Introduction

1.1 WHAT WE SHOULD KNOW TO VALUE A COMPANY

This book is based on the idea that mastering valuation techniques is possible only after having gained a sound theoretical knowledge. But theory is not enough. In order to evaluate an enterprise or an acquisition, an analyst should have enough first-hand experience: such experience usually does not depend on the quantity of the previous valuations carried-out but on the quality of the work done.

A distinguishing feature of the valuation process is that to produce convincing valuations, analysts should master various areas of expertise, and three in particular:

1. *Industrial economics and business strategy* with reference to the analysis of the industry and competitive context devoted to understanding the validity of the company's business model, its past results, and its future plans
2. *Theory and techniques of finance* with regard to the basic principles of net present value, to the underlying links between leverage and value, to models that explain stock prices on financial markets, and finally to the techniques which correctly depict the business plan in terms of cash flow
3. *Economic theory,* in particular with regard to the relationship between uncertainty and value[1] in all those cases in which the simplifications assumed in the standard models presented in the finance textbooks do not permit the development of convincing valuations

Despite the fact that theoretical contributions in all three disciplines are widely known, valuation is more than a collage of knowledge and technique.

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[1]One of the limitations of such models is the assumption of normal distributions of results. In such a case, the highest probable expected output is the average output. Quite often, though, prospective results are mutually exclusive, thus making expected "average" results unlikely. The very idea of *average* thus loses its significance.

In a valuation, critical drivers are so bound together that the real distinguishing element is the "glue" that holds them together. This glue consists of the ability to balance the different choices made in each phase of which the evaluation process is composed, of correctly weighing the empirical evidence, and of the ability to perform coherent estimates within the final objectives of the valuation work.

1.2   VALUATION METHODS: AN OVERVIEW

Finance textbooks offer several different options to perform the valuation of a firm or of an acquisition. Furthermore, financial institutions and consulting firms typically work out tailor-made models expanding the spectrum of available techniques. In the end, in assessing value of firms belonging to particular industries, several empirical techniques have gained quite a standing among practitioners.

Given the number of methodologies made available by theorists and practitioners, we find it useful, before getting into the core of this book, to explore a classification of the most widely used methodologies (Exhibit 1.1).
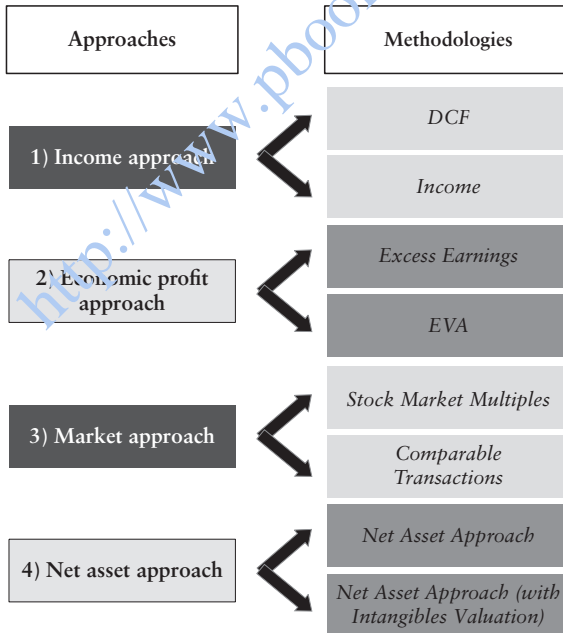
Exhibit 1.1   An overview of the main valuation methodologies/approaches

Exhibit 1.1 shows that the methodologies available (excluding simplistic empirical approaches) can be grouped into four fundamental approaches, each a function of the relevant link between corporate value and relevant value driver. A methodology is then a choice of the relevant driver, chosen out of the above-mentioned four approaches in order to assess value:

1. Income approach
2. Economic profit approach
3. Market approach
4. Net asset approach

The first approach expresses the value of a company or an investment as a function of the expected returns it generates. The so-called financial method (or, better, discounted cash flow, or DCF) falls into this approach and is the methodology most consistent with those found in standard finance textbooks.

The second approach is based on the idea that the value of a company is determined by two components: net asset value and earnings that exceed the "normal" return of the assets (economic profit is then the difference—when positive—between realized returns and "normal" industry returns).

The third approach is empirical: valuations are performed through a comparison with comparable assets traded on the market.

Finally, the fourth approach determines value from the estimation of the assets (tangible and intangible) that, net of the liabilities, constitute the net invested capital of the firm.

1.2.1 Common Practices in the Accounting and Financial Communities

Often, professionals separate methodologies into two main approaches to valuation: the first is the standard practice adopted by the financial community; the second one is the most widely used by accounting professionals.

The common practice in the financial community can be traced back to the methodologies adopted by investment and merchant banks—in particular:

- The DCF method based on the discounting of future cash flows derived from the company's business plan or assumed by the analyst
- Stock market multiples or multiples derived from comparable transactions

In other professional fields, the other methods set forth in Exhibit 1.1 seem to be preferred, partly because of cultural affinities and partly because of the specific goal of the valuation.

Indeed, some methods (particularly those based on excess earnings):

- better fit into some economic and accounting environment;
- follow, therefore, a logic more understandable to the actors for whose benefit the valuation is performed; and
- allow one to effectively and convincingly deal with special valuation problems, such as third-party interests or tax benefit valuations.

1.2.2   Approach of This Book

Despite the widespread use of alternative methodologies, most of this book will be devoted to the DCF analysis.

The reason for this choice is that DCF valuation processes allow a clear focus on the fundamental principles underlying valuation conditions that need to be met, and also when the professional believes a different methodology to better fit the final valuation objective.

In this chapter, we introduce, following a logical order that teaching experience has shown to be effective, the basic principles and themes that form the pillars of the DCF valuation approach:

- The net present value (NPV) principle
- How to deal with uncertainty
- The relationship between uncertainty and value
- The need for preventing, when possible, subjective judgments in value determination

1.3   THE TIME VALUE OF MONEY

Irving Fisher is considered the founding father of modern finance theory, not only for his market equilibrium model, which explains investment and consumption decisions, but also because of his almost-obsessive insistence on the need to determine any asset value exclusively as a function of its expected discounted cash flows.

Thanks to Fisher, since the early 1920s the main building block of valuation has been identified as follows: any asset value (financial or real) is a function of the cash flows it can generate and of the time distributions of the cash flows.[2]

Through Fisher's contribution, the concept of *time value of money* became solidified, thus building the rationale for the universally agreed need for a present value approach to valuation.

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[2]Irving Fisher, *The Rate of Interest* (New York: Macmillan 1907) and *The Theory of Interest* (New York: Macmillan 1930).
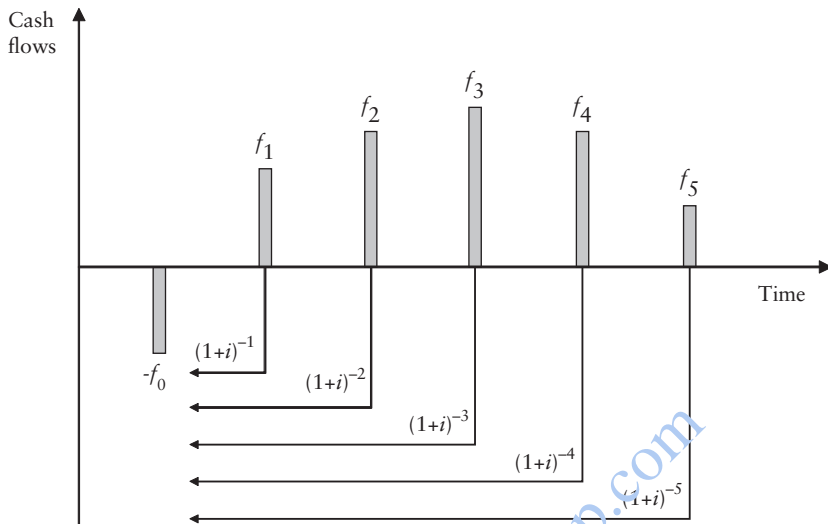
Exhibit 1.2 Investment cash flow profile and mechanics of discounting

So, without uncertainty, or, as it is often said, in a deterministic framework, an investment, firm, or more generally any asset value can be obtained by the following:

- Calculate the asset relevant cash flows and their time distributions.
- Discount any cash flows at a rate expressing the time value of money.

Typically, this rate is the return rate of investments whose issuers are virtually free of any insolvency risk, such as government bonds (so-called *risk-free* rate). Exhibit 1.2 shows the concept.

1.4 UNCERTAINTY IN COMPANY VALUATIONS

In order to set forth in an organized fashion the crucial problem of every evaluation, it is necessary to understand the reasoning that guides the process of valuation in a context in which the results of an investment, or of a business, cannot be certainly determined in advance, but can only be estimated.

In order to introduce the problem of uncertainty with the pragmatic approach more suitable to the needs of a business or financial analyst, it is useful to start from some basic concepts:

- *The performance of industries is characterized by different degrees of predictability and, therefore, uncertainty.* For example, trend in demand

in the public utilities sector shows a significant correlation with the trend in the GDP, or the total family income. In other sectors, demand is a function of different macroeconomic variables, such as industrial investments, interest rates, etc. Generally, though, these correlations are more weak because some factors, such as lifestyle evolution or consumer behaviour, can have a great influence on the demand. Further, some other industries are extremely sensitive to economic trends (typically, the intermediate sectors, investment goods sectors for which demand is formed by other industries). Finally, some industries are less cyclical (e.g., some food sectors, and the pharmaceutical industry).

- *New ventures, or firms that develop innovative strategies, face a different kind of uncertainty than traditional or consolidated industries.* In fact, in traditional industries historical information helps to identify systematic correlations between the economic environment and a firm's expected results. In innovative ventures lacking significant historical comparisons, uncertainty can be associated with the idea of probability as an expectation of future events: therefore, estimates are largely subjective (uncertainty = belief).[3] Such a concept of uncertainty, in general, is contrasted by academics with the notion of probability that past events repeat themselves (in such case, the concept of probability is associated with that of frequency).

- *Firms, as organizations of individuals competing on the market, generate evolutionary phenomena that constitute risk factors for other firms, which in turn react by generating new changes.* Therefore, we must abandon the idea, implicitly accepted by finance theorists, that uncertainty is a situation passively faced by firms. In the real world, uncertainty is managed by firms that seek to exploit favorable opportunities and limit the downside of unfavorable events. Management, indeed, by its own decisions continuously molds the risk profile characteristic of its core activity. That is, management style, interaction with the economic environment, and adopting innovative approaches rather than passive adaptation are fundamental factors in adjusting the degree of uncertainty associated with external factors, common to all the firms belonging to the same strategic business area.

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[3]It's well known that the different phases of the life cycles of firms and industries are characterized by different levels of uncertainty. Scholars are of the opinion that there exists a stable and demonstrated relationship among the risk profile type of industry and life cycle of the very same industry. In the initial phases of the cycle (so-called "introduction" and "development"), the risks are particularly elevated, with the consequent possibility of huge losses of invested capital. In general, in the innovative sectors uncertainty and the difficulty of forecasting are well-known risk factors.

In the valuation of investments, acquisitions, or businesses, different forms of uncertainty can coexist—although, generally, one form tends to prevail over the others.

On the one hand, there are valuations of companies that operate in highly stable macroeconomic contexts, in highly predictable industry, and whose future performance is characterized by high visibility. Such cases of "easy" valuations become less and less frequent in the current context of erratic economies and turbulent financial markets.

1.4.1 Organizing the Analysis

Financial analysts approach the issue of uncertainty in forecasting by adopting logical tools and models developed in the area of industrial economics and of strategy. Exhibit 1.3 shows a simplified description of a typical analysis workflow.

Business Model Analysis Typically, analysts use the expression *business model* to assess the characteristics of the products or services offered by a firm, the marketing choices adopted, and the production decisions. In the business model analysis, analysts seek to understand the cost/revenues structure of the firm or of the investment project. An example can help clarify the concept.

Alpha is the European leader in automated equipment for manufacturing and packaging for the pharma industry (blisters, boxes, wrappers, case packers, and palletizers). In the pharma industry, a fundamental feature of production equipment is reliability while price is a secondary issue. Alpha has consolidated its leadership position by systematically investing a significant portion of its revenues in improving equipment for specific functions and researching innovative technical solutions. Non-core components production has been assigned to different companies. Equipment is marketed by a European and North American distribution network. Technical support, spare parts sales, and equipment updates represent a significant fraction of the overall gross margin.

Business Model Analysis

⬇

Market and Competitors Analysis

⬇

Risk Profile Analysis
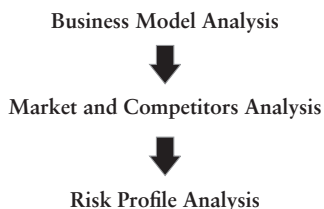
Exhibit 1.3 Uncertainty analysis

This scant information defines the "business model" and lets us understand that the revenue share emerging from equipment sales, being related to the pharmaceutical industry, is only marginally affected by cycles and is complemented by further revenues, with high margins and no cyclicity (as, for instance, in the after-sales support business).

Under the cost structure planning, assembly, setup, and a significant share of the R&D costs are largely inelastic, because they require a highly specialized staff, which is a strategic resource of the company and is fundamental to the growth outlook for Alpha.

Production costs are, on the other hand, relatively flexible: as previously noted, Alpha assigns the manufacturing of noncore components of its own products to a small selected number of suppliers, mostly located in the same geographical area.

Market and Competitors Analysis The next step consists of the analysis of the environment external to the company, in order to understand the firm's market positioning relative to competitors and therefore the prospects for growth and profit. At this stage the analysis focuses on the business lifecycle and the competitive pressure which characterize the industry, the threat of substitute products, the entry barriers and potential competitors, and the relationship between customers and suppliers.

In the Alpha case, the pharmaceutical industry is characterized by a sustained growth rate, both in Europe and in the USA (over 7% per year in real terms). Industry analysts believe this trend is destined to last in the future.

By examining balance sheets for the most important pharmaceutical firms, one observes a strong correlation between revenue growth rate and spending on technical investments.

Just a small number of competitors are active in Alpha's market niche. Potential supply is represented by packaging equipment firms, which generally develop less reliable technologies than the standard pharma industry requirements.

Risk Profile Analysis Typically the assessment of risk profile begins with a classical SWOT analysis of the competitive environment and the competitors.[4]

The case under consideration doesn't show significant risk factors: entry in the industry is limited by specific technical competence needed to produce

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[4]The most widely used models are the Porter five forces—Michael Porter, *Competitive Strategy* (New York: The Free Press, 1980)—and the strategies and competitive advantages matrices—M. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York: The Free Press, 1985).

the equipment targeted for the pharmaceutical industry and by the market reputation of Alpha. Thus, there are no reasons to induce the analyst to delineate alternative competitive scenarios (for instance, the entry of a new-comer with resulting reduction of market share or margin squeezes). Yet, this approach can be easily shared provided Alpha can keep up with a growth rate consistent with the pharma industry rate and can complete its product range by acquiring competitors working in related market niches.

Consolidating Alpha's market share could allow for an extension of the product range offered: from mere equipment sales to planning the whole production cycle as a general contractor. Moreover, Alpha could step into the business machines used in the cosmetic industry that, although not as demanding in terms of the technological specifications as the pharma industry ones, show significant similarities.

1.5   UNCERTAINTY AND MANAGERIAL FLEXIBILITY

In a traditional approach, closer to financial modeling than strategic analysis, estimate of value stems from a passive attitude toward risk. Yet, we have observed that in reality businesses are by far more articulated: in fact, up to a certain level, the phenomena of change can be managed or turned to one's favor through opportune intervention.

1.5.1   Static versus Dynamic Assumption

As a first step, when facing the valuation of an investment plan, acquisition, or firm, it is worth asking which standpoint should be adopted:

- A static view assuming that the current business model will continue to work as it is
- A dynamic view which takes into account the adaptation of the business model to new scenarios

If we want to frame the issue in general terms, the valuation boundaries are determined—with regard to the choice of the correct standpoint—by two main factors:

1. The level of uncertainty, which characterizes the estimate measured as the impact that information unavailable at the time of the valuation can have on the valuation result itself; or, in other words, how far it is from the idea of probability based on the repetition of past results
2. Managerial flexibility—that is, how much the business model allows management to handle unfavourable scenarios or pick new opportunities in favorable situations
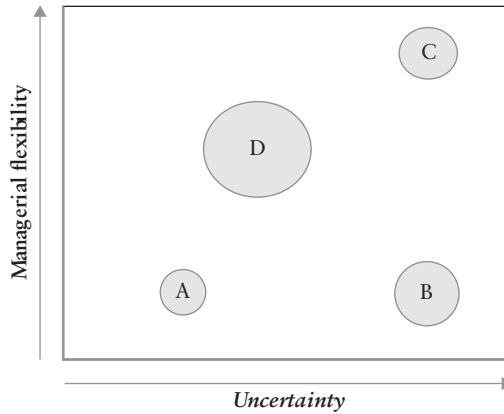
Exhibit 1.4   Valuation framework as a function of uncertainty and managerial flexibility

Exhibit 1.4 presents a graph that permits us to frame the context that drives the valuation with respect to the degree of uncertainty and management flexibility.

Limited Uncertainty and Flexibility   In Exhibit 1.4, area A identifies situations in which the frame of reference of the estimate is delineable in clear terms and the business model does not permit significant room to manoeuvre. A typical example is the business of gas and electricity grids; in these business areas, results emerge from a model in which relationships between macroeconomic variables, tariffs, transported volumes, and costs are definable with a close approximation and can be consistently projected in the future with a high degree of credibility.

Uncertainty factors consist of the evolution of energy consumption that, as is well known, is a function, in the short term, of climate factors and, in the long term, of the general trend of the industry as a whole; changes in industry regulations; and the intensity of competitive pressure from the supply side.

In these businesses, shifts in consumption translate directly into operating margin decreases/increases since the cost structure is extremely rigid and management has very limited flexibility to keep up with unfavorable trends in demand.

In the previously sketched framework, the representation of uncertainty is consistent with the assumptions generally adopted by finance textbooks. In particular, it is possible to forecast different scenarios and to expect credibly that realized results of the business will fall in between the two most extreme cases (the most and the least favorable).

To keep the analysis simple, analysts in general limit themselves to just three scenarios (optimistic, the most probable, and pessimistic). Therefore, uncertainty can effectively be depicted by means of a triangular distribution.

In the case of public utilities, the gap between scenarios is generally quite small; in other industries, the gap can significantly widen. Generally speaking, the scenario expected in average conditions is also the most likely to happen. Exhibit 1.5 graphically depicts the point.

In the framework similar to Exhibit 1.5, it is not unusual for analysts to work out only the most probable scenario[5] with respect to cash flow projections.

High Uncertainty and Limited Flexibility   Area B in Exhibit 1.4 identifies those situations in which information useful to assess the performance of a business is not available at the time of the valuation, and flexibility to manage unfavorable events or to improve favorable ones is very limited.

For example, a company in the waste management industry had assumed the construction of a new landfill in its business plan. The project kickoff, though, was under litigation with the environmental groups that opposed the project, despite the fact that set-aside for dumping was a part of a regional plan.

The legal experts had identified a negligible risk of abandoning the project.
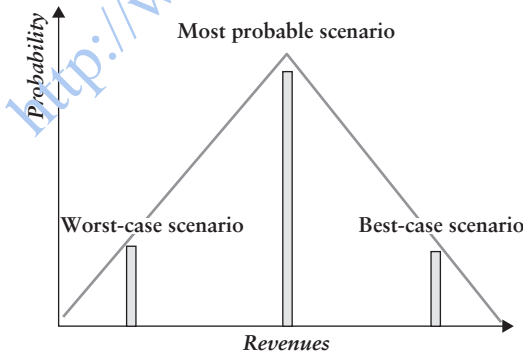
Exhibit 1.5   Moderate uncertainty scenario

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[5]With asymmetric probability distributions, the most likely scenario is different from the expected scenario.

In similar situations, the following procedure could be adopted that has the merit of highlighting the risk profile of the venture:

- Delineate the scenarios (in our case, accomplishment of the dumping or abandonment of the venture).
- Calculate the net present value for each of the scenarios.

The procedure described has unquestionable effectiveness in terms of information transparency: it avoids the assessment of an "average" result (the mathematical average of two different scenarios) because this "average" event cannot, by definition, take place.

An example can clarify the idea. The existing landfill can generate returns equal to 400 per year, in the most probable scenario. The construction of the new facility can generate additional returns of 1,200. The total expected returns if the project is completed are therefore 1,600. Yet, the probability of making the second facility is 50 percent. Exhibit 1.6 depicts the situation.

One can see that the representation is very different than that presented in Exhibit 1.5. In this case, the uncertainty framework is closer to a coin toss: as a matter of fact, either you get the favorable scenario or the unfavorable one.

In valuating businesses, similar situations are rather frequent and involve:

- The valuation of start-ups, of ventures in the initial phases of their life cycle, and of innovative businesses
- The valuations with specific risk characters (e.g., license or contract renewals, environmental risks, strategic supplier dependence, high customer concentration, dependence on key persons)
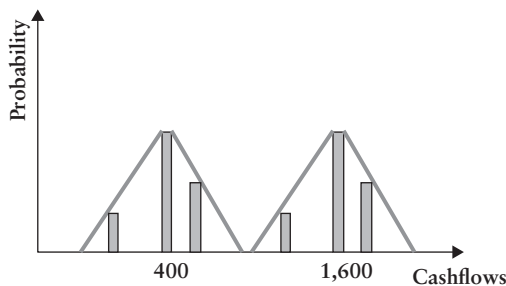
Exhibit 1.6   High uncertainty scenario

High Uncertainty and Flexibility Area C in Exhibit 1.4 depicts situations in which high uncertainty is accompanied by a wide range of managerial choices, which can, consequently, open new scenarios (in other words, some scenarios are extremely management decisions–related, decisions that can be the response to alternative scenarios).

Going back to the public utilities case, many analysts have approached the valuation of energy distribution firms by estimating the value of the growth opportunities offered by the option of using the commercial network to offer different services to the final users.

Given the uncertainty associated with such initiatives, it is reasonable to assume that a multiservice business model can be developed using a step-by-step process: the firm can, in an early stage, offer just services related to the core business (e.g., combine the energy distribution with the sale activities, installation and maintenance of home appliances), to further expand into a wider range of services in case of success of the *trial phase* (in-house insurance, consumer credit services, etc.).

Average Uncertainty and Flexibility In Area D in Exhibit 1.4 fall the situations that form the background of an evaluation: the scenarios can be credibly delineated and it is likely that management can take the necessary steps or seize the opportunity offered by change.

With regard to the situations referred to in Area C of Exhibit 1.4, change does not arise as a disruptive and intermittent phenomenon, but can lead back to the observable dynamics of the present.

As an example, in the valuation analysis of an important business in the spirit industry, the team doing the business analysis had described two scenarios. The first assumed decreasing sale volumes, consistently with the life cycle of a mature industry as observed in other firms within the same industry. The second one assumed instead, due to the strong brand value, a constant sale volume not affected by the general trend in the industry.

Given the notoriety of the brand and the strength of the commercial network of the business, it was unlikely to assume that management would have reacted passively to a reduction in sales. More realistically, it would have differentiated the products between the traditional ones and the new ones ("white" spirits, etc.).

Therefore, considering the operational flexibility permitted by the strength of the brand, the unfavorable scenario was modified assuming, after an initial decrease in sales, a return to the original levels with slightly lower margins given the increase in advertising costs.

The example shows a typical process of financial analysts, which translates into an upgrading of expectations in comparison to the industry due

to the strength points of the business that confirm the hypothesis that the management can effectively react to unfavorable market conditions.

Obviously, the opposite reasoning also holds: when the firm under valuation is weaker than competitors, the average industry expectations can be modified and generate worse scenarios.

Growth opportunities for firm Alpha can also fall in Area D of Exhibit 1.4. Entering the business of packaging for cosmetic products and offering new services to pharmaceutical companies are a natural evolution of the core business of Alpha. Alpha has in fact adequate technological and managerial resources to sustain growth in those businesses which are similar to the niche in which it already has a leadership position.

1.5.2   Some Conclusions on Uncertainty and Managerial Flexibility

The approach outlined in the previous paragraph departs from traditional analysis since it tries to contemplate whether, with different scenarios, the firm's business model can be adapted to new assumptions and what those assumptions imply in terms of the creation of value.

From a historical standpoint, the first attempts to assess managerial flexibility, when future opportunities in the evolution of a business exist, have concerned themselves with R&D investments, brand and patent acquisition, development of new technologies, and the research and exploitation of natural resources. These attempts assume as a starting point the explicit representation of a firm's results as a consequence of managerial decisions expected to be taken in the future. Generally speaking, these methodologies today fall into the field of so-called real option valuation (ROV).[6]

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[6]For introductory reading on applications of real options in capital budgeting and investment policies, see Chapters 1 and 2 of A. Dixit, R. Pindyck, *Investments under Uncertainty* (Princeton, NJ: Princeton University Press, 1994), and W. C. Kester, "Today's Options for Tomorrow's Growth," *Harvard Business Review*, 60 (1984): 153–160. For an in-depth presentation of the real option applications, see L. Trigeorgis, E. S. Schwartz, *Real Options and Investment under Uncertainty: Classical Readings and Recent Contributions* (Cambridge: The MIT Press, 2001); N. Kulatilaka, M. Amram, *Real Option: Managing Strategic Investment in an Uncertain World* (Boston: Harvard Business School Press, 1999); T. Copeland, V. Antikarov, *Real Options: a Practitioner's Guide* (Texere, 2001). Though the real option approach is extremely insightful in terms of the logic underlying investment decisions, its real-world applications are limited; therefore this book will not cover the real option issue.

In this framework, the value of a project is just the sum of two elements:

$$\text{PROJECT VALUE} = \frac{\text{Base value in a}}{\text{static framework}} + \frac{\text{Value generated by new}}{\text{choices and opportunities}}$$

1.5.3   Valuing Companies Assuming a Dynamic Standpoint

The dynamic approach was first used in valuations of Internet companies and Internet stocks.

Looking at the background in which the so-called *new economy*–related ventures originated at the end of the nineties, we can identify the typical characteristics referable to area C of Exhibit 1.4:

- The operators' expectations assumed strong growth in the market.
- A high degree of uncertainty characterized the assumptions about Internet users' behavior and technological evolution.
- Entry barriers on the market were modest: Internet companies could have adapted the business model to eventual shifts.

After the radical U-turn in scenarios and expectations with respect to high-tech stocks, in the first half of 2000, the dynamic valuation models have been harshly criticized. Despite many excesses, the euphoria that drove markets and the analysts has left us an important contribution: the models adopted and the debate that followed have brought attention, also out of the academic studies, to the fact that managerial flexibility can be an appreciable factor in the valuation of businesses and acquisitions, and not only in well-defined investment niches (R&D, natural resources search and development, etc.). On the practical side, the key issue of the dynamic approach is the need for restricting the analysis only to the credible development of a business model.

1.6   RELATIONSHIP BETWEEN VALUE AND UNCERTAINTY

The basis for the determination of the cash flow that best represents the future expected performance of the business lies in the analysis of the risk profile of the business itself. This section aims at classifying some typical situations of uncertainty, and at representing the cash flows that best describe them. Exhibit 1.7 provides us with a general initial reference framework, which by the way proves useful in multiple valuation settings as well by enabling the expert to carry out a more refined comparability assessment.

Exhibit 1.7 Risk profiles and cash flows modeling

Risk profile	Cash Flow Modelling	How to Structure the Valuation
Stable business model and continuity of the corporate strategy	Single dominant likely scenario	Valuation "as is": standard DCF valuation
Risks are mostly related to the whole economy/market		
Relevant changes of the business model/strategy are expected	Multiple scenarios	Scenario analysis valuation: average (weighted using scenarios probabilities) value in each scenario
Risks are mostly related to firm-specific factors		
Managerial real options are embedded in the expected strategy	Event tree Decision tree	Decision Tree Approach (DTA) or Real Option Valoation (ROV) approach

Exhibit 1.7 shows how valuations of businesses whose financial results are driven mainly by market factors or macroeconomic parameters are based generally on a single cash flow profile, referring to the scenario that management deems the most likely one ("management scenario").

These valuations yield accurate results only when the distribution of expected results is symmetric. This condition is satisfied, for example, when the relevant risk factors depict a continuous distribution. Furthermore, it should be noted that such cash flow representation type requires historical data be both available and reliable. When there are multiple risk factors, the traditional representation centered on the management scenario may lead to undesired informational gaps.

Simulation techniques, like for instance the Monte Carlo, may in these cases improve the informational quality through the use of numerous combinations of the risk factors, yielding different expected results and different related results and valuations.

A second case is represented by the businesses subjected to idiosyncratic risks, which by their own nature are characterized by discrete (and at an extreme binary) outcomes distribution (e.g., businesses whose activity is based on the renewal of a concession). In these situations, the informational quality increases by projecting a cash flow pattern in each of the major scenarios that could take place. In practice, a final valuation can be obtained by weighting the valuations obtained in the different scenarios. As said, it

is worth stressing the fact that this proceeding is sensible in those situations when risks have discrete distributions. Otherwise, the applicable case turns back to scenario A, which envisages the representation of the cash flow profile of only the most likely scenario.

For some businesses (case C of Exhibit 1.7), which are typically articulated along distinct sequential phases, risks depict a sequential structure in that value creation process is subordinated to the successful crossing of some key critical steps in the project life. This is the case, for instance, of some pharmaceutical businesses, or of the projects subjected to articulated authorization itinera (e.g., wind farms). In such situations, cash flow profiles linked to the business can be analyzed through the techniques of the event trees and of the decision trees. These techniques to deal with uncertainty have the advantage to highlight the key critical aspects in the formation of the value of a project along its life. Typically, during the initial phases idiosyncratic risks are the prevailing ones, and they can determine the survival or abandonment of an initiative. Once the uncertainty surrounding the first phases of the life cycle of an initiative has been solved, systemic (market) risk factors tend to emerge.

Such analyses on the risk profiles have important consequences on the choices regarding the determination of which is the most appropriate discount rate to be applied. Indeed, if the dominant risk is an idiosyncratic one, the risk-free rate can be used assuming a Capital Asset Pricing Model framework (Chapter 8). In the opposite case, some more complex techniques deriving from the valuation models of financial option should be used.