction between linear and nonlinear payoff structures is a key consideration when selecting the contingent consideration valuation methodology. In particular, the expected payoff of an earnout with a linear structure (i.e., with no caps, thresholds, tiers, etc.) may be estimated based on the single payoff associated with the expected (probability-weighted) outcome for the metric. In contrast, any payoff structure that varies in any way from a purely linear structure—a nonlinear structure incorporating any operative[11] thresholds, caps, multiple tiers, carry-forwards, etc.—will require explicit consideration of the probability distribution of possible outcomes for the metric and the associated payoffs.

3.2.1 Common Contingent Consideration Payoff Structures

The following examples present certain common contingent consideration payoff structures observed in practice. A fixed payment (constant payoff) structure is also included—even though a non-contingent payoff structure generally is not considered to be *contingent* consideration—to illustrate a structural extreme.[12] Where the example contingent consideration payoff structure resembles the payoff structure for an option, such as a put option or a call option, that resemblance is noted (in parentheses). The impact of structure on risk alluded to in the examples is explained in Section 4.4. Illustrative examples of fair value computations for each of these payoff structures (and additional variations) are provided in Section 9.

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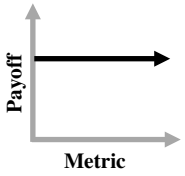
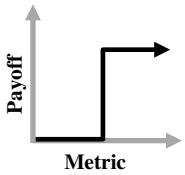
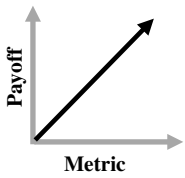
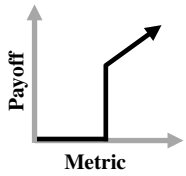
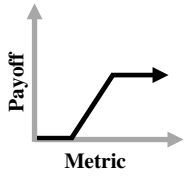
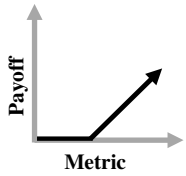
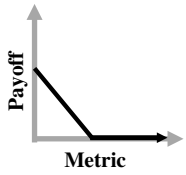
[9] See an example of the valuation of a technical milestone in Section 9.3.

[10] The Required Metric Risk Premium is discussed in Section 5.2.2.

[11] A cap might not be operative if, for example, the likelihood of the metric being above the cap is de minimis. Such a situation is more likely to occur when the valuation of the contingent consideration is updated a year or two post-transaction (after some of the uncertainty is resolved unfavorably) than for the initial valuation.

[12] At initial recognition, a fixed payment would be considered deferred consideration. However, once the uncertainties are resolved, a contingent consideration liability can resemble a fixed payment obligation, due at its contractual maturity.

EXAMPLE STRUCTURES

Structure	Payoff	Description and Risk Characteristics[13]
Constant (debt-like)		• A fixed (deferred) payment. • The earnout cash flow is only subject to counterparty credit risk.
Milestone payment (digital / binary option) See Examples 9.3-9.4		• A fixed payment contingent upon achieving a future milestone or performance threshold. • Nonlinear payoff, where the risk of the earnout cash flow depends on the risk of the underlying metric, the impact of the nonlinear structure (which is non-zero if the metric's risk is non-diversifiable) and counterparty credit risk.
Linear See Examples 9.1-9.2		• Payment is equal to a fixed percentage of the outcome for the underlying metric. • Linear payoff, where the risk of the earnout cash flow is the same as the risk of the underlying metric, plus counterparty credit risk.
Percentage of total above a threshold (asset-or-nothing call option) See Example 9.6		• Payment is equal to a percentage of the underlying metric, but only if a performance threshold is reached. • Nonlinear payoff, where the risk of the earnout cash flow depends on the risk of the underlying metric, the impact of the nonlinear structure, and counterparty credit risk.
Excess above a threshold with a cap (capped call option) See Example 9.7		• Payment is equal to a percentage of the excess of the underlying metric above a performance threshold, with a payment cap. • Nonlinear payoff, where the risk of the earnout cash flow depends on the risk of the underlying metric, the impact of the nonlinear structure, and counterparty credit risk.
Excess above a threshold (call option) See Example 9.5		• Payment is equal to a percentage of the excess of the underlying metric above a performance threshold. • Nonlinear payoff, where the risk of the earnout cash flow depends on the risk of the underlying metric, the impact of the nonlinear structure, and counterparty credit risk.
Clawback (put option) See Example 9.11		• Payment is equal to a percentage of the shortfall of the underlying metric below a performance threshold. • Nonlinear payoff, where the risk of the clawback cash flow depends on the risk of the underlying metric, the impact of the nonlinear structure, and counterparty credit risk.

[13] The discount rate for any of these structures should consider the time value of money, as well as the risks described in this table.

3.2.2 *Path Dependency*

Contingent consideration arrangements may cover a short time period (e.g., three months) or a long period (e.g., many years). In addition, the arrangement may specify a single measurement period or multiple measurement periods. For some arrangements that include multiple measurement periods, the payoff in each period may be independent of (and therefore can be valued separately from) the results in other periods. Some arrangements, however, include carry-forward or catch-up features, overall (multi-year) caps, or other terms that cause some of the payments to depend on the performance over multiple periods. This latter type of contingent consideration is typically referred to as having path-dependent features.

When a payment in one period is dependent on the outcomes in other periods, one typically cannot model the payments independently. More complex techniques, the most common of which is a Monte Carlo simulation, are generally required. See Section 5.4.4 for a description of a Monte Carlo simulation.

> *Example*: The acquirer is required to pay 70% of EBITDA above 1 million in year 1, and 70% of EBITDA above 2 million in year 2, with an overall payment cap of 2 million. Due to the overall payment cap, the earnout payment in year 2 depends on the earnout payment in year 1, and is therefore path dependent.

Also, see the example in Section 9.10.

3.2.3 *Multiple Underlying Metrics or Multiple Forms of Settlement*

The contingent consideration payoff may depend on more than one underlying metric. In such cases, each underlying metric would typically be modeled based on its forecast and risk characteristics, taking into account the correlation between the metrics. In most cases the valuation of an earnout based on multiple, correlated (or otherwise interdependent) underlying metrics will require a Monte Carlo simulation.[14]

> *Example:* The acquirer is required to pay 100 if first year post-close revenue exceeds 1,000 and first year post-close EBITDA exceeds 200. Expected first year post-close revenue and EBITDA are 1,000 and 200, respectively.

In the example above, the situations in which revenue exceeds 1,000 are more likely to occur (but not certain to occur) when EBITDA is above 200. That is, these two financial metrics (like most financial metrics) are not independent; they are positively correlated. Because of this positive correlation, the value of the earnout is higher than if the two metrics were independent. (To grasp this concept intuitively, it might help to consider that whenever revenue exceeds 1,000, EBITDA is more likely to exceed 200 if the two metrics are positively correlated than if they are independent.) A Monte Carlo simulation is one technique that can incorporate the impact of the correlation between revenue and EBITDA on the value of the earnout. In contrast, if (instead of EBITDA) the criterion related to a nonfinancial milestone whose achievement had no impact on or relationship with first year revenue (for example, on-time completion of the first year of a multi-year new product development effort that will produce no revenues until the new product is launched), then in this example a Monte Carlo simulation would not be required.

[14] In rare situations, it may be possible to simplify the analysis by modeling one risky metric in terms of another, under certain strong assumptions about the relationship between the risky metrics (such as where the relationship between the metrics can be reasonably modeled as perfectly correlated).

Similarly, the contingent consideration payoff may require settlement in more than one form. In such cases, each form of settlement needs to be modeled based on its risk characteristics, taking into account the correlation between the metric(s) and the form of settlement.

See Sections 5.3.6 and 5.4.4 for a description of Monte Carlo simulation in the context of SBM and OPM, respectively.

3.2.4 Buyer or Seller Choices

In rare cases, the earnout is structured with the ability of the buyer or seller to make a decision during or at the conclusion of the earnout period, which will impact the form, amount, or settlement type for the earnout payment. In these cases, and consistent with fair value concepts, the valuation specialist needs to consider the optimal decision that would either maximize (in the case of a seller decision) or minimize (in the case of a buyer decision) the value of the earnout payment.

> *Example:* An earnout equal to 10% of future EBITDA over five years, where each year the seller can choose between continuing to receive the contingent payments or receiving a pre-specified cash settlement amount.

The above example illustrates that the introduction of a choice can turn a simple, linear contingent consideration payment that can be valued based on the expected EBITDA into a complex, path-dependent, nonlinear arrangement for which the valuation requires a full understanding of the distribution of future outcomes and the use of methods such as a binomial (lattice) model (discussed in Section 5.4.5) or a Monte Carlo simulation in conjunction with an algorithm that incorporates optimal decision making.[15]

3.2.5 Currency

The currency in which an earnout is structured and/or settled can significantly impact its fair value. In most cases, all the features of the earnout arrangement (including settlement, performance thresholds, payment caps, etc.) are denominated in a single, common currency. Such a single, common currency is usually the currency in which the valuation analysis is performed, to avoid the need to model future foreign exchange rates.

> *Example:* An earnout payment of 1,000 Brazilian Real if EBITDA earned in the first year exceeds 2,000 Brazilian Real.

Since all the earnout features are contractually denominated in Brazilian Real, the valuation analysis, including all assumptions, is usually more easily performed in Brazilian Real. Once the fair value of the earnout is estimated in a specific currency, then the fair value can be converted to other currencies as needed, for example by using the appropriate spot foreign exchange rate at the measurement date.

For earnout arrangements with terms that span multiple currencies (where the multiple currency exposure is substantial), the valuation can be significantly more complicated, as discussed further in Section 5.2.7.

3.3 Settlement Types for Contingent Consideration

While most earnouts are settled in cash, there are cases where settlement involves the transfer of other assets, equity, and/or liabilities. For example, an earnout may be settled in the acquirer's shares, which

[15] In some situations, the algorithm can be a relatively simple decision rule assessed by management. For more complex situations such as the path-dependent early exercise option in the example above, there are many algorithms and techniques that have been developed. See for example, Longstaff and Schwartz (2001), "Valuing American options by simulation: A simple least-squares approach."

may be specified as a fixed number of shares or as a fixed monetary value of shares. The currency in which the earnout is settled will also have an impact on the valuation (see Section 3.2.5).

The way an earnout is settled may or may not have an impact on its fair value.

> *Example (settlement in fixed monetary value of shares):* An earnout payment equal to $500 worth of the acquirer's common shares if EBITDA earned in the first year exceeds $5,000.

In the above example, the earnout payment is specified in monetary terms, but settled through the transfer of other assets (the acquirer's common stock in this example). Such an earnout is economically equivalent to an earnout settled in cash.

> *Example (settlement in fixed number of shares):* An earnout payment equal to 500 common shares of the acquirer if EBITDA earned in the first year exceeds $5,000.

However, specifying an earnout as a fixed number of the acquirer's shares (as in the example above) will impact the fair value of the earnout, and the valuation of such an earnout generally requires consideration of the fair value of the shares being transferred, the impact on the counterparty credit risk (if any, see discussion and examples in Section 5.2.6) and the correlation between the value of the shares and the underlying metric. Also, a contingent consideration obligation that requires settlement in the acquirer's shares may be classified as either a liability or as equity for financial reporting purposes, depending on facts and circumstances.

Section 4: Key Valuation Concepts Related to Earnouts

There are several concepts that are key to understanding why certain methodologies are, or are not, appropriate for valuing various types of contingent consideration:

- **Market participants and their assumptions**: since fair value requires one to assume a transaction involving the contingent consideration on a standalone basis, it is important to carefully consider the perspectives of the relevant market participants on issues such as the inclusion of synergies.
- **Probabilistic forecasts**: contingent consideration valuation often requires an understanding of the probability distribution of potential outcomes for the underlying metric, not just the expected (probability-weighted, mean) outcome.
- **Diversifiability of risk**: contingent consideration payoffs may depend on metrics that are largely uncorrelated with the market, which can simplify the valuation analysis. However, if the risk associated with the metric is non-diversifiable, valuation complexities can arise and affect the choice of valuation methodology.
- **Payoff structure**: whether the payoff is a nonlinear function of the underlying metric has implications for the risk of, and therefore the discount rate used for, the contingent consideration cash flow.
- **Leverage**: contingent consideration payoff structures often entail a leveraged exposure to the underlying metric(s), which affects the riskiness of the contingent consideration cash flow.
- **Risk-neutral valuation**: this concept of adjusting for risk is a fundamental underpinning of the option pricing method.

These key valuation concepts will be referenced throughout this Valuation Advisory.

4.1 Market Participant Assumptions

As explained in Section 2.2, the objective of a fair value measurement is to estimate the price at which an orderly transaction would take place between market participants under the market conditions that exist at the measurement date. In the context of contingent consideration, therefore, developing a fair value estimate requires identification of the assumptions of market participants for the contingent consideration as a freestanding instrument.

It is rare for the parties to contingent consideration arrangements to subsequently transact in or sell their interest in the arrangement as a freestanding instrument; there is not an established market for trading of most contingent consideration arrangements.[16] Rather, the parties typically retain their respective interests until the contingencies have been resolved and any payments made. As a result, one does not typically observe how market participants value and price contingent consideration arrangements as separate freestanding instruments. Therefore, careful consideration of the assumed orderly transaction and the perspectives of the relevant market participants may require significant judgment.

The market participants for the contingent consideration may be different from the market participants for other items requiring fair value determinations in a business combination. For example, the market participant for an acquired intangible asset might be a company that operates in the same industry with similar products. For a contingent consideration arrangement, the market participant purchasing the

[16] A rare exception (contingent value rights) is discussed in Section 5.1.

rights to receive the future contingent payments or assuming the contingent payment obligations could be a private equity firm, hedge fund or some other investor wanting to gain exposure to the acquired business by purchasing the rights to receive future payments, or willing to assume the risk of potentially paying the future contingent payments in exchange for a lump sum cash payment on the measurement date.

The perspective of market participants transacting in the contingent consideration arrangement may also differ from that of market participants transacting in other items requiring fair value measurement in a business combination. For example, a market participant for an intangible asset would not consider post-combination synergies that are specific to the acquirer when estimating the projected cash flows related to that intangible asset. Similarly, the financial projections developed for valuing an acquired business typically only include market participant synergies, not buyer-specific synergies. On the other hand, a market participant transacting in an earnout arrangement on a standalone basis would consider *all* relevant post-combination synergies, including those specific to the acquirer. This is because any payments ultimately due will reflect the contractual terms of the earnout arrangement and buyer-linked characteristics are implicit elements of that contract. A market participant for the standalone earnout would therefore consider the impact of buyer-linked characteristics when estimating the projected earnout cash flow and pricing the earnout arrangement.

To summarize, all synergies relevant to the calculation of the payoff, i.e. all synergies not excluded contractually from the definition of the metric underlying the contingent consideration, *including all relevant buyer-specific synergies,* should be included in the financial projections for the contingent consideration valuation.

Similarly, market participants valuing a contingent consideration arrangement would consider risks specific to the post-acquisition business in developing assumptions for other inputs. For example, if an earnout has been put in place to share the risk of a large uncertainty around the degree of success for a new product launch, then a market participant would estimate a volatility specific to these circumstances—which might be considerably higher than the volatility observed for public company comparables.

4.2 Probabilistic Forecasts and Expected Values

The valuation of earnouts often requires the use of probabilistic models. That is, one typically needs to contemplate future scenarios and their associated probabilities (i.e., a probability distribution) to correctly estimate the expected future earnout payment. For clarity, in this Valuation Advisory, all uses of the term "expected" as an adjective, including expected case, expected payment, expected cash flow, expected value, etc. refer to the mean—the mean case (the mean, probability-weighted result across the possible outcomes, not the most likely case), the mean payment, the mean cash flow, and the mean value, respectively. In addition, all uses of the term "probability" refer to the real-world probability of an outcome, unless the context is explicitly described as involving a "risk-neutral" probability in a risk-neutral framework (see Section 4.6).

A key concept in valuing earnouts is to recognize that, except for linear payoff structures,[17]

the expected cash flow for the contingent consideration

is usually **NOT** equal to

the payoff associated with the expected value of the metric.

Example: An earnout with a payoff equal to the excess of future EBITDA above 100, where forecast EBITDA is 100, and the probability of various outcomes is as shown in the first three columns of Table 1 below.

TABLE 1

Scenario	Probability	EBITDA	Earnout Payoff (Max (EBITDA-100,0))
1	2.5%	180	80
2	15%	130	30
3	20%	120	20
4	25%	100	0
5	20%	80	0
6	15%	70	0
7	2.5%	20	0
Expected Value:		**100**	**10.5**

In the above example, the future earnout payoff associated with the expected EBITDA forecast of 100 is zero, but zero is not the expected future cash flow of the earnout. To calculate the expected future cash flow of the earnout, one needs to consider the probability of being above or below the forecast (i.e., one needs to consider the probability distribution of future EBITDA). Consideration of the full probability distribution for the EBITDA metric leads to a variety of scenarios for the earnout payoff such as those shown in the last column of Table 1.

Based on the probability distribution in Table 1, the correct expected earnout cash flow in this example is equal to 10.5,[18] not zero.

As the example in Table 1 illustrates, an understanding of the full distribution of outcomes is often required for the valuation of an earnout. As for any valuation, it can be important to confirm that the financial projections provided by management represent the expected (probability-weighted, mean) case. However, when valuing an earnout, it can additionally be important to investigate whether the valuation specialist's assumption regarding the probability distribution around that mean (e.g., a distribution with a volatility in growth rate for the metric based on an analysis of comparable companies in the industry) is appropriate. Such an investigation might identify an event, for example the timing of a new product launch or the effectiveness of a potential new partnership, that substantially affects the distribution (or even the mean) of outcomes over the timeframe for the earnout. While these kinds of diversifiable, near-term events might not affect the long-term value of the business, they can have a sizeable impact on the value of the earnout. Similarly, an investigation

[17] For example, when the earnout is a flat percentage of the underlying metric (i.e., a linear payoff structure with no thresholds, caps, tiers, carryforwards, minimum levels of profitability, or other terms or conditions), the expected earnout cash flow is equal to the payoff at the expected metric outcome. See the examples of a linear structure in Sections 9.1 and 9.2.

[18] Specifically, the computation to arrive at the expected payoff is (80×2.5%) + (30×15%) + (20×20%) + (0×62.5%) = 10.5.

might identify that there is a wider range of uncertainty around the mean financial projections for a young, high-growth business than there is for the public company comparables in the industry. Any such issues identified should be captured in the valuation specialist's modeling of the distribution of outcomes for the underlying metric.

See Sections 5.2.1 and 5.2.4 for a more in-depth discussion of methods for estimating the mean for the underlying metric and the probability distribution around that mean.

Another important factor to consider is consistency between the assumed probability distribution for the underlying metric in the earnout analysis and the forecasts for that metric implied by the expected case cash flows used to value the business.[19] See Section 7.1 for a discussion of this issue and an example.

4.3 Diversifiable and Non-Diversifiable Risk

A widely accepted valuation principle assumes that rational investors and market participants reduce risk through diversification. As a result, it is assumed that market participants will only require a return premium for those risks that cannot be diversified away. Therefore, for valuation purposes, risks are often categorized into two broad groups.

- **Non-diversifiable risk**: risks that cannot be fully removed through diversification (such as systematic risks, i.e., risks that are correlated with the market)
- **Diversifiable risk**: risks that can be diversified away.[20] For example, an event whose outcome is not influenced by movements in the markets is a diversifiable risk; such risks are often illustrated by comparison to a coin flip.

The categorization of the risk associated with the underlying metric as diversifiable or non-diversifiable is a key consideration when estimating the value of contingent consideration. In particular, whether the risk associated with the underlying metric is diversifiable will affect the estimation and the magnitude of the required rate of return (or discount rate) associated with the contingent consideration.

To illustrate this concept, suppose that the risk associated with the underlying metric for an earnout is largely diversifiable. In the context of contingent consideration, events with predominantly diversifiable risks include, for example, a payment contingent upon receiving regulatory approval, upon favorable resolution of a legal dispute, upon timely completion of a construction project, or upon achievement of technical milestones such as successfully completing a software integration task or development of a new product.[21]

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[19] Note however, that the mean forecast for the metric associated with the expected case cash flows used to value the business might differ from the mean forecast for the metric used to value the earnout, due to the impact of buyer-specific synergies. See Section 4.1.

[20] For clarity, note that a diversifiable risk need not be one where you can make another investment with a favorable result if the uncertainty is resolved in the negative direction. Diversifiability does not imply that you can cancel out the uncertainty and remove the possibility of a negative outcome for a single uncertain event. Rather, a diversifiable risk is a peril that is peculiar to an individual company. An investor's portfolio can include numerous (unrelated, i.e. diverse) investments that entail such risks. The more such (unrelated) investments there are in the portfolio, the more likely it is that the expected outcome will be achieved across the portfolio, due to the law of large numbers. The same level of assurance of achieving the expected case cannot be achieved with a portfolio of non-diversifiable risks, since they are all, to some degree, interdependent, due to their correlation with movements in the market. See, e.g., *Principles of Corporate Finance* by Brealey, Myers, Allen (2013), p. 174.

[21] While there may be a small degree of systematic risk associated with the achievement of technical or regulatory milestones, in most cases, the non-diversifiable risk is *de minimis* as compared to the diversifiable risk. Assuming the risk associated with such events to be diversifiable is therefore generally considered reasonable.

Example: The acquiree has a pharmaceutical drug under development that has passed clinical trials. An earnout is structured that pays one million if that drug receives regulatory approval.

The discount rate associated with the expected (probability-weighted, mean) cash flow contingent on a metric with only diversifiable risks is the risk-free rate, plus any adjustment for counterparty credit risk.[22] In the above example, the risk-free rate plus any adjustment for counterparty credit risk would be the discount rate to apply to (one million × the probability the drug receives regulatory approval). No additional premium for *systematic* risk needs to be incorporated in that discount rate.

This is not to say that even a fully diversifiable metric is not subject to uncertainty. Indeed, the likelihood of occurrence of an event on which an earnout is based could be high or low, but it is typically *uncertain*. That likelihood of occurrence should be incorporated in the calculation of the expected payoff (in the above example by multiplying the payoff of one million by the probability of receiving regulatory approval).

Conversely, if the risk associated with the underlying metric for an earnout is non-diversifiable, market participants require a risk premium[23] above the risk-free rate as compensation to take on such non-diversifiable risk. In the context of contingent consideration, metrics with non-diversifiable risk include financial metrics such as revenue, EBITDA, number of units sold, rental occupancy rates, etc. If the earnout metric exhibits systematic risk, then the discount rate applied to the expected payoff will be affected by the structure of the earnout, as described in more detail in Section 4.4.

4.3.1 Capital Asset Pricing Model Framework for Quantifying Non-Diversifiable Risk

The Capital Asset Pricing Model (CAPM) is a framework that is widely used to estimate the required rate of return or discount rate associated with an investment. While the recommendations and best practices discussed in this Valuation Advisory do not require use of CAPM, many principles surrounding the estimation of a risk premium for non-diversifiable risk will be illustrated in a CAPM framework. The same principles would apply to other models for estimating systematic risk, such as, for example, models that provide various adjustments to CAPM (some of which are discussed later in this section) or the Fama-French Five-Factor Model (Fama and French 2015).

Simply stated, CAPM describes investors' required rate of return for a security as being comprised of two components: compensation for the time value of money and for taking on non-diversifiable risk. As shown in the equation below, in a CAPM framework, the time value of money is represented by the risk-free rate, which compensates investors for the risk-free return they could have earned over the holding period of the investment. The systematic risk component is represented by the beta of the investment, which quantifies the degree of non-diversifiable risk based on the volatility of the investment relative to the market volatility and the correlation of its performance with the market, multiplied by the Market Risk Premium.

[22] See Sections 5.2.6 and 6.3 for discussions of the incorporation of the obligor's credit risk into the valuation of contingent consideration.

[23] The Required Metric Risk Premium is discussed in Section 5.2.2.

$$R_A = RFR + \beta_A(R_{Market} - RFR) = RFR + \beta_A MRP$$

Where:

R_A = Required rate of return for security A
RFR = Risk-free rate of return
β_A = Beta of security A
R_{Market} = Expected return on the market portfolio
MRP = R_{Market} – RFR = Market Risk Premium

The CAPM definition of risk is consistent with the notion that rational investors will try to diversify away risk, which leaves only risk that is non-diversifiable as impacting the required risk premium. For a given investment, non-diversifiable risk depends on the volatility of returns for the investment relative to the market, as well as the extent to which the investment's returns are correlated with the market returns (as captured by beta), and can be quantified by multiplying beta by the Market Risk Premium.

Valuation specialists often also factor in adjustments to the CAPM results, as illustrated by the equation below, to capture additional risk beyond what is captured by the traditionally measured beta associated with the textbook CAPM. Some of these additional risk premiums include adjustments based on company size (size premiums[24]), country-related risk (country-specific risk premiums), and company-specific risk (alpha). For simplicity of exposition, in this Valuation Advisory we will refer to the CAPM results with adjustments to capture additional risk premiums as the "Adjusted CAPM" framework.

$$R_A = RFR + \beta_A(R_{Market} - RFR) + SP + CRP + \propto = RFR + \beta_A MRP + SP + CRP + \propto$$

Where:

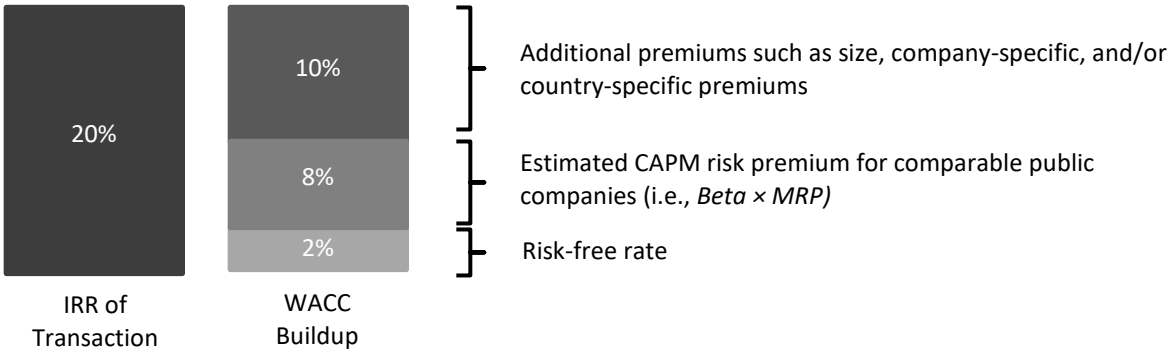
R_A = Required rate of return for security A
RFR = Risk-free rate of return
β_A = Beta of security A
R_{Market} = Expected return on the market portfolio
MRP = R_{Market} – RFR = Market Risk Premium
SP = Size premium
CRP = Country-specific risk premium
$\propto$ = Company-specific risk premium, where $\propto$ can be positive, zero or negative

The following example illustrates at a high level how the estimated CAPM risk premium might be adjusted, and that such adjustments typically result in a risk premium that is more consistent with the risk premium implied by the transaction internal rate of return (IRR).[25]

[24] A size premium typically reflects the higher return required by market participants for investing in companies that are smaller in size. For a textbook discussion, see, e.g., *Cost of Capital* by Pratt and Grabowski (2014).

[25] As noted in the Appraisal Practices Board's *Valuation Advisory #2 – The Valuation of Customer-Related Assets*, Section 5.2.25, "The WACC and the IRR should be compared and reviewed for reasonableness. An IRR that is significantly different from the WACC may warrant a reassessment of both the [Prospective Financial Information (PFI)] and the WACC calculation to determine if market participant assumptions are being consistently applied or if adjustments need to be made in either the PFI or WACC. While the purchase consideration is most often the best indication of fair value, the valuation specialist needs to be alert for circumstances when this is not the case and there is evidence of, for example, buyer-specific synergies, overpayment, or a bargain purchase."

Example: Suppose the IRR for an acquisition of a small private company is 20% per annum and a 10% required rate of return (2% risk-free rate plus 8% risk premium) is estimated in a CAPM framework (assuming no debt) using comparable, publicly traded companies. However, the valuation practitioner has identified that it is appropriate to add a size premium of 10% due to non-diversifiable risk associated with the company's size. As a result, the transaction IRR and the estimated WACC for the company are consistent, as shown in the figure below.



Note, however, that the WACC may not always reconcile to the IRR as it does in the above illustration. If the IRR is significantly higher than the WACC, the valuation specialist will typically consider whether the projected cash flows truly represent expected case, market participant cash flows, or if there may be an optimistic bias that should be removed and/or unmodeled risks that should be addressed. Alternatively, if the projected cash flows are representative of probability-weighted, expected case cash flows using market participant assumptions, and the IRR is still significantly higher than the WACC, the valuation specialist will typically consider the possibility that the transaction price represents a bargain purchase.

Similarly, if the IRR is significantly lower than the WACC, the valuation specialist will typically consider whether the projected cash flows have a conservative bias or exclude market participant synergies that should be included. If the projected cash flows are representative of probability-weighted, expected case cash flows using market participant assumptions, and the IRR is still significantly lower than the WACC, the valuation specialist will typically consider the possibility of an overpayment situation.

The concept of additional risk premiums also applies to the valuation of contingent consideration. Suppose there is an earnout structured as part of this transaction that requires the acquirer to pay 5% of future revenue to the seller in perpetuity.[26] The discount rate applied to the expected cash flow of this earnout should take into account the portion of the additional size, country-specific and/or company-specific risks identified by the valuation specialist that are applicable to the expected cash flow associated with the earnout.[27]

[26] Note that this is a linear payoff structure. Additional complexities can arise in the estimation of the appropriate discount rate for a nonlinear earnout payoff structure based on a metric with non-diversifiable risk, as described in Section 4.4. Whether the structure is linear or nonlinear, however, the additional risks related to the business identified by the valuation specialist should also be considered for the earnout valuation.

[27] If an alternative framework to the Adjusted CAPM were used, the same principle would apply: the discount rate applied to the expected earnout cash flow should include the earnout-appropriate portion of the risk premiums employed in that framework.

4.4 The Risk Associated with the Contingent Consideration Payoff Structure

The payoff structure can affect the risk associated with an earnout, if the risk of the earnout metric is non-diversifiable.

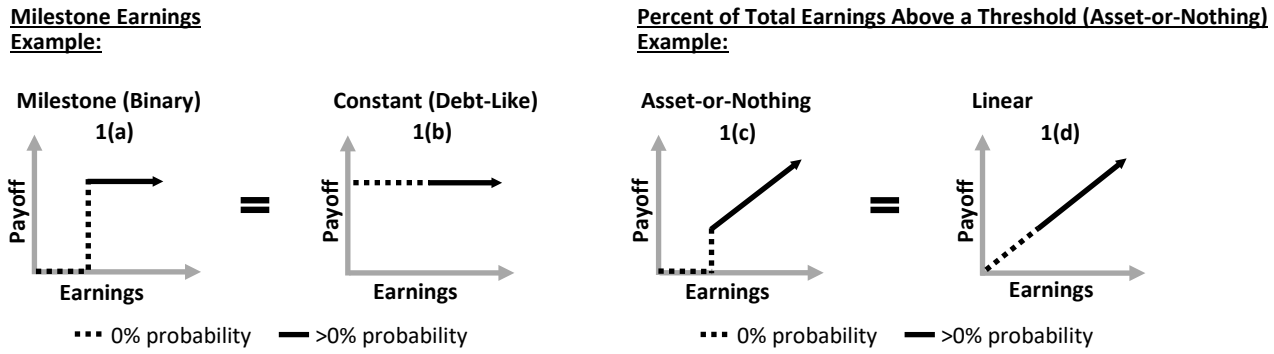
For a metric with only diversifiable risk, the appropriate discount rate is the risk-free rate, plus any adjustment for counterparty credit risk, applied to the expected earnout cash flow over the relevant time horizon. When there is no systematic risk associated with the metric, the payoff structure cannot affect the amount of systematic risk and therefore the payoff structure does not affect the magnitude of the required rate of return.

For a metric (such as a financial metric) with non-diversifiable risk, the relative risk of the earnout as compared to the risk of the underlying financial metric will depend on the earnout payoff structure.

A simple earnout that pays a fixed percentage of a financial metric such as revenue (a linear payoff structure) has the same risk as that revenue (over the relevant timeframe). However, as illustrated in Section 3.2, earnouts typically exhibit more complex payoff structures, such that the amount of payment depends on whether the performance with respect to a financial metric satisfies certain contingencies (e.g., reaches a threshold, a tier, or a cap). When this is the case, i.e., when the payoff structure is nonlinear, the risk of the earnout cash flow can diverge significantly from the risk of the underlying metric. For a metric with non-diversifiable risk and a nonlinear payoff structure, the risk of the earnout will depend not only on the risk associated with the metric, but also on the probability of achieving each threshold, tier, cap or other structural element.

Consider the two financial-metric-based earnouts illustrated in Figure 1 below. For the milestone (binary) payoff structure 1(a) illustrated on the far left, upon achieving a specified level of earnings (above a threshold), a fixed amount is paid. For the payoff structure in illustration 1(c), upon achieving a specified level of earnings (above a threshold), the payoff is an amount proportional to the earnings. This structure is similar to an asset-or-nothing payoff structure for an option. If the probability of achieving the earnings threshold is 100% (as depicted by the pattern of dotted and solid lines in Figure 1, the payoff will occur with certainty at some point along the solid line), then the milestone payment structure in 1(a) is equivalent to a deferred payment (referred to in illustration 1(b) below as "debt-like"), and the risk of the asset-or-nothing payoff structure in 1(c) is equal to the risk of the underlying earnings (i.e., equivalent to a linear payoff structure as shown in illustration 1(d)).

FIGURE 1



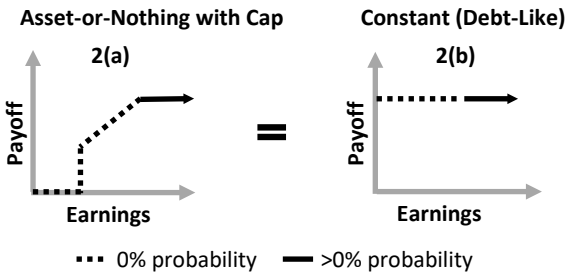
However, if the probability of achieving the earnings threshold is less than 100% (i.e., unlike as shown in Figure 1, if there is some chance that the earnings outcome will be less than the threshold and the earnout payoff will be zero), the risk of the milestone earnout cash flow will be greater than that of a

deferred payment and the risk of the asset-or-nothing earnout will be greater than the risk of the earnings metric. Similarly, the risk of the cash flow of an earnout structured as an asset-or-nothing option is always at least as great as the risk of the underlying financial metric. How much greater will depend on the probability of achieving the threshold.

This same logic can be applied to another common earnout payoff structure, which has both a threshold and a cap.

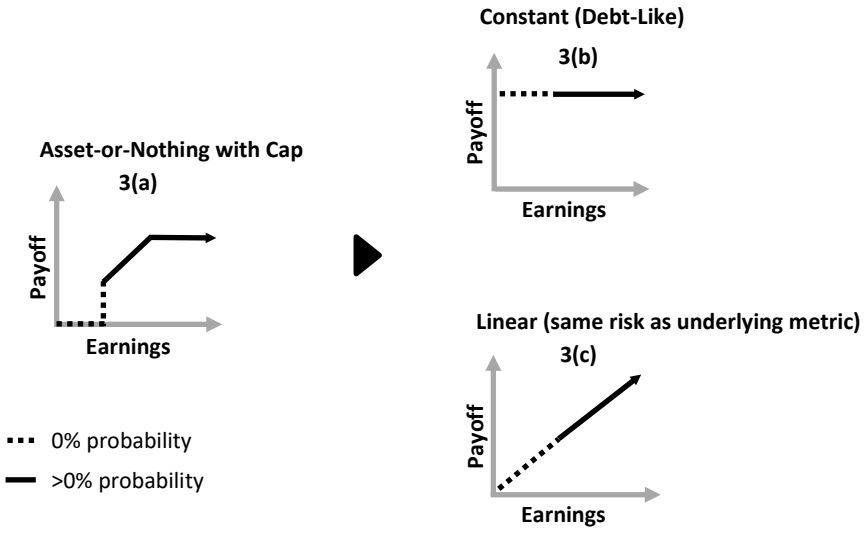
- If the probability of earnings being above the level at which the cap is in force is 100% as shown by the solid line in structure 2(a) on the left of Figure 2 below, then the earnout cash flow is equivalent to a deferred payment (debt-like, see illustration 2(b)).

FIGURE 2



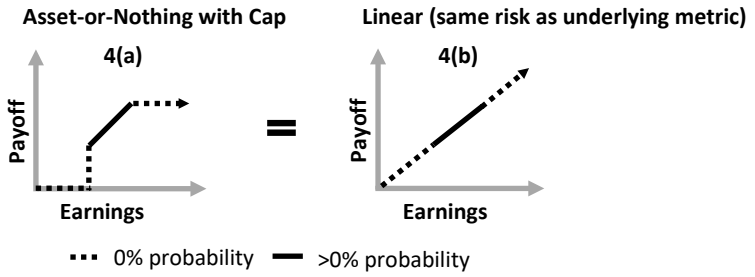
- If the probability of earnings being above the threshold is 100% (and the probability of hitting the cap is less than 100%, as shown by the solid lines in structure 3(a) on the left of Figure 3 below), then the risk of the earnout cash flow is between the risk of a deferred payment, see 3(b), and the risk of the earnings, see 3(c), as illustrated on the right side of Figure 3 below.

FIGURE 3



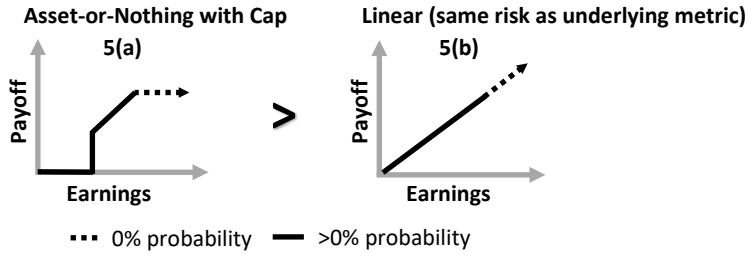
- If the probability of earnings being between the threshold and the cap is 100% (neither the threshold nor the cap is "active," as shown by the dotted lines in structure 4(a) on the left of Figure 4 below), then the structure is effectively linear and the risk of the earnout payoff is equal to the risk of the earnings metric, see 4(b), as illustrated on the right side of Figure 4 below.

FIGURE 4



- Finally, if the probability of earnings being below the level at which the cap is in force is 100% (and the probability of hitting the threshold is less than 100%, as illustrated by the solid lines in structure 5(a) on the left side of Figure 5 below), then the risk of the earnout cash flow is greater than the risk of the earnings (see 5(b) on the right side of Figure 5).

FIGURE 5

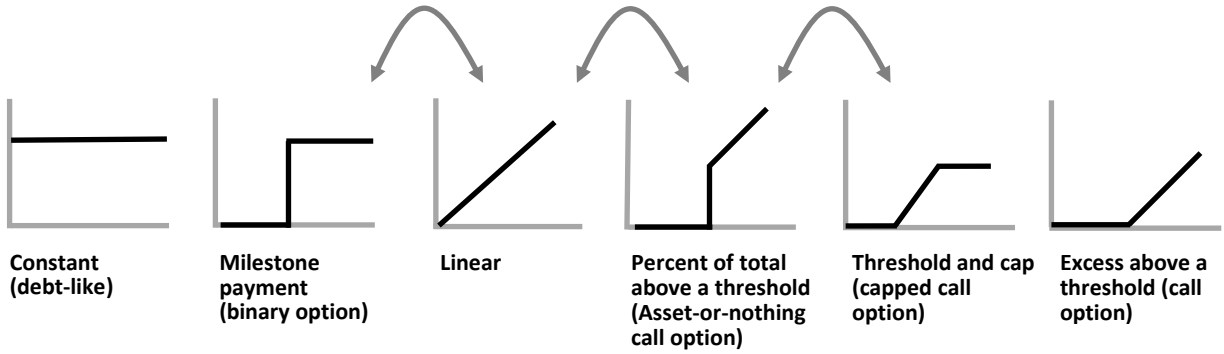


Thus, when the earnout metric has non-diversifiable risk, the risk of the contingent consideration payoff is inherently tied to the likelihood of achieving a threshold, tier or cap.[28] The lower the probability of achieving the threshold for example, the greater the leveraged position of the earnout relative to the underlying financial metric and the higher the risk of the earnout payoff (see Section 4.5 on leverage).

Based on these types of considerations, it is possible to rank order the riskiness of a financial metric-based earnout's cash flow as shown in Figure 6 below. In this figure, the least risky payoff structure is on the far left, and the most risky payoff structure is on the far right. The gray arrows indicate that the ordering of risk of certain structures depends on the specific circumstances (in particular, it depends on the likelihood of achieving the threshold and/or the cap). For example, a milestone payoff structure is always less risky than an asset-or-nothing payoff structure, assuming the same likelihood of achieving the threshold in each case. But whether a milestone payoff structure is more or less risky than a linear payoff structure depends on the likelihood of achieving the milestone.

[28] The likelihood of achieving a threshold for a contingent consideration metric is similar to the concept of "moneyness" in the context of an option. "Moneyness" refers to the relative position of the current price of an asset to the strike price of an option written on that underlying asset. The lower the probability of achieving the threshold, the less likely it is that any earnout amount will be paid, and the more likely it is that the earnout is "out of the money."

FIGURE 6



For an earnout with a nonlinear payoff structure based on a metric with non-diversifiable risk, the time remaining until the uncertainty is resolved can also affect the systematic risk of the earnout cash flow through the impact of time on the variability of the outcome. For example, assume a milestone structure with a revenue metric for the first year post-close and for which the probability of achieving the revenue target is 50%. The risk associated with the earnout cash flow will be very different if the time remaining to achieve the revenue target is one year or one week.

4.5 The Impact of Payoff Structure on Risk: the Analogy to Leverage

The analogy to leverage provides important insights into the risk associated with nonlinear contingent consideration payoff structures based on financial metrics. Leverage is most commonly thought of as an equity holder's leveraged exposure to the underlying business given the presence of debt. More generally, leverage can be characterized as a payoff resulting from something that is risky less something that is risk free (or relatively close to risk free[29]).

Common examples of leverage include:

- Equity as a leveraged exposure to the underlying business:
  Equity = Enterprise Value – Debt
- A forward contract's leveraged exposure to the underlying stock:
  Forward Contract = Stock Price – Forward Price
- A call option's leveraged exposure to the underlying stock:
  Stock Option = Max (Stock Price – Strike Price, 0)
- Operational leverage as a result of fixed costs:
  EBITDA = (Revenue Net of Variable Costs) – Fixed Costs
- Financial leverage as a result of fixed interest expense:
  Net Income = EBITDA – Interest Expense

To illustrate the impact of leverage on the value of an earnout, consider an earnout that has a payoff equal to 100% of the excess of future EBITDA earned over the next year above 100:

[29] Assumptions about whether debt risk is diversifiable (whether debt repayment is correlated with the market) characterizes some of the differences among methods for estimating the Required Metric Risk Premium associated with certain earnout metrics. See Section 10.3.1 in the Technical Notes portion of the Appendix.

- Payoff of earnout = Max(Future EBITDA in 1 year – 100, 0)
- Assume:
  - Forecast (expected value) for EBITDA earned over 1 year = 120
  - Discount rate applicable to forecast 1-year EBITDA = 10%
  - Achievement of future EBITDA of at least 100 is nearly certain[30]
  - 1-year risk-free rate = 1%
  - Enough money has been put into escrow that the counterparty credit risk is *de minimis*.

Under the stylized assumptions above, of the total expected 120 in EBITDA, the first 100 is certain and therefore has no risk. All the risk is in the performance above that threshold of 100. More generally, the lower, easier to achieve levels of a metric are far less risky than the overall metric risk. Higher, more difficult to achieve levels of a metric are far riskier than the overall metric risk. Using the above example, we can see the impact this concept of leverage has on the value of the earnout.

The relevant calculations for the example (assuming a mid-period convention[31]) are as follows:

- Value of all future EBITDA = $120/1.10^{0.5} = 114.4$
- Value of first (risk-free) 100 of EBITDA = $100/1.01^{0.5} = 99.5$
- Value of earnout is the difference = 14.9

Since the expected payoff of the earnout is 120 – 100 = 20, the implied discount rate for the earnout is $(20 \div 14.9) - 1 \approx 34\%$. That is, the earnout is much riskier than the underlying EBITDA metric. Just like equity entails greater risk the greater the company's level of debt (due to leverage), so too does the imposition of a threshold on a non-diversifiable metric like revenue or EBITDA increase the riskiness of the earnout cash flow.

The impact of leverage on the riskiness of an instrument can be significant, and earnouts structured as the excess of a financial metric above a threshold can be subject to significant leverage (as illustrated above). For a similar reason, structuring an earnout with a cap (removing the highest risk outcomes for the financial metric) makes that earnout less risky than it would be without the cap.

To further illustrate how a nonlinear payoff structure can affect the discount rate, Table 2 below depicts the implied discount rates[32] for certain traded S&P 500 call options, as a function of the term of the option and its moneyness. In this example, moneyness refers to the relative position of the current price of the S&P 500 to the strike price of an option written on the S&P 500. The implied volatility is the S&P 500 volatility derived from the traded price of the call option with the corresponding term and moneyness. Assuming a 7% (annual effective) cost of equity for the S&P 500 index, the discount rates implied by the traded prices for these call options are high, due to the impact of leverage (no payoff is achieved unless the threshold, i.e. the strike price, is reached). Such high discount rates are not easy to estimate (without using an option pricing framework) and may not be intuitive for many valuation specialists and their clients.

[30] This assumption is made so that the payoff can be assumed to be approximately linear, in order to illustrate the impact of leverage. The resulting implied discount rate is the same if we relax this assumption (i.e., assume that EBITDA can fall below 100), but assume that the payoff of the earnout is strictly linear i.e., equal to Future EBITDA in 1 year – 100 (with no payment floor). Since forecast EBITDA is risky and the threshold of 100 is contractual, the applicable discount rates are 10% and 1%, respectively.

[31] See Section 5.2.5 for a discussion about the appropriate in-period discounting convention for the valuation of contingent consideration.

[32] The Working Group is not suggesting that the valuation specialist needs to calculate an implied discount rate. Table 2 and the example provided above are intended only to illustrate the impact of leverage on the risk of a nonlinear payoff structure.

TABLE 2: Implied Discount Rates for S&P 500 Call Options[33]

Term (yrs)	Moneyness	Implied Volatility	Call Option: Implied Discount Rate
2.22	106.77%	19.24%	31.03%
2.22	101.91%	18.42%	34.81%
2.22	98.91%	17.87%	37.76%
2.22	93.42%	16.79%	44.82%
2.22	84.08%	15.40%	61.81%
2.22	76.43%	14.25%	85.87%
2.22	74.74%	14.18%	91.13%
1.22	103.48%	17.66%	49.34%
1.22	101.91%	17.28%	52.56%
1.22	98.91%	16.52%	60.00%
1.22	96.09%	15.83%	68.80%
1.22	90.89%	14.58%	92.21%
1.22	86.23%	13.58%	125.00%
1.22	80.07%	12.99%	180.11%

In the context of an earnout, the relative position of the expected outcome for an earnout metric to the threshold for a payoff is a similar concept to moneyness in an option context.

Contingent consideration arrangements tend to be more complex than the stylized leverage example above, often including the combination of a threshold and a cap, multiple tiers, aggregate payment caps over multiple payments, and/or catch-up and carry-forward features. The impact of the payoff structure on risk depends on the proximity of the expected metric forecast relative to the various thresholds, caps and other structural features, as well as on the volatility in growth for the metric and the time remaining to settlement. For this reason, it is difficult to determine the impact of the payoff structure on the discount rate for many real-world examples.

This is one of the key reasons why it is problematic to apply the SBM to the valuation of a nonlinear payoff structure based on an earnout metric with non-diversifiable risk: it is hard to know what discount rate to apply to adjust for the riskiness of the earnout cash flow. The next section introduces a concept that helps the valuation specialist avoid this difficult assessment when using an option pricing methodology.

4.6 Risk-Neutral Valuation

Many valuations involve discounting a stream of expected cash flow by an appropriately chosen discount rate. A fundamental principle of valuation requires the chosen discount rate to accurately capture the market participant view of the risk of the cash flow.

The simplest situation involves cash flows that are known and certain to be paid at different points in time. In such a case, the discount rate need only capture the time value of money (and any counterparty credit risk). The appropriate discount rate in this case is the risk-free rate plus any adjustment for counterparty credit risk,[34] where both the risk-free rate and the credit spread are for a term commensurate with the time from the valuation date to the expected date(s) of payment.

When the cash flows vary due to exposure to non-diversifiable sources of risk (e.g., revenue, EBITDA) the discount rate should include a premium in addition to the risk-free rate plus counterparty credit

[33] Implied discount rates are based on data as of September 30, 2013. Source: OptionMetrics, a provider of historical option price data.
[34] Counterparty credit risk is discussed in Section 5.2.6.

risk. This premium should be commensurate with the degree of non-diversifiable risk of the cash flow. For example, in a CAPM framework such as that described in Section 4.3.1, the higher the correlation of the cash flow with the market, the higher the premium over the risk-free rate.[35]

The CAPM framework provides one methodology for quantifying the risk premium associated with the expected cash flow for an earnout with a *linear* structure. The product of the beta for the underlying metric and the Market Risk Premium (plus, in an Adjusted CAPM framework, an appropriate portion of any additional risk premiums) represents the Required Metric Risk Premium (RMRP) for the non-diversifiable risk associated with the cash flow of that linearly-structured earnout. As discussed in Section 5.2.3, the quantification of the RMRP incorporates the correlation between the earnout metric and the market portfolio, volatility, and an appropriate portion of any additional risk premiums.

Importantly, however, the RMRP for a metric with non-diversifiable risk does *not* capture the impact of any nonlinearities in the earnout payoff structure. As illustrated by the implied discount rates for call options shown in Table 2 of Section 4.5, directly assessing the adjustment to the discount rate to incorporate the impact on the risk premium of even a relatively simple nonlinear payoff structure can be challenging.

Risk-neutral valuation provides a way to circumvent this issue.

As mentioned above, valuation is often accomplished by discounting a stream of expected cash flows by (premium for non-diversifiable risk + risk-free rate), plus in the context of contingent consideration valuation an adjustment for counterparty credit risk. An equivalent way to value cash flows is to first remove the non-diversifiable risk from the expected cash flows, for example by reducing the projected growth rate by the RMRP.[36] Then the resulting "risk-neutral" expected cash flows are discounted at the risk-free rate + adjustment for counterparty credit risk. This process is mathematically equivalent to the usual discounting—it just happens in two steps. However, separating the discounting into these two steps allows one to consider the impact of a nonlinear payoff structure on cash flows *from which the systematic risk has been removed*. If there is no systematic risk in the cash flows, the payoff structure cannot affect the amount of systematic risk and therefore the payoff structure does not affect the magnitude of the required rate of return. Thus, in this context of risk-neutral expected cash flows, there is no need to estimate the effect of a nonlinear structure on the discount rate.[37]

Similarly, in the context of contingent consideration, removing the non-diversifiable risk from the metric forecast allows the valuation analysis to be performed in a risk-neutral framework. Once the non-diversifiable risk has been removed from the forecast distribution for the metric, the payoff structure (whether it is linear or nonlinear) no longer affects the required rate of return.

More specifically, contingent consideration valuation in a risk-neutral framework can be performed, for example, using the following process:

[35] Methods for estimating the risk premium when the metric is exposed to non-diversifiable risk are explained in Section 5.2.3.

[36] There are two (equivalent) ways to risk-adjust expected cash flows to remove non-diversifiable risk: (1) subtract an amount commensurate with the (non-diversifiable) risk or (2) discount by a risk premium commensurate with the (non-diversifiable) risk. The latter is the more common method used by valuation specialists.

[37] For a discussion of the mathematics underlying this result, see the textbook by Hull entitled *Options, Futures, and Other Derivatives*, 8th ed., 2011, pp. 631-634.

- Discount the expected case forecast of the metric by the RMRP (to create a risk-neutral forecast) and assume an appropriate volatility for the metric, to construct a risk-neutral distribution of outcomes for the metric[38];
- From the risk-neutral distribution of metric outcomes, calculate the (risk-neutral) contingent consideration payoff distribution according to the terms of the contingent consideration arrangement
- Compute the expected (risk-neutral) payoff, from that (risk-neutral) payoff distribution
- Discount the expected (risk-neutral) payoff cash flow at the risk-free rate plus any adjustment for counterparty credit risk.

To illustrate how risk-neutral valuation incorporates the impact of a nonlinear structure, consider an earnout with a fixed payment of 100 if an EBITDA threshold of 2,000 is reached, i.e. a binary payoff structure. Suppose for purposes of this example that management's expected case (mean) EBITDA forecast is equal to that threshold, as depicted by Figure 7. Adjusting for the RMRP (shifting the distribution of EBITDA to the left) moves the risk-neutral expected (mean) EBITDA below the threshold, as depicted by Figure 8. If the earnout were a fixed percentage of EBITDA (i.e. linear) then the impact of the shift in distribution on the earnout would be the same as discounting at the RMRP. However, in this example, the shift of the distribution potentially dramatically reduces the likelihood of payment, reflecting the increased impact of systematic risk due to the nonlinear structure.

[38] The lognormal distribution, which is commonly used in practice to represent the distribution of most financial metric outcomes, can be specified with two parameters (a mean and a standard deviation). See Section 5.4.3 for a discussion of how to address cases for which the metric distribution is known to be far from lognormally distributed.

FIGURE 7: EBITDA Distribution with Associated Earnout Payoff

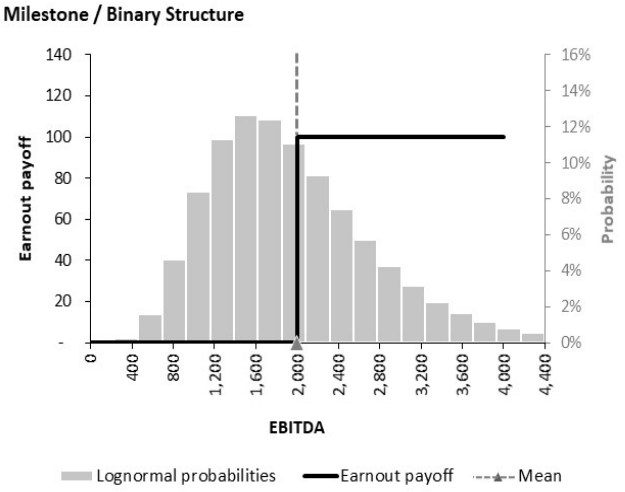
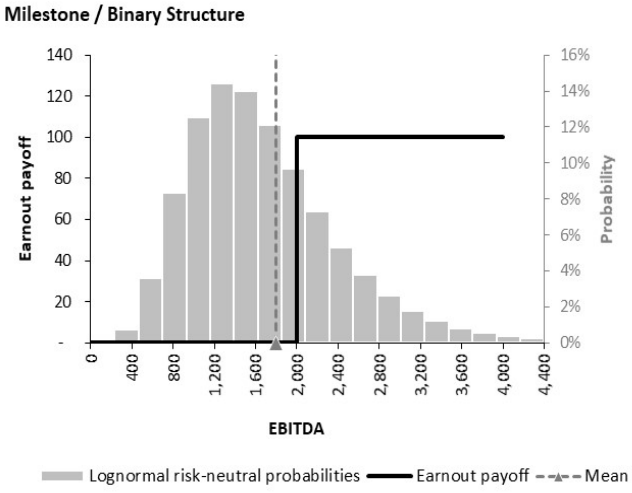


FIGURE 8: Risk-Neutral EBITDA Distribution with Associated Earnout Payoff



Section 9.4 demonstrates risk-neutral valuation in the context of valuing this type of binary payoff structure. As can be seen by comparing the examples in Sections 9.1 and 9.4, the implied discount rate for this nonlinear structure is more than twice the discount rate appropriate for a similar earnout with a linear structure.

As we shall see in Section 5.4, this concept of removing the systematic risk so that the valuation can be performed in a risk-neutral framework is crucial for the application of option pricing methods to the valuation of contingent consideration when the underlying metric has non-diversifiable risk and the payoff structure is nonlinear. The magnitude of the impact of any nonlinear structure on the discount rate depends not only on the structure and the metric (as illustrated via the examples in Chapter 9) but also on the assumptions for volatility and the positioning of the mean of the metric forecast distribution relative to the payoff threshold. Risk-neutral valuation allows the valuation specialist to avoid the difficulties of estimating an adjustment to the discount rate to address a nonlinear contingent consideration payoff structure.

Section 5: Valuation Methodologies

In this section, we present methodologies and recommendations for the valuation of contingent consideration. Although we touch briefly on the market approach and cost approach below, we will primarily focus on the income approach, as (1) the other approaches do not consider future cash flows and (2) contingent consideration is rarely traded and has no replacement cost.

5.1 Valuation Approaches: Income Approach, Market Approach, and Cost Approach

The three commonly used approaches to determine the value of an asset or liability are the income, market, and cost approaches. The nature of the asset or liability being valued, as well as the availability of information, determine which approach(es) will ultimately be used.

The income approach uses valuation methods to convert future cash flows to a single current (or present) value. The measurement reflects current market expectations about those future cash flows and their riskiness.

Given that the income approach incorporates future expectations, it is typically the approach used to value contingent consideration. Two income approach methods the Working Group has observed being used in practice for valuing contingent consideration are the Scenario Based Method (SBM, see Section 5.3) and the Option Pricing Method (OPM, see Section 5.4). Other income approach methods for the valuation of contingent consideration also may exist or be developed in the future.

A comparison of the advantages and disadvantages of the SBM and OPM is presented in Section 5.5 and the recommendations of the Working Group for the circumstances under which each methodology is typically appropriate are provided in Section 5.6.

Monte Carlo simulation (see Sections 5.3.6 and 5.4.4) and binomial lattice models (see Section 5.4.5) are examples of techniques that can be used in conjunction with either SBM or OPM. Section 5.6 provides the recommendations of the Working Group for the circumstances under which techniques such as Monte Carlo simulation are typically appropriate.

The market approach uses prices and other relevant information generated by market transactions involving identical or comparable assets or liabilities. Valuation methods consistent with the market approach typically rely on observed ranges of market value multiples of key financial metrics derived from a set of comparables. The selection of the appropriate multiple within the range requires judgment, considering qualitative and quantitative factors specific to the measurement.

Given the nature of contingent consideration and the lack of an active trading market, the market approach is rarely used to value contingent consideration. In rare cases, there may be traded securities that are relevant (e.g., contingent value rights [CVRs]). However, the market for CVRs often exhibits low trading volumes, trades between related parties, and/or perceived information asymmetries (where, for example, sellers may be perceived to have more information about the likely outcomes than most buyers.)[39] The valuation specialist would need to consider these factors along with other typical market approach reliability indicators to determine if the market approach is useful, even in the rare case where market data on the value of contingent consideration is available.

The cost approach is based on the amount that currently would be required to replace the service capacity of an asset (often referred to as current replacement cost). From the perspective of a market participant seller, the price that would be received for the asset is based on the cost to a market

[39] In most fair value measurements, buyers and sellers are assumed to be informed of relevant facts; information asymmetries are assumed to be minimal. However, in the market for CVRs, perceived information asymmetries can be significant.

participant buyer to acquire or construct a substitute asset of comparable utility, adjusted for obsolescence.

Given that there often is no obvious way to estimate a replacement cost for a contingent consideration arrangement and that the cost approach does not consider future expectations, it typically would not be appropriate to use the cost approach to value contingent consideration.

The remainder of Section 5 will focus on the income approach to valuing contingent consideration.

5.2 Key Elements of an Income Approach to Contingent Consideration Valuation

Key elements of valuation using an income approach include:

- The expected (mean) cash flow
- (For nonlinear payoff structures), the probability distribution around the mean cash flow
- The discount rate and Required Metric Risk Premium.

Because contingent consideration arrangements (1) often occur in situations where there is substantial uncertainty about the future and in some of those cases the expected forecast is not close to the most likely forecast, (2) often are based on non-traded financial metrics and (3) often include nonlinear payoff structures, addressing these three elements can require significant effort.

The remainder of this section 5.2 will address the above three key contingent consideration valuation elements as well as other elements of an income approach, including:

- The estimation of volatility in growth for the metric
- The mid-period discounting convention
- Counterparty credit risk and
- Multiple-currency structures.

5.2.1 Estimating Contingent Consideration Payment Cash Flows

There are several important differences between estimating the expected cash flows of a business and of a contingent consideration arrangement.

First, the financial projections developed for the valuation of an earnout will be based on the contractual definitions of the underlying metrics as specified in the earnout agreement. These definitions may not coincide with the standard metric definitions used to value a business. The definitions of the earnout metrics might be designed, for example, to best motivate certain desirable seller behavior, to better shift or allocate risk related to specific types of future performance, or to minimize post-transaction disputes. For example, a revenue-based earnout may focus on the revenue associated with only a key portion of the business or might have its own, idiosyncratic definition of "revenue."

Furthermore, because the earnout is valued from the perspective of a market participant buying or selling the standalone earnout post-transaction (with the relevant business under the new ownership of the actual buyer), the financial projections developed for valuing an earnout often include buyer-specific synergies.[40] In contrast, the financial projections developed for valuing an acquired business

[40] See Section 4.1 for a discussion of the market participants for contingent consideration. Buyer-specific synergies are included in the financial projections for valuing the earnout unless the relevant agreement specifically excludes such synergies from the definition of the earnout metric. There are also situations in which the earnout agreement deliberately excludes market participant synergies; in such situations, the earnout valuation might include *fewer* synergies than the valuation of the acquired business.

typically only include market participant synergies, excluding synergies that are unique to the buyer and not available to other market participants.

Second, as discussed in Section 4.2, the estimation of the expected future contingent consideration cash flow typically requires assumptions about the distribution of outcomes for the underlying metric. There are two common methods used to develop the metric distribution assumptions.

One method is to develop future scenarios relevant to the underlying metric. The analysis would include an estimation of the metric outcome under different scenarios and the scenario likelihood, based on information known or knowable as of the measurement date. Assumptions about outcome scenarios and their likelihoods may be based on, for example, analyses conducted by the parties during the transaction process (e.g., in a deal model or board presentation), historical company or industry experience (e.g., the observed track record of success in software integration for the buyer's past acquisitions or industry data on the probability that a new drug in a certain therapeutic area receives regulatory approval) or management assessments.

An alternative method commonly used for estimating the distribution of future outcomes for financial metrics is to start from the mean (probability-weighted, expected case) financial projections for the business, for example, the expected case projections[41] used to value the business or its intangibles. A typical process would be for the valuation specialist to:

- Identify the expected case projection for the relevant metric consistent with the expected case cash flows of the business
- Adjust the metric projection if necessary to be consistent with the contractual definition of the metric in the contingent consideration arrangement (including adjustment to include all relevant buyer-specific synergies and to exclude any non-relevant market participant synergies)
- Estimate the variance around the expected case projection of the metric
- Assume a metric probability distribution based on the metric's estimated mean and variance.

A combination of these two methods might also be used in certain situations, for example to address financial metric distributions that are difficult to represent with just a mean and variance due to the impact of diversifiable events, such as the results of R&D (e.g., the performance of a new product relative to its competitors). The valuation specialist often takes such diversifiable events into account via probability-weighting the payoffs in various scenarios, as described in more detail in Sections 5.4.3 and 10.3.5.

Whichever method is being used to develop a distribution of metric outcomes, the reliability of each data source should be considered and adjustments made as appropriate. For example, while a buyer's deal model might analyze only base case and downside scenarios if that was sufficient for the buyer to gain comfort with the transaction, there may be relevant upside scenarios as well. Assumptions based on historical experience may need to be adjusted for the facts and circumstances of the transaction. As another example, management might assess that the potential variability of performance around the base case is equal in all future years even though one might expect greater variability in later years.

With respect to management assessments, the valuation specialist should consider using elicitation procedures that minimize the known biases associated with probability assessments. Such known

[41] The "expected case" is not the base case or most likely scenario. The expected case is the probability-weighted mean across the potential outcomes.

biases include anchoring on recent results or a prior projection, overconfidence (failing to consider a wide enough range of potential future outcomes), and conditioning estimates on hidden assumptions (such as no competitive reactions to a new product introduction).[42] Debiasing techniques include counteranchors, counterexamples, assessing multiple scenarios (e.g., high, middle and low cases), contemplation of extreme scenarios, conducting pre-mortems, taking an outside perspective, crosschecks, and decomposition, among others.[43]

A commonly observed error in the context of contingent consideration valuation is for management to underestimate the range of outcomes for financial metrics such as revenue or EBITDA. For this reason, the volatility in growth rate for the metric implied by management's assessments is often tested for consistency with (1) the historical volatility in growth rate for the metric of the acquired business and/or comparable companies and (2) other risk measures such as the transaction IRR or acquired business WACC.

Estimates of variance are often based on the historical volatility of the acquired business and/or comparable companies, considering either (1) historical variability of growth rates for the relevant metric, for example, variability in year-on-year quarterly growth in revenues or (2) historical variability of equity prices, adjusted for financial and operational leverage of the relevant metric relative to the long-term free cash flows to equity.[44] However, care should be taken when using such historical data to estimate the variance around the expected case projections. In many situations (e.g., the acquisition of a young business), the motivation for creating the earnout is that the metric outcome is highly uncertain and therefore possibly more uncertain than implied by the historical data for public comparable companies. Just as it is useful to check management's assessments of variability around the expected case against the comparable companies, so too it is useful to check the historical volatility of the comparable companies against management's assessments of potential upside and downside scenarios.

See Section 5.2.4 for detailed discussion of estimating volatility in growth rate for a metric.

5.2.2 Discount Rate and Market Risk Considerations

Contingent consideration payoffs are exposed to various types of risks. When selecting the discounting for the contingent consideration valuation, the valuation specialist should consider:

- The time value of money – typically captured by the risk-free rate
- Counterparty credit risk, which represents the risk that the obligor will not be able to fulfill its obligation if and when a payment becomes due
- Exposure to the non-diversifiable risk associated with the metric
- The impact on risk of the payoff structure.

The first two items on the above list (the time value of money plus a credit spread for the counterparty credit risk) are applicable over the timeframe from the valuation date to the expected payment date(s). However, the latter two risks (non-diversifiable risk and payoff structure risk) are applicable only over the timeframe from the valuation date until the uncertainty associated with the metric is fully resolved.

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[42] See Tversky and Kahneman (1974), *Judgement Under Uncertainty: Heuristics and Biases* for a discussion of biases that influence probability assessments and other judgements.

[43] See, e.g., Montibeller and von Winterfeldt (2015) for best practices in eliciting outcome scenarios and risk assessments, including debiasing techniques for minimizing both conscious and unconscious biases. See also Soll, Milkman and Payne (2015) for a practical discussion of strategies for overcoming biases in thinking too narrowly about the future.

[44] It should be noted that reliance on historical volatility of the metric or of equity prices only produces a *proxy* for volatility of the earnout metric, as this data does not measure the volatility of metric growth *relative to management's forecast.*

If, for example, the contingent consideration payoff depends on the level of revenue or earnings, such financial metrics are typically exposed to systematic risk only until the time at which the uncertainty is resolved, i.e., until the metric outcome, and hence the payoff amount, is known. However, even after the uncertainty about a payoff amount is resolved, the discounting should incorporate the time value of money and a premium for any exposure to counterparty credit risk until the date the payment is made. Systematic risk is the primary subject of this section. See Section 5.2.6 for a discussion of counterparty credit risk.

An earnout metric can be exposed to non-diversifiable risk, diversifiable risk, or both. The level of exposure varies depending on the nature of the metric. The risk of certain nonfinancial milestone contingent consideration structures, where a payment is made upon occurrence of a company-specific event largely unrelated to market dynamics, would likely be considered predominantly diversifiable. In contrast, contingent consideration payments based on a company's revenue or earnings that depend on the general economy, and are therefore correlated with market movements, would include a higher level of systematic risk.

The Required Metric Risk Premium (RMRP) is a measure of the excess return above the risk-free rate, or risk premium, that investors demand to bear the non-diversifiable risk associated with a metric. While our discussion of how to estimate the RMRP is set within the Adjusted CAPM framework introduced in Section 4.3.1 because that framework is commonly used in practice, the same principles would apply if one is using an alternative framework for capturing systematic risk.

It is useful to begin a discussion of estimating the RMRP associated with an earnout metric with a discussion of estimating the RMRP applicable to long-term free cash flows to equity (LTFCFE), for which there are well-established and widely used methods, derived from the estimate of the cost of equity. We have the following standard definition (including the potential additional premiums as discussed in Section 4.3.1):

$$RMRP_{LTFCFE} = R_{LTFCFE} - LTRFR = \beta_{Equity} \times MRP + AP$$

Where:

$RMRP_{LTFCFE}$ = the Required Metric Risk Premium for LTFCFE

R_{LTFCFE} = the required rate of return (i.e., discount rate) for LTFCFE

LTRFR = the long-term risk-free rate

β_{Equity} = the beta of the equity capital needed to generate the LTFCFE

MRP = Market Risk Premium

AP = Additional premiums (e.g., size premiums, country risk premiums, and company-specific premiums as discussed in Section 4.3.1)

Since earnouts based on the long-term free cash flows to equity are rare, one generally needs to modify the estimate to account for the specific risk and return characteristics of the earnout metric.

The above framework can be generalized to estimate the RMRP for the earnout metric (such as short-term EBITDA or revenue), as follows:

$$RMRP_{Metric} = R_{Metric} - R_{MRFR} \approx \beta_{Metric} \times MRP^{45} + AP_{Metric}$$

Where:

[45] This formulation does not incorporate the impact that debt financing might have on the RMRP for the earnout metric. The valuation specialist should consider whether any adjustments are needed.

$RMRP_{Metric}$ = the Required Metric Risk Premium for the metric

R_{Metric} = the required rate of return (i.e. discount rate) for the metric

R_{MRFR} = the risk-free rate over a term consistent with the metric exposure timeframe

β_{Metric} = the beta of the metric

MRP = the Market Risk Premium

AP_{Metric} = the portion of the additional risk premiums applicable to the earnout metric

The bottom-up method of estimating the RMRP (described in Section 5.2.3) relies on this framework.

An alternative starting point for estimating the RMRP is the risk premium applicable to long-term free cash flows to the firm (LTFCFF), for which there are also well-established and widely used estimation methods. To estimate the RMRP for the earnout metric, the estimated RMRP applicable to LTFCFF is modified to account for differences between the specific risk and return characteristics of the earnout metric (such as short-term EBITDA or revenue) as follows:

$$RMRP_{Metric} = R_{Metric} - R_{MRFR} = RMRP_{LTFCFF} \times \mathrm{AF}_{Metric} \approx (WACC^{46} - LTRFR) \times \mathrm{AF}_{Metric}$$

Where:

$RMRP_{Metric}$ = the Required Metric Risk Premium for the metric

R_{Metric} = the required rate of return (i.e. discount rate) for the metric

R_{MRFR} = the risk-free rate over a term consistent with the metric exposure timeframe

$RMRP_{LTFCFF}$ = the Required Metric Risk Premium for LTFCFF

$LTRFR$ = the long-term risk-free rate

AF_{Metric} = the adjustment factor required to account for the differences in risk between LTFCFF and the earnout metric[47]

$WACC$ = the weighted average cost of capital for the earnout-relevant business

The top-down method of estimating the RMRP (described in Section 5.2.3) relies on this framework.

As can be seen from the equations for $RMRP_{LTFCFE}$ and $RMRP_{Metric}$, no matter which framework you are using, the risk premium for a metric will often <u>not</u> be the same as the risk premium associated with the long-term free cash flows to equity or to the firm. Therefore, <u>even for an earnout with a linear payoff structure</u>, the earnout discount rate will often <u>not be the same as the IRR or the WACC</u> for the business.

The structure of the earnout does not impact the estimation of the RMRP. Importantly, however, the impact on the *value* of the earnout of *applying* the RMRP varies greatly based on the structure of the earnout. If the payoff structure is *linear*, the systematic risk exposure can be easily captured by

[46] This formulation explicitly incorporates the impact of the tax-related benefits associated with debt financing. The valuation specialist should consider whether such benefits are applicable to the RMRP for the earnout metric and whether any adjustments are needed.

[47] As an example, adjustments for operational leverage and for duration would be required for a short-term revenue-based earnout metric. An adjustment should also be considered for differences in risk between LTFCFF and for example, EBITDA, when there are significant cash flow adjustments for, e.g., depreciation and amortization, capital expenditures, or working capital requirements. The adjustment factor is often characterized as multiplicative when it is reasonable to adjust all risk premiums proportionately, but it may take other forms when the various risk factors require disproportionate adjustments. See Section 5.2.3 for a more in-depth discussion of methods of estimating the RMRP.

discounting the future contingent consideration expected payoffs at the RMRP. However, as explained in Sections 4.4, 4.5 and 4.6, estimating a discount rate for a *nonlinear* payoff structure exposed to systematic risk is a challenge which can best be overcome by using a risk-neutral valuation framework.

Returning to the discussion of how to account for the specific risk and return characteristics of the earnout metric, we note that estimation of the Market Risk Premium (MRP) has been well studied. There are numerous publications that estimate the currently expected equity return required by the market over and above the return associated with investments in risk-free securities.[48] The market risk premium that is estimated by using a broad-based index is typically considered a reasonable proxy for the risk premium required by an investor for a diversified portfolio of investments. Estimating the required premium associated with the *metric's* risk (i.e., the RMRP), however, is not always as simple a task.

Estimating the RMRP *associated with the earnout metric* requires consideration of (1) the systematic risk factors associated with an investment in the metric (such as the correlation of the growth rate of the metric with market returns, the volatility of the growth rate for the metric, and the volatility in the rates of return required by investors for an investment with a duration matching that of the earnout[49]) and (2) consistency with the rates at which comparable or related cash flows are being discounted for other purposes (such as a valuation of the intangible assets acquired in the same transaction).[50] At a fundamental level, estimating the RMRP involves a quantification of the amount of risk associated with an investment in the metric over the duration of the earnout.

It is important to consider how the contingent consideration metric relates to the cash flows generated by the business. For instance, cash flows associated with the business are generally free cash flows, whereas many earnouts are based on metrics related to earnings before interest and tax (EBIT), EBITDA, revenue, etc. Each metric may have unique characteristics that impact the amount of systematic risk as compared to the long-term free cash flows to equity or the firm due to, for example, differences in financial and operational leverage or volatility.[51]

If there is no non-diversifiable risk associated with the metric, then the RMRP is zero. This situation is common for earnouts based on nonfinancial milestone events with predominantly diversifiable risk, such as the success of a research and development (R&D) effort, the ability to meet a deadline for a software integration task, or the success in getting a specified percentage of the acquiree's existing customer base to agree to a contract modification in order to continue receiving services post-acquisition. (See Section 9.3 for an example of the valuation of an earnout based on a nonfinancial milestone event with predominantly diversifiable risk.) For financial metrics such as revenue or profit-based metrics, the RMRP is typically not zero, and an adjustment for the non-diversifiable risk associated with the metric is required.

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[48] See, for instance, Duff & Phelps' estimation of the equity risk premium at https://www.duffandphelps.com/CostofCapital.

[49] As for the value of an investment in equity, the value of the earnout to a market participant is affected by two types of volatility: (1) the volatility of the forecast for the earnout metric around the expected case and (2) the volatility in the rates of return required by investors for an investment with a duration matching that of the earnout. The need to incorporate the second type of volatility may be more apparent if one considers the replicating portfolio derivation of options pricing theory, whereby a combination of a risk-free asset and the underlying security (whose value is affected both by changes in the forecast results and by changes in the market's required rates of return) is used to replicate the payoff of a financial derivative.

[50] Consistency does not mean that the discount rates are identical or even similar. See Section 7.2 for a discussion of consistency checks and some of the key differences between the valuation of a business or its intangibles and the valuation of contingent consideration.

[51] See, e.g., Sections 10.3.1, 10.3.2, and 10.3.3 for discussions of alternative methodologies for addressing how to take differences in financial leverage, operational leverage, and volatility into account, when estimating a RMRP.

A financial metric-based beta, such as an earnings-based beta or a revenue-based beta, is a measure of the systematic risk associated with the future performance for that financial metric, in a CAPM framework. While the literature on equity betas, asset betas, and the WACC is rather extensive, estimating a revenue beta (or a RMRP for revenue) may be a less familiar undertaking for many valuation specialists. Nevertheless, there are multiple methodologies that can be used for measuring systematic risk even for a revenue metric.

Methods for estimating the RMRP for a financial metric are described in the next section, with earnings-based metrics (such as EBITDA) and revenue used as illustrative examples of a financial metric.

5.2.3 Methods for Estimating the Required Metric Risk Premium

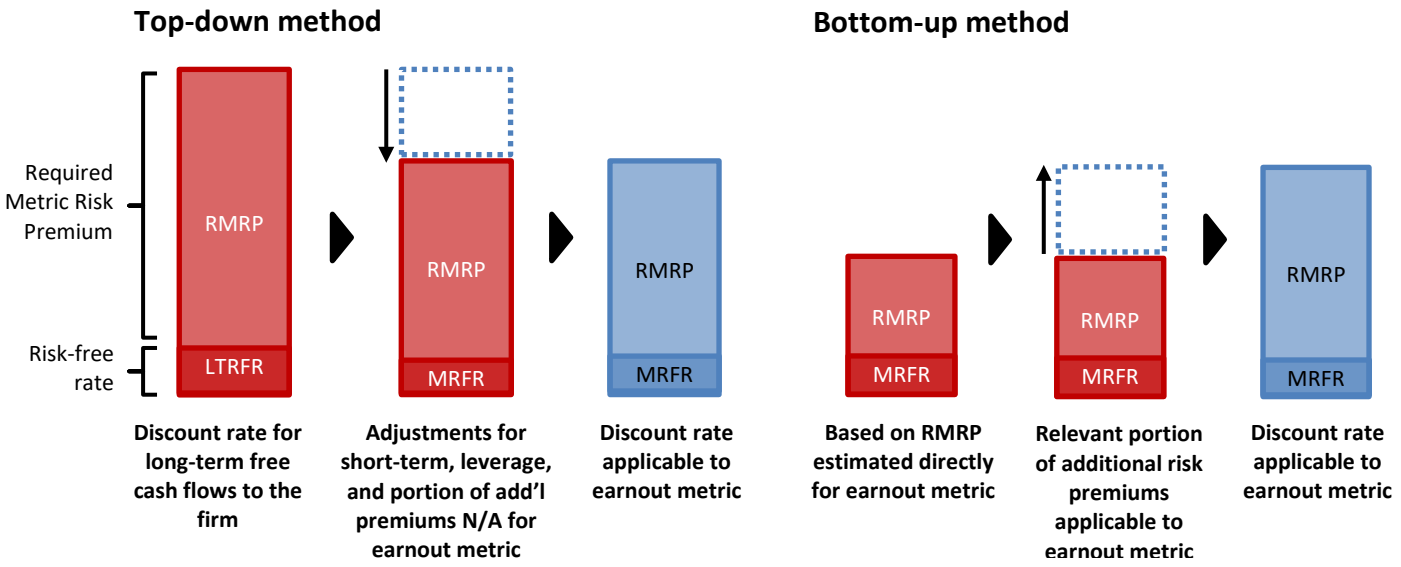
The methods for estimating the RMRP (equivalently the methods for estimating the discount rate for risk-adjusting the metric projections) associated with financial metrics can be divided into two broad categories:

1. The **top-down method** typically starts with the estimated risk premium implied by the discount rate for the long-term free cash flows to the firm (for example, the transaction IRR or the WACC estimate – the long-term risk-free rate), which is then adjusted for the differences in risk between the long-term free cash flows and the earnout metric. Adjustments are often made for the following items:
    a. The short-term nature of the earnout metric, potentially including differences in investor volatility for short-term free cash flows as compared to long-term free cash flows
    b. Differences in leverage[52] between free cash flows and the earnout metric
    c. Differences attributable to which synergies are included or excluded by the definition of the earnout metric (for example, the inclusion of buyer-specific synergies)
    d. Other differences in risk (e.g., if using an Adjusted CAPM framework, differences in the size premium, country-risk premium, and company-specific premium) between the long-term free cash flows of the relevant business and the earnout metric. For example, if starting from a WACC derived from comparable public companies where for purposes of valuing the business a size premium was added, adjustments might be made to incorporate the portion of that size premium that is applicable to the earnout metric. As another example, if starting from the IRR associated with the transaction for the relevant business, adjustments might need to be made to remove the portion of the size premium (or any other additional risk premiums) that is not applicable to the earnout metric.
2. The **bottom-up method** starts (in the Adjusted CAPM framework) by estimating the earnout metric's beta, based on (a) the volatility in growth of the metric relative to the volatility of a proxy for the market and (b) the correlation between growth in the metric and in the market. Adjustments are then made to incorporate the portion of the additional risk premiums (i.e., size premiums, country-risk premiums, and company-specific premiums) applicable to the earnout metric. Adjustments could also be considered for the availability of debt financing.

[52] Financial leverage is typically accounted for in the WACC. Operational leverage is not accounted for in the WACC or IRR and therefore top-down methods should adjust for operational leverage for a metric such as revenues. In addition, the valuation specialist should consider whether there are other differences in leverage for the earnout metric as compared to the long-term free cash flows. For example, depending on the earnout metric, adjustments might be considered if there are substantial differences in leverage due to depreciation, amortization, capital expenditures, or working capital requirements.

Figure 9 below illustrates these two methods for estimating the RMRP, in an Adjusted CAPM framework. Figure 9 also illustrates that when starting with the WACC or IRR, the discount rate appropriate for the metric replaces the long-term risk-free rate with a risk-free rate commensurate with the duration of the earnout.

FIGURE 9: Illustration of Two Methods for Estimating the RMRP



The following example illustrates (in an Adjusted CAPM framework) how the top-down and bottom-up methods can be used to estimate the RMRP associated with an earnout metric.

Example: Consider the following situation:

- Long-term risk-free rate = 4%
- Market Risk Premium = 5%
- Equity beta for the business = 1.0
- Size premium for the business = 10%
- Debt/equity ratio = 0.

With this fact pattern, the WACC for the business could be estimated to be 19% (computed as 4% + 1.0×5% + 10%). The Required Metric Risk Premium for the long-term free cash flows to the firm ($RMRP_{LTFCFF}$)[53] is 15% (computed as 1.0×5% + 10%, or equivalently, WACC – long-term risk-free rate = 19% – 4%).

Now suppose that the earnout for this transaction is based on revenues over the next year. How can the top-down and bottom-up methods be used to estimate the RMRP associated with this earnout?

1. Top-Down Method:

The valuation specialist considers what adjustments are needed to the $RMRP_{LTFCFF}$ of 15% to account for the differences in risk between the long-term free cash flows to the firm and the short-term free cash flows over the earnout period. For the purposes of this example, assume

[53] Note, as debt is assumed to be zero in this example, RMRP for the long-term free cash flows to the firm = RMRP for the long-term free cash flows to equity = (WACC – long-term risk-free rate).

that the valuation specialist concludes that no adjustments are needed for duration. Next, the valuation specialist considers whether there are significant differences in financial leverage as compared to the leverage taken into account by the WACC analysis. Assume for purposes of this example that, after due consideration, the valuation specialist concludes that there are no significant differences in risk caused by, for example, capital expenditures, depreciation, amortization, or working capital requirements. In combination with the assumption of no debt, this analysis leads the valuation specialist to conclude that no adjustments to the $RMRP_{LTFCFF}$ are needed for financial leverage. Next, the valuation specialist estimates the operating leverage ratio applicable to the first year of revenue post-close, perhaps using one of the methods described in Section 10.3.2. For the purposes of this example, assume that the leverage ratio estimate is 50%. After due consideration, the valuation specialist concludes that it is appropriate to apply the leverage ratio adjustment to the entire risk premium, i.e., proportionately adjusting the market risk and size premiums that are applicable to the one-year revenue metric. With these assumptions, the RMRP for one-year revenue is calculated as 15% × 50% = 7.5%.

2. Bottom-Up Method:

The valuation specialist estimates the beta for one-year revenue, perhaps using one of the methods described in Section 10.3.3, to be 0.5. Assume that after due consideration, the valuation specialist concludes that it is appropriate to use the ratio of the revenue beta to the equity beta (0.5÷1.0) to estimate the portion of the additional size premium applicable to the one-year revenue metric (i.e., half the 10% size premium is applicable to the revenue metric). Finally, because debt is zero in this example, the valuation specialist concludes that no further adjustment is needed for the availability of debt financing. With these assumptions, the RMRP for one-year revenue is also 7.5% (computed as 0.5×5% + 10%×50%).

Note also that, whether using a top-down or a bottom-up method, the risk-free rate used in the remainder of the analysis will *not* be the long-term risk-free rate of 4% that is included in the WACC for the business. The risk-free rate (and any counterparty credit risk premium, see Section 5.2.6) used in the earnout valuation should be commensurate with the time period from the valuation date to the expected payment date(s).

In both the top-down and bottom-up methods, consideration should be given to the extent to which any additional risk premiums (e.g., size premiums, company-specific premiums, country risk premiums or other additional premiums representing non-diversifiable risk)[54] incorporated in the estimated WACC for the relevant business are applicable to the earnout metric. Typically, the valuation specialist will consider the rationale for including each of the additional premiums in the WACC build-up, and then assess whether and to what degree the same rationale applies to the risk associated with the earnout metric. Sample considerations are provided below.

- In assessing the portion of any size premium applicable to the earnout metric, one consideration might be the extent to which the business relevant to the earnout is anticipated to be integrated with the acquirer over the term of the earnout. The more integrated the business, the more the size premium applicable to the RMRP would resemble the size premium for the *acquirer's* business (post-transaction).

[54] Methods such as the Fama-French five-factor model (see Fama and French (2015)) include other measures of systematic risk. The principles articulated in this Valuation Advisory should generally be applicable to any premiums intended to capture non-diversifiable risk.

- The portion of a company-specific premium applicable to the earnout metric can be challenging to gauge. If there is support that the earnout metric is, for example, 20% less risky than the long-term free cash flows of the related business, then including the additional premiums used in the WACC proportionately reduced by 20% might be a reasonable and practical methodology. However, if the company-specific premium is included in the WACC solely to reflect the higher risk of aggressive projections for *long-term* future cash-flows (but not higher risk over the course of the earnout period), then a lower company-specific premium may be appropriate for the earnout metric's RMRP. Similarly, if the rationale for the company-specific premium is to address significant near-term risk or aggressive projections relevant to the earnout metric over the earnout period, then including the full company-specific premium may be appropriate for the earnout metric's RMRP.
- For country risk premiums, in addition to the extent to which such a premium is relevant to the earnout metric, another consideration might be whether the earnout payoff is derived from the relevant countries in the same proportions as the long-term free cash flows for the business.

In the example provided earlier in this section, for the top-down method, the operating leverage ratio adjustment proportionately reduced both the size premium and the market risk premium included in the WACC. For the bottom-up method, the portion of the size premium deemed applicable to the revenue metric was chosen to be proportional to the ratio of the revenue beta to the equity beta. When there is no clear support for fully including or fully excluding an additional premium, it is not uncommon for a valuation specialist to consider it reasonable to include a proportion of the additional premium in accordance with the relative risk of the earnout metric and long-term free cash flows to equity.

Given the above considerations regarding size, country-specific and company-specific premiums, the additional premiums incorporated in an earnout metric's Required Metric Risk Premium will generally be less than or equal to the additional premiums associated with the long-term free cash flows of the business. Similarly, due to financial and operational leverage and the typically shorter time horizon for an earnout, the metric beta for an earnings-based or revenue-based earnout is also typically less than the beta for the long-term free cash flows to equity. As a result, an earnout metric's RMRP will often be less than the risk premium built into the WACC minus the long-term risk-free rate (LTRFR) for the related business.[55] The earnout metric's RMRP will generally be less than (WACC – LTRFR) for a revenue-based metric, due to operational leverage. Even for an earnings-based metric such as EBITDA, the earnout metric's RMRP may be less than (WACC – LTRFR), due to the difference in duration or, for example, when capital expenditures add significant leverage.

Ultimately, the objective is to estimate a RMRP that reflects the market participant view of the non-diversifiable risk associated with the earnout metric, while ensuring consistency with the transaction economics and market conditions as of the measurement date.

The next sections discuss the RMRP estimation process using the top-down and bottom-up methods for two common contingent consideration financial metrics: earnings-based metrics and revenue-based metrics. After the discussion of these RMRP estimation methodologies, this section concludes

[55] An exception could occur, for example, if the expected earnout cash flow is riskier than the cash flows of the business from a market participant point of view (e.g., due to the inclusion in the earnout of riskier buyer-specific synergies that are not included in the market participant WACC for the business).

with a discussion of whether and when to incorporate tax effects into the estimate of the RMRP for a pre-tax metric.[56]

5.2.3.1 Top-down Methods for Earnings-Based RMRP Estimation

The top-down method for estimating an earnings-based RMRP such as EBIT typically[57] starts with the estimated risk premium implied by the discount rate for the long-term free cash flows to the firm for the relevant business (i.e., typically the transaction IRR or the WACC for the business, less the long-term risk-free rate), which is then adjusted for differences in duration and in leverage between the long-term free cash flows to the firm and the earnout metric.[58]

Many methodologies for estimating earnings-based discount rates start with the assumption that the risk associated with the earnings of the firm is reasonably comparable to the risk associated with the underlying assets of the firm. In the CAPM framework,[59] an asset beta (or "unlevered" equity beta, i.e., unlevered to remove the effect of financial leverage) is assumed to be a reasonable proxy for an EBIT beta. Furthermore, in many circumstances an EBIT beta is considered a reasonable approximation for other earnings-based betas such as EBITDA betas.[60] That is, in many circumstances it is considered reasonable to assume that

$$\beta_{EBITDA} \approx \beta_{EBIT} \approx \beta_{Asset}$$ [61]

In certain circumstances in which the leverage introduced by taxes and cash flow adjustments such as tax depreciation and amortization, capital expenditures, and working capital requirements is minimal, it may be considered a reasonable approximation to use the same RMRP implied by the discount rate applied to the long-term free cash flows of the business (as estimated by, for instance, the WACC)[62] as an estimate of the RMRP for EBITDA.

$$\text{WACC} - LTRFR \approx RMRP_{EBITDA} \approx RMRP_{EBIT}$$

However, in the less common situation when taxes are not linearly related to pre-tax earnings (e.g., if there are substantial net operating losses or tax credits in some of the earnout years) or when there are substantial cash flow adjustments due to, e.g., depreciation, amortization or capital expenditures over the earnout timeframe, an adjustment may be required for the related difference in risk between an

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[56] Pre-tax earnings typically have comparable risk to post-tax earnings, although there are instances in which taxes introduce significant financial leverage and therefore significant differences in risk, as explained in Section 5.2.3.7.

[57] The top-down method could also start with the estimated risk premium implied by the discount rate for long-term free cash flows to equity, which would require additional adjustments to account for financial leverage. See Section 10.3.1.

[58] For simplicity of exposition, in this and similar succeeding sections, we will assume that the expected cash flow for the earnout has been adjusted to reflect all relevant synergies (including any earnout-relevant buyer-specific synergies), and that there are no differences in the metric risk due to any differences caused by the inclusion or exclusion of synergies in the calculation of the earnout payoffs.

[59] While the discussion of the adjustments to the RMRP in this section illustrates the concepts in the CAPM framework, the underlying theory of adjusting for financial leverage in estimating an earnings-based RMRP should apply to most other models for quantifying non-diversifiable risk. See Section 4.3.1 for a description of the CAPM framework and the Adjusted CAPM framework.

[60] The approximate equivalence of the EBIT beta and the EBITDA beta generally holds, except when there are significant fixed depreciation or amortization expenses. In such circumstances, the asset beta can be adjusted by using the de-levering techniques described in Section 10.3.2, but instead of de-levering for fixed costs as compared to EBIT, the valuation specialist would instead de-lever only for the fixed portion of depreciation or amortization in EBITDA as compared to EBIT. Alternatively, this distinction can be captured directly using the bottom-up method. Similarly, while the asset beta is usually a reasonable approximation for the EBIT beta, adjustments might be required for businesses with a significant amount of fixed capital expenditures.

[61] More generally, when a business has both debt and equity funding, the long-term asset beta implied by the WACC may often be approximated as (WACC – long-term risk-free rate) / MRP. Such an estimate of the asset beta assumes that the financial leverage adjustments incorporated in the WACC are approximately comparable to the financial leverage adjustments required for the relevant earnings-based metric (such as EBIT or EBITDA).

[62] Such an estimate should already capture aspects of the financial leverage difference between free cash flows to equity and total free cash flows.

earnout metric such as EBIT and the long-term free cash flows to the firm. See Sections 10.3.1 and 10.3.2 for a discussion of de-leveraging methodologies that could be used to adjust for these types of differences in risk.

As discussed in more detail in Section 5.2.3, in an Adjusted CAPM framework, only the portion of any additional risk premiums included in the WACC for the relevant business (e.g., size premiums, country-risk premiums, and company-specific premiums) that are applicable to the earnout metric over the earnout period should be included in the RMRP.

When applying top-down methods, it is important to consider whether any adjustments may be warranted to account for differences in the earnings metric for the earnout as compared to the long-term free cash flows of the business. For instance, typically asset betas are based on estimates of long-term equity betas, and as such relying on them produces estimates of long-term EBIT betas. However, many earnouts are short term in nature. There is some empirical evidence that long-term betas may generally be higher than short-term betas,[63] consistent with the greater exposure in the long term to the impact of shifts in macroeconomic drivers of the market.[64] In cases where the earnout is short term, each of the components of the WACC build-up can be replaced with short-term assumptions, thereby at least partially adjusting for the short-term nature of the earnout metric versus the long-term free cash flows of the business. However, short-term earnings-related results may also be more related to idiosyncratic, largely diversifiable, company-specific factors that may be specific to the acquisition (such as integration risks, timing of achievement of cost or cross-sell synergies, or timing of product launch) than they are related to long-term earnings growth; further adjustments might be appropriate in such a situation.

When applying top-down methods, it is also important to consider whether there are any differences in risk due to differences in the definition of what is included in the earnout metric. For instance, an earnings-based earnout metric that includes buyer-specific synergies may be riskier than the cash flows excluding those synergies.

Adjustments could also be appropriate to address volatility-related issues associated with the short-term nature of the earnout. For example, volatility might be lower (e.g., if a portion of the future results will be derived from contracts already in place) or higher (e.g., if management has assessed an unusually large uncertainty regarding future results) than implied by comparable company asset betas. See Section 5.2.4 for a further discussion of volatility estimation.

Additionally, estimates of both the equity and asset betas include the volatility in returns required by investors for investments in equity securities. Top-down methods that rely on the equity or asset beta therefore assume that the risk characteristics (i.e., beta and volatility in a CAPM framework) for EBIT are the same as the risk characteristics of a hypothetical security that generates EBIT, including the volatility in returns required by investors for such securities. Since equities are typically longer-term investments, and the volatility in the value investors place on investments generally increases with the time horizon,[65] this method can overestimate systematic risk for earnout metrics. The overestimate is normally small for long-term earnouts, but may be significant for short-term earnouts. Furthermore, an earnings metric such as EBIT is a flow variable[66] that is earned over the course of the earnout

[63] It is typically assumed that betas are mean-reverting and that the term structure of betas is flat.

[64] See Allen, Myers, and Brealey, *Principles of Corporate Finance*, 11th ed. (2013), pp. 228-229.

[65] For instance, there is significant volatility in U. S. treasury bonds with a 20-year remaining term, even though the underlying cash flows associated with those treasury bonds are considered to be risk-free. However, this volatility drops dramatically as the remaining term approaches zero, with e.g. negligible volatility for a 20-year U.S. treasury bond with one year remaining on its term.

[66] A metric that is earned over a fixed time period (e.g., EBITDA or revenue for a year) is referred to as a flow variable. In contrast, a stock variable includes all value to be received over an infinite future time horizon.

period, whereas an equity value (from which the asset beta is derived) is a stock variable, i.e. a forward-looking point estimate of the future value of returns on investment in the company. As just one example of the impact of this difference on systematic risk and volatility, any new information that substantially changes the long-term outlook for a business would affect the equity (and asset) value, but unless that new information substantially affects earnings over the course of the earnout period, the value of an earnout based on the flow variable EBIT would be less impacted or even possibly unaffected. An adjustment could also be considered to account for these issues.

If, instead of starting with the WACC – long-term risk-free rate, the valuation specialist chooses to start with the cost of equity, then an adjustment should be considered for financial leverage. There are many methods for de-levering the equity risk premium to estimate the RMRP for earnings-based metrics such as EBIT, including but not limited to:

- The Hamada Method
- The Modigliani-Miller Generalized Beta Method
- The Practitioners' Method
- Volatility-Based Method.

See Section 10.3.1 for a discussion of the above de-levering methodologies and for considerations when choosing among these methods for a specific valuation assignment.

5.2.3.2 Top-down Method for Revenue RMRP Estimation

The top-down method for estimating a revenue-based[67] RMRP typically[68] starts with the estimated risk premium implied by the discount rate for the long-term free cash flows to the firm for the relevant business (i.e., typically the transaction IRR or the WACC for the business, less the long-term risk-free rate),[69] which is then adjusted for differences in risk between the long-term free cash flows to the firm and the revenue-based earnout metric over the earnout-relevant time horizon.

Many top-down methodologies start with the WACC less the long-term risk-free rate, make any needed adjustments for duration and/or leverage differences as described in Section 5.2.3.1, and then adjust for operational leverage to account for the impact of fixed costs. Such methods start with the same assumptions used for discounting the cash flows of the business, ensuring a consistent starting point and incorporating the appropriate adjustments for financial leverage.

In the CAPM framework,[70] revenue betas can also be derived from estimated asset betas by adjusting for the impact of fixed costs. This adjustment captures the impact of operational leverage in addition to the financial leverage already captured by the asset beta.

As discussed in more detail in Section 5.2.3, in an Adjusted CAPM framework, only the portion of any additional risk premiums included in the WACC for the relevant business (e.g., size premiums, country-risk premiums, and company-specific premiums) that are applicable to the earnout metric over the earnout period should be included in the RMRP.

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[67] While the discussion in the next few paragraphs focuses on revenue, similar points could be made for other metrics that are subject to operational leverage, such as gross profit.

[68] The top-down method could also start with the estimated risk premium implied by the discount rate for long-term free cash flows to equity, which would require additional adjustments to account for financial leverage using, for example, methods such as those described in Section 10.3.1.

[69] For simplicity of exposition, we will assume that the expected long-term free cash flows to the firm have been adjusted to reflect all relevant synergies, and that there are no differences in the metric risk due to any differences in synergies.

[70] While the discussion in this section illustrates the concepts in a CAPM framework, the underlying theory of adjusting for operational leverage should apply to most other methods for quantifying non-diversifiable risk for a revenue-based metric.

When applying top-down methods, it is important to consider whether any additional adjustments may be warranted to account for differences in the revenue metric as compared to the long-term free cash flows of the business. For instance, typically asset betas (and the WACC) are based on estimates of long-term equity betas, and as such adjusting them for operational leverage produces estimates of long-term revenue betas. However, many earnouts are short term in nature. There is some empirical evidence that long-term betas may be higher than short-term betas,[71] consistent with the greater exposure in the long term to the impact of shifts in macroeconomic drivers of the market.[72] In cases where the earnout is short term, each of the components of the WACC build-up can be replaced with short-term assumptions, thereby at least partially adjusting for the short-term nature of the earnout metric versus the long-term free cash flows of the business. However, short-term revenue-related results may also be more related to idiosyncratic, largely diversifiable, company-specific factors that may be specific to the acquisition (such as integration risks, timing of cross-sell synergies, or timing of product launch) than they are related to long-term earnings growth.

When applying top-down methods, it is also important to consider whether there are any differences in risk due to differences in the definition of what is included in the earnout metric. For instance, revenues that include buyer-specific synergies may be riskier than the revenues excluding those synergies.

Adjustments could also be appropriate to address volatility-related issues associated with the short-term nature of the earnout. For example, volatility might be lower (e.g., if a portion of the future revenues will be derived from contracts already in place) or higher (e.g., if needed to address unusually large uncertainty regarding future results) than implied by comparable company asset betas. See Section 5.2.4 for a further discussion of volatility estimation.

Additionally, estimates of both the equity and asset betas (and of the WACC), which the top-down methods can use as a starting point to estimate the RMRP for revenue, include the volatility in returns required by investors for investments in equity securities. As discussed in more detail in Section 5.2.3.1, the top-down methods can therefore overestimate systematic risk for earnout metrics. The overestimate is normally small for long-term earnouts, but may be significant for short-term earnouts.

While less well known than methods for estimating earnings-based RMRPs, there are methods for de-levering the RMRP for an EBIT metric for operational leverage over the term of the earnout, including:

- The Fixed Costs vs. Assets Method
- Volatility-Based Method.

See Section 10.3.2 for a discussion of the above methodologies and for considerations when choosing between these methods for a specific valuation assignment. A third method (the Modified Harris-Pringle Method) is also discussed briefly in Section 10.3.2. However, the Working Group does not recommend the Modified Harris-Pringle Method for the estimation of a revenue RMRP.

5.2.3.3 Bottom-Up Method for Estimating RMRP for Earnings-Based or Revenue-Based Metrics

The Required Metric Risk Premium for a financial metric can also be estimated from the bottom-up by direct estimation, rather than by starting from (and adjusting as appropriate) the risk premium appropriate to long-term free cash flows.

[71] It is typically assumed that betas are mean-reverting and that the term structure of betas is flat.
[72] See Allen, Myers, and Brealey, *Principles of Corporate Finance*, 11th ed. (2013), pp. 228-229.

In the CAPM framework,[73] a metric beta can be built up using estimates of the volatility of that metric and of the correlation between the growth in that metric and the market.[74] See Section 10.3.3 for more information regarding the bottom-up method for estimating a beta for an earnout metric and Section 5.2.4 on estimating volatility.

As discussed in Section 5.2.3, only the portion of any additional risk premiums included in the WACC for the relevant business (e.g., size premiums, country-risk premiums, and company-specific premiums) that are applicable to the earnout metric over the earnout period should be incorporated in the RMRP. For example, if a size premium was included in the WACC, then a portion of that size premium will likely need to be included in the RMRP.

In circumstances where there is significant debt in the capital structure, the valuation specialist should consider whether it would be appropriate to make an adjustment to the estimated RMRP due to the impact of the availability of debt financing.

For earnings-based metrics, the bottom-up estimation of the RMRP using the underlying metric itself allows for capturing the intricacies of the differences in risk associated with different types of earnings, e.g., earnings before tax (EBT) vs. EBIT vs. EBITDA. However, estimation of an earnings-based beta can be challenging. Early stage companies are often the subject of acquisitions involving earnouts, and historical data for such companies can involve negative or very small positive earnings. Comparing growth rates in such cases to market returns may not result in reasonable correlation estimates. Nevertheless, one may be able to overcome these difficulties through careful selection of comparable companies with earnings that are sufficiently positive.

For revenue-based earnouts, the bottom-up method allows for capturing the intricacies of the differences in risk associated with different types of revenue (e.g., management fees versus performance fees, the latter of which may be significantly more volatile).

For both revenue and earnings-based metrics, estimation of the correlation between growth in the metric and growth in the market requires care. For example, there are some indications that the returns in the stock market might be a leading indicator of revenue and earnings growth for certain industries, which would indicate that one may need to investigate lagged effects to obtain a proper estimate of correlation. As another example, if estimating correlation or volatility based on quarterly data, growth in the metric for a quarter should be measured on a year-on-year basis, so that (predictable) seasonality effects do not depress correlation estimates or inflate volatility estimates.

The bottom-up method can easily accommodate alternative methods for estimation of future volatility into the RMRP, such as incorporating management assessments or historical differences between forecasts and actual results. As discussed in Section 5.2.4, these two methods directly estimate the desired quantity, which is the volatility of metric growth *relative to management's forecast*. Other methods, such as de-levering equity volatility (often used in top-down methods) or using historical metric growth of comparable companies, only estimate a proxy for volatility of the earnout metric. (They estimate the volatility of growth in the metric, not the volatility of metric growth relative to management's forecast.) Such a proxy estimate for volatility may not always produce reasonable results.

[73] While this discussion of the bottom-up method illustrates the concepts in the CAPM framework, the underlying theory of how to develop a bottom-up, metric-appropriate discount rate should apply to most other methods for quantifying systematic risk.

[74] See Hull, *Options, Futures, and Other Derivatives*, 8th ed. (2011), pp. 766-768.

Finally, bottom-up methods do not include the volatility in returns required by investors and therefore can result in an underestimate of systematic risk for earnouts. The underestimate is normally small for short-term earnouts, but may be significant for long-term earnouts.

5.2.3.4 Ensuring Reasonableness of the Concluded Required Metric Risk Premium

Regardless of which method the valuation specialist uses to estimate a RMRP for a financial metric, it is important to ensure that the concluded estimate is reasonable. Certain methodologies are subject to potential measurement challenges or theoretical shortcomings, while others may require adjustment for duration or differences in volatility or systematic risk between the starting point (equity risk premium) and the earnout metric. When concluding on financial metric RMRPs, one should consider how the RMRP compares to other discount rates used in the valuation.

- A comparison of the respective discount rates and the related risk factors (e.g., beta and any additional risk premiums if working in an Adjusted CAPM framework) should confirm that they are all reasonable relative to one another, and that the differences are reasonable relative to differences in the underlying risk (e.g., leverage, duration, etc.)
- A high risk premium for the (WACC – long-term risk-free rate) is often associated with a commensurately high RMRP for an earnings-related metric. While there could be reasons for differences between the two (e.g., shorter duration, leverage differences, etc.), there should be a reasonable explanation behind any significant difference.
- The RMRP for revenue would typically be less than the (WACC – long-term risk-free rate), due to the removal of the effect of operational leverage. The estimated RMRP for revenue during the earnout period could be *far* lower than the (WACC – long-term risk-free rate), but if so there should be a reasonable explanation for why the systematic risk is so much lower for the earnout metric (e.g., shorter duration, leverage, proportion of booked business, etc.)
- If the earnout metric is tied to cash flows that differ from the cash flows generated by the standalone acquired business, then the relative risk of those different cash flows should be considered. For example, if the earnout metric over the earnout period is tied to performance of a consolidated business unit into which the acquired entity is merged or is affected by buyer-specific synergies,[75] that different risk profile should be reflected in the estimate of the RMRP.

5.2.3.5 Advantages and Disadvantages of the Top-Down Method

Advantages of the Top-Down Method:

- The top-down method typically starts with the transaction IRR or estimated WACC of the relevant business, both of which have well-established measurement frameworks.
- The top-down method ensures consistency of a business valuation or transaction price with an earnout that is based on the long-term free cash flows of the business. For example, the top-down method ensures that the value of an earnout that is based on 10% of the free cash flows of the business in perpetuity reconciles to 10% of the value of the business.
- The reference WACC/IRR have often been calculated for other purposes and are therefore readily available.
- By starting with the reference IRR or WACC, the top-down method creates a bridge between the RMRP and the discount rates used in the valuation of the relevant business.

[75] See Section 4.1 for a discussion of buyer-specific synergies.

Disadvantages of the Top-Down Method:

- There is no well-established method for adjusting long-term discount rates or IRRs to reflect the short-term nature of most earnouts. One might expect short-term betas, or IRRs from short-term investments, typically to be lower than those estimated or implied by the transaction IRR/WACC.
- There are challenges associated with measuring the operational leverage ratio used to de-lever the risk premium associated with the long-term free cash flows to estimate the RMRP for revenue-based metrics. Also, the general assumptions used to de-lever for financial leverage may not be appropriate when adjusting for operational leverage. In particular, the methods used to de-lever the RMRP for long-term free cash flows for financial leverage often assume that correlation with the market is not affected by leverage.
- The top-down method typically uses adjusted risk characteristics of equity prices as a proxy to measure the risk characteristics of the earnout metric. While the use of equity prices to estimate risk characteristics is widely accepted when discounting a stream of long-term, perpetual free cash flows, it may not be suitable when the underlying metric is a short-term subset of free cash flows.
- The top-down method assumes that the three main differences between the long-term free cash flows of the relevant business and the underlying metric are differences in term, financial leverage and operational leverage. The impact of other differences, such as the intricacies of differences in risk associated with different types of earnings (e.g., EBT vs. EBIT vs. EBITDA), may not be adequately captured using the top-down method.
- Additional adjustments may be required to achieve consistency with the situation-specific volatility of the underlying metric in the short term (especially in the case of higher-than-usual uncertainty, which is common for earnout metrics).
- The disadvantages of the top-down method are more prominent for revenue-based earnouts, due to the relative difficulty of estimating the magnitude of and adjusting for operating leverage.

5.2.3.6 Advantages and Disadvantages of the Bottom-up Method

Advantages of the Bottom-up Method:

- The bottom-up method is flexible in that it can cater to any underlying metric that has sufficiently reliable historical data. It can, for example, quantify the differences in risk associated with different types of earnings (e.g., EBT vs. EBIT vs. EBITDA) or different types of revenue (e.g., management fees vs. performance fees).
- The procedure for calculating the RMRP of the underlying metric is reasonably straightforward and is similar to the well-established procedure for calculating historical equity betas.
- The bottom-up method can directly measure the risk characteristics of the relevant metric using historical data, facilitating the recognition of any necessary adjustments to ensure consistency with the situation-specific volatility of the underlying metric, including the flow variable nature of a metric.

- The bottom-up method can easily accommodate alternative methods for estimation of future volatility into the RMRP, such as incorporating management assessments or historical differences between forecasts and actual results.[76]

Disadvantages of the Bottom-up Method:

- Estimating betas based on historical growth in financial metrics versus the market is not widely used or well researched.
- There may be measurement challenges associated with estimating betas using historical financial metrics, including:
  - Accounting anomalies associated with financial metrics (particularly for earnings metrics)
  - A mismatch between historical financial metrics that reflect realized historical results versus the value of market indices that reflect forward looking (future) expectations by investors[77]
  - Historical experience might need adjustment for the facts and circumstances of the situation (e.g., sometimes the factors that drive the parties to put an earnout in place imply that the outcome is more [or less] uncertain than historical results);
  - The need to estimate appropriate time-lags to best fit the growth in realized financial metrics to the growth in market indices.
- Beta estimates based on the bottom-up method exclude the volatility in required rates of return of investors, and thus may underestimate the RMRP. The underestimate is typically small for short-term earnouts, but an adjustment might be appropriate for long-term earnouts.
- Beta estimates based on the bottom-up method for the free cash flows of the firm are often very different from betas estimated for the same free cash flows of the firm in the typical WACC estimate. For example, the bottom-up method will typically result in a gap between the value of an earnout that is based on 10% of the free cash flows of the business and 10% of the value of the business. There is no well-established framework to bridge such a gap.
- The disadvantages of the bottom-up method are more prominent for earnings-based metrics, as the earnings data for comparable companies is more prone to measurement issues such as negative earnings and changes in accounting policies.

5.2.3.7 Incorporating Tax Effects into the RMRP

In deriving a discount rate for an earnout based on a pre-tax, financial metric (such as EBITDA or revenue), adjustments for tax effects are not typically warranted because in most situations taxes do not significantly impact risk, as they are linearly related to pre-tax earnings. For instance, if corporate taxation is anticipated to be a fixed percentage of pre-tax profits (as is often the case), and if pre-tax earnings are anticipated to have a *de minimis* likelihood of being negative (as is usually the case for earnouts based on an earnings metric), a pre-tax earnings metric will not be subject to substantially different leverage than the related post-tax earnings metric simply due to taxes.[78] Under

[76] Alternative methods for estimation of volatility are discussed in Section 5.2.4.

[77] The Working Group is aware of efforts to address this issue by relying on historical data related to (forward looking) analyst projections, rather than on historical outcomes. This type of research, if successfully completed, could partially mitigate this disadvantage.

[78] However, if (1) there is a significant chance of pre-tax earnings being negative, (2) there are significant net operating losses or tax credits, (3) a large, fixed tax payment is anticipated, or (4) pre-tax and post-tax cash flows differ due to, for instance, the inclusion or exclusion of large amounts of depreciation or amortization, then the relationship between pre-tax and post-tax earnings could be nonlinear, especially over a short time horizon. In such a situation, an adjustment might need to be made to account for the resulting

this assumption, taxes typically would not have a significant impact on systematic risk of the metric (especially in the short term). In such cases, it would usually not be necessary to make a tax adjustment to the Required Metric Risk Premium (or to the discount rate) for an earnout based on a pre-tax financial metric.

Note that it is generally not appropriate to use what are often referred to as "pre-tax discount rates" to capture tax effects in the context of the valuation of contingent consideration. Using a discounted cash flow method to estimate the *value of a business* one can either discount post-tax expected cash flows at a post-tax discount rate, or discount pre-tax expected cash flows at a pre-tax discount rate. In the latter case, the higher pre-tax discount rate is used to compensate for the expected cash flows excluding corporate tax to obtain an equivalent present value of the business. However, *when valuing an earnout*, the valuation specialist is not attempting to obtain an equivalent present value of after-tax cash flows, but instead is attempting to estimate the systematic risk applicable to the pre-tax metric (e.g. revenue or EBITDA) itself. Therefore, it is not appropriate to apply a pre-tax discount rate to the earnout metric, even if it is a pre-tax metric.

When applying a top-down method to estimate the RMRP, the valuation specialist should also consider whether there are any tax effects that impact the discount rate for the business (e.g., the IRR for the transaction) that would not impact the systematic risk associated with the underlying metric. For example, there may be instances in which the transaction IRR is higher due to specific tax benefits associated with the transaction. Any such tax-related increases in the discount rate should be removed from the estimated RMRP for a pre-tax metric.

5.2.4 Estimating Volatility

Volatility is a key element for valuation of many contingent consideration arrangements. Whenever the earnout has a nonlinear payoff structure, it is essential to quantify how much uncertainty there is around the expected case forecast for the metric because (as explained in Section 4.2) the expected payoff for the earnout will not be the same as the payoff at the expected outcome for the metric. In the context of an option pricing model (discussed further in Section 5.4), this uncertainty is often captured by estimating the volatility (or standard deviation)[79] of the change in the underlying metric over an appropriate length of time. In addition, some of the methods used to estimate the RMRP for an earnout involve estimating the volatility of the earnout metric.

For an earnout with a nonlinear payoff, the volatility estimate can have a significant impact on value. Consider the example in Section 9.5, in which the earnout payoff is 30% of the excess of the acquiree's annual EBITDA above 2,000 in the first year post-close. Assuming the other inputs remain the same (which may or may not be reasonable, as a higher volatility would generally be related to a higher RMRP), an increase in the volatility from 50% to 55% would increase the value of the earnout by 11.6% from 66.1 to 73.8, whereas a decrease in volatility from 50% to 45% would decrease the value by 11.7% to 58.4. In general, the degree of sensitivity of the value to changes in the volatility assumption will depend on where the expected case forecast is relative to the earnout thresholds and caps (the moneyness of the earnout, as explained in Section 4.5) and the time remaining from the valuation date to the end of the earnout period.

difference in risk. The methods discussed in Section 10.3.2 could be used to adjust the RMRP to address the differences in leverage (and therefore risk) caused by any such nonlinearities.

[79] Distributions typically used in practice, such as the lognormal distribution, have two parameters–a mean and standard deviation (or volatility).

There are numerous methods for estimating volatility associated with a metric, including:[80]

1. De-lever the historical and/or implied equity volatility of the subject company and/or comparable companies (the "Deleveraging Equity Volatility Method")
2. Rely on historical variability in the metric growth rate for the subject company and/or comparable companies (the "Historical Metric Variability Method")
3. Utilize management's estimates of the potential variation in alternative future outcomes, in conjunction with bias mitigation techniques (the "Management Assessment Method").

The remainder of this section provides a more in-depth discussion of each of these methods, along with a discussion of adjustments to the estimated volatility to account for any additional risks captured in the RMRP, such as size premiums and/or company-specific risk premiums. The section concludes with a discussion of how to cross-check the volatility estimate for reasonability.

5.2.4.1 The Deleveraging Equity Volatility Method

One way to estimate the volatility of the earnout metric is to begin with an annualized[81] equity volatility based on the company's (or comparable companies') historical equity returns and/or implied volatilities from traded options commensurate with the term of the earnout. Next, the equity volatility is de-levered in the same fashion that betas are de-levered in the top-down methods presented in Sections 10.3.1 and 10.3.2. For example, the equity volatility is de-levered for financial leverage for EBIT-based earnouts, and is de-levered for both financial and operational leverage for revenue-based earnouts.

Equity values, unlike most earnout metrics, are point estimates reflecting the total estimated future value of the equity investment. Moreover, historical or implied equity volatilities are often annualized to reflect the volatility of returns over a full year. However, most earnout metrics are exposed to risk over the period during which they are earned, with the average exposure typically at the mid-period. Therefore, if the volatility in growth rate for the metric is estimated by de-levering an annualized equity volatility, the metric's modelled risk exposure[82] should be adjusted to reflect the period over which the metric is earned. While the implementation of this adjustment can depend on the methodology employed, typically the valuation specialist would incorporate the estimated volatility in growth rate for the metric from the valuation date to the middle of the initial earnout period, followed by the volatility from that mid-period to the mid-period of the second period, and so forth. For example, if using Geometric Brownian Motion for an earnout based on revenue in each of the first three years post-close, the valuation specialist might incorporate a half-year of volatility for the first period and a full year of volatility for each of the second and third periods. See the example in Section

[80] This list is not meant to be exhaustive. For instance, one alternative method for estimating volatility would be to rely on the differences between historical analyst forecasts for comparable company performance as compared to actual results. Like the method that relies on management's assessments of alternative future outcomes, this method has the advantage of directly measuring the uncertainty around a future forecast, i.e., it is a direct measurement of the desired input. However, adequate data might not be available to support this method, analyst forecasts are developed with less information than is available to management (or to market participants), and it might be difficult to adjust for any biases in analyst forecasts, as these might not be stable over time. If implementing this method, care needs to be taken to align the timeframe for the forecast to the current forecast timeframe (e.g., an analyst forecast of calendar year 2017 results as of December 31, 2016 would be comparable to a forecast as of deal close for Year 1 post-close) and to adjust for (1) the information disparity between analyst and management forecasts and (2) the tendency for optimism in analyst forecasts. Another method for estimating volatility around a forecast would be to rely on the differences between historical management forecasts for performance of the earnout-relevant business as compared to actual results. However, adequate data is typically not available to support a robust estimate using this method, and like all methods using historical data, past volatility might not provide a good estimate of the volatility of the business post-transaction.

[81] If starting from historical equity volatilities based on daily or weekly data, it is important to annualize the volatility estimate.

[82] In an option pricing context, a typical model for the underlying metric assumes Geometric Brownian Motion, which has a time-varying volatility assumption of $\sigma^2 \times t$ where σ is an annualized volatility of returns/growth rates.

9.10 for an illustration of this mid-period adjustment to the volatility estimated by deleveraging an annualized equity volatility.

The resulting volatility estimate includes both the volatility of the growth rate for the metric and volatility in returns required by investors. Since equities are typically longer-term investments, and under normal circumstances the volatility in the value investors place on investments generally increases with the time horizon,[83] this method typically overestimates volatility for short-term earnouts.

Note also that this method only estimates a proxy for volatility of the earnout metric, and may not always produce reasonable results, as it is attempting to measure volatility of growth in the metric, not the volatility of metric growth relative to management's forecast. The valuation specialist should consider using the volatility implied by management's assessments of multiple future scenarios (where available and ideally after employing debiasing techniques, as discussed in Section 5.2.1) as a reasonability cross-check. Such a check helps to guard against underestimates of volatility in cases of higher uncertainty for the earnout-relevant business over the earnout timeframe than for the equity prices of comparable companies.

5.2.4.2 The Historical Metric Variability Method

To estimate the volatility of the growth in the earnout metric, one can look at the historical standard deviation in the metric growth for the company (or comparable companies[84]) and use this historical evidence as guidance for an estimate for future metric growth rate volatility. Consideration should be given as to how historical variation in the growth of the metric of the company (or comparable companies) compares to the uncertainty around the expected case for the subject company's metric. For example, a company that has had historically steady growth rates may not provide a reasonable comparable for estimating volatility for an earnout metric related to an early stage business anticipated to evolve rapidly or to launch "bet the business" new products.

If historical volatilities based on year-on-year growth of the metric are used to estimate the volatility of the earnout metric, then one has a direct estimate of the volatility over the course of a year, already adjusted for the metric's exposure to risk during that one-year period. To be consistent with the estimation process, one should generally use a full period of volatility in historical metric growth. (Using a half-period of volatility would underestimate the variation around the expected case.)

As for the Deleveraging Equity Volatility Method, the Historical Metric Variability Method only estimates a proxy for the volatility of the earnout metric. It may not produce reasonable results in some cases, as it assumes that the average growth rate in the metric is as good a predictor of next year's results as is management's forecast. The valuation specialist should consider using the volatilities implied by management's assessments of multiple future scenarios (where available and ideally after employing debiasing techniques, as discussed in Section 5.2.1) as a reasonability cross-check. Such a check helps to guard against underestimates of volatility in cases of higher uncertainty for the earnout-relevant business than historically for comparable companies.

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[83] For instance, there is significant volatility in U. S. treasury bonds with a 20-year remaining term, even though the underlying cash flows associated with those treasury bonds are considered to be risk-free. However, this volatility drops dramatically as the remaining term approaches zero, with negligible volatility for example, for a 20-year U.S. treasury bond with one year remaining on its term.

[84] Theoretically, if sufficient historical data is available for the subject company (or even better, if sufficient historical management projections were also available), one could estimate volatility from subject company data. However, availability of adequate subject company data is uncommon, the presence of the earnout agreement itself might signal greater than usual uncertainty around the expected case forecast, and the requisite assumption that the subject company's future volatility (post-transaction) will be similar to its historical volatility may not be met.

If relying on quarterly historical data to estimate volatility in growth rate for the metric, the valuation specialist would typically use year-on-year quarterly growth (e.g., Q1 of the current year vs. Q1 of the prior year) rather than quarter-on-quarter growth (e.g., Q1 of the current year vs. Q4 of the prior year) to avoid having seasonality artificially impact the volatility estimates.

It may be necessary to adjust the historical volatilities to account for the risks specific to the metric during the period of the earnout. For instance, if the metric-based earnout is short-term revenue and a significant portion of the first-year revenue is reasonably certain due to contracts already in place, it is possible that the first-year volatility should be less than the historical volatility. On the other hand, if deal model scenarios indicate greater uncertainty related to potential outcomes for the acquired company than has been observed historically for the comparables, or if the rationale for putting the earnout into place is to share the risk associated with an unusually large uncertainty about the metric outcome, it is possible that the volatility should be higher than that of the comparables.

The volatility estimate resulting from this method does not include any volatility in returns required by investors and therefore may underestimate volatility.

5.2.4.3 The Management Assessment Method

A third method for estimating the volatility associated with an earnout is to utilize management's estimated variation in potential outcomes associated with high case and low case projections. One can fit a distribution around assessments of high case, base case, and low case projections,[85] and calculate an implied volatility based on these assessments.

If management's high, base and low case projections are used to estimate the volatility of an earnout metric, a full period of volatility should be incorporated, as management's assessments already take into account that the metric is earned over the period. (Using a half-period of volatility would underestimate the variation around the expected case.)

On the plus side, this volatility estimate is tied specifically to management's forward-looking estimated variation around the expected case, rather than to historical volatility that may or may not be comparable to the risk of the metric over the earnout period. Indeed, if management's assessments imply a much higher volatility with a sound rationale, it is likely that historical or comparable company analyses would underestimate the volatility in growth rate for the metric in the relevant timeframe.

Also, of the three volatility estimation methods discussed in this section, this method is the only one that directly estimates the relevant volatility (variability around the expected case forecast) rather than relying on a proxy (variability in the metric or in equity returns). As discussed above, the proxies relied upon by the Deleveraging Equity Volatility Method and the Historical Metric Variability Method do not always produce reasonable results.

On the downside, management assessments can be subject to certain well-known assessment biases, including anchoring on recent results or a prior projection, overconfidence (failing to consider a wide enough range of potential future outcomes), and conditioning estimates on hidden assumptions (such as no competitive reactions to a new product introduction).[86]

To mitigate these potential issues, it can be useful to employ the probability assessment debiasing techniques discussed in Section 5.2.1 and to compare the volatility estimates implied by management's assessments to historical subject company or comparable company data. For example, the volatility

[85] A typical set of percentiles for which to obtain management assessments are the 10th percentile, expected case, and 90th percentile. In the context of an option pricing model, the distribution typically fit is a lognormal distribution.

[86] See Tversky and Kahneman (1974), *Judgement Under Uncertainty: Heuristics and Biases* for a discussion of biases that influence probability assessments and other judgements.

implied by management's assessments generally shouldn't be substantively less than the historical metric growth rate volatility of comparable companies, without good reason (such as having an unusually mature business or an unusually high proportion of business already booked.) Such a cross-check helps to guard against management underestimates of volatility due to anchoring on the base case or overconfidence.

Finally, the volatility estimate resulting from this method typically would not include any volatility in returns required by investors and therefore may underestimate volatility.

5.2.4.4 Adjusting Volatility for Additional Risk Premiums

If the valuation specialist uses either of the first two methods (the Deleveraging Equity Volatility Method or the Historical Metric Variability Method), it may be necessary to adjust the estimated volatility to account for additional risks captured in the RMRP, such as size premiums and/or company-specific risk premiums. For example, if the earnout-relevant business is a different size than the comparable companies used to estimate volatility, adjustments may be required to factor in the difference in volatility associated with the relative size of the business.[87] Below are examples of a few different techniques (not intended to be an exhaustive list) by which the valuation specialist might choose to adjust volatility estimates to address differences in size between the earnout-relevant business and the comparable companies used to estimate volatility.

- Select a volatility at a percentile of the range of comparable companies based on the size of the earnout-relevant business relative to the size of the comparable companies. For example, if the earnout-relevant business is smaller than the average company in the comparables list, and the smaller companies in the comparables list tend to have higher volatility than the larger companies on the list, one might select a volatility in the upper half of the range rather than the median.
- Adjust the volatility estimate for each comparable company based on the following ratio:

  $$\frac{\text{(the RMRP including a size premium for the subject company)}}{\text{(the RMRP replacing the size premium with that for the comparable company).}}$$

  For example, assume that the subject company has a RMRP of 10%, of which 5% is due to a size premium. Assume there are three comparable companies, with corresponding size premiums of 0%, 2.5%, and 5%. This method would adjust the volatilities for these companies by 2x, 1.33x, and 1x, respectively.

- Adjust the volatility estimate for each comparable company based on broader empirical data on the average volatility by size of companies.[88] More specifically, adjust the volatility estimate for each comparable company by the following ratio:

  $$\frac{\text{(average volatility of companies in the size category for the earnout-relevant business)}}{\text{(average volatility of companies in the size category for the comparable company).}}$$

If other additional risk premiums (such as company-specific risk premiums or country-specific risk premiums) are included in the RMRP, consideration should be given as to whether to make a corresponding adjustment to the volatility. For instance, depending on the rationale behind including a company-specific risk premium in the RMRP, it may or may not be appropriate to adjust the

[87] There is empirical evidence that smaller companies tend to have higher equity volatility than larger companies. See, for example, Herr (2008), "Size Adjustments for Stock Return Volatilities."

[88] Sources of such empirical data include Grabowski et al. (2017) *Valuation Handbook U.S. Guide to Cost of Capital* and *Valuation Handbook International Guide to Cost of Capital.*

estimated volatility in growth rate for the metric. As an example, if the rationale for adding a company-specific risk premium to the RMRP is that short-term revenues are highly uncertain due to the planned launch of important new products, it would be appropriate to increase the estimated volatility to address this additional source of variability around the expected case.

5.2.4.5 Volatility Reasonability Cross-Checks

Regardless of which volatility estimation method is selected, the valuation specialist should confirm that the calculated volatility is reasonable given the underlying risk associated with the metric, and therefore that the concluded volatility is consistent with the risk inherent in the estimated RMRP. For instance, if working in a CAPM framework, one reasonability cross-check is to compare the assumed volatility to the theoretical minimum volatility:

$$\sigma_{Metric} \geq (RMRP \div MRP) \times \sigma_{Market}$$

Where:

$RMRP$ = the Required Metric Risk Premium

MRP = the Market Risk Premium

σ_{Metric} = the volatility of the growth in the metric

σ_{Market} = the volatility of the return on a broad market index.

The equation above relies on the relationship between volatility and risk associated with the standard CAPM measurement of beta. When working in an Adjusted CAPM framework, the assumption is that this relationship extends to any additional risk premiums added to the traditional CAPM, which may not be a reasonable extension of the CAPM conclusions. The cross-check also implicitly assumes that the volatility in returns required by investors for a long-term investment should also be included in the volatility in metric growth, which may not be reasonable for short-term earnout metrics. As such, while it is useful to perform this cross-check, the relationship may not hold in all circumstances.

Similarly, regardless of which volatility estimation method is selected, the valuation specialist might consider comparing the calculated volatility to the historical subject business experience with volatility of actual results versus business plan forecasts (where available). Unless the earnout-relevant business is substantially more mature or predictable than it had been historically, the variability around the base case projections would often be expected to be at least as large as the historical variability of actual results versus business plan forecasts.

As another possible cross-check, the valuation specialist might consider why the particular earnout metric was chosen and, more generally, the rationale behind the earnout structure. For instance, if the earnout was put in place in part to mitigate or share an unusually high risk, then the valuation specialist should verify that the selected metric volatility is consistent with this fact pattern.

5.2.5 In-Period Discounting Convention

The practice of discounting cash flows using a mid-period convention is well known and widely used as a practical approximation to allow for the time value and risk of financial metrics that are earned over a period, as opposed to at a single point in time. For example, if forecast revenue earned for the next year is estimated to be 100, discounting for a full year assumes that the entire 100 is earned at the end of the period. Predicting the timing of when the revenue of 100 will be earned can be difficult, and therefore valuation specialists often assume that, on average, the financial metric is earned at the midpoint of the period to which it applies.

Earnout payoffs based on financial metrics can be very risky and hence command very high discount rates (for example, when the functional form of the earnout subjects the payoffs to significant leverage). As such, the period convention applied when discounting can have a significant impact on the value of the earnout.

For example, consider an earnout that has a payoff equal to 100% of the excess of future EBITDA earned over the next year above 100:

- Payoff of earnout = Max(Future EBITDA in 1 year – 100, 0);
- Assume:
  - Forecast (expected value) for EBITDA earned over 1 year = 120;
  - Discount rate applicable to forecast 1-year EBITDA = 10%;
  - Achievement of future of EBITDA of at least 100 is nearly certain;[89]
  - 1-year risk-free rate = 1%.

The present value of this earnout can vary significantly depending on the in-period convention used to discount EBITDA.[90] To illustrate this concept, Table 3 below shows the impact of two different period conventions on the value of the earnout: EBITDA is earned at the end of the year (full period) or is earned on average at the middle of the year (i.e. mid-period). The analysis follows the procedure discussed in Section 4.5.

TABLE 3: Example of the Impact of Full Period Versus Mid-Period Discounting

	Period (p)	Value of 120 ($120 \div 1.1^p$)	Value of 100 ($100 \div 1.01^p$)	Earnout Value
Full Period	1.0	109.09	99.01	10.08
Mid-Period	0.5	114.42	99.50	14.99

In addition to the potentially significant impact that the in-period discounting convention can have on the earnout value, it is important to maintain consistency throughout the analysis. If, for example, mid-period discounting is used in the valuation of the business because the cash flows are earned on average at the mid-point of each period, then mid-period discounting for the metric's exposure to non-diversifiable risk should also be maintained in an earnout valuation based on financial metrics that similarly are earned on average at the mid-point of each measurement period specified for that earnout.

Note, however, that the earnout *payment* is made later, typically after the conclusion of the relevant period for measuring the earnout metric. A mid-period convention is not used for discounting the payment for the time value of money and any counterparty credit risk. Discounting the payment for the time value of money and any counterparty credit risk uses the time horizon from the valuation date to the expected payment date(s).

[89] This assumption is only made so that the payoff can be assumed to be approximately linear, in order to illustrate the impact of in-period discounting. The same results are obtained if we assume that EBITDA can be below 100, but assume that the payoff of the earnout is strictly linear i.e. equal to Future EBITDA in 1 year – 100, (with no payment floor and a clawback if EBITDA is negative). Since forecast EBITDA is risky and the threshold of 100 is contractual, the applicable discount rates are 10% and 1%, respectively.

[90] The in-period convention is only applicable to EBITDA and not to the contractual threshold of 100, because the threshold is a fixed quantity, not subject to risk.

5.2.6 Counterparty Credit Risk

An earnout arrangement generally represents a contingent obligation to make future payments. As such, the counterparty credit risk (or default risk) of the legal obligor (typically the buyer for an earnout and the sellers for a clawback) should be considered, taking into account the seniority of the earnout claim in the obligor's capital structure and the expected timing of the payment. The obligor's own specific credit risk is considered in determining fair value (as opposed to the credit risk of a market participant) because ASC 820 (and IFRS 13) presumes the contingent liability is transferred to a market participant with a similar credit standing.[91] Also, considering the fair value of the earnout from the perspective of a market participant that holds the identical item as an asset, such a market participant would consider the credit risk associated with the specific obligor (typically for an earnout, the buyer) being able to make the future payments if and when they become payable.

An earnout often represents a subordinate, unsecured obligation of the buyer. To capture the time value of money and non-performance risk, the valuation specialist would typically use a pre-tax cost of debt that aligns with the term and seniority of the obligation. The seniority of the earnout payment in the obligor's capital structure should be evaluated based on discussions with management and/or a review of the purchase documentation, because seniority can have a significant impact on the counterparty credit risk.[92]

There are, however, mechanisms where the counterparty credit risk is either partially or fully mitigated, including:

- Fully or partially funding the potential earnout obligation by depositing cash (or other collateral) into an escrow account
- Increasing the seniority and/or securitization of the obligation by structuring the earnout as a note issued by the buyer, specifying the increased seniority ranking of the earnout obligation
- Obtaining a guarantee from a bank or other external party.[93]

There are also circumstances where the counterparty credit risk may be considered to have already been incorporated (fully or partially) into the valuation through the allowance for the risk of the earnout metric. These circumstances can arise where the earnout is based on the future performance of the acquired business and in the (typically) upside scenarios in which the earnout is paid, the performance of the acquired business is significantly positively correlated with the performance of the buyer, or with the buyer's ability to fulfill its obligation to pay the earnout. Such a situation is not typical, but can arise when:

a) the acquired business represents a sizeable portion of the post-acquisition company
b) the acquired business is maintained as a separate entity that is responsible for the payment and it is not guaranteed by the parent

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[91] ASC 820-10-35-17 states that "[t]he fair value of a liability reflects the effect of nonperformance risk. Nonperformance risk includes, but may not be limited to, a reporting entity's own credit risk. Nonperformance risk is assumed to be the same before and after the transfer of the liability." Similarly, per IFRS 13:42 "The fair value of a liability reflects the effect of non-performance risk. Non-performance risk includes, but may not be limited to, an entity's own credit risk (as defined in IFRS 7 Financial Instruments: Disclosures). Non-performance risk is assumed to be the same before and after the transfer of the liability".

[92] In general, contingent consideration payoffs tend to be unsecured subordinated claims. However, this is not always spelled out in the agreements. The valuation specialist should consider the impact of cross-default provisions, subordination, and explicit priority of payment when selecting a credit spread.

[93] Depending on facts and circumstances, credit risk mitigation mechanisms such as a guarantee by a third party may be accounted for separately, rather than as part of the consideration transferred. The specific accounting rules for determining whether a credit risk enhancement is a characteristic of the contingent consideration liability or asset are beyond the scope of this Valuation Advisory.

c) the success of the acquired business is dependent on the success of the buyer's business and/or

d) the success of the acquired business and the buyer are both largely driven by the same uncertainty (for example, when both businesses do significantly better when the economy for a certain industry or customer set is robust).

In such cases, the credit risk associated with the future payments may be lower in the upside scenarios in which the earnout payments are due.

> *Example:* A pre-revenue company acquires another pre-revenue company. The purchase consideration includes an earnout with 5 million payable when annual revenues of the acquiree reach 100 million. The acquirer's cost of debt at the time of acquisition is very high. However, the acquirer is likely to be in a significantly stronger financial position to pay 5 million upon achieving 100 million of revenues. The counterparty credit risk used in the valuation of the earnout should reflect this stronger position. For example, the counterparty credit risk could be estimated assuming annual revenues of at least 100 million for the combined entity at the time of payment.

The above discussion highlights the need to consider the counterparty credit risk associated with making the future payments if and when they become payable. In rare cases, such as when the contingent payment is a large multiple of revenue or EBITDA (perhaps intended to reflect the impact on future value of the growth in business over the first few years), the obligation associated with the payment of the earnout may even be large enough that it affects the creditworthiness of the obligor.

The form of payment of the earnout obligation may also affect the counterparty credit risk applied to the valuation of the earnout obligation. For example, an earnout payment that is specified as a *fixed* number of shares of the buyer's common stock is unlikely to require an incremental allowance for the buyer's credit risk since the buyer will be able to use its shares as currency and satisfy the earnout obligation regardless of the value of those shares.

As an alternative example of settlement in stock, if the earnout payment is specified as a monetary amount that is settled in the form of the buyer's common stock of equal value (i.e., the earnout payment is settled in an equivalent *variable* number of shares of the buyer's common stock), then the earnout obligation is still subject to the buyer's credit risk as if it were settled in cash. In this case, since the earnout obligation is specified as a monetary amount, the form of the settlement does not impact credit risk.

To summarize this section, when considering the amount of counterparty credit risk to incorporate in the valuation of contingent consideration, issues to consider include the credit risk of the obligor over the relevant timeframe, the seniority of the contingent consideration obligation in the obligor's capital structure, mitigation of non-payment risk via e.g. the use of an escrow account or guarantee, and the correlation between the likelihood or amount of contingent consideration paid and the obligor's ability to pay (i.e., the obligor's ability to pay *in the scenarios in which the payment is due*).

5.2.7 Multiple-currency Structures

Earnouts are often structured with performance thresholds, payment caps, and other features that are contractually specified in monetary terms. Occasionally these features involve more than one currency or are denominated in a different currency than is specified for the payment. For earnout arrangements that span multiple currencies, one can often avoid the need to explicitly model future foreign exchange rates by carefully choosing the currency in which the analysis is performed.

Since the contractual terms of an earnout determine its *future* payoff, for earnouts that span multiple currencies one needs to consider *future* foreign exchange rates when converting these monetary contractual terms to another currency. Where the contractual terms have a linear relationship with the earnout payment, one may be able to convert the contractual terms using the forward foreign exchange rate[94] at the time of measurement. This is not true for contractual terms that have a nonlinear relationship with the earnout payment (such as thresholds, caps, tiers, etc.), which would typically require the use of a stochastic foreign exchange rate model to perform the currency conversion within the valuation analysis. To avoid this complexity, the valuation analysis can be performed in the currency in which the thresholds, caps, tiers and other contractual monetary terms (the nonlinear structural features) of the earnout are specified.

Example: A U.S. company acquires a Brazilian company. If the revenue of the acquired business exceeds 10 million Brazilian Real in the first year post-close, the sellers will receive an earnout payment equal to 10% of the revenues above that threshold. However, the earnout will be settled in equivalent U.S. Dollars (i.e. the payments are calculated in Brazilian Real and then converted to *equivalent* U.S. Dollars as of the settlement date.)

The valuation analysis is typically more easily performed in Brazilian Real.[95] The fair value of the earnout can then be converted from Brazilian Real to U.S. Dollars, if necessary, at the appropriate spot foreign exchange rate as of the measurement date.

Example: A German company acquires a U.S. company that produces revenue through subsidiaries in the U.S. and Japan. The earnout will pay €1 million if the first-year post-close revenues of the U.S. business exceed €10 million and the first-year post-close revenues of the Japanese business exceed €5 million. The forecasts for the business are provided in U.S. Dollars (for the U.S. subsidiary) and Japanese Yen (for the Japanese subsidiary.)

The valuation analysis is most easily performed by converting the revenue forecasts to the currency of the structural feature that has a nonlinear effect on risk, i.e., the currency of the thresholds, which are denominated in euros. Since revenue in dollars (or yen) converts linearly to euros, one can convert the revenue forecasts to euros at the term-matched forward foreign exchange rates. The valuation analysis is then performed entirely in euros.

There are rare cases when the parties to the transaction structure an earnout with the contractual monetary terms (the nonlinear structural features) spanning multiple currencies. If the multiple currency features do not interact with one another, the evaluation can be performed separately for each country, in its own currency. However, if multiple currency features interact, for example through an aggregate cap, additional complexities can arise. In such a case, the valuation specialist may need to explicitly model future foreign exchange rates, to accurately capture the impact of the interaction. Given the complexity involved in modeling future foreign exchange rates, the valuation specialist should consider whether any such cross-currency exposure is likely to have a significant impact on the earnout value.

[94] The forward foreign exchange rate is equivalent to the (risk-neutral) expected future foreign exchange rate. In general, one can only use the forward foreign exchange rate to convert an underlying metric from one currency to another, or to convert contractual terms that have a *linear* impact on the earnout payment from one currency to another. For currencies that do not have liquid forward markets, alternative methods may be needed. Typical approaches to estimate forward exchange rates are based on the relative nominal interest rates or inflation rates in each respective currency.

[95] If one were to perform the analysis in U.S. Dollars, then due to the nonlinear impact of the performance threshold, the valuation specialist would need to consider a stochastic model for future foreign exchange rates to convert the performance threshold to U.S. Dollars.

When estimating the value of an earnout, the assumptions are currency-specific. For example, if the earnout valuation analysis is carried out in Brazilian Real, the assumptions used in the analysis should all be specific to Brazilian Real. That is, the metric forecasts should be denominated in Brazilian Real and the volatility, RMRP (or discount rate), counterparty credit risk and risk-free rate should all be estimated to be appropriate for Brazilian Real.

5.3 The Scenario-Based Method (SBM)

The SBM is a method under which the valuation specialist identifies multiple outcomes, probability-weights the contingent consideration payoff under each outcome, and discounts the result at an appropriate rate to arrive at the expected present value of the contingent consideration.

The Working Group recommends the use of SBM for valuing contingent consideration when:

a) The risk of the underlying metric is diversifiable, e.g., for achievement of diversifiable nonfinancial milestones or

b) The payoff structure is linear (e.g., a fixed percentage of revenues or EBITDA with no thresholds, caps, tiers, or carry-forwards).[96]

As described in more detail in Section 5.3.1, the Working Group does not recommend the use of SBM for nonlinear payoff structures involving a contingent consideration metric with non-diversifiable risk.

The first step of the procedure for applying the SBM is relatively simple in concept. In each period relevant to the earnout, the valuation specialist calculates the expected payoff as the weighted average of the earnout payoffs across the possible scenarios for that period. The weights are equal to the probabilities assigned to these possible scenarios. Identifying the scenarios and estimating the probabilities can be a complex exercise, as discussed in more detail below.

In the second step of the procedure for applying the SBM, the valuation specialist discounts the expected payoff. The SBM discount rate addresses the time value of money (risk-free rate) over the relevant time horizon, the Required Metric Risk Premium, the impact of the earnout payoff structure on risk, and any counterparty credit risk.

The sections that follow address:

- When the SBM is most appropriate
- Considerations for developing the scenarios and estimating the discount rate
- Applying the SBM to the valuation of a linear earnout payoff structure or a diversifiable nonfinancial milestone payment
- Handling path dependencies or multiple interdependent metrics
- Conclusions about the use of SBM in the context of valuing contingent consideration.

5.3.1 When the SBM is Most Appropriate

The SBM is appropriate for pricing contingent consideration when:

a) The risk of the underlying metric is largely diversifiable (e.g., nonfinancial metrics such as achievement of regulatory approvals, degree of R&D success, resolution of legal disputes, completion of a software integration project prior to a deadline, etc.) and/or

[96] For payoff structures based on a fixed percentage of an earnings metric (for example, EBITDA), if there is a significant chance that EBITDA will be negative and there is no clawback mechanism, then zero EBITDA serves as an implicit threshold, resulting in a nonlinear payoff structure. However, if negative EBITDA outcomes have a de minimis impact on the expected payoff, it is reasonable to assume such a structure is linear.

b) There is a linear payoff structure.

In the case of a metric with only diversifiable risk, estimating the discount rate for the SBM is relatively simple. In this case, the Required Metric Risk Premium will be zero (see Section 5.2.2). For a metric with only diversifiable risk, the SBM discount rate need only address the time value of money (risk-free rate) over the relevant time horizon and any counterparty credit risk.

In the case of a linear payoff structure, the structure does not change the risk of the underlying metric (see Section 4.4). In this case, the discount rate must incorporate the Required Metric Risk Premium, as well as the time value of money over the relevant time horizon and any counterparty credit risk.

In the case of a nonlinear payoff structure (for example, a structure with tiers, thresholds, caps, or path dependencies such as carry-forwards, roll-backs or cumulative targets) involving a contingent consideration metric with non-diversifiable risk, estimating the discount rate for the SBM is not at all simple. In this situation, the SBM discount rate must be adjusted for the risk of that nonlinear payoff structure—but the amount of the adjustment cannot be easily intuited by the valuation specialist. Furthermore, the Working Group is not aware of any reasonable "rules of thumb" that would allow the valuation specialist to gauge, in an objective manner and consistently across payoff structures, the appropriate adjustments to the WACC, to the IRR, to the RMRP, or to any other discount rate considered as a starting point to account for the impact on risk of a nonlinear payoff structure.[97]

The Working Group has observed attempts to estimate the discount rate to be applied to the expected contingent consideration payoff in an SBM framework by "risk-adjusting" the WACC based on identifiable features of the contingent consideration arrangement (e.g., credit risk and optionality risk). Most often these adjustments are based on the valuation specialist's subjective judgment and lead to discount rates that do not appropriately account for the risk associated with a nonlinear payoff structure.

Section 4.5 explains why selecting an appropriate discount rate in this situation is challenging to implement correctly in an SBM framework. The examples in Chapter 9 further clarify the difficulty. Even holding as much as possible about each example constant, the implied discount rate varies widely with the structure, from 10% to 40% for the earnouts to -28% for the clawback (see Sections 9.1, 9.4, 9.5, 9.6, 9.10, and 9.11). Moreover, the magnitude of the impact of any nonlinear structure on the discount rate depends not only on the structure and metric but also on the assumptions for volatility and the positioning of the mean of the metric forecast distribution relative to the payoff threshold. Table 2 in Section 4.5 illustrates this latter point. Varying the volatility and moneyness while keeping the payoff structure the same, the discount rate in this table ranges from about 30% to well over 100%. Due to the need to consider simultaneously the implications of the structure, the metric, the volatility, and the positioning of the mean of the metric forecast distribution relative to the payoff threshold, the Working Group believes that discount rate adjustments to account for nonlinear payoff structures in an SBM framework are difficult to estimate quantitatively and even more difficult to justify qualitatively.

For this reason, the Working Group does not recommend using the SBM for valuing contingent consideration with nonlinear payoff structures involving metrics subject to non-diversifiable risks.

[97] One could apply an OPM to back-solve for the discount rate, but if one is doing that, the use of the SBM is superfluous. The Working Group is also aware of methodologies such as stochastic deflators (see, e.g. Jarvis (2001)) and the Wang transform (see, e.g., Wang (2002)). However, these techniques can be complex to implement, negating the chief advantages of SBM—its simplicity and transparency.

5.3.2 *Developing the Scenarios*

The valuation specialist's primary goal when developing scenarios is to adequately represent the metrics' probability distribution over the relevant time period(s), considering the region of the probability distribution that may require more granular consideration due to the nature of the payoff structure. For example, it may be sufficient to only have two scenarios for a payment contingent upon at least 80% of certain software development tasks being completed (in the first year post-close). Meanwhile, an earnout with multiple tiers, for example, an earnout with differing levels of payment for the first 80%, for the next 10% (between 80 and 90%), and for the final 10% (between 90 and 100%) of such software development tasks completed in the first year post-close, would require more scenarios.

From a statistical standpoint, the more granular the scenarios the better. However, the valuation specialist should balance the need for statistical accuracy with the additional subjectivity introduced by estimating many scenarios and probabilities. One possibility is to fit a continuous distribution around a small number of assessed scenarios in order to estimate the likelihood of outcomes falling in between the discrete scenarios that have been assessed.

It is recommended that the valuation specialist rigorously examine management's assessments, challenge whether management has adequately considered both the probability of various scenarios as well as a wide enough range of potential outcomes, and challenge the consistency of these scenarios and probabilities with other assumptions in the analysis. As discussed in Section 7.1 and 7.2, care should be taken that there is consistency between the scenarios, probabilities, and expected metric outcomes used to value the earnout and the assumptions used to value the business, its intangibles and any in-process research and development (IPR&D).

Section 5.2.1 provides a more in-depth discussion around developing the expected payoff cash flow, including a discussion of elicitation procedures that can help to minimize the known biases associated with management's assessment of scenario probabilities.

5.3.3 *Discount Rate Considerations*

When estimating a discount rate, the valuation specialist should consider the time value of money, the Required Metric Risk Premium, the impact of the earnout payoff structure on risk, and counterparty credit risk. The goal for the valuation specialist is to select a discount rate that is commensurate with a market participant view of the risks in the expected contingent consideration payoff.

Thus, the considerations for a discount rate for contingent consideration contain elements of the following:

- The time value of money – typically captured by the risk-free rate
- Counterparty credit risk, which represents the risk that the obligor will not be able to fulfill its obligation if and when a payment becomes due, as discussed in Section 5.2.6
- Required Metric Risk Premium – market participants require a premium in excess of the risk-free rate that captures the metric's exposure to systematic risk and the portion of any additional risk premiums (e.g., size premiums, country-risk premiums, and company-specific premiums) relevant to the contingent consideration metric, as discussed in Section 5.2.2
- The impact of the contingent consideration structure on risk, if the structure is nonlinear (see Section 4.4).

The first two items on the above list (the time value of money and counterparty credit risk) are applicable over the timeframe from the valuation date to the expected payment date(s). However, the

latter two risks (RMRP and payoff structure risk) are applicable only over the timeframe from the valuation date until the uncertainty associated with the metric is fully resolved.

Prior to the publication of this Valuation Advisory, many practitioners would select the WACC or the IRR of the transaction as the discount rate for the expected contingent consideration payoff. The selection of the WACC or IRR as the discount rate was typically justified by reasoning that if the projected cash flows are subject to the risk of the acquiree's business, then the contingent consideration payoffs resulting from these cash flows are subject to the same risk. This argument is flawed for almost all contingent consideration valuations.

First, if an earnout metric is not directly (and linearly) related to the value of the assets, then the WACC (or IRR) will not correctly represent the risk profile of either the metric or the contingent consideration payoff structure.[98] Even for a linear earnout payoff structure, differences between the riskiness of the long-term free cash flows for the business and the riskiness of the earnout metric should be reflected in a difference between the discount rate for the business and the discount rate for the earnout. Issues to address include differences in volatility, correlation with the market, financial and operational leverage, additional risk premiums, and relevant timeframe. See Section 5.2.2 for a more detailed discussion.

Second, when the scenarios in which payment occurs are more certain (typically, 90 to 100% probability), the payments become more comparable to deferred payments, i.e., they are lower risk. One might consider the context in which the contingent payoff was agreed to (e.g., a large entity acquiring a smaller entity with the intention to delay a portion of the payment vs. the intention to share the risk associated with the success of a young product line) when considering the level of certainty to attribute to the payoff.

For additional discussion of the difficulty of estimating discount rates for use in an SBM when the payment structure is nonlinear and the metric has non-diversifiable risk, see Section 4.5.

5.3.4 Applying the SBM to a Linear Payoff Structure

As discussed earlier, the SBM is appropriate, and often the simplest method, for valuing contingent consideration arrangements with a linear payoff structure.

Example Earnout Payoff Structure

Company A will be required to pay 30% of the acquiree's EBITDA earned over the following one-year period. Assume the likelihood of EBITDA being negative is *de minimis*.[99] The payment is due three months after the end of the year.

Assumptions

Management provided estimates for future annual EBITDA under three scenarios.[100] The outcomes and corresponding probabilities are as follows:

Low scenario: 1,500 with probability 25%

[98] Note that even if the WACC would be an appropriate discount rate for the metric (which it generally is not, due to differences in duration and leverage between the earnout metric and the long-term free cash flows for the business), the WACC is still not an appropriate rate to be used for discounting the contingent consideration payments, unless the payoff structure is linear. See Section 4.4.

[99] If the likelihood of EBITDA being negative is substantial, and if there is no clawback of 30% for negative EBITDA, then the earnout payoff structure would not be linear. In this case, OPM might be a more appropriate methodology.

[100] For illustrative purposes, this example assumes three scenarios were considered by management. This is not meant to suggest that three is always the correct number of scenarios to consider.

Base scenario: 2,000 with probability 50%

High scenario: 2,500 with probability 25%

The RMRP associated with the acquiree's EBITDA is 9.5%, the risk-free rate consistent with the timeframe to payment of the earnout is 0.5% (so the discount rate applicable to future EBITDA is 10%), and the credit spread of Company A for a subordinated obligation such as this earnout is 3.0% (all these rates are per annum, continuously compounded). We also assume that the correlation between the acquiree's business and Company A's business post-acquisition is not so large that the credit risk of Company A would be significantly affected by the success of the acquiree's business.[101]

Valuation Methodology

Since the contingent consideration's payoff function is linear, the SBM is appropriate. Moreover, the implication of linearity is that the contingent consideration payoff has the same risk as the metric, in this case EBITDA. Thus, ignoring counterparty credit risk, the discount rate that is applicable to future EBITDA is also applicable to the contingent consideration payoff.

The first step of the valuation is to calculate the expected earnout payoff, as illustrated in Table 4 below.

TABLE 4: Calculating the Expected Earnout Payoff

Scenario	EBITDA (a)	Earnout Payoff (b) = 30% × (a)	Probability (c)	Probability Weighted Earnout Payoff (d) = (b) × (c)
Low	1,500.0	450.0	25%	112.5
Base	2,000.0	600.0	50%	300.0
High	2,500.0	750.0	25%	187.5
Total			100%	600.0

For this example, assume that the continuously compounded discount rate for a linear function of EBITDA is estimated to be 10% per annum. Consistent with the valuation of the cash flows of the business and the fact that EBITDA is earned over the course of the year, the present value is calculated as of the mid-period. Thus, the equivalent risk-adjusted future value for this amount of EBITDA over the one-year period is given by:

$$570.7 = 600 \times \exp(-10\% \times 0.5)$$

However, the earnout is not paid out over the course of the year, i.e., it is not paid on average at the mid-point of the year. The payoff happens 1.25 years after the valuation date. The present value of the earnout cash flow therefore is calculated taking into account (1) the time value of money for the additional 0.75 years from the mid-period to the payment date and (2) the credit spread of Company

[101] This situation is uncommon but could happen, for example, if the acquiree's business were large in comparison to Company A's business. See Section 5.2.6 for a discussion of counterparty credit risk.

A, for the 1.25 years from the valuation date to the payment date:[102]

$$547.7 = 570.7 \times \exp(-0.5\% \times 0.75) \times \exp(-3.0\% \times 1.25)$$

5.3.5 Applying the SBM to a Diversifiable Nonfinancial Milestone

As discussed in Section 5.3.1, the SBM is appropriate and is often the simplest method for valuing contingent consideration based on metrics that have no substantial systematic risk (i.e., in a CAPM framework, metrics with a beta close to zero). Such metrics include technical milestones such as achievement of product development targets and other idiosyncratic, diversifiable events not based on financial metrics (e.g., resolution of legal disputes).

Example Earnout Payoff Structure

The acquiree has a drug under development and Company A (the buyer, a much larger company with numerous drugs both launched and under development) will be required to pay the sellers an amount of 2,000 in the event the acquiree's drug currently under development receives regulatory approval within a year. The payment is due three months after the end of the year.

Assumptions

Company A's management estimates a probability of 50% that the acquiree's drug currently under development will receive regulatory approval within a year. The risk-free rate commensurate with the time to payment of the earnout is 0.5% per annum (continuously compounded) and the credit spread of Company A for a subordinated obligation such as this earnout is 3.0% per annum (continuously compounded). We also assume that the credit risk of the much larger Company A will not be significantly affected by the approval of the acquiree's drug under development.

Valuation Methodology

Since the earnout metric's risk is predominantly diversifiable, the SBM is appropriate. The implication of the diversifiable metric (i.e., no systematic risk affects the payoff function) is that the discount rate is the risk-free rate plus an adjustment for the credit risk of the obligor (in this case, Company A).

The expected payoff at the end of the year is:

$$1{,}000 = 2{,}000 \times 50\% + 0 \times 50\%$$

The payment's expected present value is calculated taking into account the credit risk of Company A:

$$957.2 = 1{,}000 \times \exp(-(3.0\% + 0.5\%) \times 1.25)$$

5.3.6 Using Simulation to Handle Path Dependency or Multiple Interdependent Metrics in SBM

As discussed in Section 3.2.2, earnout payoff structures that span multiple periods with features that create path dependency or that involve multiple, interdependent metrics will often require the use of a technique such as Monte Carlo simulation.[103] Applied in the context of an earnout valuation, each

[102] Equivalently, one could *grow* the value of the EBITDA (570.7) by a half year at the risk-free rate (0.5%) to get 572.2 (this is the value after discounting for the Required Metric Risk Premium for EBITDA but before accounting for any of the time value of money), then discount for the full 1.25 years by (risk-free rate + credit spread = 3.5%). The answer is the same.

[103] An exception occurs if the path-dependency or multi-metric interdependent nature of the payoff structure is due to its dependence in a relatively simple way on the outcome for a diversifiable metric. For example, if the likelihood of achieving a technical milestone in year two depends on the degree of technical success achieved with respect to a year one technical milestone, the analysis might only require the use of conditional or joint probabilities, rather than a simulation, to address the interdependency. Similarly, for a payoff based on both revenues and technical success, if the expected revenues depend on the degree of technical success achieved in year one, the analysis might only require the use of scenarios for year one technical success to address the interdependency.

iteration or trial of the Monte Carlo simulation draws a value from the assumed (joint) distribution for each earnout metric, for each period of the earnout. As part of the specification of the joint distribution, the valuation specialist must also estimate the correlation between outcomes from one period to the next and/or the cross correlations among metrics.

The earnout payoffs are calculated based on the "path" for the simulated metrics and the contractual terms of the earnout arrangement and are discounted to present value at a rate that reflects the risk associated with the earnout payoffs (risk associated with the earnout metrics and structure, time value of money, counterparty credit risk, etc., as explained in Section 5.2.2.) The value of the earnout is estimated to be the average present value of the earnout payoffs over all iterations of the simulation.

Many iterations are typically required to get reliable results from a simulation. The standard error of the simulation mean is a statistical measurement that can be used to determine how many iterations are necessary.

5.3.7 Conclusions Regarding SBM

The main advantages of the SBM are its simplicity and transparency (when used appropriately), and the relative ease of understanding the model and modifying the inputs. The main disadvantage of the SBM is that estimating a discount rate adjustment to incorporate the impact on risk of a nonlinear payoff structure for a metric with non-diversifiable risk is neither simple nor intuitive, nor is the Working Group aware of any reasonable "rules of thumb" for such an adjustment.

For the above reasons, the Working Group recommends the use of SBM for valuing contingent consideration when:

a) The risk of the underlying metric is diversifiable, e.g., for achievement of certain nonfinancial milestone events or

b) The payoff structure is linear (e.g., a fixed percentage of revenues or EBITDA with no thresholds, caps, tiers, or carry-forwards).

However, the Working Group does not recommend the use of SBM if the payoff structure has thresholds, caps, tiers, carryforwards, or other significant nonlinearities and the risk of the underlying metric is non-diversifiable.

5.4 The Option Pricing Method (OPM)

The purpose of this section is to describe the method recommended by the Working Group for use in valuing contingent consideration for which the payoff structure is nonlinear and involves a metric or event with non-diversifiable risk.[104] As illustrated in Section 3.2.1, the payoff functions for common contingent consideration arrangements that have a nonlinear structure are option-like (e.g., resemble calls, caps, collars, cash-or-nothing, asset-or-nothing, etc. options) in that payments are triggered if certain thresholds are met. Ample literature is available that supports the use of the OPM in pricing instruments with nonlinear payoff functions. Some of the earliest contributions to the field of option pricing theory are the papers by Louis Bachelier (1900), Robert C. Merton (1973), Fisher Black and Myron Scholes (1973), and John C. Cox, Stephen A. Ross and Mark Rubinstein (1979). See Section 10.3.7 for a further discussion of the academic support for the use of option pricing methods for non-traded metrics.

[104] This section complements Section 5.3, which addressed the method recommended by the Working Group for use in valuing contingent consideration based on metrics that have a linear payoff structure or for which the underlying risk is diversifiable— the SBM.

The essence of the OPM is to adjust the contingent consideration metric forecast for risk, or to create a "risk-neutral" metric forecast, by applying a risk-adjusting discount rate to the metric forecast and then to evaluate the contingent consideration payoff function using the risk-neutral framework (see Section 4.6). Section 5.2.3 provides a discussion of how to estimate the Required Metric Risk Premium for the metric. Once the metric forecast has been adjusted for risk, the expected contingent consideration payoff is calculated based on the risk-neutral distribution (typically lognormal) of the metric, and discounted at the risk-free rate plus any adjustment for counterparty credit risk[105] from the expected payment date(s) to the valuation date.

The OPM thus uses a risk-neutral framework to avoid the difficulties of estimating the adjustment to the RMRP to address a nonlinear contingent consideration payoff structure.

5.4.1 When the OPM is Most Appropriate

The OPM is most appropriate for valuing contingent consideration with nonlinear payoff structures that are based on metrics for which the underlying risk is non-diversifiable. In such cases, the OPM provides a framework by which the impact of the payoff structure on the non-diversifiable risk of the metric can be easily modeled.[106] However, the OPM might add unnecessary complexity and unnecessary assumptions (e.g., lognormal distribution) if the valuation specialist is valuing either (a) an earnout with a linear payoff structure or (b) an earnout based on metrics with fully diversifiable risks. In these two cases, an SBM may be simpler and will suffice.

5.4.2 OPM Implementation in the Risk-Neutral Framework

In the context of contingent consideration, the implementation of OPM requires a risk adjustment to account for the fact that the metric (e.g., revenue, EBITDA, etc.) has non-diversifiable risk. See Sections 4.3 and 4.6 for a discussion of non-diversifiable risk and risk-neutral valuation. See Sections 5.2.2 and 5.2.3 for a discussion of how to estimate the risk adjustment (i.e. the Required Metric Risk Premium).

Management usually provides an expected (mean) forecast for the metric(s) over the earnout period. These forecasts are adjusted for risk by applying a risk-adjusting discount rate[107] commensurate with the non-diversifiable risk embedded in each metric, and then used as an input into a closed-form solution or a simulation depending on the payoff function. There are two equivalent ways to perform this risk adjustment (also known as "forecast risk-adjustment methods"). Assuming for simplicity of exposition a single time period, these two methods are:

1. Discount the metric forecast by a risk-adjusting discount rate to create a risk-neutral time zero (or present) value of the metric. The time zero risk-neutral metric is then grown at the risk-free rate over the considered time period; or
2. Adjust management's forecasted growth rate of the metric over the considered time period downward by the Required Metric Risk Premium.[108]

See Section 10.3.4 for a more detailed discussion of these two different ways of implementing forecast risk-adjustment methods and their equivalence.

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[105] A discussion of counterparty credit risk is provided in Section 5.2.6.

[106] As discussed in Section 5.3.1, due to the need to consider simultaneously the implications of the structure, the metric, the volatility, and the positioning of the metric mean relative to the payoff threshold, it is difficult to estimate a discount rate for a nonlinear payoff structure based on a non-diversifiable metric in an SBM framework.

[107] Using continuous growth rates and continuously compounded discount rates is best practice when implementing OPM.

[108] In some cases, this adjustment will make the growth rate negative.

5.4.3 Using OPM When the Metric Distribution is Not Lognormal

Typically, the OPM is implemented assuming a lognormal distribution or Geometric Brownian Motion (GBM)[109] for the earnout metric(s) due to mathematical tractability and ease of use. Section 10.3.5 provides a discussion of some common criticisms of the use of the lognormal distribution for financial investments and notes its wide usage despite some of these criticisms being well-founded.

Although textbooks and other literature have addressed option pricing with non-traded underlying metrics since at least the 1990s, the literature on the application of option pricing specifically to the valuation of contingent consideration is limited; see Section 10.3.7 for a detailed discussion. However, because (a) the application of the lognormal distribution to a company's stock price is widely used in practice, (b) alternative distributions for traded assets do not seem to provide significantly different results,[110] and (c) typical non-diversifiable earnout metrics such as EBITDA and revenue tend to be at least somewhat correlated with a company's equity value, GBM is typically also used for non-traded financial metrics.

Revenue or EBITDA may not be lognormally distributed. As discussed below, many of the most significant deviations from a lognormal distribution involve (a) diversifiable risks or (b) profit outcomes that are negative—each of which can often be addressed in a straightforward manner in the valuation. Setting aside these cases, the Working Group believes that the choice of using a lognormal distribution for a financial (non-diversifiable) metric does not often significantly affect the valuation. In the rare cases where the risk associated with the financial metric is non-diversifiable and the metric's distribution is known to be far from lognormally distributed in a manner that could significantly affect the valuation, an adjustment may be appropriate. However, consideration should be given to the trade-off between computational complexity vs. a more accurate representation of the real-world metric distribution.

Fortunately, many of the most significant deviations between a lognormal distribution and the distribution of typical (short-term, non-diversifiable, financial) earnout metrics are due to contingencies related to *diversifiable* events. For example, future revenues might depend on whether a key product development effort is very successful or only modestly successful. (Indeed, this might be one of the prime reasons for putting the earnout in place—to allow the seller to share in the upside and the buyer to mitigate the downside associated with this product development uncertainty.) In such a situation, the valuation model can be separated into two different scenarios, each with their own mean forecast and volatility (a higher mean for the "very successful" scenario in this example), and with a management-assessed probability for each of the two possible resolutions of that diversifiable risk. Similarly, if a closed-form model is appropriate, the results of two such closed-form models could be weighted in proportion to the likelihood of these different scenarios for product development success.

The second common issue with the lognormal assumption is that a lognormal distribution does not capture outcomes below zero, which can occur with profit-based earnout metrics such as EBITDA or EBIT. Fortunately, a typical profit-based earnout is generally only paid (or receives the vast majority of its payoff) when profits are substantially positive—making it most important to correctly capture

[109] See Section 10.3.6 for an in-depth discussion of the properties of a GBM, and suggestions for alternatives to consider when these properties do not hold.

[110] For traded shares or market indices, the use of GBM and its assumption of a lognormal distribution has become widely accepted due to several academic papers published in peer-reviewed journals. These papers considered alternative distributions and/or processes (e.g., arithmetic Brownian motion, jump-diffusion processes) with reported results that are not significantly different from those obtained under the lognormal distribution assumption. The computational burden required for these alternative specifications is, however, considerably increased.

the likelihood of various upside outcomes. Thus, for earnouts, the overall impact of excluding negative outcomes, or treating them as slightly positive, will not often be significant. In the rare cases (including clawbacks) where contingent consideration is paid for negative profit outcomes or the impact of excluding negative outcomes is significant, there are a few methodological solutions the valuation specialist could apply.

Often the simplest technique to address significant negative earnings outcomes is for the valuation specialist to convert the analysis to an alternative (but related) metric that is unlikely to go negative. For example, the valuation specialist can apply an OPM using Monte Carlo simulation of future *revenues* (assuming a lognormal distribution of revenues) and then estimate the profit associated with the revenues and the corresponding contingent consideration payoff, in each simulation path. If conversion to an alternative metric such as revenues is problematic, there are other techniques available. Section 10.3.6 discusses these techniques, along with suggestions for addressing other, less common issues, such as significant discrete drops or jumps in the metric distribution due to non-diversifiable risks, and (for multi-time period earnouts) correlation over time that differs from that implied by GBM, or time-varying volatility.

To summarize, in an OPM used to value an earnout, the distinction in riskiness between traded shares and the (non-traded) earnout metric is captured by the difference between their respective required risk premiums. However, the valuation specialist should also consider whether to explicitly address any substantial difference between a lognormal distribution and the metric distribution.

5.4.4 Using Simulation to Handle Path Dependency or Multiple Interdependent Metrics in an OPM

As discussed in Sections 3.2.2 and 3.2.3, contingent consideration structures that span multiple periods with features that create path dependency or that involve multiple, interdependent non-diversifiable metrics[111] will generally require the use of a technique such as Monte Carlo simulation. Applied in the context of an earnout valuation, each iteration or trial of the Monte Carlo simulation draws a value from the assumed (joint) distribution for the metrics, for each period of the earnout. As part of the specification of the joint distribution, the valuation specialist should consider what assumptions are appropriate for the correlation between outcomes from one period to the next (if there is path dependency) and for the correlation between metrics (if there are multiple, interdependent metrics).

For the correlation between outcomes from one period to the next, if a single GBM process is employed, as is often the case for an OPM, the assumption is one of relatively strong positive period-to-period correlation (more than 50%). As discussed in Section 10.3.6, the valuation specialist can choose a different correlation by modeling each period as a separate GBM.

For estimating the correlation between two or more metrics, the methods include:

- Historical Metric Correlation Method: estimation based on the observed historical correlation between the metric growth rates for the earnout-relevant business (where sufficient data is available), for comparable companies, and/or for the industry. Adjustments can be made if the future metric correlation is expected to differ from the historical relationship. For example, the correlation between licensing revenue and maintenance revenue may change post-transaction if the acquirer will modify the term of the license or maintenance contracts. Note that if using

[111] If the structure involves dependencies only for example between a diversifiable metric and a non-diversifiable metric, this situation can also sometimes be handled by creating outcome scenarios for the diversifiable metric, applying OPM within each scenario (taking into account the impact of that scenario on the mean and volatility for the non-diversifiable metric), and weighting the scenarios by their likelihoods to estimate the average risk-neutral payoff.

quarterly data, the analysis should use year-on-year quarterly growth (e.g., Q1 of the current year vs. Q1 of the prior year) rather than quarter-to-quarter growth (e.g., Q1 of the current year vs. Q4 of the prior year) to avoid artificial impacts of seasonality on the correlation estimate.

- Management Assessment Method: estimation based on management's assessment of the correlation between metric growth rates. Direct assessment of correlation is challenging but is often employed where adequate historical data does not exist, or where the metrics or the company-specific correlation between them is unique. It is also good practice to use management assessments as a cross-check. For example, it is appropriate to ask management whether the observed historical correlation between the metrics is reasonable as an estimate for the earnout-relevant business post-acquisition.

Once the correlation between the metrics has been estimated, the valuation specialist can incorporate the correlation into the simulation.

> *Example:* The buyer agrees to pay the sellers of an asset management company 10% of management fees in excess of 100 million, and 15% of performance fees in excess of 40 million in the first year after the acquisition, with an overall cap of 20 million. Historically, the correlation in the growth of these two metrics for the subject company has been 50%. Management agrees that 50% is a reasonable projection for the future correlation of growth in these metrics. A Monte Carlo simulation is set up. For each iteration of the simulation, two draws are made from a standard normal distribution, x_1 and x_2. The random draw used to simulate management fees is x_1 and the random draw used to simulate (the correlated) performance fees is $(0.5 \times x_1) + (x_2 \times \sqrt{1 - (0.5)^2})$.[112]

After risk-adjusting the metric forecasts to a risk-neutral framework, the earnout cash flow is calculated based on the "path" for the simulated metrics and the contractual terms of the earnout arrangement and are discounted from the expected payment date(s) to the valuation date at the risk-free rate plus any adjustment for counterparty credit risk. The value of the earnout is estimated to be the average present value of the earnout payments over all iterations of the simulation.

Many iterations are typically required to get reliable results from a simulation. The standard error of the simulation mean is a statistical measurement that can be used to determine how many iterations are necessary. See the example in Section 9.10 for an illustration of a Monte Carlo simulation in the context of a multi-period earnout with a catch-up feature.

5.4.5 Using a Binomial Lattice to Handle Buyer or Seller Choices

As discussed in Section 3.2.4, earnouts may be structured with the ability of the buyer or seller to make decisions over the term of the earnout that impact its payoff. In these cases, a binomial tree (or more generally a lattice or finite-difference technique) can be used to incorporate optimal decisions into the earnout valuation.

A binomial tree, whose branches represent potential future metric paths, is constructed based on assumptions for future volatility in a risk-neutral framework. That is, the risk-neutral probability distribution of future metric outcomes is modeled at successive time steps. The optimal decision feature can then be incorporated by working backwards through the tree, from the end of the earnout term to the valuation date, by minimizing (in the case of the buyer's decision) or maximizing (in the case of the seller's decision) the expected present value of the payoff.

[112] More generally, Cholesky decomposition can be used to simulate two or more correlated metrics. See Hull, *Options, Futures, and Other Derivatives,* 8th ed. (2011), p. 450 for further detail.

The use of a binomial tree is restrictive, however, since it may cause difficulties in addressing certain path-dependent features. Valuing earnouts that have both path-dependent and optimal decision features generally requires the use of a Monte Carlo simulation in conjunction with an algorithm to address the buyer or seller decision for each iteration of the simulation.[113]

5.4.6 Conclusions Regarding OPM

The main advantage of the OPM is that the impact of the risk associated with a nonlinear payoff structure based on a metric with non-diversifiable risk can be appropriately and readily incorporated into the valuation using a risk-neutral framework. The main disadvantages of the OPM are its complexity, lack of transparency, and that it is not widely understood. OPM also generally assumes a lognormal assumption; substantive deviations from this assumption can be addressed when required, but sometimes at the cost of additional complexity.

Therefore, the Working Group recommends the use of OPM for valuing contingent consideration if the risk of the underlying metric is non-diversifiable AND the payoff structure is nonlinear (e.g., has a threshold, cap, tiers, or carry-forwards). However, the Working Group recommends the simpler SBM where there are no difficulties associated with estimating the impact on risk of the payoff structure, i.e., when the payoff structure is linear or the risk of the underlying metric is diversifiable.

5.5 Comparison of SBM versus OPM

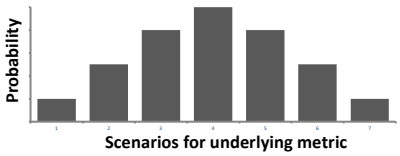
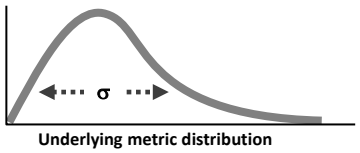
The SBM and OPM described in the preceding sections 5.3 and 5.4 are both applications of the income approach, whereby the expected future earnout payments are discounted to the valuation date. Both methods are similar in that they incorporate the Required Metric Risk Premium, time value of money, and counterparty credit risk into their respective methodologies for discounting/adjusting for risk.

The differences between these methods relate to (a) the assumption about the distribution for the growth rate of the earnout metric and (b) the way the risk associated with the payoff structure of the earnout is incorporated into the valuation. OPM typically assumes that the growth rate of the earnout metric is normally distributed[114] and the risk associated with the structure of the earnout is incorporated into the valuation using a risk-neutral framework. SBM is more flexible about the distribution for the growth rate of the earnout metric, but requires an assessment of the impact on risk of the payoff structure—which is challenging when the payoff structure is nonlinear and the risk of the underlying metric is non-diversifiable.

A comparison of the SBM versus OPM is summarized in Table 5 below.

[113] In some situations, the algorithm can be a relatively simple decision rule assessed by management. For more complex situations such as a path-dependent early exercise option, there are many algorithms and techniques that have been developed. See for example, F.A. Longstaff and E.S. Schwartz, "Valuing American options by simulation: A simple least-squares approach" (2001).

[114] Equivalently, the method assumes that the underlying metric is lognormally distributed or follows a GBM process. However, as discussed in Section 5.4.3, "lumpy" distributions caused by events with diversifiable risks can easily be incorporated into an OPM.

TABLE 5: Comparison of SBM and OPM		
	Scenario-Based Method (SBM)	**Option Pricing Method (OPM)**
Approach	Income approach	Income approach
Model for Underlying Metric	Assessment of the distribution of the underlying metric, based on estimated forecasts, scenarios, and probabilities: 	Lognormal assumption for the underlying metric distribution, based on estimated forecasts and volatility: 
Discount Rate / Risk Adjustment		
Metric Risk	Required Metric Risk Premium	Required Metric Risk Premium
Payoff Structure Risk	Assessment (challenging for nonlinear payoff structures associated with non-diversifiable risks)	Built into OPM's risk-neutral framework[115]
Time Value of Money	Risk-free rate over relevant time horizon until payment	Risk-free rate over relevant time horizon until payment
Counterparty Credit Risk	Obligor's credit spread	Obligor's credit spread

5.5.1 Advantages and Disadvantages of the SBM

SBM Advantages:

- The SBM is the simplest, most transparent and most appropriate model for earnouts where the earnout metric does not have systematic risk or the payoff is linear.
- The SBM may be more consistent with how acquirers value earnouts when building deal models that inform the consideration paid in the acquisition.
- The SBM is flexible in that it can easily model any distributional assumption for the underlying metric, including distributions that are not lognormal, such as:
  - Asymmetric outcomes – for example, when there are more downside than upside possibilities (or vice versa) associated with a young business
  - "Lumpy" distributions, based on varying levels of success or strength of competition
  - Outcomes that cannot exceed certain levels due to capacity constraints

[115] OPM implicitly accounts for the risk associated with the structure of the contingent consideration, there is no need for an explicit additional adjustment to the discount rate for that risk. The RMRP is used to risk-adjust the forecast. See Section 10.3.4 for a discussion of this procedure. By using a risk-neutral framework (see Section 4.6), OPM accounts for the risk associated with the contingent consideration structure, regardless of how complex that structure is.

- A beta distribution, which is useful for approximating the outcome of repeated trials with a probability of winning – often the fundamental nature of revenue generation
- Negative earnings for earnouts based on earnings-based metrics.

- The SBM inputs (scenarios and probabilities) are generally provided by management and, while relatively subjective, are easier for management to understand.

SBM Disadvantages:

- The impact of the risk associated with nonlinear payoff structures is often significant and difficult to correctly assess qualitatively. Moreover, the Working Group is not aware of any well-established framework to directly estimate the appropriate discount rate associated with nonlinear payoff structures based on metrics with non-diversifiable risk.
- Estimating scenarios and probabilities (or a distribution) consistent with the valuation of the business and its intangibles can be challenging.
- Given the qualitative (and in many cases subjective) nature of the input assumptions, the valuation based on an SBM can be difficult to support and can be susceptible to biases that underestimate risk.

5.5.2 Advantages and Disadvantages of the OPM

OPM Advantages:

- The OPM is widely used to value financial instruments with nonlinear payoff structures similar to nonlinear contingent consideration payoff structures.
- The impact of the risk associated with nonlinear payoff structures based on non-traded metrics with non-diversifiable risk can be appropriately and readily incorporated into the valuation using a risk-neutral framework.
- The volatility structure of a GBM is consistent with the typical assumption that the uncertainty of future projections increases with time.
- The OPM has been extensively researched and there are widely used formulas to value many of the payoffs typically used to structure earnouts.

Disadvantages:

- The OPM is less transparent and more difficult for management to understand than SBM.
- The OPM relies on complex mathematics and therefore OPM can be more costly and difficult to implement for those not versed in option pricing theory.
- The growth of the underlying metric is generally assumed to follow a normal distribution, which may not adequately fit the distribution of possible outcomes.[116]
- The implied discount rate associated with an OPM, and therefore the concluded fair value, can be unintuitive and difficult to explain.

[116] However, the diversifiable risks that typically drive lumpy distributions can be incorporated into an OPM, as described in Section 5.4.3.

5.6 Summary of Key Recommendations Regarding the Valuation of Contingent Consideration

For valuing contingent consideration, the market approach is rarely used due to the lack of an active trading market. Even in the unusual case where a market exists for contingent consideration (such as in the market for CVRs), the market often exhibits low trading volume, trades between related parties, and/or perceived information asymmetries. The valuation specialist would need to consider these factors along with other typical market approach reliability indicators to determine if the market approach is useful, even in the rare case where market data on the value of contingent consideration is available.

The cost approach is also typically not appropriate, because (1) there often is no obvious way to estimate a replacement cost for a contingent consideration arrangement and (2) the cost approach does not consider future expectations.

The Working Group has observed two income approach methods commonly used in practice to value contingent consideration: SBM and OPM. Other methods also may exist or be developed in the future.

No single income approach method for valuing contingent consideration appears to be superior in all respects and circumstances. Each of SBM and OPM has merits and challenges, these methods differ in level of complexity, and there are trade-offs in selecting one method over the other.

However, the Working Group has concluded that there are contingent consideration types for which each method is typically most appropriate. For the reasons articulated earlier in this section, the Working Group recommends the following to select a method for valuing contingent consideration:

a) If the risk of the underlying metric is diversifiable, e.g., for achievement of a product development milestone, choose SBM

b) If the payoff structure is linear (e.g., a fixed percentage of revenues or EBITDA with no thresholds, caps, or tiers), choose SBM

c) If the risk of the underlying metric is non-diversifiable *and* the payoff structure has thresholds, caps, tiers, or other nonlinearities, choose OPM

d) If the payoff structure is path dependent (e.g., a carry-forward feature, a catch-up provision or a multi-year cap) or is based on multiple interdependent metrics, choose SBM or OPM as recommended above, using a technique that can handle these complexities (such as Monte Carlo simulation).

The Working Group does not recommend the use of SBM for nonlinear payoff structures involving a metric with non-diversifiable risk. In this situation, the SBM discount rate would have to be adjusted to account for the impact of the nonlinear payoff structure. However, the amount of the discount rate adjustment cannot be easily intuited and the Working Group is not aware of any reasonable "rules of thumb" for developing such adjustments. It is for this reason that OPM is recommended over SBM in this situation.

Whether applied to the expected payoff cash flow (as in SBM) or to create a risk-neutral expected payoff cash flow (as in OPM), the discount rate should incorporate a risk premium associated with and appropriate to the underlying metric for the contingent consideration. The Required Metric Risk Premium will often differ from the risk premium used to value the associated business, due to differences in risk between the metric (such as revenue or EBITDA) and long-term free cash flows of the business. For example, long-term free cash flows of the business are generally riskier than revenue,

due to operational leverage. Thus, even for a linear payoff structure, the contingent consideration discount rate will often differ from the WACC and from the transaction IRR.

Because the earnout is valued from the perspective of a market participant buying or selling the standalone earnout post-transaction (with the relevant business under the new ownership of the actual buyer), the financial projections developed for valuing an earnout should include buyer-specific synergies unless the earnout agreement specifically excludes them from the definition of the metric.

Section 6: Clawbacks

There are cases where the parties to a transaction will structure the contingent consideration so that the buyer may be entitled to a clawback (or refund) of a portion of the initial purchase consideration from the seller. In these cases, the buyer has essentially taken out insurance that is payable by the seller if the acquired business underperforms or to mitigate specific risks. Clawbacks are therefore contingent assets to the buyer that reduce the fair value of the total purchase consideration.

> *Example:* The sellers agree to pay the buyer one million if the EBITDA of the acquired business falls below three million in the first year after the acquisition.

In general, the valuation considerations for clawbacks are the same as for earnouts. The valuation specialist should consider the risk of and expectations for the underlying metric, the impact of the clawback payoff structure on risk (especially if the structure is nonlinear), as well as any counterparty credit risk.

6.1 Underlying Metrics for Clawbacks

Clawbacks tend to be structured to mitigate the risk of the acquired business underperforming over a specified future period. As such, the underlying metrics or payment triggering events observed in practice for clawbacks are generally the same as for earnouts, including:

- Financial or business metrics with systematic risk: revenue, EBITDA and net income, number of units sold, etc.
- Nonfinancial milestone events (for a clawback, usually based on failure to achieve milestones or negative events): regulatory approvals, resolution of legal disputes, execution of certain commercial contracts or retention of customers, completion of certain software tasks or construction projects, etc.

Therefore, the valuation considerations related to the underlying metrics or events for clawbacks are typically the same as for earnouts. However, the impact on the valuation of the payoff structure of a clawback can be significantly different from an earnout, as discussed in the following section.

6.2 The Impact of the Payoff Structure of Clawbacks on the Discount Rate

Unlike earnout payments, which are typically triggered as a result of outperformance or successfully achieving certain milestones, clawback payments are often triggered as a result of underperformance, failure to achieve certain milestones, or negative resolution of uncertainty. As a result, the value of a clawback tends to increase as the anticipated performance of the underlying metric deteriorates. That is, the value of a clawback is usually negatively correlated with the performance of the underlying metric. Such a clawback can resemble a financial instrument with a negative beta, often resulting in a negative discount rate applied to the expected future payments associated with the clawback.

Clawbacks resemble insurance contracts or put options. Just as the value of an insurance contract increases as the likelihood of the downside event increases, so too does the value of a clawback increase as the likelihood of poor performance or a negative triggering event increases.

A negative discount rate can arise naturally when valuing a clawback using an OPM, which often takes the form of a put option (see the example in Section 9.11).

6.3 Counterparty Credit Risk for Clawbacks

In general, clawbacks are typically an obligation of the seller to make future contingent payments to the buyer. As such, the allowance for counterparty credit risk should be specific to the seller, considering the seller's credit risk and the expected timing of the payoff. This is different from a typical earnout, where the buyer is typically the obligor and it is the buyer's credit risk that is considered.

In practice, since the sellers' company no longer exists as a standalone entity post-transaction and the obligors are often the individual former shareholders, the counterparty credit risk of the seller is often mitigated through the use of an escrow account (or other credit risk mitigation mechanism as discussed in Section 5.2.6). If present, the credit risk mitigation mechanism could cause the valuation specialist to reduce or even remove the allowance for counterparty credit risk, depending on the extent of the risk mitigation mechanism.

If the maximum possible clawback payment is not placed in escrow (and no other credit risk mitigation mechanism is used), the credit risk of the seller in the typical scenarios in which the clawback will be paid should be considered. Clawbacks are typically paid when the acquired business fails to perform as expected. If such downside scenarios predominantly occur when the economy is notably poor or are otherwise correlated with financial stress on the seller, the likelihood of seller default in such downside scenarios may be larger than the overall credit risk associated with the seller.

Section 7: Assessing the Reasonability of a Contingent Consideration Valuation

The valuation of contingent consideration requires the estimation of a number of key inputs and assumptions. It is important to maintain internal consistency among the assumptions used in the contingent consideration valuation as well as to assess consistency with the assumptions for the valuation of the overall business and/or related intangibles and with historical and market data. Finally, it is important to consider the reasonableness of the total purchase consideration.

The remainder of this section addresses these considerations for assessing the reasonability of the valuation of contingent consideration in more detail.

7.1 Consistency of the Earnout Metric Forecast in Single vs. Multi-scenario Valuation

Given the nature of contingent consideration, multiple scenarios will often be used to arrive at the expected outcome for the earnout metric and also occasionally (depending on methodology) to estimate the volatility for the metric and/or the expected payoff cash flow. In contrast, a business valuation will often rely on only one scenario: typically, the deal model expected case scenario (representing in principle the mean, i.e., the probability-weighted average of the possible scenarios for future cash flows).

Using a different number of scenarios for the earnout computations versus the business valuation is not, on its own, problematic. However, consistency between these two valuation techniques should be evaluated. For instance, if the expected outcome for the earnout metric using multiple scenarios is significantly different than the corresponding estimate in the single-scenario model used for the valuation of the business, there could be a lack of consistency between the assumptions for the two valuation models. Such an inconsistency, if significant, would imply that either the valuation of the earnout or the valuation of the business is incorrect.

More generally, assuming the same measurement date and valuation basis, the expected value of the projections for the earnout metric based on the probability distribution used in the earnout analysis should equal the forecast of the same earnout metric implied by the expected cash flows used to value the business or its intangibles (excluding any impact of buyer-specific synergies). If not, significant distortions can arise.

For example, consider an earnout with a payoff equal to the excess of future EBITDA above 100, where the EBITDA forecast used in the valuation of the business is 100. Assume there are no buyer-specific synergies and no differences due an idiosyncratic definition of "EBITDA" for purposes of the earnout. Recognizing that a deeper understanding of the distribution of EBITDA outcomes is required to value the earnout, the valuation specialist gathers additional information, resulting in the probability distribution for EBITDA to be used in the earnout analysis presented in Table 6.

TABLE 6: Example Probability Distribution

Scenario	Probability	EBITDA	Earnout payoff (Max (EBITDA-100,0)
1	2.5%	200	100
2	15%	160	60
3	20%	140	40
4	25%	100	0
5	20%	80	0
6	15%	70	0
7	2.5%	60	0
Expected value		**110**	**19.5**

The *expected value* (mean) of EBITDA for the earnout analysis is 110 (calculated as the probability-weighted average across the scenarios).[117] This value is different from the forecast of 100 used in the business valuation.[118] This mismatch between the EBITDA forecast for the business and the expected value of the probability distribution for EBITDA assumed for the earnout can be problematic. It likely means that using this distribution will cause the expected value of the earnout payoff (19.5 in this example) to be overstated or that the valuation of the business is not using expected cash flows and may therefore be understating value.

7.2 Consistency with Valuation of the Business, the Intangibles, and IPR&D

The assumptions made for the contingent consideration valuation should be consistent with those made for valuation of the business and, when applicable, its intangible assets. The evaluation of consistency should also allow for the different treatment of buyer-specific synergies for business valuation as compared to contingent consideration valuation. Table 7 summarizes some of the key differences between the valuation of a business and of an earnout; additional differences are described throughout this guide. These key differences and other considerations are discussed in more detail in the remainder of this section.

[117] Specifically, the computation to arrive at the expected EBITDA is (200×2.5%) + (160×15%) + (140×20%) + (100×25%) + (80×20%) + (70×15%) + (60×2.5%) = 110.

[118] The assumed EBITDA probability distribution does have its *most likely* scenario equal to the forecast of 100. However, best practice is for the valuation of the business to use expected cash flows. If expected cash flows are not used in the valuation of the business, an adjustment—which is typically not easy to estimate—would have to be made to the discount rate for the valuation of the business to account for any difference in risk between the expected cash flows and the most likely cash flows.

TABLE 7: Comparison of Business Valuation (Income Approach) to Earnout Valuation		
	Business Valuation	**Earnout Valuation**
Projections		
Level of detail	Typically uses expected cash flows; does not require assumptions about the probability distribution around the mean	Unless linear payoff structure, requires assumptions about the probability distribution for future outcomes for the earnout metric
Synergies	Includes market participant synergies, excludes buyer-specific synergies	Includes all synergies relevant to the calculation of the payoff
Discount Rate		
RFR	Long-term RFR	RFR based on the time until the earnout payment(s) are made
Counterparty credit risk	Not relevant	Typically, obligor's credit spread for subordinated debt in the scenarios in which, and over the timeframe until, the earnout payment(s) are made
Risk premium	Risk premium for long-term free cash flows (i.e., WACC or IRR less RFR)	RMRP for the earnout metric
Impact of earnout structure	Not relevant	For a metric with non-diversifiable risk, nonlinear payoff structures impact the effective discount rate

Consistency with Business Projections: As discussed in Section 7.1, projections for the business in principle should use the expected case cash flows (a single set of cash flows approximating the probability-weighted average of the possible scenarios for the future). Typically, the same set of projections should be considered as the starting point when valuing the contingent consideration. However, earnout valuations typically require a probabilistic analysis,[119] including an assumption about the distribution of future outcomes for the earnout metric. The methods described in Section 5 generally require (1) the use of multiple scenarios (for the SBM, e.g., for nonfinancial milestone payments with predominantly diversifiable risk) and/or (2) the expected value for the metric and a volatility around that expected value (for the OPM, assuming a lognormal distribution). Thus, for the valuation of most earnouts, it is imperative to start with a full understanding of the probability distribution for the metric outcome.

The projections used for the earnout valuation should be consistent with the projections used for the business valuation, after allowing for any differences due to buyer-specific synergies or to the definition of the earnout metric. A qualitative assessment of consistency with the projections for the business should thus be performed. The example below illustrates how performing a consistency check can identify a necessary revision to the assumptions.

[119] The only situation in which an earnout valuation might not require understanding the probability distribution of the underlying metric is when the earnout payoff has a linear structure, as explained in Section 4.4.

Example: An asset management company was acquired. One year from the acquisition date, the sellers are entitled to an earnout payment of one million if the client retention rate is 95% or higher. Except in times of an economic downturn, it is uncommon for client retention rates to be below 95%. Revenues are projected to grow by 2% over the next year, whereas typical prior growth had been about 10% per year.

The valuation specialist planned to assume a probability of 90% that the 95% retention threshold will be achieved, based on the historical retention rates. However, when management is asked about the reasonability of the 90% assumption, the valuation specialist learns that the lower projected growth in the next year is due to the anticipated loss of a key principal in the firm and as a result, 20% of the clients are at high risk to depart post-acquisition.[120] Therefore, the 90% probability estimate for achieving the earnout payment is quite possibly inconsistent with the assumptions used to forecast revenue for the company in the first year.

Consistency with Intangible(s) Projections: One may also need to assess the contingent consideration assumptions relative to the assumptions for valuation of the intangible assets of the subject business. For example, as part of valuing the intangible assets associated with an acquisition, a pharmaceutical company may develop projections for a drug candidate under development. The projections used for valuing an earnout contingent upon the success of that drug candidate should use consistent assumptions for the probability of success and for performance estimates (revenues, units sold, timing assumptions, etc.)

Consistency with Methodology for Valuing Assets and Liabilities of the Business: In some cases, assets or liabilities of the business might involve nonlinear payoff structures. For example, a company might pay (or receive payment of) royalty rates that are tiered at different rates based on future sales. As another example, real estate leases might have contingencies based on the revenue of the lessee or other nonlinear payoff structures. There is a potential for inconsistency if such assets or liabilities are valued using a different methodology than is recommended in this Valuation Advisory for the valuation of (related[121]) contingent consideration.

Market Participant Assumptions/Buyer-Specific Synergies: The forecast assumptions for the earnout metric and subject business may vary due to differences in the assumptions related to synergies. In terms of the fair value of the business, the value is estimated based on what market participants would assume about the expected cash flows for the business. These assumptions are hypothetical and exclude assumptions unique to one buyer, such as buyer-specific synergies.

However, as explained in Section 4.1, for that same transaction the market participant assumptions for the earnout valuation can be different. Market participants evaluating the standalone earnout would include in the calculation of the earnout cash flow any buyer-specific synergies that would affect the payoff outcome for the earnout metric.

For this reason, buyer-specific synergies should be identified and, unless they are excluded from or irrelevant to the definition of the earnout metric, included in the financial projections used for the earnout valuation. Any such buyer-specific synergies should, however, be excluded from the valuation of the business and its assets. The fact that buyer-specific synergies can impact the value of the

[120] Note that because this issue also affects the value of customer relationships, it would typically be addressed in the process of valuing those relationships.

[121] For example, the contingent consideration valuation is related to the valuation of such assets and liabilities if the contingent consideration metric is related (in our examples) to sales of the products that have the tiered royalty rates or to the lease revenues.

transaction consideration but not the value of the business can also affect the check on the reasonableness of the transaction IRR (see Section 7.5).

Discount Rates: The discount rate used for the contingent consideration valuation (either directly as in an SBM or in the risk-neutral adjustment to the metric growth forecast in an OPM) should be consistent with those used to value the business and its intangibles, after taking into account differences such as those noted in Table 7. For example, if additional premiums (e.g., size, country, or company-specific premiums) are added to the discount rate for the business valuation, appropriate proportions of such additional premiums (with adjustments for differences in risk between the earnout metric and the long-term free cash flows of the business, as discussed in Section 5.2.2) should be considered for addition to the Required Metric Risk Premium.

Note, however, that the discount rate for the earnout will generally not be the same as the discount rate for the business. The Required Metric Risk Premium will incorporate adjustments for differences in risk between the contingent consideration metric and the long-term free cash flows of the business. These differences in risk often include factors such as duration, volatility, correlation with the market, and leverage. Further differences in risk are present if there are nonlinearities in the earnout payoff structure associated with a financial metric (or other metric with non-diversifiable risk).

Volatility: Thought should also be given to maintaining consistency between the discount rates used for the business and its intangible assets and the volatility assumed for the earnout metric. It is commonly assumed that companies and assets with higher discount rates exhibit higher risks in their earnings or cash flows, and therefore also would have higher volatilities. Empirical evidence supports this assumption in some cases. For example, smaller companies (which on average have a higher WACC than larger companies) also tend to experience higher volatility in net income, EBITDA, and sales.[122]

Therefore, for example, it might be inconsistent to use the historical volatility of comparable companies as a proxy for the volatility of growth in the earnout metric, if the subject business has a higher discount rate than those comparables. See Section 5.2.4 for methods for adjusting the estimated volatility in the growth rate for the earnout metric to account for common differences between acquired businesses and public company comparables, such as size premiums or company-specific risk premiums.

Further, consistency should be maintained between the estimated Required Metric Risk Premium for the earnout metric and the estimated volatility in growth rate for the earnout metric. For example, a RMRP of 20% and a metric growth rate volatility of 5% are likely not consistent.

Counterparty Credit Risk: When estimating counterparty credit risk for contingent consideration, one should consider the credit risk specific to the obligor, not to a market participant. The valuation specialist should consider the yield, if observable, on traded debt instruments for the obligor. When assessing consistency, it is understood that differences may exist between the yield on these debt obligations and the contingent consideration counterparty credit risk assumption due to differences in duration and seniority of the obligations, correlation between financial stress and contingent consideration payment scenarios, and potentially other significant differences between the debt and the contingent consideration obligation.

[122] See, for instance, Grabowski et al. (2017) *Valuation Handbook U.S. Guide to Cost of Capital* and *Valuation Handbook International Guide to Cost of Capital*.

Example: An acquisition occurs with potential annual earnout payments over a five-year period. The acquirer has senior notes trading at a current market yield of 4.2% and subordinated notes trading at a current market yield of 5.5%; both notes have a five-year remaining term. The five-year risk-free rate as of the valuation date is 2.0%. The contingent consideration is subordinated to the acquirer's subordinated debt. The valuation specialist (incorrectly, as described below) assumes a blended rate of 5.0% as a proxy for the cost of debt. After subtracting the 2.0% risk-free rate, a counterparty credit risk adjustment of 3.0% is estimated.

This calculation ignores that the contingent consideration is a subordinated obligation to the subordinated debt. Therefore, the estimated cost of debt should be higher than 5.5%. After subtracting the 2.0% risk-free rate, the counterparty credit risk adjustment would have to be larger than 3.5% to be consistent with the current market yield of the obligor's existing debt.

7.3 Consistency with the Rationale for Including Contingent Consideration in the Transaction

It is often the case that management or its mergers & acquisitions team, as a part of the acquisition process, would have prepared either a deal model or management presentation outlining the buyer's expectations for the acquired company. Such documents, along with discussions with management, can provide insights into the rationale for incorporating an earnout arrangement as part of the transaction, for the choice of earnout metric, and for the chosen payoff structure.

As discussed in Section 1.3, the rationale for an earnout can include bridging the gap between the buyer and seller perceptions of prospects for the business, incenting seller behavior post-transaction, sharing of risks and rewards, and/or deferring a portion of the purchase consideration. The assumptions related to risk and uncertainty associated with the earnout metric should be consistent with the rationale for structuring the earnout arrangement. For example, if the earnout has been structured primarily to share a significant risk related to revenues in year one, it could potentially be inconsistent for the volatility of revenues in year one to be low. Indeed, in such a situation, one might expect the acquiree's volatility of revenues in year one to be higher than the volatility observed for comparable public companies. On the other hand, if the primary rationale is for the earnout to serve as a form of seller financing of the transaction (deferring payment for a year), then the volatility of revenues for comparable companies might be an appropriate assumption for the acquiree's business.

7.4 Consistency with Historical and Market Data

In assessing the riskiness of the projected cash flows and scenario probabilities for valuing contingent consideration, historical and market data should be considered. From a market participant point of view, relevant factors to consider might include, for example:

- Historical financial performance of the subject business and comparable companies
- The reasonableness of the acquired company's projected growth and profitability expectations, and the risks of achieving those projections, in light of historical company and market data
- The risks of achieving anticipated technical milestones and/or acquisition synergies, as benchmarked against historical experience for the subject business, the acquirer, and comparable companies
- Historical subject business experience with volatility of actual results versus business plan forecasts
- The discount rates and volatilities of comparable companies.

Example: The projections for the acquired business contain 50% revenue growth for the next three years and a profit margin of 30%. The company's historical revenue growth rates were between 5% and 10% per year with a profit margin of about 10%. The acquisition rationale includes offering the acquired company's products to the buyer's customer base, which could result in significant revenue increases and higher profit margins due to increased scale. The buyer has achieved similar revenue growth rates for similar past transactions. However, the buyer's and other comparable companies' profit margins are in a relatively tight range around 15%.

In this case, given the acquirer's historical success with previous deals, the projected revenue growth rates could be reasonable. However, the projected margins are significantly above all the benchmarks and, therefore, this assumption would need to be evaluated further.[123]

7.5 Reasonableness of the Total Purchase Consideration and IRR

In the context of a business combination, contingent consideration is required to be valued initially pursuant to ASC Topic 805 or IFRS 3R, Business Combinations. According to ASC 805-30-25-5 and IFRS 3:39, "The acquirer shall recognize the acquisition-date fair value of contingent consideration as part of the consideration transferred in exchange for the acquiree."

One way of assessing the reasonableness of the contingent consideration value is to evaluate the total purchase consideration inclusive of the value of the contingent consideration, relative to what a market participant would be willing to pay for the business. This fair value estimate can be arrived at using the measurement framework and guidance of ASC Topic 820 or IFRS 13, Fair Value Measurement. For example, the market approach could be used to compare the implied multiple from the transaction to those of comparable public companies or comparable acquired companies.

Another common method used to assess the reasonableness of the total consideration is an IRR analysis for the transaction. IRR analysis is discussed in the Appraisal Practices Board's *Valuation Advisory #1: Identification of Contributory Assets and Calculation of Economic Rent*s (the "Contributory Asset Guide"). The Contributory Asset Guide describes an IRR analysis as follows: "the IRR in a transaction is the discount rate at which the present value of the prospective financial information (PFI) of the acquired entity (adjusted if necessary for market participant assumptions) is equal to the purchase price … because of potential adjustments to the purchase price and to the PFI, the valuation specialist's IRR may not be consistent with management's internal assumptions." If the IRR doesn't seem reasonable compared to other marketplace transactions, the valuation specialist would typically review the assumptions leading to that IRR—including those underlying the contingent consideration valuation, the expected case financial projections, etc.—and would also consider whether there might be a bargain purchase or an overpayment situation.

The value of the contingent consideration will affect the overall purchase price (typically increasing it, for an earnout). As a result, if there is an earnout, the IRR would need to be lowered in order for the higher purchase price to equal the sum of the present value of the projected cash flows. To the extent that the IRR was relied upon to assist in the estimation of a company-specific risk premium for the transaction, this lowering of the IRR could also result in a lower discount rate for the earnout metric.[124]

[123] This issue should also be identified when valuing the business and its intangibles.

[124] In rare cases, where the inclusion of buyer-specific synergies in the earnout significantly increases the value of the total purchase consideration to a level that is inconsistent with other marketplace transactions, the valuation specialist should identify the reasons and be able to reasonably explain why the acquirer is willing to pay for its own unique synergies. An IRR that doesn't seem reasonable compared to other marketplace transactions may indicate that the expected achievement level for the buyer-specific synergies included in the earnout valuation might be overly optimistic.

The interaction between the value of the earnout and the IRR thus creates a circular relationship, i.e., adding the fair value of the earnout to the purchase price lowers the IRR and therefore lowers the estimated company-specific risk premium, which lowers the earnout discount rate, raises the fair value for the earnout, and further increases the purchase price. The higher purchase price, in turn, would result in the valuation specialist needing to repeat the IRR analysis. While this circular relationship causes some added level of complexity (and often, the need to iteratively recalculate the value of the earnout and the IRR until the analysis converges on an estimate of the company-specific risk premium), the Working Group believes that this relationship must be, and can be, addressed properly and in a manner where the IRR is consistent with the earnout valuation. The need to iteratively recalculate the value of the earnout may also impact other parts of the valuation analysis, such as the weighted average return on assets (or "WARA," also discussed in the Contributory Asset Guide) or the estimated return on certain intangible assets (e.g., IPR&D).

Section 8: Updating Contingent Consideration Valuation

Typically, an earnout will result in the acquirer recognizing a liability on its balance sheet, measured at fair value. Under U.S. GAAP or IFRS, for contingent consideration classified as an asset or a liability, at each subsequent reporting date prior to the contingent consideration being resolved, the fair value of the asset or liability is remeasured. However, if the contingent consideration is classified as equity, the carrying value (i.e., the acquisition date fair value) of the contingent consideration is not remeasured subsequent to the acquisition date.

While the process of updating the fair value of an earnout at a subsequent reporting period is similar to the process used in the initial measurement, there are important nuances to consider.

8.1 Valuation Methodology for Updating the Fair Value of Contingent Consideration

This Valuation Advisory outlines various methods that might be used in estimating the fair value of an earnout. At the initial measurement date, the valuation method or methods anticipated to provide the most reliable estimate of fair value and that are most appropriate given the structure of the earnout would be utilized to estimate the fair value of the earnout. The Working Group believes that, while there may be exceptions, the methodology used in updating the fair value of an earnout should generally be consistent with the methodology used in the initial measurement. An example of such an exception is when enough uncertainty has been resolved that the structure of the earnout is no longer relevant to the choice of methodology (e.g., the amount of the payment is known with near certainty, the structure has become linear because the only nonlinearity—a cap—is now known to not be active, or there is only one period left so the carryforward is known and the earnout is no longer path dependent.) Judgment should be applied in determining whether a change in methodology is appropriate at subsequent dates based on the facts and circumstances.

8.2 Updating the Valuation Inputs

As described in previous sections, the valuation of an earnout at initial measurement may require the estimation of multiple inputs based on the facts and circumstances existing (known or knowable) on the transaction date, including certain assumptions and expectations regarding the possible payoff of the contingent consideration arrangement. At subsequent measurement dates, the fair value of the earnout liability should be measured based on the updated information available as of each respective date. To the extent the facts and circumstances have changed and additional relevant information is available, the inputs used in the earnout valuation methodology should be updated.

While there might be exceptions (for example due to improvements in methodology or where certain information sources are no longer available or relevant), consistency should generally be maintained in the methodology for estimating inputs. A similarly rigorous process to estimate the expected outcome for the earnout metric, volatility, and discount rate should be utilized for the subsequent valuations as was used for the initial valuation. Moreover, the updated inputs should be consistent with the original inputs, after taking into account any relevant new information, uncertainty resolution, business evolution, and the passage of time.

Included below are some of the valuation issues that may need to be considered for valuations performed subsequent to the initial measurement date.

8.2.1 Actual Results Related to the Earnout Metric

Actual results regarding the earnout metric(s) may be available at subsequent measurement dates. For instance, if the earnout payment is contingent on financial performance, actual results may now be

available for a portion of the earnout period, even if an earnout payment is not yet contractually required. The valuation model should take these actual results into account. The actual results may be such that some of the uncertainty regarding the earnout payoff is resolved.

> *Example*: An earnout is based on the cumulative revenue over the first two years post-close. When updating the earnout value at the end of year one, the actual year one revenue would now be known; it is no longer subject to systematic risk or uncertainty. As such, there is no longer a need to estimate year one revenue and the year one revenue in the earnout valuation model would be updated based on the actual revenue.

8.2.2 Updated Forecast for the Earnout Metric

In addition to the possibility that actual results may have resolved some of the uncertainty regarding the earnout metric, market participant assumptions regarding the expectations for the unresolved portion of the earnout may also have changed, and these changes in expectations should be reflected in the updated valuation.

> *Example*: Continuing with the prior example, assume that based on the positive results for year one revenue and higher demand anticipated within the industry, the company expects revenue to be 10% higher for year two than was anticipated at the initial earnout measurement date. This updated expectation for year two revenue would be incorporated into the valuation model along with the actual results for year one.

From a consistency perspective, it is advantageous if the updated expected case for the earnout metric is forecast in a similar manner as for the original valuation. This can be challenging if the company does not have as robust a set of projection scenarios from which to compute the expected case as of a subsequent period as at the initial transaction date. Nevertheless, it is important to ensure that the forecast used for the contingent consideration valuation update is still estimated based on the expected case at the time of the update.

Further, the updated forecast should be consistent with the original forecast, in light of any resolution in the initial uncertainty and any evolution in expectations for the business. If the relevant portion of the business has outperformed, one would typically expect the forecast to have increased, and if it has underperformed, one would typically expect the forecast to have declined. For example, continued optimism with respect to future projections when the initial results have fallen far short of the projections at the time of the deal close might warrant extra scrutiny. More generally, if a trend is observed in actual results to date, the valuation specialist should consider whether the updated projections should be consistent with a continuation of that trend.

8.2.3 Updated Discount Rate and Volatility for the Earnout Metric

When updating the earnout metric discount rate (or Required Metric Risk Premium), the estimation process should take into account changes related to the risk of the earnout metric, updated market-based inputs (e.g., risk-free rates, estimated betas and other inputs into the estimation of the RMRP) and changes as a result of the passage of time. For instance, if the transaction IRR was used as a starting point for estimating the RMRP at the initial transaction date, then facts and circumstances should be considered to determine whether the IRR is still a relevant starting point at the subsequent measurement date. Even if so, if adjustments to the IRR were made, these adjustments would need to be reconsidered and updated based on information available as of the subsequent measurement date. For example, if the IRR was adjusted for a shorter timeframe based on the relative U.S. Treasury yields at the initial measurement date, a similar adjustment would need to be made based on market risk-free rates at the subsequent measurement date.

In addition to updating the market-based components of the earnout metric discount rate, if a company-specific risk premium was included as a component of the RMRP at initial measurement, judgment should be applied in determining whether market participants would perceive the same degree of company-specific risk at the subsequent measurement date. The company-specific risk premium should be adjusted accordingly. For example, if a significant portion of the uncertainty about the success of post-transaction integration activities has been resolved at the subsequent measurement date and this uncertainty was a key driver of the company-specific risk at initial measurement, then the discount rate used in updating the fair value of the contingent consideration should reflect the lower risk.

Similar to the discount rate, if an option pricing method is utilized, volatility assumptions will need to be updated for the portion of the earnout period that remains. The volatility estimate could be impacted by updated market conditions, the shorter length of time remaining in the earnout period, and actual results, among other factors.

Even if the actual results are not available for the entire earnout period, there may be updated information that significantly changes the assessment of risk for the remaining portion of the earnout period. For instance, continuing with the prior example, if year one revenue is now known and the company has backlog for year two revenue that will result in cumulative year one and year two revenue being sufficient to ensure at least 75% of the maximum earnout payment, there may be much less risk and also less volatility assumed in the update valuation than at the initial measurement.

8.2.4 Updated Counterparty Credit Risk

Counterparty credit risk should be updated based on an updated assessment of the risk associated with the obligor being unable to make the contingent consideration payments if and when they fall due, taking into account the updated forecasts, the current market conditions, and the financial position of the obligor as of the subsequent valuation date.

Section 9: Examples of Valuation of Common Contingent Consideration Payoff Structures

The following is a series of examples that illustrates the estimation of the fair value of contingent consideration with payoff structures commonly found in practice. The input assumptions in these examples are presumed to be known. Also, for all examples with financial metrics we have assumed (1) that the financial metrics follow a GBM and (2) the mid-period convention, i.e., that the financial metric is earned at the midpoint of the period to which it applies. All discount rates are assumed to be annual, continuously compounded. In addition, for all examples we have assumed zero correlation between the scenarios in which contingent consideration payments are due and the scenarios in which the acquirer is unable to fulfill its contingent consideration payment obligations.

9.1 Example: Linear Payoff Structure (EBITDA)

Earnout Payoff Structure

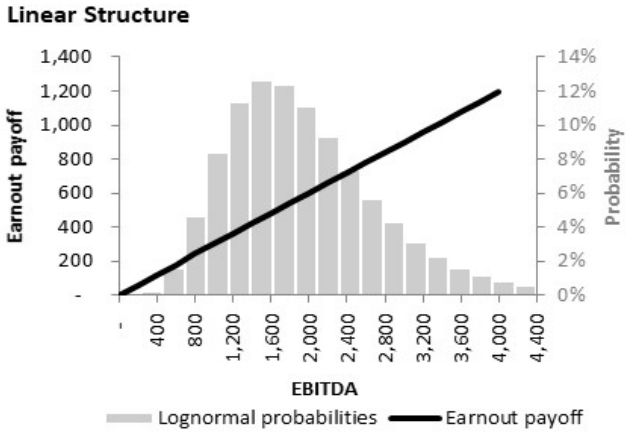
Company A will be required to pay 30% of the acquiree's EBITDA earned over the subsequent one-year period. The payment is due three months after the end of the year.

Assumptions

Forecast annual EBITDA:	2,000	
Discount rate applicable to future EBITDA:	10%	
Risk-free rate over payment period:	0.5%	
Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of Company A:	3%	

Valuation Methodology

Since the earnout is a linear function of EBITDA, only the expected case EBITDA is needed to estimate the expected future cash flow of the earnout. Also, a risk-neutral framework is not needed to incorporate the impact of the structure on the discount rate. For illustration purposes, and to compare with more complex structures, we will perform the analysis in both an SBM (using the expected case) and an OPM framework.



Calculations Using SBM

[1] Expected future value of earnout payment:	600.00	{ = 2,000 × 30% }
[2] Discount factor for risk of EBITDA (mid-period)	0.95123	{ = exp(-10.0% × 0.5) }
[3] Discount factor for time from mid-period to payment:	0.99626	{ = exp(-0.5% × (1.25 - 0.5)) }
[4] Discount factor for credit risk*:	0.96319	{ = exp(-3.0% × 1.25) }
Value of earnout:	**547.67**	{ = [1] × [2] × [3] × [4]}

Calculations Using OPM

[5] Expected present value of EBITDA:	1,902.46	{ = 2,000 × exp(-10% × 0.5) }
[6] Expected future value of EBITDA (risk-neutral):	1,907.22	{ = [5] × exp(0.5% × 0.5) }
[7] Equivalent RMRP-adjusted forecast:	1,907.22	{ = 2,000 × exp(-9.5% × 0.5) }
[8] Expected future earnout cash flow (risk-neutral):	572.17	{ = [6] × 30% }

[9] Discount factor for credit risk and time value*:	0.9572	{ = exp(-(3.0%+0.5%) × 1.25) }
Value of earnout:	**547.67**	
Expected future value of earnout payment:	*600.00*	{ = [1]}
Implied discount rate, excluding credit risk	*10.0%*	{ = $\log_e$([1]/[8])/(1 – 0.5) + 0.5% }

*Credit risk and time value of money from the valuation date to the payment date.

9.2 Example: Linear Payoff Structure (Revenue)

This example is the same as Example 9.1, except the earnout is based on the first year of *revenue* rather than EBITDA. For this reason, the Required Metric Risk Premium differs between these two examples.

Earnout Payoff Structure

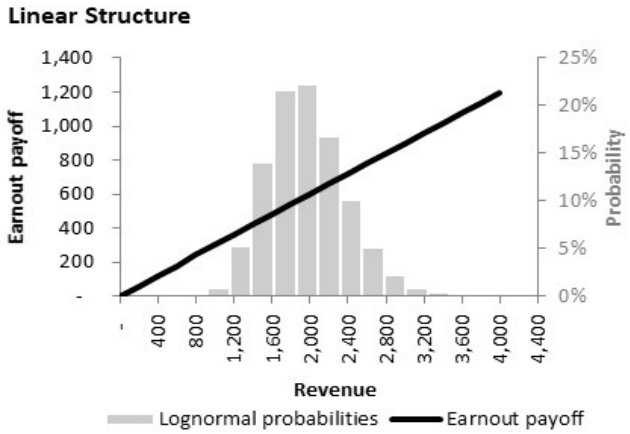
Company A will be required to pay 30% of the acquiree's revenue earned over the subsequent one-year period. The payment is due three months after the end of the year.

Assumptions

Forecast annual revenue:	2,000	
Discount rate applicable to future revenue:	5%	
Risk-free rate over payment period:	0.5%	
Required Metric Risk Premium:	4.5%	{= 5% – 0.5%}
Credit spread of Company A:	3%	

Valuation Methodology

Since the earnout is a linear function of revenue, only the expected case revenue is needed to estimate the expected future cash flow of the earnout. Also, a risk-neutral framework is not needed to incorporate the impact of the structure on the discount rate. For illustration purposes, and to compare with more complex structures, we will perform the analysis in both an SBM (using the expected case) and an OPM framework.



Calculations Using SBM

[1] Expected future value of earnout payment:	600.00	{ = 2,000 × 30% }
[2] Discount factor for risk of revenue (mid-period)	0.97531	{ = exp(-5.0% × 0.5) }
[3] Discount factor for time from mid-period to payment:	0.99626	{ = exp(-0.5% × (1.25 - 0.5)) }
[4] Discount factor for credit risk*:	0.96319	{ = exp(-3.0% × 1.25) }
Value of earnout:	**561.54**	{ = [1] × [2] × [3] × [4]}

Calculations Using OPM

[5] Expected present value of revenue:	1,950.62	{ = 2,000 × exp(-5.0% × 0.5) }
[6] Expected future value of revenue (risk-neutral):	1,955.50	{ = [5] × exp(0.5% × 0.5) }
[7] Equivalent RMRP-adjusted forecast:	1,955.50	{ = 2,000 × exp(-4.5% × 0.5) }
[8] Expected future earnout cash flow (risk-neutral):	586.65	{ = [6] × 30% }
[9] Discount factor for credit risk and time value*:	0.9572	{ = exp(-(3.0%+0.5%) × 1.25) }
Value of earnout:	**561.54**	
Expected future value of earnout payment:	*600.00*	

Implied discount rate, excluding credit risk:	*5.0%*	{ = $\log_e$([1]/[8])/(1 – 0.5)+0.5% }

*Credit risk and time value of money from the valuation date to the payment date.

9.3 Example: Technical Milestone (Diversifiable Binary) Structure

Earnout Payoff Structure

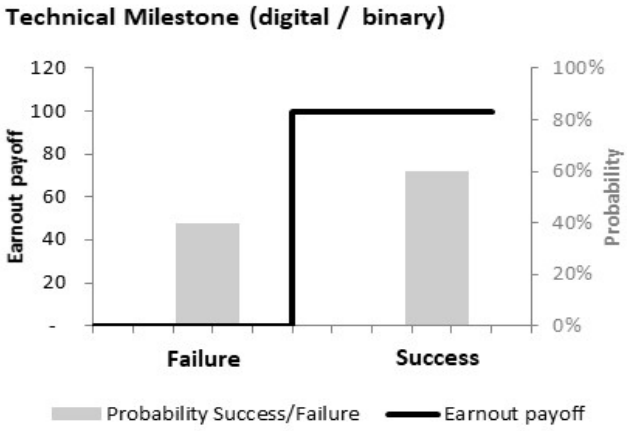
Company A will be required to pay 100 upon the achievement of a technical (nonfinancial) milestone that represents a diversifiable risk. The success or failure of achievement of the milestone will be determined in one year. The payment is due three months after the milestone is achieved.

Assumptions

Probability of success/failure:	60% / 40%
Risk-free rate over payment period:	0.5%
Credit spread of Company A:	3%

Valuation Methodology

Since the earnout is a nonlinear function of the outcome, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. A risk-neutral framework, however, is not needed since the risk of the underlying outcome is diversifiable. Since the risk of the underlying outcome can be fully diversified, the discount rate need only account for time value of money and counterparty credit risk (i.e., the cost of debt of Company A specific to the term and seniority of the earnout obligation).



Calculations Using SBM

[1] Expected future value of earnout payment:	60.00	{ = 100 × 60% }
[2] Discount factor for systematic risk:	1.0	{ because beta = 0 }
[3] Discount factor for time to payment:	0.99377	{ = exp(-0.5% × 1.25) }
[4] Discount factor for credit risk:	0.96319	{ = exp(-3.0% × 1.25) }
Value of earnout:	**57.43**	{ = [1] × [2] × [3] × [4] }
Expected future value of earnout payment:	*60.00*	
Implied discount rate, excluding credit risk:	*0.5%*	{ = $\log_e$([2])/(1 – 0.5) + 0.5% }

9.4 Example: Financial Milestone (Systematic Binary) Structure

Earnout Payoff Structure

Company A will be required to pay 100 if the acquiree's annual EBITDA exceeds 2,000 over the subsequent one-year period. The payment is due three months after the end of the year.

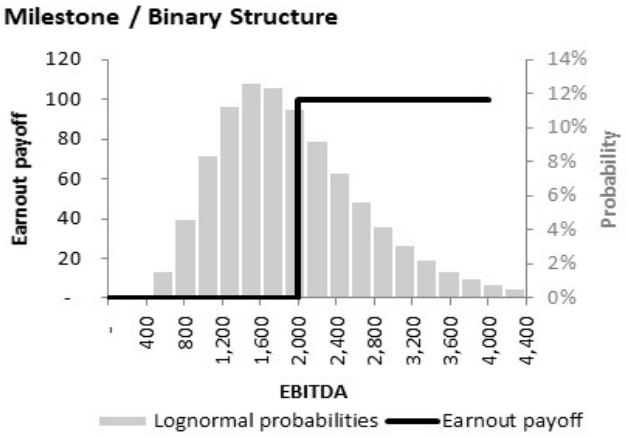
Assumptions

Forecast annual EBITDA:	2,000
Expected volatility of future annual EBITDA:	50%
Discount rate applicable to future EBITDA:	10%
Risk-free rate to payment period:	0.5%

Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of Company A:	3%	

Valuation Methodology

Since the earnout is a nonlinear function of EBITDA, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. The valuation is performed in a risk-neutral framework to incorporate the impact of the nonlinear payoff structure on the discount rate. The earnout payoff structure can be replicated as a long digital/binary call option with strike = 2,000 in an OPM framework.



Black-Scholes-Merton Digital/Binary Call Option Formula

$$\text{Digital/Binary Call Option} = P \times N(d_2) \times e^{-rT}$$

$$\text{Where } d_2 = (\log_e(S_0/K) + (r - 0.5\sigma^2) \times T)/\sigma\sqrt{T}$$

N(.): standard normal cumulative distribution function	S_0: present value of the underlying
P: payment upon the underlying reaching the strike price	K: strike price
T: term of the option	σ: volatility of the underlying
r: risk-free rate commensurate with term T	$\log_e$(.): natural logarithm function

Calculations

[1] Expected present value of EBITDA:	1,902.46	{ = 2,000 × exp(-10% × 0.5) }
[2] Expected future value of EBITDA (risk-neutral):	1,907.22	{ = [1] × exp(0.5% × 0.5) }
[3] Equivalent RMRP-adjusted forecast:	1,907.22	{ = 2,000 × exp(-9.5% × 0.5) }
[4] Expected future earnout cash flow (risk-neutral):	37.785	{*}
[5] Discount factor for credit risk and time value**:	0.9572	{ = exp(-(3.0%+0.5%) × 1.25) }
Value of earnout:	**36.17**	
[6] Expected future value of earnout payment:	*42.984*	{***}
Implied annual discount rate, excluding credit risk:	*26.28%*	{ = $\log_e$([6]/[4])/(1 – 0.5) + 0.5% }

*Digital Call × exp(0.5% × 0.5). Inputs to Black-Scholes-Merton Digital Call formula: S0 = [1]; K = 2,000; r = 0.5%; σ = 50%; T = 0.5; P = 100.
**Credit risk and time value of money from the valuation date to the payment date.
***Digital Call × exp(10% × 0.5). Inputs to Digital Call formula: S0 = [1]; K = 2,000; r = 10%; σ = 50%; T = 0.5; P = 100.

9.5 Example: Threshold (Call Option) Structure

Earnout Payoff Structure

Company A will be required to pay 30% of the excess of the acquiree's annual EBITDA above 2,000 over the subsequent one-year period. The payment is due three months after the end of the year.

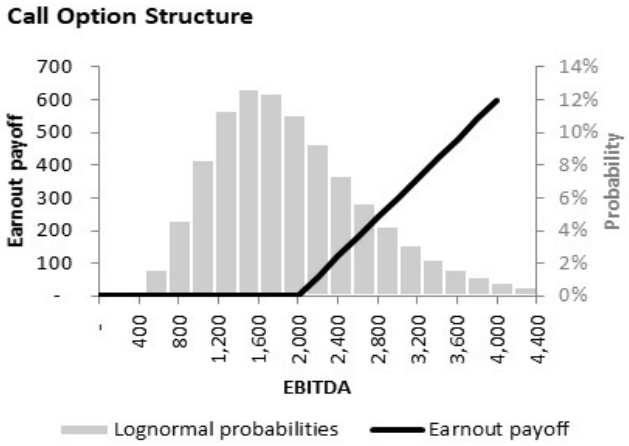
Assumptions

Forecast annual EBITDA:	2,000
Expected volatility of future annual EBITDA:	50%
Discount rate applicable to future EBITDA:	10%

Risk-free rate to payment period:	0.5%	
Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of Company A:	3%	

Valuation Methodology

Since the earnout is a nonlinear function of EBITDA, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. The valuation is performed in a risk-neutral framework to incorporate the impact of the nonlinear payoff structure on the discount rate. The earnout payoff structure can be replicated as a call option with strike = 2,000 in an OPM framework.



Black-Scholes-Merton Call Option Formula

$$\text{Call Option} = S_0 \times N(d_1) - K \times N(d_2) \times e^{-rT}$$

Where $d_1 = (\log_e(S_0/K) + (r + 0.5\sigma^2) \times T)/\sigma\sqrt{T}$ *and* $d_2 = (\ln(S_0/K) + (r - 0.5\sigma^2) \times T)/\sigma\sqrt{T}$

N(.): standard normal cumulative distribution function	S_0: present value of the underlying
K: strike price	T: term of the option
σ: volatility of the underlying	r: T-year risk-free rate
$\log_e$(.): natural logarithm function	

Calculations

[1] Expected present value of EBITDA:	1,902.46	{ = 2,000 × exp(-10% × 0.5) }
[2] Expected future value of EBITDA (risk-neutral):	1,907.22	{ = [1] × exp(0.5% × 0.5) }
[3] Equivalent RMRP-adjusted forecast:	1,907.22	{ = 2,000 × exp(-9.5% × 0.5) }
[4] Expected future earnout cash flow (risk-neutral):	69.053	{*}
[5] Discount factor for credit risk and time value**:	0.9572	{ = exp(-(3.0%+0.5%) × 1.25) }
Value of earnout:	**66.10**	
[6] Expected future value of earnout payment:	*84.190*	{***}
Implied discount rate, excluding credit risk:	*40.14%*	{ = $\log_e$([6]/[4])/(1 – 0.5) + 0.5% }

*30% × Call Option × exp(0.5% × 0.5). Inputs to Black-Scholes-Merton Call option formula: S0 = [1]; Strike = 2,000; r = 0.5%; σ = 50%; Term = 0.5.

**Credit risk and time value of money from the valuation date to the payment date.

***30% × Call Option × exp(10% × 0.5). Inputs to Black-Scholes-Merton Call option formula: S0 = [1]; Strike = 2,000; r = 10%; σ = 50%; Term = 0.5.

9.6 Example: Percentage of Total above a Threshold (Asset-or-Nothing) Structure

Earnout Payoff Structure

Company A will be required to pay 30% of the acquiree's annual EBITDA if the annual EBITDA exceeds 2,000 over the subsequent one-year period. The payment is due three months after the end of the year.

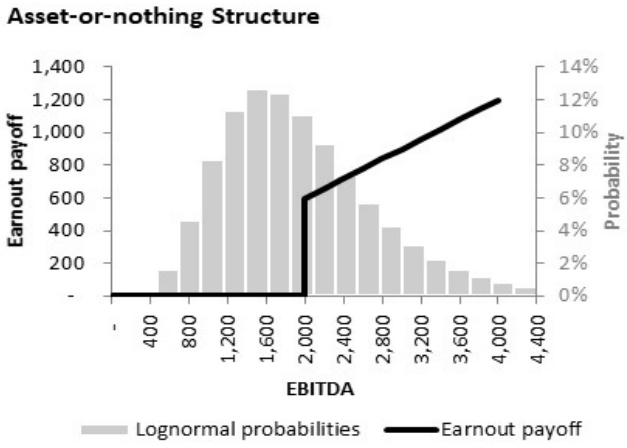
Assumptions

Forecast annual EBITDA:	2,000
Expected volatility of future annual EBITDA:	50%

Discount rate applicable to future EBITDA:	10%	
Risk-free rate to payment period:	0.5%	
Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of Company A:	3%	

Valuation Methodology

Since the earnout is a nonlinear function of EBITDA, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. The valuation is performed in a risk-neutral framework to incorporate the impact of the nonlinear payoff structure on the discount rate. The earnout payoff structure can be replicated as a digital call option with strike = 2,000 plus a call option with strike = 2,000 in an OPM framework.



Calculations

[1] Expected present value of EBITDA:	1,902.46	{ = 2,000 × exp(-10% × 0.5) }
[2] Expected future value of EBITDA (risk-neutral):	1,907.22	{ = [1] × exp(0.5% × 0.5) }
[3] Equivalent RMRP-adjusted forecast:	1,907.22	{ = 2,000 × exp(-9.5% × 0.5) }
[4] Expected future earnout cash flow (risk-neutral):	295.76	{*}
[5] Discount factor for credit risk and time value**:	0.9572	{ = exp(-(3.0%+0.5%) × 1.25) }
Value of earnout:	**283.10**	
[6] Expected future value of earnout payment:	*342.09*	{***}
Implied discount rate, excluding credit risk:	*29.60%*	{ = $\log_e$([6]/[4])/(1 – 0.5) + 0.5% }

*(Digital Call Option + 30% × Call Option) × exp(0.5% × 0.5). Inputs to Black-Scholes-Merton Option formulae: S0 = [1]; Strike = 2,000; r = 0.5%; σ = 50%; Term = 0.5; Digital payment = 2,000×30% = 600.
**Credit risk and time value of money from the valuation date to the payment date.
***(Digital Call Option + 30% × Call Option) × exp(10% × 0.5). Inputs to Black-Scholes-Merton Option formulae: S0 = [1]; Strike = 2,000; r = 10%; σ = 50%; Term = 0.5; Digital payment = 2,000×30% = 600.

9.7 Example: Threshold and Cap (Capped Call) Structure

Earnout Payoff Structure

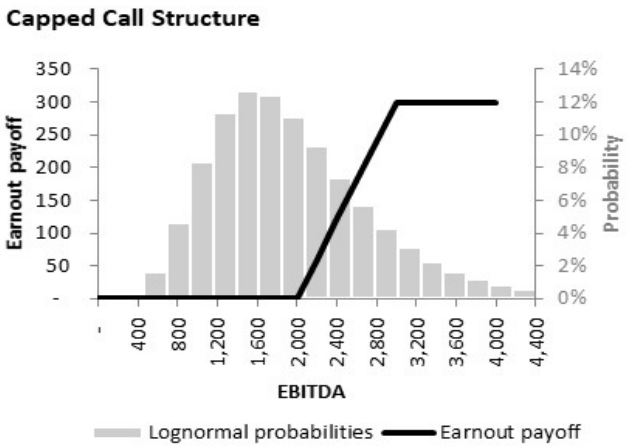
Company A will be required to pay 30% of the excess of the acquiree's annual EBITDA above 2,000 over the subsequent one-year period with a payment cap of 300. The payment is due three months after the end of the year.

Assumptions

Forecast annual EBITDA:	2,000	
Expected volatility of future annual EBITDA:	50%	
Discount rate applicable to future EBITDA:	10%	
Risk-free rate to payment period:	0.5%	
Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of Company A:	3%	

Valuation Methodology

Since the earnout is a nonlinear function of EBITDA, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. The valuation is performed in a risk-neutral framework to incorporate the impact of the nonlinear payoff structure on the discount rate. The earnout payoff structure can be replicated as a long call option with strike = 2,000 minus a short call option with strike = 3,000 in an OPM framework.



Calculations

[1] Expected present value of EBITDA:	1,902.46	{ = 2,000 × exp(-10% × 0.5) }
[2] Expected future value of EBITDA (risk-neutral):	1,907.22	{ = [1] × exp(0.5% × 0.5) }
[3] Equivalent RMRP-adjusted forecast:	1,907.22	{ = 2,000 × exp(-9.5% × 0.5) }
[4] Expected future earnout cash flow (risk-neutral):	57.16	{*}
[5] Discount factor for credit risk and time value**:	0.9572	{ = exp(-(3.0%+0.5%) × 1.25) }
Value of earnout:	**54.71**	
[6] Expected future value of earnout payment:	*68.12*	{***}
Implied discount rate, excluding credit risk:	*35.58%*	{ = $\log_e$([6]/[4])/(1 – 0.5) + 0.5% }

*(30% × Call Option$_1$ – 30% × Call Option$_2$) × exp(0.5% × 0.5). Inputs to Black-Scholes-Merton Call Option formulae: S0 = [1]; Strike$_1$ = 2,000; Strike$_2$ = 3,000; r = 0.5%; σ = 50%; T = 0.5.

**Credit risk and time value of money from the valuation date to the payment date.

***(30% × Call Option$_1$ – 30% × Call Option$_2$) × exp(10% × 0.5). Inputs to Black-Scholes-Merton Call Option formulae: S0 = [1]; Strike$_1$ = 2,000; Strike$_2$ = 3,000; r = 10%; σ = 50%; T = 0.5.

9.8 Example: Tiered Payoff Structure

Earnout Payoff Structure

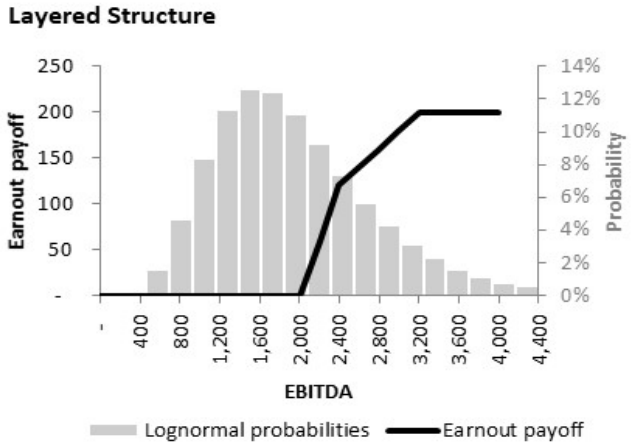
Company A will be required to pay 30% of the excess of the acquiree's annual EBITDA above 2,000, plus 10% of the excess annual EBITDA above 2,400 over the subsequent one-year period with a payment cap of 200. The payment is due three months after the end of the year.

Assumptions

Forecast annual EBITDA:	2,000	
Expected volatility of future annual EBITDA:	50%	
Discount rate applicable to future EBITDA:	10%	
Risk-free rate to payment period:	0.5%	
Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of Company A:	3%	

Valuation Methodology

Since the earnout is a nonlinear function of EBITDA, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. The valuation is performed in a risk-neutral framework to incorporate the impact of the nonlinear payoff structure on the discount rate. The earnout payoff structure can be replicated as a long call option with strike = 2,000, minus a short call option with strike = 2,400 and minus a short call option with strike = 3,200 in an OPM framework.



Calculations

[1] Expected present value of EBITDA:	1,902.46	{ = 2,000 × exp(-10% × 0.5) }
[2] Expected future value of EBITDA (risk-neutral):	1,907.22	{ = [1] × exp(0.5% × 0.5) }
[3] Equivalent RMRP-adjusted forecast:	1,907.22	{ = 2,000 × exp(-9.5% × 0.5) }
[4] Expected future earnout cash flow (risk-neutral):	43.003	{*}
[5] Discount factor for credit risk and time value**:	0.9572	{ = exp(-(3.0%+0.5%) × 1.25) }
Value of earnout:	**41.16**	
[6] Expected future value of earnout payment:	*50.746*	{***}
Implied discount rate, excluding credit risk:	*33.61%*	{ = $\log_e$([6]/[4])/(1 – 0.5) + 0.5% }

*(30% × Call Option$_1$ – 20% × Call Option$_2$ – 10% × Call Option$_3$) × exp(0.5% × 0.5). Inputs to Black-Scholes-Merton Call Option formulae: S0 = [1]; Strike$_1$ = 2,000; Strike$_2$ = 2,400; Strike$_3$ = 3,200; r = 0.5%; σ = 50%; T = 0.5.

**Credit risk and time value of money from the valuation date to the payment date.

***(30% × Call Option$_1$ – 20% × Call Option$_2$ – 10% × Call Option$_3$) × exp(10% × 0.5). Inputs to Black-Scholes-Merton Call Option formulae: S0 = [1]; Strike$_1$ = 2,000; Strike$_2$ = 2,400; Strike$_3$ = 3,200; r = 10%; σ = 50%; T = 0.5.

9.9 Example: Multi-year, Not Path Dependent (Series of Capped Calls)

Earnout Payoff Structure

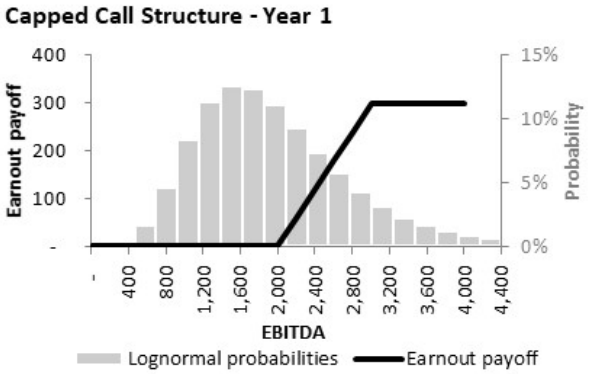
Company A will be required to pay 30% of the excess of the acquiree's annual EBITDA above 2,000 with a payment cap of 300 for the first year, and 30% of the excess of the Target's annual EBITDA above 2,400 with a payment cap of 300 for the second year. The payments are due three months after the end of each earnout period.

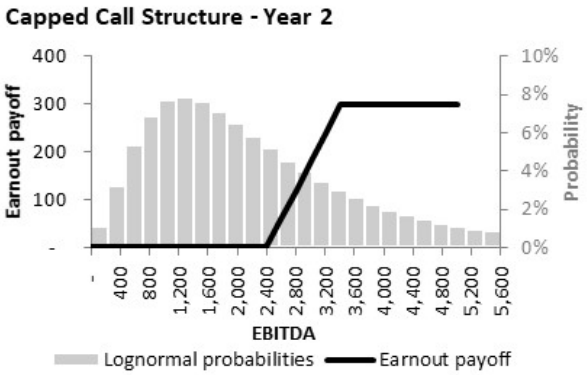
Assumptions

1st year annual EBITDA forecast:	2,000	
2nd year annual EBITDA forecast:	2,400	
Expected volatility of future annual EBITDA:	50%	
Discount rate applicable to future EBITDA:	10%	
Risk-free rate to payment period:	0.5%	
Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of Company A:	3%	

Valuation Methodology

Since the earnout is a nonlinear function of EBITDA, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. The valuation is performed in a risk-neutral framework to incorporate the impact of the nonlinear payoff structure on the discount rate. The earnout payoff structure can be replicated as a series of long and short call options in an OPM framework.





Calculations

Value of earnout for year 1:	**54.71**	{See Section 9.7, Capped Call}
[1] Expected present value of EBITDA:	2,065.70	{ = 2,400 × exp(-10% × 1.5) }
[2] Expected future value of EBITDA (risk-neutral):	2,081.25	{ = [1] × exp(0.5% × 1.5) }
[3] Equivalent RMRP-adjusted forecast:	2,081.25	{ = 2,400 × exp(-9.5% × 1.5) }
[4] Expected future earnout cash flow (risk-neutral):	61.09	{*}
[5] Discount factor for credit risk and time value**:	0.9243	{ = exp(-(3.0%+0.5%) × 2.25) }
Value of earnout for year 2:	**56.47**	
[6] Expected future value of earnout payment:	*82.37*	{***}
Implied discount rate, excluding credit risk:	*20.42%*	{ = $\log_e$([6]/[4])/(2 – 0.5) + 0.5% }

*(30% × Call Option$_1$ – 30% × Call Option$_2$) × exp(0.5% × 1.5). Inputs to Black-Scholes-Merton Call Option formulae: S0 = [1]; Strike$_1$ = 2,400; Strike$_2$ = 3,400; r = 0.5%; σ = 50%; Term = 1.5.

**Credit risk and time value of money from the valuation date to the payment date.

***(30% × Call Option$_1$ – 30% × Call Option$_2$) × exp(10% × 1.5). Inputs to Black-Scholes-Merton Call Option formulae: S0 = [1]; Strike$_1$ = 2,400; Strike$_2$ = 3,400; r = 10%; σ = 50%; Term = 1.5.

9.10 Example: Multi-year, Path Dependent (Capped Call Series with a Catch-Up Feature)

Earnout Payoff Structure

Company A will be required to pay 30% of the excess of the acquiree's annual EBITDA above 2,000 with a payment cap of 300 for the first year, and 30% of the excess of the acquiree's annual EBITDA above 2,400 with a payment cap of 300 for the second year. If the payment cap in the first year is not reached, then any shortfall as compared to the first-year payment cap will be added to the payment cap in the second year as a catch-up feature. The payments are due three months after the end of each earnout period.

Assumptions

Previous years EBITDA:	1,800 (illustrative - not needed in the analysis)
Forecast annual EBITDA 1st year:	2,000
Forecast annual EBITDA 2nd year:	2,400

Expected volatility of future annual EBITDA:	50%	
Discount rate applicable to future EBITDA:	10%	
Risk-free rate to payment period:	0.5%	
Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of Company A:	3%	

Analysis Methodology

Since the earnout is a nonlinear function of EBITDA, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. The valuation is performed in a risk-neutral framework to incorporate the impact of the nonlinear payoff structure on the discount rate. In addition, due to the catch-up feature, the earnout payoff structure is path dependent and therefore an implementation that can handle path dependency, such as Monte Carlo simulation, is needed to estimate the value of the earnout.

Calculation of a Single Iteration of a Monte Carlo Simulation:

Calculation Steps	$Period_T = 1$	$Period_T = 2$	Description of Calculation Step
Simulating Future EBITDA in Risk-Neutral Framework			
[1] Calculation period (yrs)	1.0	2.0	Periods at which payments are calculated
[2] Payment period	1.25	2.25	Periods at which earnout payments are made
[3] Mid-period	0.5	1.5	Mid-period of calculation period
[4] Time-step for simulation	0.5	1.0	Simulation period consistent with mid-period assumption
[5] Forecast/Expected EBITDA	2,000	2,400	Input assumption
[6] Expected annual growth rate	10.536%	18.232%	$\log_e(2{,}000/1{,}800)$; $\log_e(2{,}400/2{,}000)$; Previous years EBITDA of 1,800 cancels in [12].
[7] Discount factor for EBITDA:	0.9512	0.8607	=exp(-10% × [3])
[8] Expected PV of EBITDA:	1,902.46	2,065.70	Present value of forecast EBITDA using mid-period i.e. [5] × [7]
[9] Random Normal (0,1)	0.951	0.856	Standard Normal distribution random numbers
[10] Geometric Brownian Motion (GBM)	1.3182	1.7936	Risk neutral GBM starting at 1: = $[10]_{t-1}$ × exp((0.5% – 1/2 × 50%^{2}) × [4] + sqrt([4]) × 50% × [9])
[11] Risk-neutral random EBITDA	**2,507.73**	**3,705.05**	[10] × [8]
[12] Equivalent Risk-neutral random EBITDA using RMRP	**2,507.73**	**3,705.05**	Risk neutral GBM starting at 1,800: = $[12]_{t-1}$ × exp(([6] – 9.5% × [4] – 1/2 × 50%^{2} × [4]) + sqrt([4]) × 50% × [9])
Calculating the Present Value of the Earnout Payment			
[13] Min. EBITDA Threshold	2,000	2,400	Minimum EBITDA threshold for payment
[14] Maximum EBITDA Cap (excl. catch-up)	3,000	3,400	EBITDA at which cap payment is reached, excluding the catch-up feature
[15] Earnout payment (excl. catch-up)	152.32	300.00	30% × (Max([12] – [13],0) – Max([12] – [14],0))
[16] Catch-up adjustment to cap		147.68	Max(300 – $[15]_{T=1}$,0)
[17] Adjusted Maximum EBITDA Cap (incl. catch-up)		3,892.27	[13] + ([16] + 300) / 30%
[18] Earnout payment (incl. catch-up)	152.32	391.52	T=2: 30% × (Max([12] – [13],0) – Max([12] – [17],0))
[19] Discount factor for credit risk and time value	0.9572	0.9243	At 3.0% + 0.5%= 3.5% over the Payment Period [2]
PV of earnout payments	**145.80**	**361.87**	[19] × [18]
PV of earnout for one iteration	**507.66**		

Running the above calculation 10,000 times and averaging over all iterations resulted in an estimated value for the earnout of 123.67 (results will vary slightly depending on the random numbers generated).

9.11 Example: Clawback (Put Option Structure)

Clawback Payoff Structure

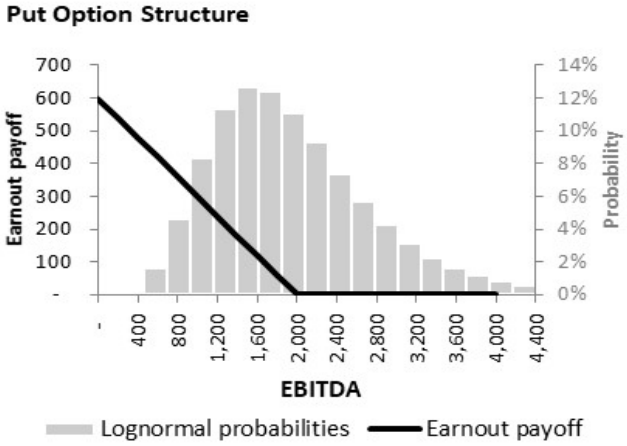
Company A will be entitled to receive 30% of the shortfall of the acquiree's annual EBITDA below 2,000 over the subsequent one-year period. The payment is due three months after the end of the year and is payable by the sellers as a potential clawback of the purchase price.

Assumptions

Forecast annual EBITDA:	2,000	
Expected volatility of future annual EBITDA:	50%	
Discount rate applicable to future EBITDA:	10%	
Risk-free rate to payment period:	0.5%	
Required Metric Risk Premium:	9.5%	{= 10% – 0.5%}
Credit spread of the sellers:	3%	

Valuation Methodology

Since the payoff structure is a nonlinear function of EBITDA, a probabilistic framework is needed to estimate the expected future cash flow of the earnout. The valuation is performed in a risk-neutral framework to incorporate the impact of the nonlinear payoff structure on the discount rate. The clawback payoff structure can be replicated as a put option with strike = 2,000 in an OPM framework.



Black-Scholes-Merton Put Option Formula

$$\text{Put Option} = K \times N(-d_2) \times e^{-rT} - S_0 \times N(-d_1)$$

Where $d_1 = (\log_e(S_0/K) + (r + 0.5\sigma^2) \times T)/\sigma\sqrt{T}$ *and* $d_2 = (\log_e(S_0/K) + (r - 0.5\sigma^2) \times T)/\sigma\sqrt{T}$

N(.): standard normal cumulative distribution function	S_0: present value of the underlying
P: payment upon the underlying reaching the strike price	K: strike price
T: term of the option	σ: volatility of the underlying
r: risk-free rate commensurate with term T	$\log_e$(.): natural logarithm function

Calculations

[1] Expected present value of EBITDA:	1,902.46	{ = 2,000 × exp(-10% × 0.5) }
[2] Expected future value of EBITDA (risk-neutral):	1,907.22	{ = [1] × exp(0.5% × 0.5) }
[3] Equivalent RMRP-adjusted forecast:	1,907.22	{ = 2,000 × exp(-9.5% × 0.5) }
[4] Expected future clawback cash flow (risk-neutral):	96.887	{*}
[5] Discount factor for credit risk and time value**:	0.9572	{ = exp(-(3.0%+0.5%) × 1.25) }
Value of earnout:	**92.74**	
[6] Expected future value of clawback payment:	*84.190*	{***}
Implied discount rate, excluding credit risk:	*-27.59%*	{ = $\log_e$([6]/[4])/(1 – 0.5) + 0.5% }

*30% × Put Option × exp(0.5% × 0.5). Inputs to Black-Scholes-Merton Put option formula: S0 = [1]; Strike = 2,000; r = 0.5%; σ = 50%; Term = 0.5.

**Credit risk and time value of money from the valuation date to the payment date.

*** 30% × Put Option × exp(10% × 0.5). Inputs to Black-Scholes-Merton Put Option formulae: S0 = [1]; Strike = 2,000; r = 10%; σ = 50%; Term = 0.5.

Section 10: Appendix

10.1 Frequently Asked Questions

1. *None of my bankers or corporate development staff consider option pricing models when negotiating a deal. Usually the terms of the earnout are the outcome of the negotiation with the seller, who is probably also not considering option pricing models. How does using an OPM result in an appropriate fair value when the methodology is not used in practice?*

Parties to a business acquisition do not transact the earnout on a standalone basis. From the perspective of a market participant for the standalone earnout, the observable active market trades that most resemble (have nonlinear payoff structures like) contingent consideration are traded options and other derivatives. These are typically priced using an OPM. Furthermore, the scenario-based models discounted at a WACC or IRR sometimes used by deal participants do not accurately account for the impact on risk of either (a) differences in time horizon and in leverage between the earnout metric and long-term free cash flows or (b) nonlinear payoff structures with non-diversifiable underlying metrics.

2. *I have carefully constructed scenarios and their associated probabilities that I used in the negotiation with the seller. Why are they not used in estimating the fair value of the earnout?*

For diversifiable metrics (e.g., technical milestones), the scenarios and their probabilities are key inputs into the valuation of the related earnout. For non-diversifiable metrics (e.g., financial metrics), the scenarios and their probabilities are primarily used to estimate the expected outcome of the earnout metric and to help inform the estimate of volatility around this expected outcome. In either case, care should be taken to minimize common assessment issues such as anchoring on recent results or overconfidence bias and to cross-check the implied variability in the metric to be sure that the range of outcomes has not been underestimated. However, for an earnout based on a non-diversifiable metric with a nonlinear payoff structure (e.g., a financial metric with a threshold, a cap, tiers, or other nonlinear payoff structure), the use of a scenario-based valuation model can present significant difficulties with regard to the estimation of an appropriate discount rate.

3. *If the contingent consideration is based on future earnings and my expected earnings are exactly at the earnings threshold, why would the discount rate differ from the WACC or IRR?*

The objective is to estimate the fair value of the contingent consideration payments and not of the underlying earnings. If the payoff structure is not a simple fraction or multiple of earnings, then the risk of the contingent consideration payments may be fundamentally different than the risk of the earnings. For example, for an earnout with a threshold (and no cap), the payoff of such an earnout resembles a leveraged investment with a higher discount rate than for earnings.

4. *When estimating the earnout metric discount rate or the required metric risk premium, what factors should I consider with respect to the additional premiums in the WACC build-up for the acquiree (i.e., size, country, and/or company-specific premiums)?*

The valuation specialist should first consider the rationale for including each of the additional premiums in the WACC build-up, and then assess whether and to what degree the same rationale applies to the earnout metric. The factors to consider might include, for example, the extent to which the acquiree's business is anticipated to be integrated with the acquirer's over the term of the earnout (for size premium) or the extent to which a higher risk due to aggressive projections is relevant to the earnout metric over the earnout period (for company-specific premium). When there is no clear

support for fully including or excluding an additional premium, the valuation specialist may deem it reasonable to proportionately adjust that additional premium in accordance with an estimate of the risk-differential between the free cash-flows of the acquiree and the earnout metric. For example, if there is support that the earnout metric is 20% less risky than the acquiree's long-term free cash-flows, then proportionately reducing the additional premiums by 20% might be reasonable and practical.

5. The option pricing theory you reference is based on a significant body of academic research. What academic studies have been published to support using OPM for earnouts?

Since the application of option pricing theory specifically to the valuation of earnouts is relatively new (first textbook treatment that the Working Group is aware of is a 2005 textbook by Arzac), the body of academic research is developing. However, there is a robust, more general literature on the application of option pricing theory to assets and liabilities that are not traded in the market (the literature on real options).

6. A major assumption underlying OPM is that the earnout metric (e.g., EBITDA, revenue) is lognormally distributed. What evidence do you have that EBITDA or revenue is lognormally distributed?

The Working Group does not have substantive evidence that EBITDA or revenue are lognormally distributed. The application of the lognormal distribution to a company's stock price, however, is widely used in practice and EBITDA and revenue are at least somewhat correlated with a company's equity value. Where the risk associated with the metric is non-diversifiable and the metric's distribution is known to be far from lognormally distributed in a manner that could significantly affect the valuation, an adjustment may be appropriate. For example, certain deviations from the lognormal distribution, such as a "lumpy" distribution due to the impact of an event with diversifiable risk (e.g., the degree of technical success for an R&D effort) or the need to model negative EBITDA, can be handled relatively simply.

7. When using an OPM for which the earnout metric is based on profits, isn't it a problem that a lognormal distribution assumes the metric cannot go below zero?

While a lognormal distribution does not capture outcomes below zero, the overall impact of excluding these outcomes may not be significant. A typical profit-based earnout is generally only paid when profits are substantially positive—making it most important to correctly capture the likelihood of upside outcomes. In the rare case where contingent consideration is paid for negative profit outcomes or the impact of excluding negative outcomes is significant (such as, for example, for a clawback), the analysis could be modified to model an alternative (but related) metric that is unlikely to go negative (e.g., modeling future revenues and then estimating profits from revenue) or to transform the distribution into a non-negative distribution consistent with a risk-neutral framework.

8. The use of an OPM generally results in lower values than the values estimated using a scenario-based method. As a result, later I may have to recognize a loss because the amount ultimately paid to the seller is much greater than originally estimated. Does this cause a problem from a financial reporting perspective?

Implemented appropriately with consistent assumptions, the OPM and SBM will give the same result. For nonlinear payoff structures involving a metric with non-diversifiable risk, the SBM discount rate needs to be adjusted to account for the impact of the nonlinear payoff structure. This adjustment cannot be easily intuited and the difficulty of estimating the impact of the payoff structure on risk in an SBM

framework can be the source of significant differences between the results obtained using OPM and SBM. Assuming however that the OPM and SBM are implemented appropriately with consistent assumptions, the initial lower value versus what is expected to be paid out reflects the impact of time value of money, counterparty credit risk and non-diversifiable risk (including the impact of the payoff structure on risk) on the value that a market participant would pay for the expected earnout payment in a fair value transaction. As the uncertainty is resolved positively or in-line with expectations, the increase in value is entirely consistent with the requirement to update the fair value at specified reporting periods. Similarly, if the uncertainty is resolved negatively, a decrease in the value of the earnout liability may cause a gain to be recognized.

9. We do not typically do complex security valuations at my firm and do not have models or software to perform Monte Carlo simulations. Is it okay to never use such a model?

When the earnout payoff is path dependent or is a function of multiple correlated financial outcomes, a technique such as Monte Carlo simulation will generally be needed to model the earnout cash flow.

10. When performing a Monte Carlo simulation, what are examples of situations where one would consider a distribution different than lognormal?

For an earnout payoff based on the outcome of a nonfinancial milestone event with predominantly diversifiable risk (such as the result of a product development phase), the valuation specialist would typically consider a discrete distribution for a set of scenarios that represent the possible outcomes for that event. For an earnout based on a financial metric with a nonlinear payoff structure, the valuation specialist would generally assume a lognormal distribution. To address situations where the distribution of a financial metric is "lumpy" or asymmetric due to the impact of a diversifiable risk or where it is important to consider profit outcomes that are negative, simple adjustments to the standard implementation of a lognormal distribution may be appropriate. If other issues cause a financial metric to be far from lognormally distributed in a manner that could significantly affect the valuation, more complex adjustments or techniques may be appropriate. In general, consideration should be given to the trade-off between computational complexity versus a more accurate representation of the real-world metric distribution.

11. I am valuing an earnout for an acquisition that, in addition to market participant synergies, is expected to realize significant synergies that are unique to the buyer. Should I consider these buyer-specific synergies in the valuation of the earnout?

Yes, assuming the synergies are included in the earnout agreement's definition of the metric. Because an earnout depends on the performance of the acquired business following the acquisition, a market participant buying or selling the standalone earnout would consider the expected earnout payments post-transaction, under the new ownership of the actual buyer. Therefore, to the extent that the earnout payoff is affected by buyer-specific synergies (or dis-synergies), these should be included in the valuation of the earnout.

12. I strongly believe that we will be making the earnout payment, yet the valuation analysis indicates a significant discount from the payment amount. Why does that make sense?

The valuation of the earnout is based on the expected payment rather than the most likely payment. Even when the payment is anticipated to be made, there may still be considerable downside risk. Further, even if there is no uncertainty about the payment (e.g., for a deferred payment) since the fair value analysis estimates the price that would be paid for the earnout cash flow by a market participant,

the fair value of the earnout will always be less than the expected payment due to discounting for the time value of money and counterparty credit risk.

13. I am valuing an earnout for an acquisition of an early stage life sciences company with one drug under development by a large pharmaceutical company. A payment of 10 million will be made if regulatory approval is received. I have estimated the probability of receiving that regulatory approval. Would it be preferable in this case to use a scenario-based method? What discount rate should I use?

Yes, it would be preferable to use a scenario-based method. The earnout represents a fixed payment upon realization of an outcome (i.e., regulatory approval) that is largely a diversifiable risk. The probability-weighted expected earnout cash flow can be discounted at the obligor's cost of debt (i.e., the risk-free rate plus the counterparty's credit spread, with adjustments for duration, seniority, etc.).

14. Related to #13 above, what discount rate would you consider if the payments involved a simple royalty based on a fixed percentage of revenues (assuming the product is successfully launched)?

In this case, the earnout metric (revenue) is exposed to systematic risk and therefore a discount rate should be used that captures the Required Metric Risk Premium associated with the forecast revenue, the time value of money over the relevant time horizon (the risk-free rate), and the credit risk of the obligor. The estimate of the Required Metric Risk Premium will generally differ from the risk premium used to value the associated business, due to differences in risk between revenue and the long-term free cash flows of the business. Unless there are buyer-specific synergies incorporated in the revenue projections for the earnout, long-term free cash flows would generally be riskier than revenues, due to operational leverage. Thus, even in a linear payoff structure such as a fixed percentage of revenues, the discount rate for the earnout cash flow (excluding the impact of the obligor's credit risk) will typically be lower than the WACC for the relevant business.

15. Can I use a simpler methodology to value an earnout that is almost certain to be paid? For example, consider an earnout that pays five million at the end of three years if cumulative EBITDA over the three years exceeds one million. After two years, cumulative EBITDA is 990,000. Nothing has recently occurred to indicate a change in the outlook for the business over the next year.

In this fact pattern, one can reasonably argue that the probability of payment is so high that the risk of the earnout cash flow resembles the risk of a plain vanilla debt instrument. In this case it may be appropriate to assume that the earnout payment will be earned with certainty and to discount the payment of five million at a rate that reflects the time value of money (risk-free rate) and the obligor's credit risk over the remaining one-year time horizon.

16. When updating an earnout valuation, should I assume the same discount rate and counterparty credit risk as in the original valuation?

All inputs should be reevaluated when updating the valuation. Consideration should be given to changes in market conditions and to the credit risk of the obligor as well as to changes in the discount rate, the expected case (mean) forecast of the earnout metric, and (if using OPM) the estimated volatility around that forecast.

17. Is adding an additional discount for the buyer's credit risk double counting since I am already considering the WACC as part of estimating the risk of the earnout metric? Does this imply that the buyer will book a gain if its credit quality worsens?

There are two distinct risks being considered in the valuation of the earnout: the risk of the underlying metric (as modified by the functional form of the payoff) and the risk associated with the obligor's ability to make an earnout payment if and when it becomes due. Therefore, there is no double counting. The dynamics of booking a gain associated with a decline in the buyer's credit quality is no different than the dynamics observed when estimating the fair value of debt for financial reporting purposes.

18. How should I estimate counterparty credit risk? Should I consider the credit risk of the buyer or the seller?

Counterparty credit risk represents the risk associated with the obligor's ability to make a contingent consideration payment when it is due. For an earnout, the obligor is typically the buyer. For a clawback, the obligor is typically the seller. Factors to consider in estimating counterparty credit risk include the expected timing of the payment(s), the seniority of the obligation, any credit risk mitigation mechanisms (such as whether or not sufficient funds to cover the potential payment have been placed in escrow), and any correlation between the outcomes (e.g., the upside scenarios in which an earnout payment is due) and the obligor's ability to pay.

19. Should the counterparty credit risk adjustment assume that the earnout payment is subordinated to the buyer's outstanding debt?

The seniority of the earnout payment in the obligor's capital structure should be evaluated based on discussions with management and/or a review of the relevant documentation. When estimating the counterparty credit risk, consideration should be given to the level of subordination (e.g., priority of claims) of the earnout within the obligor's capital structure.

20. If the expected outcome for the earnout metric is partially locked in, should I take that into consideration in the valuation of the earnout? For example, a portion of the revenue needed to achieve the threshold may already be under contract.

Yes. The assessment of the risk of the earnout metric should consider all relevant facts and circumstances.

21. Since the earnout is a liability, should I apply a premium to the value over the asset value to reflect what a market participant would require to assume the risk of the liability?

No. The fair value of the earnout as an asset and as a liability should be the same. Also, the accounting guidance is clear that one needs to value an earnout from the perspective of the asset. For example, ASC 820-10-35-16B states, "When a quoted price for the transfer of an identical or a similar liability or instrument classified in a reporting entity's shareholders' equity is not available and the identical item is held by another party as an asset, a reporting entity shall measure the fair value of the liability or equity instrument from the perspective of a market participant that holds the identical item as an asset at the measurement date." Similar guidance is provided in IFRS 13:37.

22. I am valuing an earnout that will pay 10% of EBIT in the first year post-close. I plan to start with the WACC for the subject business, then adjust for the short-term nature of the earnout to get to a discount rate appropriate for 1-year EBIT. However, the WACC for the business is a measure of

the cost of capital for post-tax cash flows. Do I need to make any further adjustment to the discount rate, since EBIT is a pre-tax metric?

Typically, no, assuming EBIT is unlikely to be negative. Income taxes are usually assumed to be a linear function of earnings, and therefore typically do not impact risk. In such a situation, the systematic risk does not differ between the pre-and post-tax cash flows of a business, and therefore a tax-related adjustment to the post-tax WACC is not appropriate. However, there are cases in which tax payments can introduce nonlinearities and/or leverage that would significantly affect the risk of the cash flows of a business; such a situation could require an adjustment to the discount rate to capture this difference in risk between pre- and post-tax cash flows.

10.2 Glossary

Terms	Definitions
Adjusted CAPM	A framework in which adjustments are made to the results of the traditional Capital Asset Pricing Model to incorporate additional risk(s) beyond volatility and correlation with the market. Common examples of such additional risks include risks related to the size of the relevant business, country-related risk, and company-specific risk.
ASC 805	FASB Accounting Standards Codification 805 "Business Combinations"
ASC 820	FASB Accounting Standards Codification 820 "Fair Value Measurement"
Asset Beta	Also known as unlevered beta, it is derived from the equity beta by removing the effect of financial leverage in the capital structure of a specific company.
Backlog	Unfulfilled purchase or sales order contracts.
Beta	A measure of systematic risk (e.g., the tendency of a stock price to correlate with changes in the market).
Binary/Digital Option	A type of option in which the payoff is either a fixed amount if the option expires in the money or nothing at all if the option expires out of the money.
Black-Scholes-Merton Formula	A formula which gives a theoretical estimate of the price of options that can only be exercised at maturity, derived from the Black-Scholes-Merton model.

Buyer-Specific Synergies	Synergies that only a particular buyer would be able to realize from the transaction.
Call Option	An agreement that gives the buyer the right, but not the obligation, to buy an agreed quantity of an asset from the seller at a certain time for a certain price.
CAPM	Capital Asset Pricing Model is a model in which the cost of capital for any stock or portfolio of stocks equals a risk-free rate plus a risk premium that is proportionate to the systematic risk of the stock or portfolio.
Catch-Up Feature	A feature of an earnout agreement which allows specified shortfalls in payment (as compared to a payment cap) in prior periods to be earned in subsequent periods.
Clawback	The right of an acquirer to the return of previously transferred consideration if specified conditions are met.
Contingent Consideration	Contingent consideration usually is an obligation of the acquirer to transfer additional assets or equity interests to the former owners of an acquiree as part of the exchange for control of the acquiree if specified future events occur or conditions are met. However, contingent consideration also may give the acquirer the right to the return of previously transferred consideration if specified conditions are met.
Cost Approach	A general way of determining a value indication of an individual asset by quantifying the amount of money required to replace the future service capability of that asset.
Counterparty Credit Risk	Risk of the obligor being able to make a future payment when it is due.
Credit Spread	Rate of return above the risk-free rate required by investors to compensate for counterparty credit risk. Typically measured as the difference between the yields of corporate debt instruments and the benchmark (risk-free) government debt security (e.g., U.S. Treasury bond) of the same maturity.

DCF	Discounted Cash Flow is a method of valuing a project, company, or asset by discounting future cash flow projections at an appropriate rate to address risk and the time value of money, in order to arrive at a present value estimate.
Discount	Determine the present value of a cash flow or stream of cash flows that are projected to be received in the future.
Diversifiable	Diversifiable risks are idiosyncratic risks that can be substantially mitigated or eliminated from a portfolio by using adequate diversification. For example, a diversifiable (but still uncertain) event is one where the resolution of the uncertainty is typically not influenced by movements in the markets.
Earnout	An obligation of the acquirer to transfer additional assets or equity interests to the former owners of an acquiree as part of the exchange for control of the acquiree if specified future events occur or conditions are met.
EBIT	Earnings Before Interest and Tax is a measure of a firm's profitability that includes all expenses except interest and income tax expenses.
EBITDA	Earnings Before Interest, Tax, Depreciation, and Amortization is a measure calculated using a company's net earnings, before interest expenses, taxes, depreciation and amortization are subtracted, as a proxy for a company's current operating profitability.
EBT	Earnings Before Tax is a measure of a firm's profitability that includes all expenses except for income tax expenses.
Enterprise Value	An economic measure that reflects the market value of an ongoing operating business.
Fair Value	The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

FASB	Financial Accounting Standards Board is the independent, private-sector, not-for-profit organization that establishes financial accounting and reporting standards for public and private companies and non-for-profit organizations that follow U.S. Generally Accepted Accounting Principles.
Financial Leverage	Measurement of the degree to which a company uses fixed-income securities such as debt and debt-like instruments.
Financial Metric	Refers to a unit of measurement of a company's financial or business performance, such as revenue, revenue margin, EBITDA, EBITDA margin, EBIT, net income, units sold, rental occupancy rates, market share, etc.
GBM	Geometric Brownian Motion is a continuous-time stochastic process in which the logarithm of the randomly varying quantity follows a Brownian motion.
IASB	International Accounting Standards Board is the independent, accounting standard-setting body of the IFRS Foundation.
Income Approach	The valuation approach that uses techniques to convert future amounts (e.g., cash flows or earnings) to a single current amount (discounted).
IFRS	International Financial Reporting Standards
IFRS 3R	International Financial Reporting Standard 3 (Revised) "Business Combinations"
IFRS 13	International Financial Reporting Standard 13 "Fair Value Measurement"
IPR&D	In-Process Research and Development refers to the incomplete R&D projects of an acquired business.
IRR	The Internal Rate of Return is a discount rate at which the present value of the future cash flows of the investment equals the value of the investment.
Leverage	Typically, the use of financial instruments or borrowed capital to increase the potential return on an investment, representing an equity

	holder's exposure to the underlying business as a result of the presence of debt in the capital structure. Can also refer to the degree of fixed costs in a firm's cost structure.
Leverage Ratio	A financial ratio that quantifies the extent or reliance on debt financing and/or the degree of fixed costs in a firm's cost structure.
LTFCFE	Long-Term Free Cash Flow to Equity is a measure of how much cash can be paid to the equity shareholders of a company after all expenses, reinvestment and debt are paid.
LTFCFF	Long-Term Free Cash Flow to the Firm is a measure of how much cash can be paid to the investors in a company (including debtholders, equity holders, and other non-equity investors) after all expenses and reinvestment are paid.
Market Approach	A valuation approach that uses prices and other relevant information generated by market transactions involving identical or comparable assets or liabilities.
Market Participant Synergies	Synergies that can be realized by a pool of hypothetical buyers and sellers (market participants with certain characteristics) in the principal (or most advantageous) market.
Market Risk Premium (MRP)	The Market Risk Premium, also known as the Equity Risk Premium, is the rate of return above the risk-free rate that is required by investors for holding the market portfolio (i.e., a large portfolio of diversified stocks, typically represented by a broad stock market index).
Midyear Convention	A convention that reflects economic benefits being generated at midyear, approximating the effect of economic benefits being generated evenly throughout the year.
Moneyness	The relative position of the current price (or future price) of an underlying asset with respect to the strike price of an option.
Monte Carlo Simulation	A technique used to sample randomly from a probability distribution, to produce different possible outcomes.

Noncontrolling Interest	The portion of equity (net assets) in a subsidiary not attributable, directly or indirectly, to a parent. A noncontrolling interest is sometimes called a minority interest.
Non-diversifiable	Risks that cannot be fully mitigated or eliminated through diversification. Typically these are risks that are correlated with the market. For example, revenue is exposed to both company-specific risk as well as to market risk.
Nonfinancial Milestone Event	Refers to an event that is not defined based on the outcome of a Financial Metric, such as regulatory approvals, resolution of legal disputes, execution of certain commercial contracts or retention of customers, closing of a future transaction, or achievement of technical milestones.
Operational Leverage	Measurement of the degree to which a firm or project incurs a combination of fixed and variable costs. A company with high fixed costs relative to its earnings has a high degree of operational leverage.
OPM	Option Pricing Method is a method whereby the valuation specialist applies an appropriate discount rate to the contingent consideration metric forecast in order to establish a risk-neutral forecast distribution for the metric, estimates the expected payoff cash flow in this risk-neutral framework, and discounts the risk-neutral expected payoff cash flow at the risk-free rate, plus any adjustment for counterparty credit risk.
Orderly Transaction	A transaction that assumes exposure to the market for a period before the measurement date to allow for marketing activities that are usual and customary for transactions involving such assets or liabilities; it is not a forced transaction (e.g., a forced liquidation or distress sale).
Path Dependency	An arrangement that includes multiple earnout periods and in which at least some of the contingent payments depend on the interrelated performance over multiple of these periods.

PV	Present Value is the value of future economic benefits and/or proceeds as of a specified date, calculated using an appropriate discount rate.
PFI	Prospective Financial Information is a forecast of expected future cash flows.
Required Rate of Return	The rate of return required by an investor to compensate for the time value of money and the non-diversifiable risk of investing in a particular investment.
Revenue Beta	A measure of the systematic risk of company revenue relative to the market.
RFR	The Risk-Free Rate is the rate of return required by investors to compensate for the time value of money on a risk-free investment.
Risk-Adjusting Discount Rate	The Required Metric Risk Premium plus the Risk-Free Rate
Risk-Neutral Framework	A framework in which non-diversifiable risk is first removed from a contingent consideration metric, the contingent consideration payoffs are then calculated based on the risk-adjusted metric, and finally the payoffs are discounted at the risk-free rate (plus any adjustments for counterparty credit risk).
RMRP	Required Metric Risk Premium is a measure of the excess return, or risk premium, that investors demand to bear the non-diversifiable risk associated with a specific metric.
SBM	Scenario-Based Method is a method whereby the valuation specialist identifies multiple outcomes, probability weights these outcomes to arrive at an expected payment cash flow, and discounts the result at an appropriate rate.
Size Premium	The additional return required to compensate an investor for the additional risk associated with smaller companies.
Standard Deviation	A measure that quantifies the amount of variation or dispersion of a set of data values from their mean.
Standard Normal Distribution	A special case of the normal distribution that occurs when a normal random variable (a very common, continuous probability distribution

	with a symmetrical, bell shape) has a mean of 0 and a standard deviation of 1.
Strike Price	The price at which the holder of an option can buy or sell the underlying security.
Systematic Risk	Risks that cannot be fully mitigated or eliminated through diversification because they are correlated with the market. For example, revenue is exposed to both company-specific risk factors as well as to market risk.
Term	The remaining time to expiry of an instrument or security.
Unit of Account	The level at which an asset or liability is aggregated or disaggregated for accounting recognition purposes.
U.S. GAAP	United States Generally Accepted Accounting Principles
Volatility	The standard deviation of asset returns or metric growth rates.
WACC	Weighted Average Cost of Capital is the return required by both debt and equity investors, weighted by their respective contributions to the overall capital structure.
WARA	Weighted Average Return on Assets is the cost of capital determined by the weighted average, at market value, of the collective rates of return on the various types of tangible and intangible assets of a company.

10.3 Technical Notes

The Technical Notes section contains detailed technical discussions related to various methodologies including:

- Estimating the RMRP for an earnings-based metric using the Hamada, Modigliani-Miller Generalized Beta, Practitioners' and Volatility-Based Methods
- Estimating the RMRP for a revenue-based metric using the Fixed Costs vs. Assets Method and Volatility-based Methods
- Estimating the RMRP for any metric via a bottom-up estimation technique
- Risk-adjusting the metric forecast (to create a risk-neutral metric forecast for use in an OPM), using either of two equivalent techniques
- The applicability of the normal distribution to financial metrics: pros and cons
- The properties of a Geometric Brownian Motion, including how to handle situations where these properties do not hold (alternative methods)

- A discussion of the academic literature and its support for the application of option pricing methods to the valuation of non-traded assets and liabilities.

10.3.1 Estimating Earnings-Based RMRPs by De-Levering for Financial Leverage

The methods for estimating earnings-based RMRPs by de-levering the equity RMRP for financial leverage described below include the Hamada, Modigliani-Miller Generalized Beta, Practitioners' and Volatility-Based Methods. There are numerous other methods for de-levering for financial leverage that can be employed, such as the Miles-Ezzel, Harris-Pringle, and Fernandez methods.[125,126] Each of these methods relies on differing underlying assumptions, requires differing levels of complexity to estimate, and can produce different estimates for the RMRP.

In choosing among these methods, it is important to ensure that the assumptions associated with the selected method are reasonable given the earnout timeframe and the capital structure of the subject business. Any potential issues with a method's assumptions should be thought through prior to applying the methodology. The following is a summary of the main considerations associated with these four de-levering methods (which are discussed in more detail in the remainder of this section):

- The Hamada Method assumes that the company will always be able to realize an interest tax deduction in the period intended, debt has no systematic risk, and the debt amount is constant over time.
- The Modigliani-Miller Generalized Beta Method assumes constant financial leverage and requires an estimate of the required risk premium for debt.
- The Practitioners' Method assumes that debt has no systematic risk and that tax shields have the same risk as operating assets.
- The Volatility-Based Method assumes that the correlation between the market and the earnout metric is the same as the correlation between the market and the company's return on equity and requires an estimate of volatility in growth rate for the metric.[127]

Depending on the underlying characteristics of the financial leverage associated with the earnout metric, an alternative method may be appropriate. For example, the Hamada, Modigliani-Miller Generalized Beta and Practitioners' Methods all estimate the same RMRP for all earnings-based metrics—which might be an issue, e.g., where the metric is EBITDA and depreciation or amortization are substantial. In such a situation, the Fixed Costs vs. Assets Method (see Section 10.3.2) can be used to further adjust the RMRP for EBIT estimated with one of these three methods to obtain a RMRP for EBITDA.

The Hamada, Modigliani-Miller Generalized Beta, Practitioners' and Volatility-Based Methods are described below in terms of estimating the RMRP. Because the theories are predicated on the CAPM framework, the reader may be more familiar with the application of these methods to estimating betas. Indeed, that is how they are typically portrayed and understood in the financial literature.

In general, similar principles should be applicable even under alternatives to the CAPM framework for the analysis of systematic risk.

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[125] See Pratt and Grabowski, *Cost of Capital*, 5th ed. (2014), pp. 248-254.

[126] The WACC less the long-term risk-free rate is another alternative estimate that could be used to approximate the RMRP of an earnings-based metric. This method is described in Section 5.2.3.1. When using this method, the valuation specialist should consider whether adjustments are needed for differences in the risk of the earnout metric as compared to the risk associated with the long-term free cash flows to the firm.

[127] If the valuation specialist is using OPM (e.g., because the payoff structure is nonlinear), an estimate of metric volatility will often be required for the analysis anyway. However, if using SBM to value an earnout with a linear payoff structure, an estimate of metric volatility would generally not be required unless it is needed for the method used to estimate the RMRP.

Hamada Method

The Hamada Method uses the following equation to de-lever the equity RMRP for financial leverage:[128]

$$RMRP_{EBIT} = RMRP_{Equity} / [1 + (1-t) \times D/E]$$

Where:

$RMRP_{EBIT}$ = the risk premium (above the risk-free rate) appropriate to EBIT

$RMRP_{Equity}$ = the risk premium (above the risk-free rate) appropriate to long-term free cash flows to equity

t = the relevant tax rate

D/E = the debt-to-equity ratio of the subject company.

The advantage of this methodology is that it is relatively straightforward to calculate and it is a well-known methodology with which many practitioners are familiar. However, this formulation assumes that the company will always be able to realize an interest tax deduction in the period intended, that the debt of the company has no systematic risk (or in a CAPM framework, that the beta on debt is always zero), and that the debt amount is constant over time, which is equivalent to assuming a decreasing debt-to-equity ratio as the company grows in size. The Hamada Method also estimates the same RMRP for different earnings-based metrics (e.g., EBIT vs. EBITDA), which might be an issue where there is a significant difference in leverage between these metrics (e.g., if depreciation or amortization are substantial). These assumptions may or may not be reasonable.

Modigliani-Miller Generalized Beta Method

An alternative method for de-levering for financial leverage that relies on estimates for both equity and debt RMRPs (or, in a CAPM framework, on both equity and debt betas) is proposed below:[129]

$$RMRP_{EBIT} = RMRP_{Debt} \times D/V + RMRP_{Equity} \times E/V$$

Where:

V = the firm's total value

D/V = the percentage of the firm's value comprised of debt

E/V = the percentage of the firm's value comprised of equity.

The fundamental underpinning of this methodology is that the returns on debt are correlated with market returns, and the methodology therefore allows for factoring in the systematic risk of debt. This methodology also assumes a constant financial leverage ratio. As for the Hamada method, the Modigliani-Miller Generalized Beta Method calculation is straightforward;[130] however, this method requires estimation of a RMRP for debt (or, in a CAPM framework, a debt beta).[131] The Modigliani-Miller Generalized Beta Method also estimates the same RMRP for different earnings-based metrics

[128] See Hamada (1972). The formula is typically expressed in terms of equity and asset betas, as follows:
Asset beta = Equity beta / [1 + (1-t)×D/E].

[129] See Brealey, Myers, and Allen, *Principles of Corporate Finance*, pp. 225-226. The formula is typically expressed in terms of equity and asset betas, as follows: $\beta_{Asset} = \beta_{Debt} \times D/V + \beta_{Equity} \times E/V$.

[130] In fact, the Hamada Method is a special case of the Modigliani-Miller Generalized Beta Method, where (a) debt is considered to be risk-free; and (b) tax shields have the same risk as debt. See McKinsey & Company, *Valuation: Measuring and Managing the Value of Companies*, 5th ed. (2010), Appendix D.

[131] For estimates of debt betas based on credit ratings, see, for instance, Pratt and Grabowski, *Cost of Capital*, 5th ed. (2014), p. 221.

(e.g., EBIT vs. EBITDA), which might be an issue where there is a significant difference in leverage between these metrics (e.g., if depreciation or amortization are substantial).

Practitioners' Method

The Practitioners' Method, so named because it is often used in practice, uses the following method for de-levering for financial leverage:[132]

$$RMRP_{EBIT} = RMRP_{Equity} / [1 + D/E]$$

Where:

$RMRP_{EBIT}$ = the risk premium (above the risk-free rate) appropriate to EBIT

$RMRP_{Equity}$ = the risk premium (above the risk-free rate) appropriate to long-term free cash flows to equity

D/E = the debt-to-equity ratio of the business.

The Practitioner's Method is a special case of the Modigliani-Miller Generalized Beta Method, where the valuation specialist assumes that (a) debt has no systematic risk (this assumption is also made by the Hamada Method) and (b) tax shields have the same risk as operating assets.[133]

On the plus side, this is also a relatively straightforward calculation, and is well known to practitioners. However, the assumption of no systematic risk for debt and the fact that it does not factor in the impacts of any tax deduction of interest payments may or may not be reasonable. The Practitioner's Method also estimates the same RMRP for different earnings-based metrics (e.g., EBIT vs. EBITDA), which might be an issue where there is a significant difference in leverage between these metrics (e.g., if depreciation or amortization are substantial).

Volatility-Based Method

The Volatility-Based Method is predicated on the assumption that differences in risk due to leverage are fully captured by differences in volatility of the underlying metrics. In a CAPM framework, this assumption implies that the correlation between the subject metric (e.g., EBIT) and the market is the same as the correlation between the return on equity (if starting with an equity RMRP) and the market.

$$RMRP_{EBIT} = RMRP_{Equity} \times \sigma_{EBIT}/\sigma_{Equity}$$

Where:

σ_{EBIT} = the volatility of the EBIT of the company[134]

σ_{Equity} = the volatility of the equity of the company.

If this method is selected, care should also be taken to ensure that sufficiently reliable data is available to estimate volatility in the growth rate for the metric. Note that if the valuation specialist is using OPM (e.g., because the payoff structure is nonlinear), an estimate of volatility in the growth rate for the metric will often be required for the analysis anyway. However, if using SBM to value an earnings-based earnout with a linear payoff structure, an estimate of volatility in the growth rate for the metric would generally not be required, unless it is needed for the method used to estimate the RMRP.

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[132] See Pratt and Grabowski, *Cost of Capital*, 5th ed. (2014), pp. 248-254. The formula is typically expressed in terms of equity and asset betas, as follows: Asset beta = Equity beta / [1 + D/E].

[133] See McKinsey (2010), *Valuation: Measuring and Managing the Value of Companies*, Appendix D.

[134] Note: the volatility of the earnings-based metric can be estimated either by de-levering equity volatilities or by estimating volatilities specific to the metric itself (i.e., EBITDA or EBIT, etc.)

On the plus side, the Volatility-Based Method allows for capturing the intricate differences in risk associated with different types of earnings (e.g., EBIT vs. EBITDA). However, the method relies on the simplifying assumption that the correlation between the market and the earnout metric is the same as the correlation between the market and the company's return on equity, which may or may not be reasonable.

See Section 5.2.4 for estimating volatility.

10.3.2 Estimating Revenue-Based RMRPs by De-Levering EBIT RMRPs for Operational Leverage

Methods for estimating revenue RMRPs by de-levering EBIT RMRPs[135] for operational leverage include the Fixed Costs vs. Assets Method and the Volatility-Based Method. These two methods are described below. An alternative method, the Harris-Pringle formula (which was designed to estimate operating betas), is not recommended by the Working Group for estimating a RMRP for a revenue metric.[136] See also Section 5.2.3.5 for a more general discussion of the pros and cons of using a de-levering methodology for estimating the RMRP for a revenue-based metric.

In choosing between these methods, it is important to ensure that the assumptions associated with the selected method are reasonable given the earnout timeframe and the capital structure of the subject business. Any potential issues with a method's assumptions should be thought through prior to applying the methodology. The following is a summary of the main considerations associated with these two methods (which are discussed in more detail in the remainder of this section):

- The Fixed Costs vs. Assets Method assumes that the systematic risk associated with fixed costs is approximately zero and generally requires an estimate of the percentage of costs that are fixed versus variable over the time horizon(s) relevant to estimating the earnout payoff (which can be challenging to estimate, given the typical difficulties in distinguishing between fixed and variable costs).
- The Volatility-Based Method assumes that the correlation between the market and the earnout metric is the same as the correlation between the market and the company's return on equity and the method also requires an estimate of volatility in the growth rate for the metric.[137]

Note that both the Fixed Costs vs. Assets Method and the Volatility-Based Method can also be used to estimate the RMRP for other metrics besides revenue, such as gross profit, net income, etc., as long as adjustments are made for the relative risk and leverage of the relevant earnout metric.

These two methods are described in this section in terms of estimating the RMRP. Because the theories are predicated on the CAPM framework, the reader may be more familiar with the application of these

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[135] In lieu of starting with an EBIT RMRP, it may often be reasonable to start with the WACC less the long-term risk-free rate, make any adjustments for differences in duration or financial leverage, and then de-lever for differences in operational leverage.

[136] The Harris-Pringle formula is as follows:

$$\beta_{Operating} = \beta_{Unlevered} / [1 + Fixed\ Costs/Variable\ Costs]$$

Where:

$\beta_{Operating}$ = *the operating beta of the company*

$\beta_{Unlevered}$ = *the unlevered beta*

Fixed Costs/Variable Costs = the ratio of fixed operating costs (without regard to costs of financing) to variable operating costs

Unfortunately, the Harris-Pringle method can be problematic in the context of estimating revenue betas as it doesn't directly relate fixed costs or variable costs to either revenue or EBIT, but rather only to each other. As such, this method would give the same result whether total costs are 1% of revenue or 100% of revenue. It may not result, therefore, in a reasonable estimate of a revenue RMRP.

[137] If the valuation specialist is using OPM (e.g., because the payoff structure is nonlinear), an estimate of metric volatility will often be required for the analysis anyway. However, if using SBM to value an earnout with a linear payoff structure, an estimate of metric volatility would generally not be required unless it is needed for the method used to estimate the RMRP.

methods to estimating betas. Indeed, that is how they are typically portrayed and understood in the financial literature.

Similar principles should generally be applicable even under alternatives to the CAPM framework for the analysis of systematic risk. That is, if an alternative framework for modeling systematic risk is used for a revenue-based metric, consideration should be given as to how to adjust the risk premiums for long-term free cash flows for operational leverage. For example, in an Adjusted CAPM framework, if a size premium is appropriate for valuing the business, consideration should be given to adjusting the size premium commensurate with the differences in risk between long-term free cash flows and the revenue metric. While the Fixed Costs vs. Assets Method and/or the Volatility-Based Method can be appropriate for such adjustments, depending on the framework and the specific situation, it is possible that an alternative method might be more appropriate for adjusting the additional risk premiums.

Fixed Costs vs. Assets Method

This method is designed to estimate a RMRP for revenue via further adjustment to the RMRP for an EBIT metric, for operational leverage over the term of the earnout. The key assumption underlying this method is that the systematic risk associated with fixed costs is approximately zero (which may or may not be reasonable). Under this assumption, the RMRP for revenue can be estimated as:[138]

$$RMRP_{Revenue} = RMRP_{EBIT} / [1 + PV(fixed\ costs) / PV(EBIT)]$$

Where:

PV(fixed costs) = the present value of fixed costs during the earnout period

PV(EBIT)[139] = the present value of EBIT during the earnout period, where PV(EBIT) = PV(revenue) – PV(fixed costs) – PV(variable costs).

The RMRP for EBIT can be estimated as discussed in Section 10.3.1. To estimate the operational leverage ratio of PV(fixed costs)/PV(EBIT), often one starts by estimating the percentage of costs that are fixed versus variable over the relevant time periods. Then one can derive the present value of the fixed costs by discounting the fixed costs over the period of the earnout; given the assumption that the systematic risk associated with fixed costs is approximately zero, the discount rate for fixed costs can be reasonably approximated by the estimated cost of debt of the entity whose obligation it is to pay these fixed costs. The present value of the EBIT can be estimated by discounting the EBIT over the period of the earnout at the estimated discount rate appropriate to EBIT.

Difficulties may arise in using this methodology, as distinguishing fixed from variable costs may be challenging. In theory, over a long time horizon, all costs become variable. Over a medium or short time horizon, though, usually some costs are fixed and some are variable. As such, it is important to consider which costs are fixed vs. variable *over the term of the earnout period.*

Furthermore, many earnouts are associated with the performance of early-stage businesses for which EBIT can often be either negative or very small. For such businesses, the denominator of this ratio may produce unreasonable results.

Finally, even though this methodology is couched in terms of revenue, it could be adapted for any financial metric based on the relative operational leverage over the term of the earnout. For instance,

[138] Or, in a CAPM framework, as $\beta_{Revenue} = \beta_{Asset} / [1 + PV(fixed\ costs) / PV(asset)]$. See Brealey, Myers, and Allen, *Principles of Corporate Finance*, pp. 226-229 for further detail on asset beta and revenue beta estimation.

[139] PV(EBIT) is generally seen as a reasonable measurement of the present value of the underlying assets of the related business, on which the formula is predicated.

if the underlying metric were gross profit, instead of using all fixed costs, you would instead use only the fixed component of operating expenses. Similarly, this method could be utilized to handle the situation where the metric is EBITDA and depreciation or amortization expenses are substantial, by adjusting a RMRP relevant to EBIT to arrive at a RMRP relevant to EBITDA.

Volatility-Based Method

The Volatility-Based Method assumes that differences in leverage can be captured solely via relative differences in volatility, which in the CAPM framework means that the correlation between the metric of interest (e.g., revenue) and the market is the same as the correlation between the return on equity (if starting with an equity beta) or the return on assets (if starting with an asset beta) and the market. This assumption may or may not be reasonable.

When using this methodology, care should also be taken to ensure that sufficiently reliable data is available to estimate the volatility in the growth rate for the metric. Note that if the valuation specialist is using OPM (e.g., because the payoff structure is nonlinear), an estimate of volatility in the growth rate for the metric will often be required for the analysis anyway. However, if using SBM to value a revenue-based earnout with a linear payoff structure, an estimate of volatility in the growth rate for the metric would generally not be required, unless it is needed for the method used to estimate the RMRP.

One possible implementation of the Volatility-Based Method starts with an EBIT RMRP as estimated, for example, by one of the methodologies in Section 10.3.1. The RMRP for the metric is then estimated as follows:

$$RMRP_{metric} = RMRP_{EBIT} \times \sigma_{metric} / \sigma_{EBIT}$$

Where:

σ_{metric} = the volatility in the growth of the metric of the company

σ_{EBIT} = the volatility of returns on the assets of the company.

Alternatively, in a CAPM framework one can instead begin with an equity beta:

$$\beta_{metric} = \beta_{Equity} \times \sigma_{metric} / \sigma_{Equity}$$

Where:

σ_{metric} = the volatility in the growth of the metric of the company

σ_{Equity} = the volatility of returns on the equity of the company.

A useful cross-check when using the Volatility-Based Method is to compute the operational leverage ratio implied by the Volatility-Based Method, test it for reasonability, and potentially also compare it to the operational leverage ratio implied by the Fixed Costs vs. Assets Method. These respective operational leverage ratios may be calculated as follows:

$$\textit{Volatility-Based Method implied operational leverage ratio} = \sigma_{EBIT} / \sigma_{metric} - 1$$

$$\textit{Fixed Costs vs. Assets Method implied operational leverage ratio} = PV(\textit{fixed costs}) / PV(EBIT)$$

This check can help ensure that the estimated de-levering adjustment makes sense for the business over the earnout period.

10.3.3 The Bottom-Up Method for Estimating a RMRP for Any Metric

The bottom-up method is described in this section in terms of estimating metric betas, from which the Required Metric Risk Premium can be calculated in a CAPM (or Adjusted CAPM) framework. The discussion is predicated on assumptions underlying the CAPM framework because that is how it is typically portrayed and understood in the literature.

Similar principles should generally be applicable under alternatives to the CAPM framework for the analysis of systematic risk; whatever method was used for estimating the risk of the long-term free cash flows of the business, the bottom-up technique should be adaptable enough to develop direct estimates of the risk associated with the underlying metric. For example, in an Adjusted CAPM framework, if a company-specific premium is appropriate for valuing the business, consideration should be given to incorporating in the RMRP the portion of that premium that is relevant to the earnings metric. Methods for incorporating such additional risk premiums are discussed in Section 5.2.3.

In any case, care should be taken to ensure that the underlying assumptions of the bottom-up method are reasonable in the given circumstance, and that any differences in underlying assumptions are thought through prior to applying the methodology.

In contrast to the top-down methods of Sections 10.3.1 and 10.3.2 that are specific to estimating RMRPs for earnings-based and revenue-based metrics respectively (or equivalently in a CAPM framework, estimating asset/earnings betas and revenue betas), a bottom-up method can be used regardless of the metric on which the earnout is based. The bottom-up method directly measures the beta of the underlying metric, and therefore does not rely on the equity beta (or the WACC or the IRR) as a starting point.

The bottom-up method estimates a beta associated with any type of metric (such as revenue, EBIT, or EBITDA) by using CAPM to estimate the systematic risk associated with the underlying metric. This method is consistent with the "real options" pricing method.[140] The metric beta can be estimated as follows:

$$\beta_{Metric} = \rho_{(Metric,\ Market)} \times s_{Metric} \div s_{Market}$$

Where:

$\rho_{(Metric,\ Market)}$ = the instantaneous correlation between the percent changes in the metric and the returns on a broad index of stock market prices

s_{Metric} = the volatility of the growth in the metric

s_{Market} = the volatility of the return on a broad index of stock market prices.

In circumstances where there is significant debt in the capital structure, the valuation specialist should consider whether it would be appropriate to make an adjustment to the estimated RMRP due to the impact of the availability of debt financing. For example, the valuation specialist could rely on an appropriately weighted average of the RMRP for the earnout metric and the cost of debt.

While it can be challenging to correctly estimate the correlation between the growth in the relevant metric and the return of the market or to estimate the volatility in growth in the metric, historical data

[140] See Hull, *Options, Futures, and Other Derivatives*, 8th ed. (2011), pp 766-768 for further detail on the Real Options methodology for valuing assets based on financial metrics not priced in the market. Note: the terminology in this Valuation Advisory differs slightly from the terminology used by Hull. In particular, what Hull refers to as the market price of risk (HMPR) is only a component of what is referred herein as the Required Metric Risk Premium (RMRP). The specific relationship is: RMRP = HMPR × s_{Metric}.

for the company in question, comparable companies, or the industry can often be used to inform the estimates if adequate historical data is available. Adjustments are typically made to remove historical outliers and/or data points with a large impact due to nonrecurring, idiosyncratic issues such as major acquisitions, divestitures, or product announcements. Furthermore, when estimating historical correlation, if using quarterly data, the analysis should use year-on-year quarterly growth (e.g., Q1 of the current year vs. Q1 of the prior year) rather than quarter-to-quarter growth (e.g., Q1 of the current year vs. Q4 of the prior year) to avoid artificial impacts on correlation due to seasonality.

When estimating the historical correlation in metric growth for the company and comparable companies with a broad market index, the first question to consider is what index might be most appropriate. The S&P 500 index may be appropriate for a U.S.-based company that conducts most of its business in the U.S., but perhaps not for a company that conducts most of its business in Europe or Asia. Furthermore, one may need to investigate lagged effects to obtain a proper estimate of correlation.[141]

As discussed above, if an alternative framework for modeling systematic risk is used, consideration should be given as to what portion of that framework's risk premiums to incorporate in the RMRP. For example, in an Adjusted CAPM framework, if a size premium is appropriate for valuing the business, consideration should be given to incorporating a portion of the size premium into the RMRP for revenue—the portion commensurate with the amount of the risk represented by the size premium that is applicable to the revenue metric. Methods for incorporating such additional risk premiums are discussed in Section 5.2.3.

See Section 5.2.4 for a discussion of estimating volatility in the growth rate for the metric.

See Section 5.2.3.6 for the pros and cons of using a bottom-up method for estimating a RMRP.

10.3.4 Two Methods for Risk-Adjusting the Metric Forecast

As discussed in Section 5.4.1, the OPM is appropriate for valuing contingent consideration based on a nonlinear payoff structure with metrics that involve non-diversifiable risk.

There are two ways of adjusting management's forecast for the metric to account for non-diversifiable risk:

- **Forecast Risk Adjustment (1) –** Management's *forecast* for the metric is discounted at an appropriate risk-adjusting discount rate, which results in a risk-neutral forecast of the metric that is forward looking.
- **Forecast Risk Adjustment (2) –** Management's *forecast growth rate* of the metric is adjusted by the Required Metric Risk Premium.

While appearing different, these two risk-adjustment methodologies are in fact equivalent; they provide the same risk-neutral future value for the metric. The equivalence will first be illustrated with an example, after which the mathematical equivalence will be demonstrated.

Example Earnout Payoff Structure

> Company A will be required to pay 30% of the excess of the acquiree's annual EBITDA above 2,000 over the next year. The payment is due three months after the end of that year.

[141] There is some evidence that stock market returns are a leading indicator of revenue growth, with a lead time of approximately one quarter (equivalently, revenue growth lags related stock market movements by approximately one quarter).

Assumptions

Management provided historical EBITDA of 1,800 as of the end of the previous period and forecasted EBITDA of 2,000 as of the end of the following period. The RMRP associated with the acquiree's EBITDA is 9.5%, the risk-free rate consistent with the timeframe to payment of the earnout is 0.5% (i.e., the risk-adjusting discount rate applicable to future EBITDA is 10%), and the credit spread of Company A for a subordinated obligation such as this earnout is 3.0% (all these rates are per annum, continuously compounded).

Forecast Risk Adjustment (1)

The present value of the forecasted EBITDA, assuming EBITDA is earned at the mid-period (i.e. using the mid-period convention) is calculated as:

$$1{,}902.5 = 2{,}000 \times \exp(-10.0\% \times 0.5)$$

The OPM is applied, assuming a lognormal distribution of the metric.[142] The risk-neutral present value of forecasted EBITDA is used to simulate the value for the risk-neutral future EBITDA as:[143]

$$2{,}507.73 = 1{,}902.5 \times \exp((0.5\% - (50.0\%)^2/2) \times 0.5 + 50.0\% \times (0.5)^{1/2} \times 0.951)$$

Forecast Risk Adjustment (2)

The continuous (annualized) growth rate of management's forecast for the metric is:

$$10.536\% = \log_e(2{,}000 / 1{,}800)$$

The growth rate of management's forecast for the metric is adjusted by the RMRP (equal to 9.5% in this example) and is used to simulate the value for the risk-neutral future EBITDA as:[144]

$$2{,}507.73 = 1{,}800 \times \exp((10.536\% - 9.5\% \times 0.5 + (50.0\%)^2/2 \times 0.5 + 50.0\% \times (0.5)^{1/2} \times 0.951)$$

The one path simulated risk-neutral future EBITDA is the same for the two forecast risk adjustment methods above. For this simulated path:

- the contingent consideration payoff for the random draw of 0.951 is

$$152.32 = 30.0\% \times \max\{2{,}507.73 - 2{,}000, 0\}$$

- the present value of the contingent consideration payment for this random draw is

$$145.8 = 152.32 \times \exp(-(3.0\% + 0.5\%) \times 1.25)$$

Equivalence of the Two Forecast Risk-Adjustment Methods for an OPM

In the example above, both forecast risk adjustment methods provide the same risk-neutral future EBITDA. The equivalence of the two methods, in terms of providing the same risk-neutral future values for the metric, hinges upon the following relation between the Required Metric Risk Premium and the risk-adjusting discount rate applicable to the metric:

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[142] A discussion on the use of the lognormal distribution for non-traded metrics (e.g., revenue, EBIT, EBITDA) is provided in Section 5.4.

[143] For illustration purposes we assume an EBITDA volatility of 50.0% and 0.951 as a random draw from a standard normal distribution. The calculated value represents only one simulated path assuming EBITDA is earned at the mid-period; the valuation specialist will choose an appropriate number of iterations (paths) that ensures the required convergence of results.

[144] The adjusted growth rate is applied to the actual EBITDA as of the end of previous period. For consistency with Forecast Risk Adjustment (1), we continue to assume an EBITDA volatility of 50.0% and 0.951 as a random draw from a standard normal distribution. The calculated value represents only one simulated path assuming EBITDA is earned at the mid-period; the valuation specialist will choose an appropriate number of iterations (paths) that ensures the required convergence of results.

Required Metric Risk Premium = Risk-adjusting discount rate – Risk-free rate

The implication is that neither of the two methods should be considered superior since the two methods are theoretically equivalent. In practice, it can be the case that practitioners using the two methods come to different conclusions, but this is due to differences in the methodology used to estimate the RMRP (see Section 5.2.2), not to differences caused by otherwise logically equivalent methods.

10.3.5 The Applicability of the Normal Distribution to Financial Metrics

The assumption that returns (or growth rates) of a financial investment are normally distributed has been debated since the advent of modern portfolio theory. The normal distribution assumption is generally applied as a simplification to ensure tractable results; any alternative assumption significantly increases the complexity of the model.[145]

In finance, the most common criticism of the normal distribution assumption is that it is not a heavy-tailed distribution and therefore does not adequately capture the significant deviations from the mean that have been empirically observed in financial markets. Despite this well-founded criticism as well as the existence of heavy-tailed alternative models, the general applications of the Capital Asset Pricing Model (CAPM) and the Black-Scholes-Merton Options pricing framework make use of the normal distribution assumption, and are among the most widely used models in finance today. The main reasons for maintaining the normal distribution assumption, despite contradictory empirical evidence and better fitting models, is ease of use and intuitive results. Extensive research, closed-form solutions, and convenient mathematical properties have also contributed to the wide application of the normal distribution in finance.

To date there have been two main criticisms of the normal distribution assumption as *applied to financial metrics* such as revenue or EBITDA, namely, (a) that the tails of the normal distribution are too heavy[146] and can result in metric growth rates that are too extreme; and (b) assuming that growth rates of the underlying metric are normally distributed results in a lognormal distribution for the underlying metric, which precludes the possibility of the underlying metric going negative.

For the first ("tails too heavy") criticism, there are few models commonly used in practice that have tails thinner than a normal distribution. However, a financial metric that has thin tails can in most cases be adequately modeled using a normal distribution with a commensurately low volatility assumption. There may be cases, however, where the underlying metric has a definite limit (e.g., a production constraint could limit the near-term upside for revenues) and the probability of reaching this limit is significant. In such cases, the use of the normal distribution might not be appropriate. An alternative is to transform the (constrained or thin-tailed) distribution in a manner that is consistent with modeling in a risk-neutral framework, as discussed in Wang (2002).

For the second criticism, it is true that a lognormal distribution cannot fully represent the distribution of a metric that can go negative, such as an earnings-based metric. Fortunately, earnouts are typically structured to incentivize substantially positive earnings, in which case the impact of modeling negative outcomes as if they were small, positive outcomes is often negligible. However, there are cases where the probability of future earnings going negative is not *de minimis* and has a significant impact on the

[145] As described in Section 5.4.3, there is an exception related to diversifiable events. If the metric distribution is substantially lumpy or asymmetric due to future diversifiable events (such as success of product development efforts), it is relatively straightforward to incorporate the impact of the resolution of such events on the metric distribution into the modeling.

[146] In contrast to equities, where the criticism is that the tails of the normal distribution are *not wide enough*, revenue and EBITDA might tend to have *narrower* tails than a normal distribution due to real world constraints such as, for example, capacity (on the high end) and already booked or repeat business (on the low end).

value of the contingent consideration. In such cases, one can still maintain the normal distribution assumption either by basing the model on pre-earnings financial metrics (such as revenues) or via the use of more sophisticated techniques. These alternatives are described in more detail in Section 10.3.6.

While the application of the normal distribution to equity/asset returns has become widely accepted, and the application of options theory to financial assets that are not traded in the market has been around for more than 20 years (see Section 10.3.7), the use of a normal distribution to model growth rates of underlying financial metrics is relatively new in the context of contingent consideration valuation. At least some justification for the use of the normal distribution to model financial metrics can be inferred from the correlation between movements in a company's equity/asset value and its financial metrics. However, similar to most applications in finance, the primary reasons for applying the normal distribution assumption to financial metrics are ease of use and mathematical tractability. In particular, the normal distribution assumption facilitates the use of a risk-neutral framework that can easily incorporate the impact of the nonlinear payoff structure of an earnout into the valuation. The normal distribution assumption is also the limiting case of a random walk and is generally justified by the central limit theorem. As such, the normal distribution tends to be a natural and objectively defensible model for financial metrics where there is no well-established alternative.

10.3.6 Characteristics of a Geometric Brownian Motion, Extensions and Alternatives

As discussed in Sections 5.4.3 and 10.3.5, when the characteristics of a GBM are substantially deficient (or contradict) the distribution of the underling metric being modelled *and* this deficiency is anticipated to have a significant impact on the value of the earnout, then a valuation specialist should consider alternative models that resolve these deficiencies.

Below are some key characteristics of a GBM to consider when determining whether it is an appropriate model. A GBM process S_t has the following properties:

- Growth rate of S_t is assumed to be normally distributed (i.e. Log (S_t/ S_{t-1}) ~ Normal)
    - Alternative models with non-normal increments could be considered (for example, one may be able to apply a more generalized Lévy process).
- S_t is always positive
    - If there is a significant probability of the earnout metric going negative and this would significantly impact the earnout payment, then the valuation specialist may want to consider a model that allows the metric to go negative.
    - For example, suppose EBITDA has a substantial probability of being negative in one year and clawback payments are based on one-year EBITDA thresholds that are negative. Then the valuation specialist could consider performing the entire analysis based on revenues (converting thresholds, caps, tiers, etc. from EBITDA to a corresponding revenue amount). Since revenues are typically not negative, the issue is circumvented.
    - Alternatively, if conversion to revenues is problematic, the valuation specialist could assume Arithmetic Brownian Motion (ABM) for the underlying metric. ABM allows the underlying metric to go negative while still preserving the tractable properties of the normal distribution assumption.
    - Yet another option is to transform the distribution to a non-negative distribution in a manner that is consistent with modeling in a risk-neutral framework, as discussed in Wang (2002).

- S_t is continuous with respect to time t (i.e. there are no "jumps")
    - If the distribution has jumps (is "lumpy") due only to the uncertainty around a small number of discrete events with *diversifiable* risk, such as outcomes of R&D programs, the valuation specialist can often take such diversifiable events into account via defining scenarios based on the outcomes of these diversifiable events, computing the payoffs in those scenarios (which no longer have a "lumpy" distribution and so are appropriate for the application of a GBM), and probability-weighting the payoffs in those scenarios.[147]
    - If there are significant discrete drops or jumps in the metric distribution due to a *non-diversifiable* risk, one may want to consider a model that allows for these "jumps" like a jump diffusion model.
- Correlation(S_t, S_{t+k}) $= \left(e^{\sigma^2 t} - 1\right) / \sqrt{\left(e^{\sigma^2 t} - 1\right)\left(e^{\sigma^2 (t+k)} - 1\right)}$
    - Subsequent realizations of a GBM usually have a strong positive correlation (> 50%). This characteristic is also generally true for subsequent financial metrics. However, if this assumption is significantly deficient (e.g. if subsequent year's financial metric is anticipated to be negatively correlated with each prior year) and this has a significant impact on the value of the earnout, then the valuation specialist may want to model each period-specific underlying metric as a separate GBM, and apply a specific correlation between the GBMs.
- Volatility of S_t is a known constant (or a known deterministic function)
    - Alternative models to GBM can assume that volatility has its own stochastic process, for example, the Heston Model.[148]

Models such as Arithmetic Brownian Motion, a more generalized Lévy process, and the Heston Model generally increase complexity and can introduce additional issues as compared to a GBM. These models are less well understood and have been less frequently studied as compared to the widely applied GBM. Since consideration should be given to the trade-off between computational complexity versus a more accurate representation of the real-world metric distribution, the usage of these alternative models should be rare.

10.3.7 Academic Support for Use of OPM for Non-Traded Financial Metrics

The academic support for the concepts presented in this Valuation Advisory starts with the literature on option pricing theory. Examples of this vast literature that are referenced in this Valuation Advisory include the 1973 papers "The Pricing of Options and Corporate Liabilities" by Black and Scholes and the "Theory of Rational Option Pricing" by Merton, the 1979 *Journal of Financial Economics* article "Option pricing: A Simplified Approach," by Cox, Ross, and Rubinstein and the textbook *Principles of Corporate Finance* by Brealey, Myers, and Allen.

More specific to the application of options theory to assets and liabilities that are not traded in the market is the literature on real options. Textbooks on this topic were published starting in the 1990s. Examples of textbooks on real options include *Options, Futures, and Other Derivatives* by Hull (first published in 1995, see e.g., Chapter 34, "Real Options" in the 2011 edition), *An Applied Course in*

[147] Similar modeling of such events should also be included in the valuation of the business, if the resolution of the uncertainty significantly impacts the value of the business.
[148] Heston (1993), "A Closed-Form Solution for Options with Stochastic Volatility with Applications to Bond and Currency Options."

Real Options by Shockley (2006), and *Real Options: A Practitioner's Guide* by Copeland and Antikarov (2001).

There is also a robust literature associated with the insurance industry on pricing risks, including the pricing of contingent payoffs where the underlying asset or liability is not traded. See, for example, "Modern Valuation Techniques" (Jarvis et al., 2001) and "A Universal Framework for Pricing Financial and Insurance Risks" (Wang 2002).

The literature specific to valuing earnouts (as opposed to the more general literature on the application of options theory to valuation of untraded assets/liabilities in general) was thin until recently. This was part of the motivation for this Valuation Advisory. The literature includes a 2005 textbook by Arzac entitled *Valuations for Mergers, Buyouts, and Restructuring* (see chapter 10.6 in this textbook, "Earnouts as Options on Future Cash Flows"), a 2009 *Business Valuation Review* article by Tallau entitled "The Value of Earn Out Clauses: an options based approach"[149] and a 2012 *European Journal of Operation Research* article by Lukas, Reuer and Welling entitled "Earnouts in merger and acquisitions: a game theoretic option pricing approach." Members of the Working Group and other valuation professionals have also made numerous presentations on this topic at various conferences, including conferences of the American Society of Appraisers and the American Institute of Certified Public Accountants dating back at least to 2009.

The literature on estimating betas is extensive, and includes literature on asset betas, revenue betas, issues relating to short vs. long-term betas, etc. Examples of the literature related to revenue betas (which tends to be less well known than the literature on betas more generally) include the textbooks by Hull (2011) and Brealey, Myers and Allen (2013), along with *Cost of Capital* by Pratt and Grabowski (2014).

Lastly, we note that in general for business valuation, the models don't change depending on whether what's being valued is a public (traded) or private (untraded) business. The same is true for options. We therefore end this section by quoting Stewart Myers:[150]

> "*A misunderstanding you run into is the idea that it is somehow inappropriate to use option pricing techniques in a corporate setting when you are dealing with non-traded assets. You hear this again and again from very sophisticated people. And it reflects a misunderstanding of what corporate finance is all about…*"

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