VALUATIONS IN TIMES OF CRISIS:
HOW TO INCREASE VISIBILITY ON MULTIPLES, FORECASTS AND SCENARIOS

MAZARS

ABOUT THIS DOCUMENT

This document restricts its analysis to the valuation of companies (i.e. the valuation of securities of these companies or equity value) as well as to the valuation of businesses (enterprise values.)

It is not intended to cover all aspects of an assessment (presence of non-operating assets, minority interests etc.), for which the reader should refer to more extensive works on the subject.

Furthermore, it does not aim to explain how to build re-forecasts or re-forecast scenarios, nor does it seek to identify the various strategic, operational and financial factors on which a differential analysis with comparable companies could be conducted to document different perspectives.

The document also does not deal with the risk of failure or bankruptcy in any specific way, nor does it deal with accounting standards when switching from the assumption of an operating business to liquidation.

What is presented in this document has neither prescriptive force nor force of recommendation, and it is not relevant in all circumstances. Its purpose is to discuss a type of approach using the information available in times of crisis, and to illustrate this approach through a simple modeling. It is up to the reader who wishes to apply such a process to make the necessary adaptations and process the transformations in order to match needs to a specific case.

The information, data and calculations presented have been prepared with utmost care. However, their precision, completeness, accuracy, applicability, transferability, are not guaranteed. Consequently, Mazars cannot be held liable for any direct use or indirect of the elements brought up in this document, nor for any error or omission that it would contain.

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INTRODUCTION

The Covid-19 pandemic reminds us of the difficulties inherent in factoring the impact of a crisis into asset valuation exercises.

The value of an asset is intimately linked to its ability to generate future probable gains: however, in times of crisis, the future is much more uncertain and the field of possibilities much wider.

Similarly, in times of crisis, common value approaches present their own set of difficulties. On one side, market-based approaches suffer from:

- highly **volatile**[1] market data,

- information on listed companies and their more **fragmented**[2] perspectives

On the other side, income-based approaches face two major problems:

- the ability to **re-forecast** in a context of uncertainty,

- the apprehension of the level of risk associated with these forecasts, and consequently the calibration that any risk premium will affect them.

Despite these difficulties, not all valuation exercises can be postponed in the expectation that a business will soon gain visibility of when a crisis will end. And, in fact, some valuation exercises can have major knock-on effects: for example, the impairment tests on goodwill, for which impairment losses recognised by companies are irreversible.

After recalling the main principles to be observed, depending on the context of the valuation, and the first actions and checks to perform, this document will focus on analysing in more detail the market-based methods, notably **multiple approaches.** In doing so, the study will connect these methods with income approaches (DCF[3]), and will highlight a number of risks and pitfalls when **implementing valuation** processes in a context of crisis.

Finally, in the course of the study, a general approach will emerge aimed at interpreting market developments in the form of a **configurable model**[4] **of the effects of the crisis.** This configurable model should increase understanding of the impairments of financial markets in times of crisis, while helping a business and its team learn what model presents a suitable course of action for them.

1. For example, the CAC 40 lost almost 40% of its value between the start of 2020 and mid-March, and then recovered more than 15% the following month, with still a high volatility.

2. Listed companies have massively withdrawn their pre-crisis forecasts, without immediately replacing them by new ones. In the meantime, the markets continued to function, and the ratings of financial analysts issued in the period incorporated estimates of forecast profiles issued by said analysts.

3. DCF or Discounted Cash-Flows: widely-used method consisting in computing the net present value of a series of free cash flows (forecasts). The document will assume this method known to the reader.

4. The modeling and parameters introduced within the framework of this document are only illustrative, they could misrepresent or be too imprecise the effects of the crisis for a given company.

EXECUTIVE SUMMARY ⌄⌄

The exceptional nature of a crisis leads to questions arising over the methods traditionally used during valuation exercises: the **simple application** of pre-crisis approaches can indeed **prove to be very dangerous**, in some cases by overestimating the effects of the crisis, or, on the contrary, by underestimating the loss of value.

This document recalls, firstly, the principles that should be observed when facing a crisis and the elements to be challenged within commonly-used valuation approaches. The study later examines the various tricks and traps that might lead to a mis-assessment.

Beyond these items concerning elementary, but also subtle, precautions to take, the document considers a **constructive approach** aiming to use as much

as possible available information in order to (i) re-calibrate the multiples or (ii) adjust the discount rate (through a risk premium) for the retained profile of forecasts.

Schematically, the approach is based on the fact that an impairment of the markets, for example a drop of 20% in a given sector, reveals little information as to the relevance of such a drop for a specific company.

It would obviously be easier for the company to be able to position itself among its peers (the above 20% drop is only an average for peer companies, the fluctuation could be higher.) This should be the case where the 20% drop could be broken down into several explanatory factors.
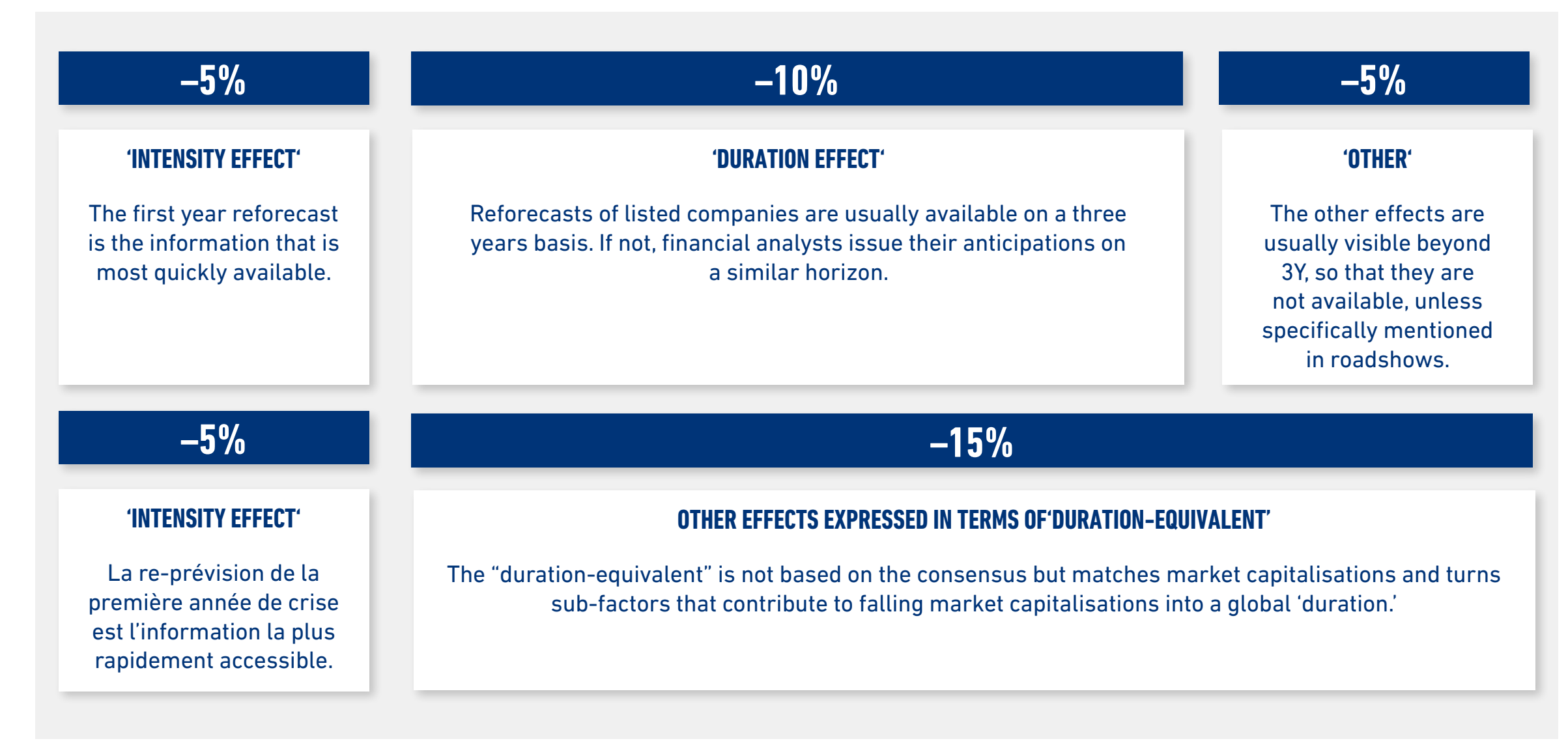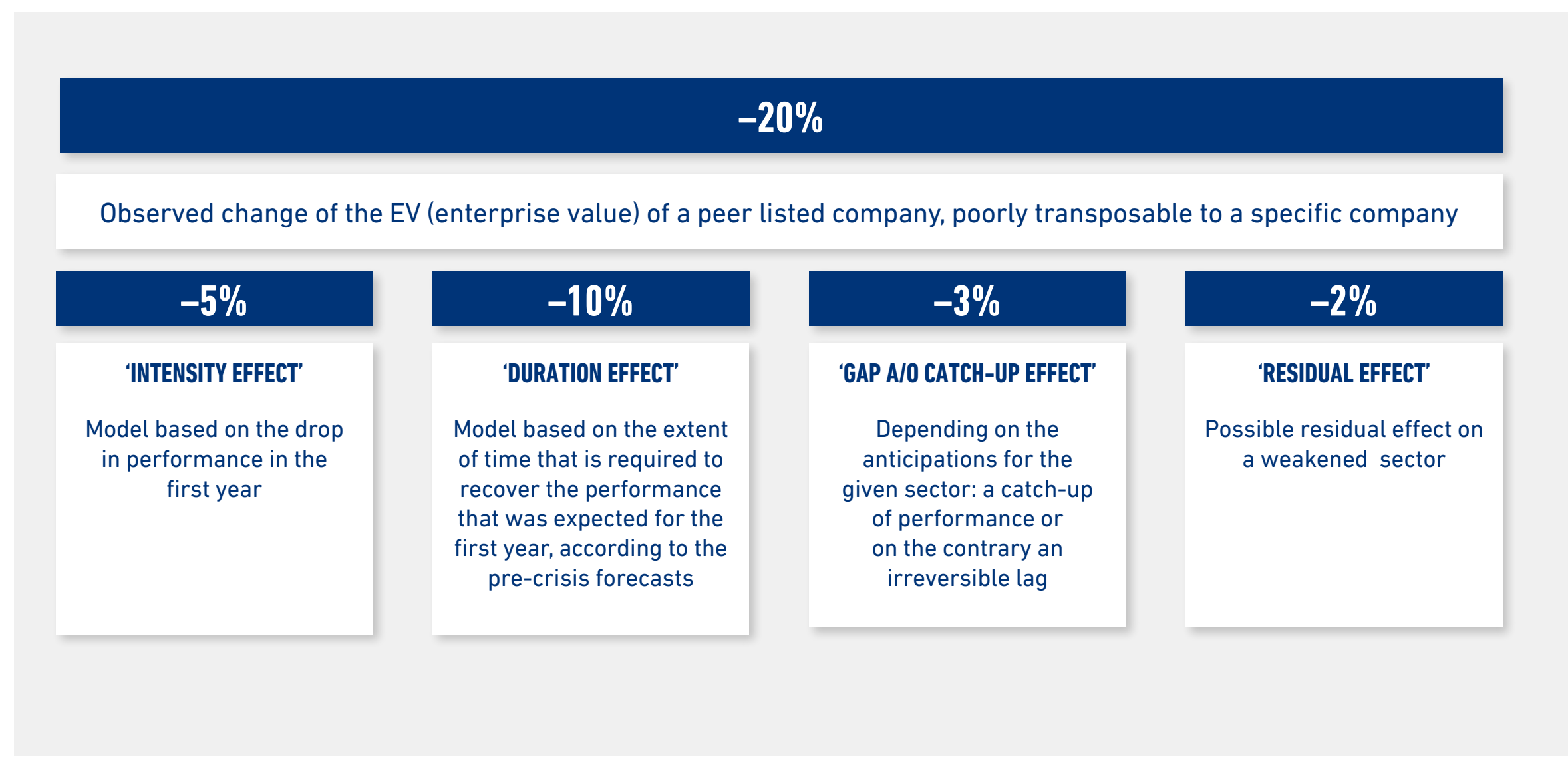
Below is an example of such an approach, where a **market rationale** is elaborated:

Such a rationale, which may be computed for each company among the considered group of comparable listed peers, provides valuable information when assessing the value of a specific company. Moreover, the model is also able to provide **the sensitivity of each "effect":** thus, any specificity of the considered company may have a consequence on the parameters (intensity, duration) involved.

For example, the "intensity effect" may widely differ for companies within the same industry; the company whose value is to be assessed may be able to take into account its own specificities, while still referring to an "analogical approach" (analogy with listed peer companies). Similarly, the duration of the crisis as "priced" by the markets on a given sector may provide important information as to the magnitude of the crisis and prove to be of valuable assistance when trying to get a range of possibilities for the forecasts of the company, which may still include some specificities.

For practical reasons, the available information on listed companies shall usually restrict the above-mentioned break-downs to the following simplified rationales:

−20%
Observed change of the EV (enterprise value) of a peer listed company, poorly transposable to a specific company

−5%	−10%	−3%	−2%
'INTENSITY EFFECT'	'DURATION EFFECT'	'GAP A/O CATCH-UP EFFECT'	'RESIDUAL EFFECT'
Model based on the drop in performance in the first year	Model based on the extent of time that is required to recover the performance that was expected for the first year, according to the pre-crisis forecasts	Depending on the anticipations for the given sector: a catch-up of performance or on the contrary an irreversible lag	Possible residual effect on a weakened sector

−5%	−10%	−5%
'INTENSITY EFFECT'	'DURATION EFFECT'	'OTHER'
The first year reforecast is the information that is most quickly available.	Reforecasts of listed companies are usually available on a three years basis. If not, financial analysts issue their anticipations on a similar horizon.	The other effects are usually visible beyond 3Y, so that they are not available, unless specifically mentioned in roadshows.

−5%	−15%
'INTENSITY EFFECT'	OTHER EFFECTS EXPRESSED IN TERMS OF 'DURATION-EQUIVALENT'
La re-prévision de la première année de crise est l'information la plus rapidement accessible.	The "duration-equivalent" is not based on the consensus but matches market capitalisations and turns sub-factors that contribute to falling market capitalisations into a global 'duration.'

These calculations, though simplified, are nonetheless effective insofar as they help companies with the positioning of their multiple adjustments, or with the elaboration of reasonable forecasts.

The study runs a model expressed in terms of multiples of free cash flows: Figures 13 to 15 display exhaustive multiple adjustments.

Discount Rate	BP CAGR	Pre-crisis EV (in x FCF)	Recovery period				
			1.0	2.0	3.0	4.0	5.0
9%	1%	13.1x	-1.1x	-2.1x	-3.0x	-3.8x	-4.6x
	3%	14.2x	-1.2x	-2.2x	-3.2x	-4.1x	-5.0x
	5%	15.5x	-1.3x	-2.4x	-3.5x	-4.5x	-5.4x
	7%	16.8x	-1.4x	-2.7x	-3.8x	-4.9x	-5.9x
	9%	18.3x	-1.5x	-2.9x	-4.2x	-5.3x	-6.4x
	11%	19.9x	-1.6x	-3.1x	-4.5x	-5.8x	-7.0x

Discount Rate	Initial Step-down	Recovery period				
		1.0	2.0	3.0	4.0	5.0
9%	-90%	0.1x	0.4x	0.7x	0.9x	1.2x
	-80%	0.2x	0.6x	1.0x	1.3x	1.6x
	-60%	0.4x	0.9x	1.5x	1.9x	2.3x
	-40%	0.6x	1.3x	1.9x	2.4x	3.0x
	-20%	0.8x	1.6x	2.3x	2.9x	3.5x
	0%	1.0x	1.8x	2.6x	3.4x	4.1x

In such a case, the pre-crisis multiple as at **16.8x** (9% WACC for a company whose pre-crisis forecasts reached a 7%/Year CAGR) would lower by −2.7 + 0.9 thus **−1.8x** (thus experiencing a −11% decrease), considering the two following crisis parameters, i.e. a performance drop for the first year as at −60%, and a 2Y crisis duration. The sensitivity of the multiples to these parameters are easy to retrieve: for example, a 3Y crisis would lead to a −3.8 + 1.5 de **−2.3x** adjustment, and a combination of it with an increased crisis intensity, for instance −80 %, the total incidence would therefore amount −3.8 + 1.0 soit **−2.8x**.

The reader should therefore refer to the last part of the document and notably to Figures 13 to 15, in order to grasp information as to the "adjusted multiples" deriving from this methodology. Of course, other parameters than the ones identified in the present study shall prove more relevant for a given industry. Nonetheless, the methodology shall remain similar: providing a rationale of the stock markets prices changes, expressed in terms of operational factors that are easier to understand and analyse.

Considering that this methodology deals with a model, the outputs are interesting when it comes to sensitivity and compared effects with peers. Such a study should be conducted for each sector, and in a more detailed basis on each group of peers.

For illustrative purpose, the study has been conducted on a number of macro-sectors:

In most of them, the total effect spreads from a fall of 6% to 15%, depending on the sector, on the duration of the crisis retained (consensus or more where relevant). For certain sectors though, markets experience a higher fall: this can be explained by several other reasons (see last chapter).

The present document acknowledges thata number of precautions must be taken, in terms of principles, in terms of challenges and criticism of the valuation approaches that are currently in force when facing a crisis event, and in terms of the implementation of multiples or DCF approaches.

These elements are summarised below.

The first analyses and thoughts to consider cover a broad scope: principles (transparency, documentation), compliance with the considered framework for the valuation (IFRS, USGAAP, national standards, or in application of contract or fund internal rules, or of guidelines such as IPEV) , and finally analysis of the relevance of current approaches:

FRAMEWORK & ENVIRONMENT OF THE VALUATION	Does the purpose/context (accounting, conventional or internal) of the valuation open-up the possibility of introducing changes in the valuation method, whether at the level of (i) the approach itself, or of (ii) the process of determination of valuation parameters?
AN ARGUED AND TRANSPARENT PROCESS	Does the valuation process include an argued documentation of: • The fact that the method in place is effectively unsuitable, in the context of the current crisis?; • The relevance and description of each change and choice made? Does the information transmitted to the stakeholders interested in the valuation include: • A description of the changes introduced and their limitation, given the reduced visibility?; • A sensitivity analysis that encompasses an extended range of values due to the reduced visibility?
MULTI-CRITERIA APPROACH	In times of crisis, relying on a single method is riskier than ever. A multi-criteria approach is recommended.
MARKET APPROACHES	Does the process include: • Verification of the level of trading volumes on the security observed (generally satisfactory in the case of the Covid-19 crisis)?; • Investigation of the actual representativity of each recent transaction, if any (rarer in times of crisis, and usually less representative)?; • Analysis of the series of changes in the share price, so that a more representative price than a spot price may be retained (should the standard/framework allows it)?; • Review of the peer group and identification of possible subgroups with differentiated behavior during the crisis?
INCOME APPROACHES	Does the process handle (as much as possible) the lack of visibility that makes difficult the elaboration of forecasts, for example through: • Issuance of a set of forecast scenarios?; • Documentation of parameters through cross-checkings with other approaches based on external data (eg market approaches and risk premiums)?

The above items deal with the methodology and the documentation of the valuation process. However, these are not the only topics to handle: the practical implementation of valuation approaches in times of crisis may also reveal unusual pitfalls.

These risks may be summarised as follows:

REDUNDANTLY TAKING INTO ACCOUNT THE EFFECTS OF THE CRISIS (IN FULL OR IN PART)	Market metrics are affected by the crisis. At first, the multiples facially decrease, but this trend actually relates to pre-crisis expectations. Therefore it should not be applied to forecasting or year-end projections that would take into account the crisis, to avoid double-counting.
VOLATILE MARKET DATA EXPOSURE	Markets grant a "price to the crisis" and to its uncertain general environment, which should be analysed with interest but not without precaution: the volatility of these "prices" in particular, makes all simplistic use irrelevant.
EXPOSURE TO PEER DATA OVERLY SENSITIVE TO THE SPECIFIC SITUATION OF EACH COMPARABLE COMPANY	The re-forecasts and/or consensuses of analysts formed after the beginning of the crisis lead to significantly higher multiples. Their level is very dependent though on the years during the core crisis, which are not representative of subsequent expectations, thus possibly generating a large disparity between multiples of companies which are nevertheless comparable. These multiples are therefore very difficult to use in a valuation.
INADEQUATE TRUNCATION OF THE BUSINESS PLAN	The usual horizon of business plans generally reveals insufficient in times of crisis, given that the crisis generates a lag in growth dynamics: a longer horizon should generally be considered, so as not to truncate any part of the value present in the pre-crisis plan
INAPPROPRIATE EXTENSION OF THE RECOVERY DYNAMICS	Exiting the crisis can result in high, albeit temporary, growth rates. Smoothing techniques are usually introduced in order to progressively connect dynamic growth profiles to the long-term growth rate. However, in this particular context, such techniques may overestimate the post-stimulus growth and consequently overestimate the calculated values.
PROFUSION OF NON-ANALYSED FLAWED APPROACHES	Implementing a multi-criteria approach requires a prior understanding of each method, its strengths and its limits, so that each of them can make a contribution to the overall estimate. The multiplication of non-analysed approaches, moreover in a context where each method suffers from weaknesses, does not guarantee more consistent results: analysis is not an option.

Multiple approaches and DCF approaches are therefore more difficult to implement than usual. However, market and income approaches have complementary benefits:

• Market approaches are based on external data that implicitly take into account the risk-reward balance;

• Income-based approaches help rationalise the impacts of many parameters and highlight the key factors of the change in value.

These approaches can support each other. This is the premise of the methodology exposed at the beginning of this summary: a practical model of the crisis mainly based on the adjustment of the pre-crisis situation, relating multiples and forecasts, eventually enabling the calibration of parameters and the determination of multiple (or risk premium) adjustments.
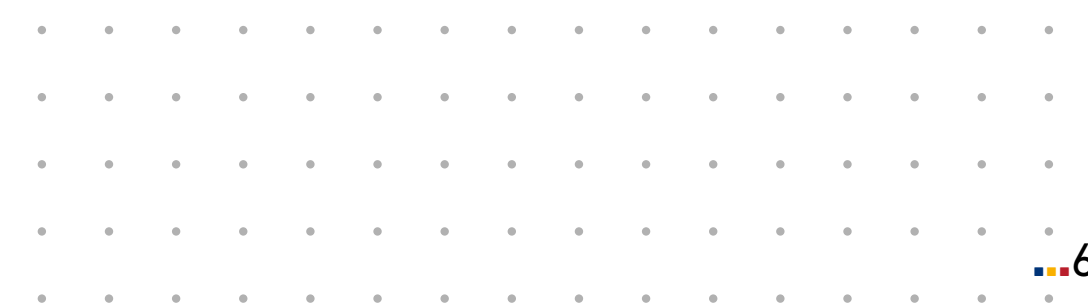
1.
FIRST THOUGHTS IN A CRISIS SITUATION

FRAMEWORK AND/OR PRESCRIPTIVE ENVIRONMENT

The exceptional nature of the crisis leads to questioning the methods traditionally used during valuation exercises: the simple application of pre-crisis approaches can indeed **prove to be very dangerous,** in some cases overly taking into account the effects of the crisis, or, on thecontrary, by underestimating the loss of value.

However, it is important at first to check whether the context of the valuation, and - should the case arise - the framework to comply with, enables any change in the valuation approach.

On such a topic, even though most of the standards and frameworks[5] advocate the **permanence of approaches** over time, some stipulate that **under certain circumstances** the approach might be modified – and there will be specific terms and conditions to deal with that.

⌖ FRAMEWORKS AND VALUATION

First check whether the standard a/o framework (regulatory, conventional, internal) under which the valuation has to be performed opens the possibility for changes in the valuation approach. Should the case arise, terms and conditions are usually enclosed.

Even though the framework or the internal methodology may not seem restrictive, it would be useful to take a certain number of precautions, including:

- An explicit explanation of the reasons why the current method would **become irrelevant** due to the circumstances,

- A rationale of the effective **improvement of relevance** generated by each amendment introduced to the current method,

- A detailed **description** of the said amendments intended for stakeholders interested in the valuation.

⌖ TRANSPARENCY AND BUSINESS ANXIETY

In this particularly uncertain context, a lack of transparency obviously adds anxiety.

It is even more important than ever to explain the choices made, their motivations, their impact, and the volatility of the results obtained.

These conditions could help avoid situations where the appearance of sincerity of the process is questioned: for example adapting a method without sufficient justification, which may suggest that the motivation for modification would be of a different nature that the search for improvement in the relevance of the exercise.

Finally, the concept of transparency obviously covers a **description** of the approach retained and implemented, of its underlying rationale, but also include information in terms of **sensitivity** of results.

FUNDAMENTAL CONSIDERATIONS REGARDING A VALUATION PROCESS

MULTI-CRITERIA APPROACH

As mentioned in the introductory chapter, the various valuation approaches are all affected by a **global and pan-sectoral crisis.**

It is customary, in normal times, to recommend a **"multi-criteria" approach** to perform a valuation, a term used to designate a methodology consisting of:

- Consider all valuation approaches,

- Analyse them individually, dismiss them or retain them according to the adequacy of the approach considered in the particular context of the asset to be evaluated,

- Implement the selected approaches,

- Compare the different results obtained, gauge the advantages and disadvantages of each method,

- Finally exercise expert judgment in order to arbitrate a range of reasonable values.

The underlying premise for such an approach is that no valuation **method alone,** is able to provide in all circumstances "the correct and accurate result". Thus, the implementation of several approaches is useful as it **diversifies** the pros and cons of each approach, it helps the valuation practitioner to identify the effects of each strength and weakness in the particular case that is being studied, so that they shall eventually better neutralise any flaws.

⌖ MULTI-CRITERIA APPROACH

The valuation approaches are all affected by the crisis. In this context, a valuation based on a single method appears very risky. The multi-criteria approach aims to implement several valuation approaches.

5. For example, accounting regulations (fair value, recoverable value, value in use or use, etc.), specific industry standards (such as IPEV), fund internal rules, etc

In a crisis context where the various methods at hand are all perturbated, a valuation relying on a single method appears particularly risky: the "multi-criteria" approach is to be **recommended** should the valuation framework allow it.

However, this approach is **not a universal solution,** since all methods are affected by the crisis.

In fact, the many perturbations caused by the crisis on all valuation approaches (volatility of stock market prices, uncertain re-forecasts, calibration of risk premium) mainly derives from the same source: the loss of visibility. The implementation of several valuation methods simply makes it possible to **approach the same problem from different angles,** which ultimately maximises the chances of better understanding or framing the level of uncertainty.

At this stage, it is now interesting to take a closer look at the different most common valuation approaches, whichare generally classified according to the following categories: market-based approaches, income-based approaches, cost-based approaches (the latter concerning isolated assets rather than activities, which are not covered in this document).

MARKET-BASED APPROACHES

Market-based approaches are preferred in most valuation frameworks, with the notable exception of impairment tests, though these do not exclude them either[6].

In times of crisis, stock market prices demonstrate increased temporary volatility. This volatility reflects:

- **Rational factors,** including in particular (i) the quasi-continuous flow of information relating to the crisis which, depending on their content[7], leads to up or down adjustments, or (ii) the weakening of economic players whose interdependencies may broaden the scope of further possible events for a company and therefore increase the risk;

- Movements of lesser rationality, sometimes amplified, compensated or even overcompensated within a few days. A possible explanation for this phenomenon would relate to the factors mentioned above, considering that however rational they may be, they are **more difficult to assess (to "price")** by the markets, due to the uncertainty caused by the crisis and the more fragmented information available (in particular when re-forecasting.)

It is also worth mentioning that the increase in observed price volatility is not caused, in the event of the Covid-19 crisis, by drastic changes in trade volumes. Indeed, these are generally high enough to ensure a satisfactory level of liquidity[8].

Stock prices are seemingly first affected by the performance of economic players, but also by the addition of the two following risks:

- **A temporary risk:** at the heart of the crisis, the loss of landmarks for market players mechanically leads to an increase of volatility of prices. This phenomenon should abate once the duration of the crisis and the profile of the recovery are clarified (whatever the levels of the prices then reached, these should be less volatile)

- **A residual risk:** in many industries some companies will be weakened, and the recovery period may also be a time when pre-crisis market shares are challenged by competitors. The field of possibilities for certain sectors should consequently widen, over a period expanding beyond the renewed visibility, generating a "residual" volatility in the sector for a longer time – i.e. a risk premium.

Finally, to complete this overview, it has to be noted that transactions concerning large blocks of shares, such as IPOs or public offers, dried up. Likewise, over-the-counter acquisitions and disposals have been massively interrupted, closed transactions have **become rare.** As to the few remaining transactions, they are likely to have been concluded on atypical conditions, for example due to a distressed situation[9].

Therefore, even though the financial markets are seemingly quite liquid, large-scale transactions appear to be less liquid: a **temporary illiquidity discount** may therefore affect the few transactions carried out in the heart of the crisis (and probably for many of those that will be carried out immediately after the crisis).

6. Impairment tests relate to assets on the balance sheets of companies intended to be operated over time. As a result, the accounting standards handle them through their "value in use" (income approach). However, even in these cases, the market approach is not omitted since the test defines the recoverable value of the assets as the highest value between the value in use and the fair value net of disposal costs (according to IAS 36. Most accounting standards stipulate similar or even identical provisions).

7. These information concern both the crisis itself and news from economic players, as well as announcements of economic measures taken by the public authorities and the monetary and financial response systems decided by governments and central banks.

8. In most cases, the relevance of stock market prices during the Covid-19 crisis is not questioned due to too low trading volumes.

9. It is worth recalling that most valuation standards require that transactions be carried out between consenting parties, willing to carry out the transaction (ie without external constraints). For example, IFRS 13 defines the concept of fair value by "the price that would be received for the sale of an asset or paid for the transfer of a liability during a normal transaction between market participants on the date of 'valuation (an exit price)"
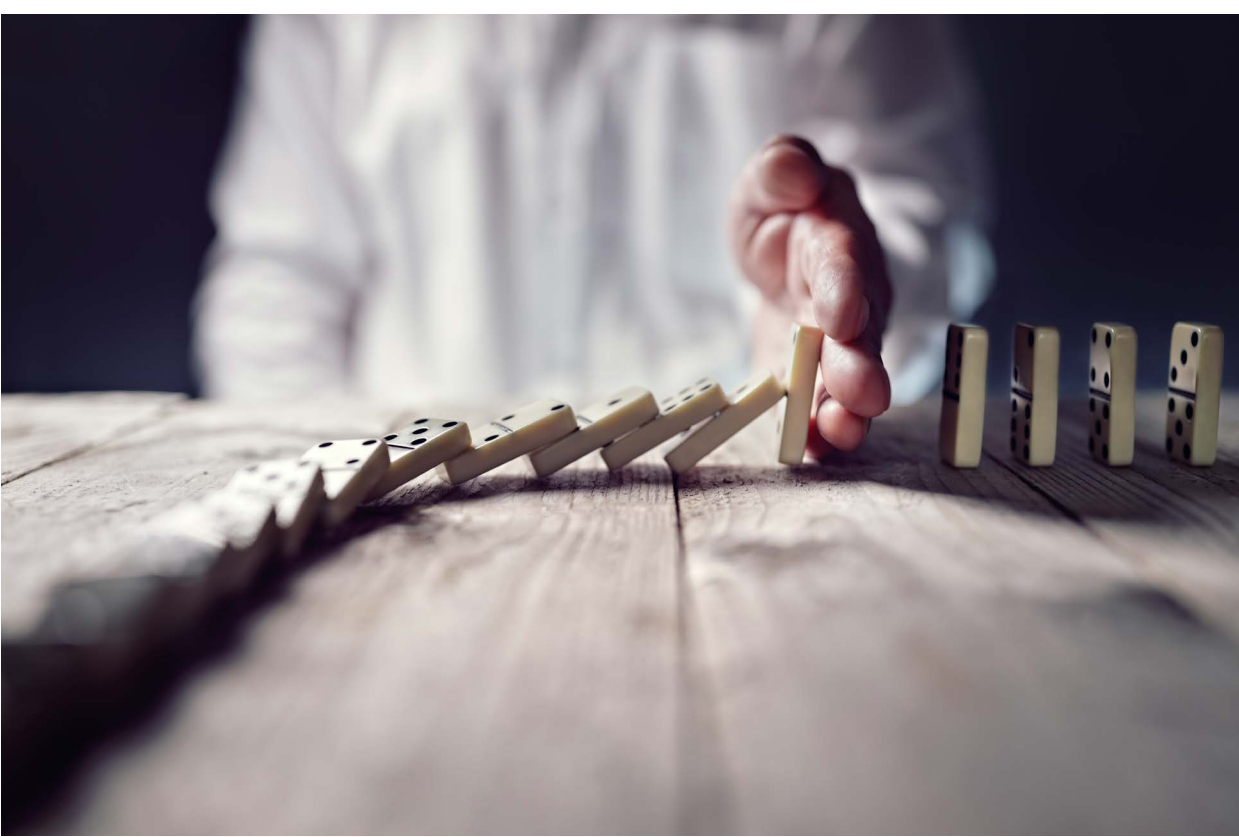
What lessons can be learned in terms of valuations?

Stock market prices as well as transactions concluded in the heart of the crisis have certainly both suffered haircuts corresponding to the "temporary" risks described above. However, it is very difficult, if not impossible, to separately quantify this component.

Many valuation frameworks stipulate that the valuation should consider the "date" of valuation (spot prices) and also should consider the situation under "normal conditions.". In times of crisis, these two stipulations are difficult to match:

- A valuation process based on the spot market price would implicitly include the above-described "temporary risk" discount (facing such an issue, a seller free from any constraint would tackle it by postponing the transaction until visibility is recovered);

- As to a valuation process that would neutralise the temporary discount, it would not comply with the "spot" price consideration (since the only way to avoid it would be for a seller to postpone the transaction).

The practical impossibility to quantify the "temporary risk" discount makes the discussion about which scenario to choose mainly ineffective: the market-based approaches will have to be conducted bearing this limit in mind.

However, in times of crisis, the valuation is probably less perturbated by this temporary discount than by the **effects of the volatility itself on daily prices:** indeed, what reference should be retained in an environment where these changes are relatively significant in a short amount of time?

There is no magic recipe here, but this problem can be more or less mitigated, depending on the valuation framework (its restrictions and conditions) and on the particular valuation approach that is contemplated

among all the market approaches:

> **IMPLEMENTATION OF MARKET-BASED APPROACH**
>
> 1. Check the trading volumes of the securities considered (on the Covid-19 crisis, generally satisfactory)
>
> 1. Demonstrate representativeness of each comparable recent transaction (this can be difficult.)
>
> 1. Where the standard/framework allows it, consider an average of prices over a relevant period of time, rather than a spot price to date.
>
> 1. Review the peer group in order to identify possible sub-sectors with differentiated behavior during the crisis.

- For **all market-based methods,** in general, the trade volumes should be checked, as low volumes could be a sign that the prices no longer reflect a truly relevant amount, and an even less applicable amount when considering a significant block of shares (i.e. the block of shares could not be reasonably sold on the market given current trading volumes). As mentioned, this phenomenon is rare in the case of the Covid-19 crisis.

- **Direct stock market approach** (approach only available for listed companies): prices may evolve significantly in short amounts of time. Depending on the valuation framework (unfortunately often very restrictive as to the date parameter. In such cases, only the spot price is to be retained), an average price or a range of prices based on a reasonably widened interval of time may be derived. The analysis of the profile of the stock price is useful in order to ensure that the interval of time does not only capture moments where huge gaps have occurred (e.g. at the peak loss of visibility.)

- **Recent transactions approach:** where a recent transaction has occurred concerning the company to assess or a comparable peer then a thorough analysis of the transaction is recommended. The objective is to assess whether the economics of the transaction are reasonably transposable: has the transaction been somewhat forced by the liquidity issues of the seller? Has the transaction been concluded on the basis of a pre-crisis situation, or could it take into account the crisis event? Is there any price adjustment or earn-outs provision? It is obviously not easy to access such detailed information on OTC transactions and this approach is often abandoned.

- **Analogical methods (to which multiple approaches belong):** these approaches are based on the analysis of a group of selected listed peers. The price fluctuations may be processed through an average approach over a reasonable period of time. However, these approaches, in times of crisis and in practice, lead to multiples sometimes very differentiated between comparable companies which makes them difficult to use. We will come back to this issue later in this document. Some of these disparities are explained by small operational differences that provide better crisis response or on the contrary, less resilience. Sometimes the chosen business model leads to a different response to the crisis[10].

10. For example, within a given industry, business models based on subscription or remote service are more resilient to the particular Covid-19 crisis than those based on physical sales or reception service. It should be noted that a crisis of a different nature could have had other impacts for each company

INCOME APPROACHES

Income approaches are generally based on the net present value of forecasted cash flows. The considered cash flows may be Free Cash Flows (FCF) within the above-mentioned DCF approach, or may be excess earnings, distributable net income, or even dividends (Dividend Discount Model or DDM) – the principle remains the same.

The implementation of a revenue approach requires:

- The elaboration of **forecasts** over a time horizon which is sufficient to capture the specific growth expected from the considered company,

- The assessment of a **discount rate** (reflecting the risk-reward balance) to be applied to these forecast flows. The calibration of such a rate depends on the considered sector (some sectors are structurally riskier than others), but also on the risk profile of the cash flows (so that an optimistic forecast or a conservative one of the same studied "object" provides the same result, thanks to an adequate association of rates to these flows).

These prerequisites are demanding, and more particularly in times of crisis. Indeed:

- Not all companies have the **steering and management resources** to issue sufficiently reliable forecasts, over a relevant time horizon. In times of crisis, even the largest groups have been temporarily hampered in this exercise. This is even more so for smaller companies. The very first re-forecasts are difficult to establish.

⊕ INCOME APPROACH

These approaches require forecasting.

The level of uncertainty reduces, more than usual, the ability to grasp the level of voluntarism and conservatism of forecasts: the implementation of forecast scenarios is recommended

- It is usually not easy to calibrate the specific risk attached to a given series of forecasts. The multi-criteria approach is useful to check that too ambitious forecasts are not associated with a low rate (e.g. showing an unreasonable discrepancy with other techniques), and in some cases the use of scenarios with high, base and low forecast dynamics are even more useful. In times of crisis, **the contribution of different scenarios** is even more interesting, since it addresses the volatility of trajectories in a concrete way. However, it should be remembered that the elaboration of forecast scenarios (not to mention the relative likelihood of each of them) is harder and just as tricky as forecasting a single scenario.

- Finally, the assessment of the risk attached to the considered sector requires reference to financial markets that implicitly balance risks and rewards through price volatility: the use of pre-crisis (or long-term) market parameters on forecasts that include an additional risk might be questionable (it has been previously discussed within the market-based approaches chapter). On the contrary the use of spot parameters is clearly subject to instability risks. Similar actions as the ones discussed in the market-based approaches may be performed (i.e. window of observation, for example for WACC beta parameter).

COMBINATION OF MARKET AND INCOME APPROACHES

A multi-criteria approach is recommended when the valuation framework allows it, in order to better avoid biases of one method or the other - even more difficult to control in times of crisis.

It seems particularly difficult to refer only to income approaches in times of crisis. Indeed, if it is difficult for most of companies to issue their re-forecasts in the middle of the crisis, how can one be assessed for its reliability?[11]

An **income approach**, which is based on **specific considerations** but also in many respects on **listed peers** (for example through comparison of re-forecasts with those issued by comparable companies and / or analysts) is much more interesting.

⊕ CROSS-DOCUMENTATION OF VALUATION APPROACHES

The documentation and the calibration of certain parameters may rely on parameters used in other approaches, where these ones are easier to determine.

Market approaches in times of crisis suffer from limitations that have been previously discussed; nevertheless, they today represent the **most complete "collective understanding"** of all the available information on the crisis, on the way it is tackled, the anticipations of its exit and of the profile of such an exit.

A company is obviously unique, it has its own specificities, its own potential, and the valuation must take into account these specificities; that said, **some structuring factors** such as the duration of the crisis, the exit profile, **are certainly common** or almost common (at least within a sector), so that such assumptions should be retrieved from a market analysis rather than issued by the company, even though it may be adjusted to the specific case of the company (if properly argued), on a second step.

A methodology emerges here, where it is both possible to avoid mechanical replication of the market changes through "gross" multiples, or to entirely rely on specific re-forecasts, potentially far from market anticipations: this methodology would **combine both worlds:**

- First, by breaking down of market changes into practical parameters (e.g. intensity, duration of the crisis), hence connecting market approaches with underlying income approaches;

- Then, by positioning the company against these parameters (i.e. similar to the sector, or with argued small changes) in a facilitated context as the sector parameters mark out the playground (e.g. where the markets may price a 3Y duration of the crisis, the forecasts of the company should not match a 6 months or on the contrary a 6Y crisis, unless a strong argument is made).

⊕ A HYBRID METHODOLOGY

Several parameters that define the crisis (its duration, the profile of the subsequent recovery) are rather addressed by income approaches, though could also be calibrated through market studies.

Such methodology is explored further later. But first, market developments and their effect on market multiples.

11. Apart from, of course, certain few specific cases where re-forecasts can be satisfactorily documented (e.g. for a sector that has been spared or even favored by the crisis, or else for a company whose order book is long and has not suffered from any cancellation, relates to strong customers, accompanied by an equally strong supplier chain, etc.)

2.
CHANGES IN MULTIPLES IN TIMES OF CRISIS

THE MARKET MULTIPLES EXPERIENCE SIGNIFICANT CHANGES OVER TIME

In times of crisis, economic players suddenly experience a situation of massive loss of visibility, in the very short term (extent and impact of the crisis), medium term (profile and duration of recovery), or even over the long-term, should consumer behavior be definitively altered.

Insuch an event, companies are typically, at first, **focused on cash and operations**, in a reactive and evolving management mode in order to adapt to further events and regulation changes. Developing re-forecasts is naturally not a priority issue, and is not always possible in such times.

Despite an uncertain context, the financial markets have remained active in most cases, so that they have **incorporated into pricing what the market players understand of the available information:** the follow-up of the crisis and its evolution, its short-term impact on each sector, the economic responses from governments and central banks, the signals coming from systemic players, the issuance of reports and studies from financial analysts.

◎ TIMING OF INFORMATION AND CONSEQUENCES ON MARKET AND MARKET MULTIPLE

In times of crisis, prices fall before issuance of any new forecast. When a re-forecast is issued, the multiple mechanically rises, unless the prices evolve again.

Market multiples that are derived in these times experience strong changes. The timing of these must be analysed carefully, as shown in the following example, where the multiple in year N fluctuates strongly over time, falling from 9.2x to 7.6x, then raising drastically to 23.3x.

The use of one multiple or the other therefore requires a **thorough understanding of the timing of events,** and the link between forecasts, re-forecasts, and stock market prices.

INITIAL DECREASE OF MULTIPLES AND RISK OF UNDERESTIMATE

Considering again the Figure 1 example: the initial multiple as at 9.2x (against budget N) decreases at first in a 1.6x due to the occurrence of the crisis. This discount represents the price granted by the markets to the impact of the crisis and its joint uncertainty.

The understanding of such a discount first requires a reminder on the fundamentals of valuation and its strong link with the risk-reward balance: a valuation relates to the expectations of gains but also to the risk associated to these gains, the latter being represented by the volatility of earnings .

Ideally, forecasts are aligned with earnings expectations, while the multiple reflects the risk-reward couple (therefore the expected remuneration considering the risk that is being taken). However, the real world is often more complex.

	Sector	Company X	Company Y
Forecasts (Normative level)		110	120
Stock Market prices		1,000	1,000
Implied Multiples		9.1x	8.3x
Multiple of Sector (vanilla)	9.5x		
Forecasts actually priced by Markets		105	105
Implicit discount on Forecasts		−4%	−12%

Figure 2: Hybrid multiples coupling expectation and volatility

The opposite figure shows that the market only partially "buys" the X and Y companies' forecasts, which are therefore considered optimistic. Doing so, the facial multiples amount as at 9.1x and 8.3x, different from the 9.5x sector multiple (of course in reality the multiples experience discrepancies between peer companies that are originated by many topics, not only the relative voluntarism of forecasts)

12. Assuming that a rational investor is risk-averse, so that with identical expectations, a rational investor would prefer a project with lower volatility

Listed Company A	N-1 Actual	N Budget	N+1 plan	N+2 plan	Market Cap	Debt	Enterp. Value (EV)
Pre-crisis BP (EBITDA)	100	106	115	123			
Stock Markets as at N (01/01)					680	300	980
Implied Multiples	9.8x	9.2x	8.5x	8.0x			
Start of Crisis event							
Stock Markets as at N (04/01)					505 −26%		805 −18%
Implied Multiples	8.1x	7.6x	7.0x	6.5x			
Crisis BP (EBITDA)	100	35	60	107			
Stock Markets post Re-forecasts					515 −24%		815 −17%
Implied Multiples	8.2x	23.3x	13.6x	7.6x			
Debt update (eg 06/30)					510 −25%	335	845 −14%
Implied Multiples	8.5x	24.1x	14.1x	7.9x			

Figure 1: Example of evolution over time of prices, forecasts, and multiples

In times of crisis:

- **Expectations of future earnings** are altered by the crisis and these should consequently decrease. However, in the early days of the crisis, the lack of visibility makes it very difficult to build such re-forecasts;

- **The volatility of future earnings increases,** following the many destabilisations due to the crisis, that widen the field of possibilities. Considering that market multiples could experience a discount to account for the increased uncertainty does not appear unreasonable.

As a consequence, some may believe that the initial fall of the multiples may relate to the increased uncertainty, so that these multiples should apply to the re-forecasts (i.e. first-year end re-forecasts).

In doing so, they **risk a significant underestimate.** Indeed, the underlying implicit assumption, i.e. the multiple reflects the risk-reward couple, is no longer relevant in the midst of a crisis. Indeed, as long as the multiples are calculated against pre-crisis forecasts, these multiples "embed" not only volatility, but also the changes in expectations.

Considering the Figure 1 example, the 1.6x drop in multiple certainly accounts for the alleged increase of volatility and therefore of risk, but it also reflects the obsolescence of pre-crisis forecasts. Figure 2 shows the impact of an inadequate use of such a multiple, wrongly applied to the re-forecasts.

The wrong use of the 7.6x multiple leads to a 608 estimate, i.e. 40% lower than the range of pre-crisis values, while the markets have fallen by 18%, when expressed in terms of enterprise value).

	Company to be appraised	N-1 Actual	N Budget	EV
Pre-crisis	Pre-crisis BP (EBITDA)	100	114	
	Pre-crisis Multiple	9.8x	9.2x	
	EV assessment	980	1,054	[980-1054]
Crisis event	Updated Multiples N (04/30)	8.1x	7.6x	
	Arithmetic update	805	866	[805-866]
	First re-forecast		80	80
	Underestimate		608	[608-866]

Figure 3: Underestimate of value: redundant effect of the crisis

Of course, it could be argued that this result is not caused by a misuse of the multiple, but by the re-forecasts of the company that would explain the underperformance when compared to the market (the market being simulated here through company A from Figure 1).

However, this argument does not hold: indeed once company A has issued its re-forecast, it may be noted that its performance drop is higher than the one of the company to appraise (i.e. a 35 EBITDA, thus a fall of 70% against pre-crisis forecasts, while the company to appraise experience a performance drop of c.30%), yet without any notable reaction of the markets after issuance of these re-forecasts (see Figure 1). Hence, there is indeed an underestimate situation.

⊙ᴄ **RISK OF UNDERESTIMATES**

A market multiple derived from pre-crisis forecasts shall not be applied to re-forecasts. A wrong use of these multiples could generate a significant underestimate.

Such multiples should only be applied to pre-crisis forecasts (see above Figure 3, "mechanistic update").

The "mechanistic" application of market multiples on forecasts that are consistent with the ones used when originally calculating the multiple provides with an unbiased output. However, the crisis **weakens the assumption of comparability** of each pre-crisis peer company, and also weakens the assumption of transferability of listed companies observations on a specific company.

Here again emerge the limits of a straight application of multiple approaches in times of crisis: a methodology that would use both market and income approaches in order to build a hybrid documentation of market parameters and crisis parameters would

obviously be of great interest. For now, the analysis of multiples approaches is still to be pushed a little further, when re-forecasts are made available.

COMMUNICATION OF RE-FORECASTS AND SUBSEQUENT CHANGES IN MULTIPLES

While listed companies need time to issue re-forecasts, in the meantime, financial analysts still build their own estimates of profit and even of dividends forecasts. Obviously, these pieces of information are likely to change significantly in a short amount of time, depending on daily information on the crisis, the new measures taken by governmental and financial institutions, and even the effects experienced in near real-time on one sector or another. While bearing in mind the possible strong further evolvements of brokers' analyses, the "consensuses" that are built on the basis of several analysts' reports provides us with an interesting state of play, reflecting the information available to date, at least for a party that is external to the considered listed company. We will come back to this later.

Financial markets benefit from various information and the market equilibrium reflects a position where these pieces of information are considered and "priced" to different extents depending on whether the markets agree or not with it.

Of course, the issuance by companies of their re-forecasts is one of the most important information channels. The market reaction to such communications may lead to a rise or fall in price, depending on whether these re-forecasts prove to be consistent or, on the contrary, different from expectations that were implicitly "priced".

◎ MULTIPLES DERIVED FROM 'ABNORMAL' YEARS

Applying market multiples based on years of under or over performance most often leads to wrong results insofar as these multiples are overly sensitive to very light fluctuations.

Figure 1 illustrated a case where the market reaction is moderate. Though, the impact of the release of these re-forecasts has a strong impact on multiples: regardless of market reactions, **the release of re-forecasts in times of crisis most often lead to a very significant rise of market multiples.**

This might appear counterintuitive (the crisis would indeed lead to a rise of the short-term multiples, even when compared to pre-crisis multiples), whereas the crisis has strong effects on the short-term performance, it is generally expected that a crisis has a finite duration. Since the financial markets take into account all future earnings, even in the long-run, then **the years in the midst of the crisis are years of underperformance when compared to the long-run average performance, therefore a multiple calculated against these years is naturally very high.**

Figure 1 illustrates such an occurrence: N and N+1 multiples amount as at respectively 23.3x and 13.6x, far beyond the pre-crisis multiples, then they settle down in N+2 with a 7.6x multiple, back to a more usual area and close to pre-crisis range of multiples.

Such behavior has of course already been observed in the past and notably during the post-Lehmann crisis. In the midst of this crisis, the multiples (price earnings ratio) of investment banks resulted extremely high[13].

One of the major difficulties in using these multiples lies in their **strong dependence on the specific situation of each company:** for example, between a company with a 80% drop in performance for the first year and another one with a 90% drop, there might not be any consequence on further normative performance, however, the derived multiples on this very first year could differ massively.

To further understand this phenomenon, the example of company A described in Figure 1 is enriched by the addition of company B, described in below Figure 4. These two companies may be grouped into a sector "peer group" (a peer group is usually made of more than two companies, but this very small group is sufficient here to illustrate the high variability of short-term multiples during crises):

Listed Company B	N-1 Actual	N Budget	N+1 plan	N+2 plan	Market Cap	Debt	Enterp. Value (EV)
Pre-crisis BP (EBITDA)	100	110	124	150			
Stock Markets as at N (01/01)					850	250	1,100
Implied Multiples	11.0x	10.0x	8.9x	7.3x			
Start of Crisis event							
Stock Markets as at N (04/01)					590	−31%	840	−24%
Implied Multiples	8.4x	7.6x	6.8x	5.6x			
Crisis BP (EBITDA)	100	−20	48	107			
Stock Markets post Re-forecasts					570	−33%	820	−25%
Implied Multiples	8.2x	-41.0x	17.1x	7.7x			
Debt update (eg 06/30)					560	−34%	300	860	−22%
Implied Multiples	8.6x	-43.0x	17.9x	8.0x			

Figure 4: Information related to company B, belonging to the same sector as company A (see Figure 1)

The information coming from these two companies may be used on a third company, i.e. the one to assess, as follows:

	Company to be appraised	N-1 Actual	N Budget	EV	
Pre-crisis	Pre-crisis BP (EBITDA)	100	114		
	Pre-crisis Multiples	9.8x 11.0x	9.2x 10.0x		
	EV assessment	980 1,100	1,054 1,140	980	1,140
Crisis Event	Updated Multiples N (04/30)	8.1x 8.4x	7.6x 7.6x		
	Mechanistic update	805 840	866 871	805	871
	First re-forecast		80	80	
	Underestimate		7.6x 7.6x	608	611
Re-forecast disclosures	Updated Multiples (post listed co BPs)		23.3x -41.0x	23.3x -41.0x	
	Higly volatile update			1,863 -3,280	
	Arithmetic update	8.2x 8.2x		815	820
	Updated Multiples (post listed co BPs)		24.1x -43.0x	24.1x -43.0x	
	Higly volatile update			1,931 -3,440	
	Arithmetic update	8.5x 8.6x		845	860

Figure 5: Summary of incorrect or risky use of market multiples in times of crisis

Figure 5 illustrates the extreme volatility that would come from an inadequate use of multiples during the crisis, once the re-forecasts are made available: a range of values between −3,280 and +1,863!

While crisis short-term multiples are not applicable, the following chapter contemplates the possibility to use mid-term multiples, i.e. multiples based on the last year of reforecast available. Indeed, it has been previously shown that the N+2 multiple for company A stood at 7.6x, in supposedly more stable times.
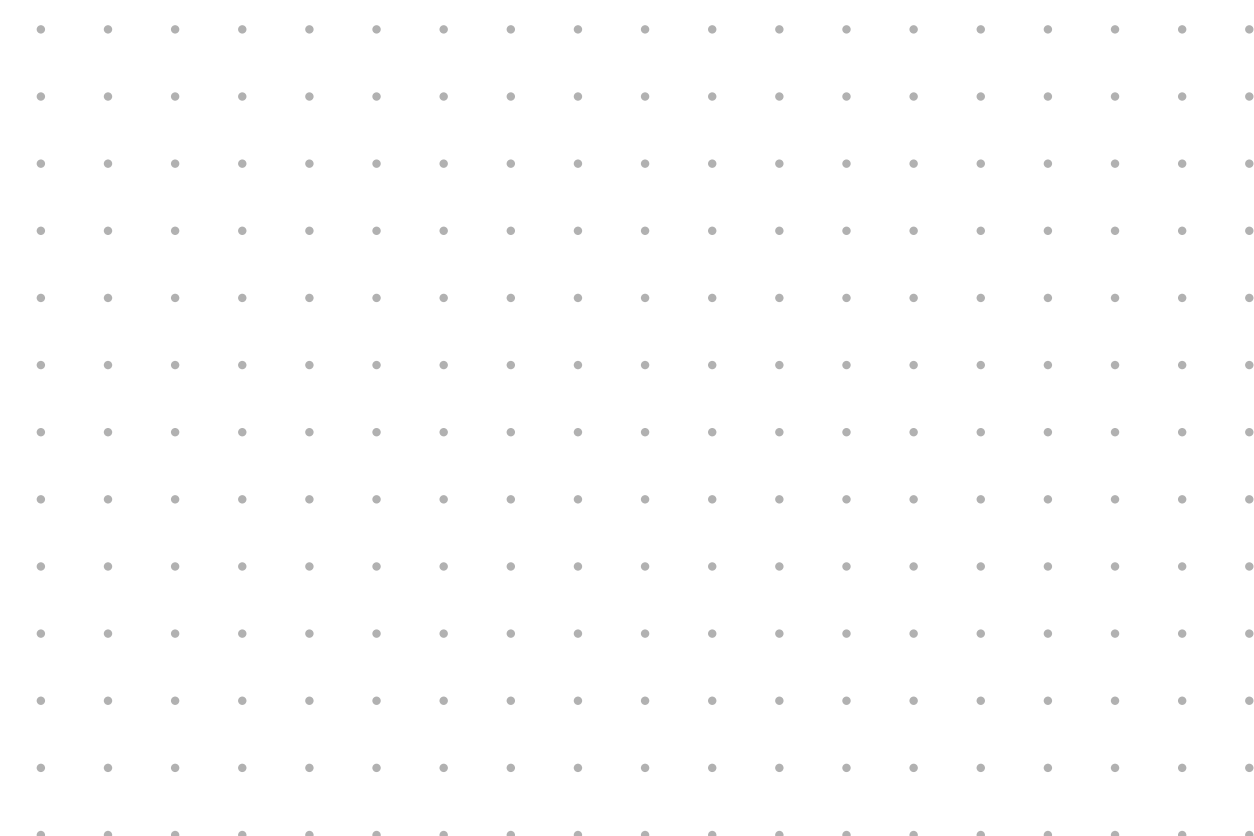
13. In fact, where multiples were not drastically higher, they were in fact negative due to net losses experienced by certain banks during the crisis (resulting in an arithmetic negative, yet irrelevant, multiple).

END OF HORIZON FORECASTS

Considering Company A, at the end of the horizon plan (i.e. N+2), the implied pre-crisis multiple stands at 8.0x (for an EBITDA reaching 123), while the implied crisis multiple stands at 7.6x (for an EBITDA reaching 107).

The 7.6x multiple appears to be slightly lower than the pre-crisis multiple, so it might be inferred that this 40 pb discrepancy matches the increase in risk. Such a conclusion is hasty, involves at least two major assumptions and suffers from one weakness:

- Pre-crisis forecasts and crisis forecasts are implicitly considered as risky (these forecasts would be neither more nor less conservative or ambitious)

- Future earnings, beyond N+2, are implicitly considered as similar in profile and trend. This assumption is not always correct, especially in situations where the last year of the plan is not normative (which is likely in times of crisis, considering the duration of the crisis itself and its recovery. This topic will be discussed in more detail later on.

- Furthermore, the direct comparison between two implied multiples at the end of the plan is not methodologically correct: indeed, the market capitalisations still refer to the beginning of N situation, so that all discrepancies between N and N+2 flows (between pre-crisis and crisis forecasts) mechanically undermine the N+2 crisis multiple.

Thus, the discrepancy between end-of-plan multiples (pre-crisis and crisis plans) does not only reflect the increase in risk.

However, where the end of the plan is deemed representative of a year not concerned any more by the crisis (i.e. after the crisis and its recovery), it is worth analysing the metrics that may be derived from it.

END-OF-PLAN MULTIPLES

These multiples lower the risk of processing aggregates at the heart of the crisis, subject to fluctuations from one company to the other (even if belonging to the same sector).

The process: remove from the Enterprise Value the NPV of flows attributable to the years at the heart of the crisis, then calculate a multiple that is attributable to the performance of subsequent years.

In order to do so, a (simplified) adjustment may be considered to the facial end-of-plan multiples, for a more relevant comparison between pre-crisis and crisis multiples:

- Calculate EBITDA.(1-Capex/EBITDA).(1-CIT) for years N and N+1 (directly favor the free cash-flows where available);
- Remove these from the MEV, the market enterprise value (market capitalization + financial debt N);
- Compute the multiple (above amount divided by N+2 EBITDA).

The resulting multiple is deemed representative of the value attributable to N+2 and later years.

Considering the A and B companies, the multiples may be calculated as follows:

	Company A		Company B	
	Pre-crisis	Crisis	Pre-crisis	Crisis
Facial N+2 Multiple	8.0x	7.6x	7.3x	7.7x
EBITDA N+2	123	107	150	107
Enterprise Value (EV)	980	815	1,100	820
o/w N+2 and >N+2 attributable part	864	765	977	805
Multiple attributable to N+2 and +	7.0x	7.2x	6.5x	7.5x

Figure 6: Implied multiples at the end of the plan (explicit horizon)

14. Some managers in charge of forecasts may favor voluntarism and ambition in difficult times, while others may on the contrary focus on lowering the risk of subsequent issuance of profit warnings, so that they may favor an « earnings at risk" approach. Doing so, the discrepancy between the median and the retained forecasts increases with the uncertainty, so that a higher part of the risk is embedded in the re-forecasts than in the pre-crisis forecasts.

The A and B companies' multiples are now higher than the pre-crisis multiples, suggesting that the financial markets may infer that the recovery period is still unfinished in N+2.

These findings are helpful as they provide information as to the duration of the crisis implicitly anticipated by the markets;they may reflect the documentation of the retained re-forecasts of the company; or they may provide food for thought and reconsideration of any re-forecasts.)

A possible 'mechanistic' use of crisis multiples would thus consist in the use of N+2 multiples, following the above methodology, to which would be added the Free Cash-Flows of N and N+1 intermediate years, as shown in Figure 7:

Company to be appraised	N-1 Actual	N Budget	N+1 plan	N+2 plan	EV
Pre-crisis BP (EBITDA)	100	114			
Re-forecasts		80	80	114	
N-N+1 attributable value		42	42		84
N+2 and + Multiple				[7.2x-7.5x]	
N+2 and + attributable value				[815-858]	[815-858]
Arithmetic update					[899-942]

Figure 7: implementation of an exit adjusted-multiple approach

Such an approach takes into account the specificities of the company in the heat of the crisis (as far as the company is able to document any differentiated behavior when compared to its peers), while still connecting it to the financial markets, given that it is still a multiple approach. This approach assumes that the duration of the crisis is somewhat similar in a given sector, and that the situation of all companies at the end of the explicit horizon for forecasts is also similar (which enables the use of an exit multiple).

This approach requires that the company be able to re-forecast. Figure 7 shows quite a rudimentary approach to re-forecasting, consisting of a re-forecast for year N, replicated in N+1, and a N+2 re-forecast deemed equal to the pre-crisis N forecast. Such an approach should of course be sufficiently argued so that it may be considered as reasonable to date (i.e. documentation of year N re-forecast, demonstration through analysis of comparable companies, through financial analysts reports and/or re-forecasts of the listed companies for year N+2 that shall concur with the assumption of crisis N+2 close to pre-crisis N).

Furthermore, this approach may be refined where relevant (e.g. discount the N and N+1 flows, etc.). However, this search for more accuracy can often prove to be useless: the method by itself is limited by its own confidence interval, which is not very narrow as it is still dependent on fluctuant stock prices, still not totally stabilised. It is thus generally preferable to conduct sensitivity studies on N+2 level of EBITDA (for example, in the Figure 7 case, should the analysis of comparable companies lead to the belief that N+2 EBITDA would rather be close to N-1 pre-crisis aggregate than N, then the impact would amount circa –100, and would widen the range of values accordingly.)

Finally, the end-of-plan multiple approach has pros and cons. The relevance of this approach is notably impaired when the crisis and its recovery period are not sufficiently stabilised at the end of the explicit horizon of the plan (N+2). This pre-requisite, in particular, raises questions about the ability to derive from the markets their implicit anticipations in terms of parameters closely related to the crisis, such as its duration or intensity. These parameters are likely to be common to all companies from the same sectorThis process is discussed further in the next chapter.

⌖ UNDERLYING ASSUMPTIONS OF AN END-OF-PLAN MULTIPLES APPROACH

This approach takes into account short-term (i.e. in the heat of the crisis) differentiated behaviors.

However, it assumes that comparable companies have similar behavior afterwards.

It also assumes that the re-forecasts of the company and of the peer group are similarly risky.

This approach thus remains "mechanistic" .

Finally, its relevance is somewhat impaired when the end of the plan is still not close enough to a normative performance level.

3.
MODELING CRISIS PARAMETERS

The limitations of each valuation approach in times of crisis have been discussed in previous chapters, which has led to the promotion of a **multi-criteria analysis.** This consists of several valuation approaches in order to avoid dependency on a single approach

However, carrying out several valuation approaches simultaneously while trying to control in times of crisis, is clearly not enough to ensure that all biases are diversified and therefore neutralised. It is obviously necessary to **challenge each approach** and to consider all means that might improve their resilience and, eventually, their relevance.

As for the **multiple approaches,** the previous chapters have demonstrated that in times of crisis it is not possible to rely on the application of multiples on short-term re-forecasts.

It has been argued that it was clearly more relevant to compute **multiples as at the end of the explicit horizon of re-forecasts** (the horizon here referred to is the one made available to the market players, thus usually a three-year plan), though this approach also suffers from limitations: lesser relevance where the crisis and its recovery are likely to exceed two years, the need for the company to build its own re-forecasts over the same horizon, with a level of ambition orconservatism deemed similar tto those of listed companies.

As to the **income approaches**, they are more demanding in terms of re-forecasting (the business plan horizon is generally longer than three years).

It has also been mentioned that the implementation of **alternative forecast scenarios** could be helpful since they could provide metrics as to the width of the field of possibilities. However, building – and documenting – such scenarios are also very demanding.

Finally, the forecasts of a company are usually documented from internal sourcesbut it is reasonable to expect that such forecasts can be compared to market data, so that it can be demonstrated that structuring parameters and assumptions concur with external sources.

Ultimately, refining multiple and income approaches require that more information be retrieved from the financial markets - especially which implicit assumptions the markets "buy" in connection with the crisis and the subsequent recovery period. Of course, such information is not directly available, but is implicit and combined with other assumptions in the stock market: thus, trying to assess them requires modeling (design and implementation).

This chapter therefore proposes and describes what that modeling requires. Like all models, it does not faithfully represent reality, is not applicable under all circumstances. On such a topic, the reader should refer to the preliminary comments enclosed at the very beginning of this document.

15. On a first step, the risk-reward is considered unchanged. Should the analysis of a particular sector lead to believe that a long-term risk premium may exist, then on a second step it will be possible to introduce sensitivity analysis (i.e. change in emulated re-forecasts in order to give room to a risk premium, etc.)

PARAMETERS EMULATING THE EFFECTS OF THE CRISIS

All valuations should match performance expectations, taking into account the risk-reward balance that may be associated to these expectations. Thus, reversely, market capitalisations may be rationalised as a series of flows (and their risk-reward couple) in a DCF-like approach.

The impact of the crisis may be calibrated through considering pre-crisis forecasts (that would then emulate crisis forecasts), so that, under identical risk-reward couple, these new forecasts would match the post-crisis market capitalisation[15].

As to the transformations leading from pre-crisis forecasts to emulated crisis-forecasts, a compromise must be found between accuracy, practicalities, ability to reasonably calibrate the parameters of the said transformation. For illustrative purpose, the following may be contemplated:

- **The initial magnitude (intensity) of the drop of performance:** this intensity may differ from one company to the other, depending of the nature of the crisis and the business model etc.
- **The duration of the crisis:** such a parameter is more likely to be common to a whole sector, it is certainly a very sensitive parameter
- **The possibility (or not) of a catch-up:** the pre-crisis plan may be considered as indefinitely delayed (the delay would thus match the duration of the crisis); but in certain few sectors, it may be considered that a catch-up is possible (the parameter being then the required duration for actually catching-up)
- **The possibility of an everlasting shift in the level of demand:** such a situation should concern certain few sectors; some could on the contrary experience an upside thanks for example to demonstrated shortages in certain equipment that the crisis would have revealed.

Again, such modelling is not relevant under all circumstances, so that the above parameters are not to be seen as a stipulation or recommendation, they are rather intended to illustrate a general methodology aiming to analyse and use as much as possible financial markets' data.

> ⊙⋈ **PARAMETERS TO PLAN CRISIS RESPONSE**
>
> • The magnitude of the first year drop of performance
>
> • The duration of the crisis
>
> • The duration for a progressive catch-up to pre-crisis plan
>
> • The lasting shift in the sector demand

it is up to the reader to systematically question its case and its specificities, and to assess to what extent one topic or the other in this methodology would help, or whether one parameter or the other is relevant.

It has to be noted that in the rest of the document, **the third and fourth parameters will not be simultaneously implemented,** considering that on one given sector, they shall not co-exist.

This being said, now is the time to consider the DCF approach and to examine how such an approach may be implemented into simplified business plans (reminder: the goal here is to express the market capitalisation of each listed peer company in terms of forecasts whose availability is restricted to two or three years at most: the business plan is thus not completely nor precisely available, and may therefore be expressed with few data – such as first year aggregate and CAGR – without any material loss in information.)

INITIAL MODELING : THE PRE-CRISIS SITUATION

Usually, a DCF valuation distinguishes two to three time horizons:

• **An explicit horizon:** this covers the usual horizon of the business plan. Even though the available market data do not cover more than two to three years, business plans are often built on a longer horizon, for example five years, or even longer for long-cycle sectors.

• **An implicit horizon:** at the end of the business plan, a terminal normative flow is built, very often starting with the last year of the plan and trying to remove all non-recurring items that are specific to this year only. Through the calculation of a 'terminal value', the valuation exercise assumes that the normative flow will grow indefinitely as at a long-term growth rate (also known as perpetual growth rate.)

• **An intermediate " smoothing " horizon:** where the dynamics at the end of the business plan is still high and different from the long-term growth rate, it is reasonable to consider unlikely that such dynamics slow down abruptly at the end of the business plan. An intermediate horizon is then introduced and positioned just after the horizon of the business plan, in which an annual growth is progressively smoothed from the last year dynamics to the long-term growth rate[16].

16. The profile including an intermediate horizon appears more realistic. Though, the introduction of such a technique is not systematic, for example in situations where the gap between the explicit annual growth rate and the long-term growth rate is moderate. Indeed, in such cases, the bias is usually considered as remaining within the boundaries of the confidence interval of the method.
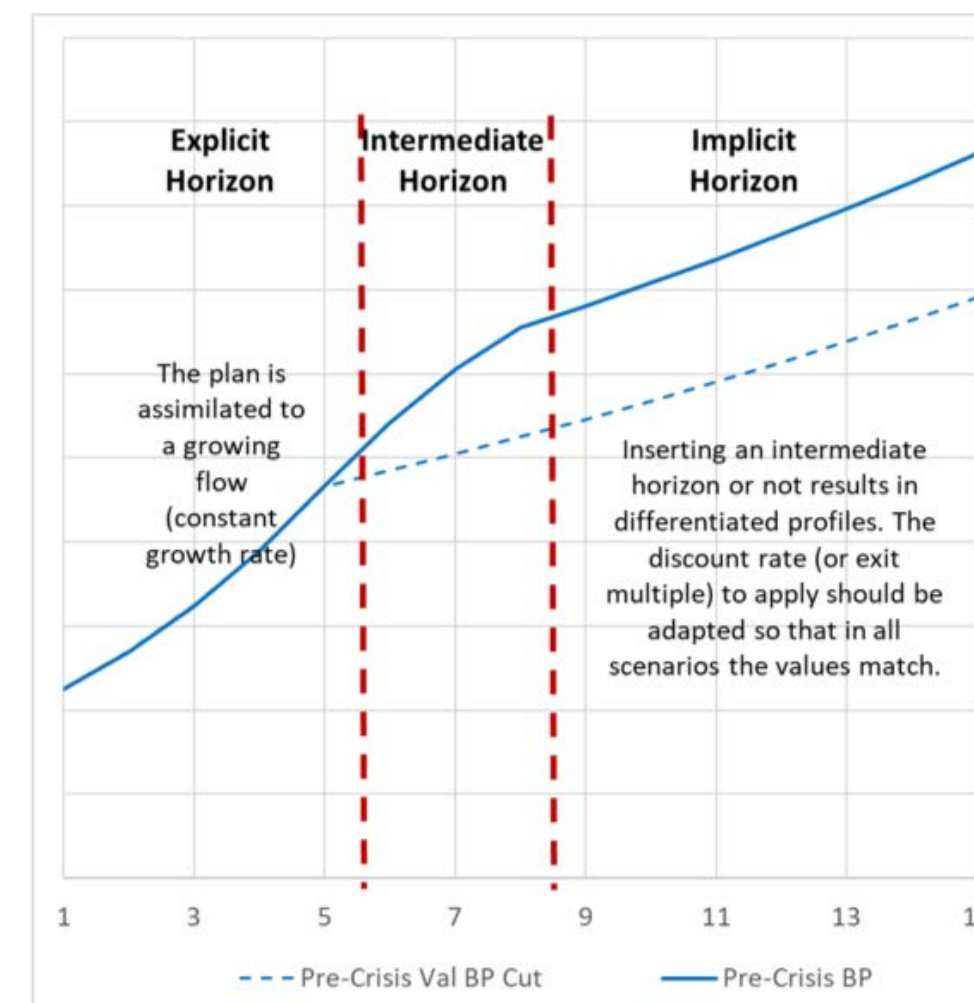

Figure 8: Pre-crisis business plan

Considering a pre-crisis simplified DCF, the parameters to consider are:
• The pre-crisis discount rate (CAPM-based WACC, for instance),
• The pre-crisis first-year forecast,
• The duration for the intermediate horizon (in the following, a 3 years duration is retained. Considering that in most cases the WACC is applied to a non-smoothed business plan, the equivalent-WACC will be reversely determined in order to achieve an identical value)
• The long-term growth rate (in the following, a 1% rate is retained).
These elements being set, it is now possible to compute the average annual growth rate (CAGR) of the explicit horizon that eventually leads to a match between the DCF and the MEV (market enterprise value). This calculated CAGR may also be compared to the one that may be derived from available 3Y forecasts (in case of more dynamic 3Y forecast, this might reveal that the market did not buy such dynamics and included a risk premium, so that this would not systematically reveal an inconsistency). To be complete, it is also possible to handle this reversely, i.e. using the 3Y available

forecasts and finding the associated market WACC (which is then an IRR).

MODELING THE CRISIS SITUATION

The transformation from the pre-crisis situation (in blue) to the crisis situation (in orange, in red where there is a catch-up, in purple where there is a perpetual discount) may be displayed as follows:
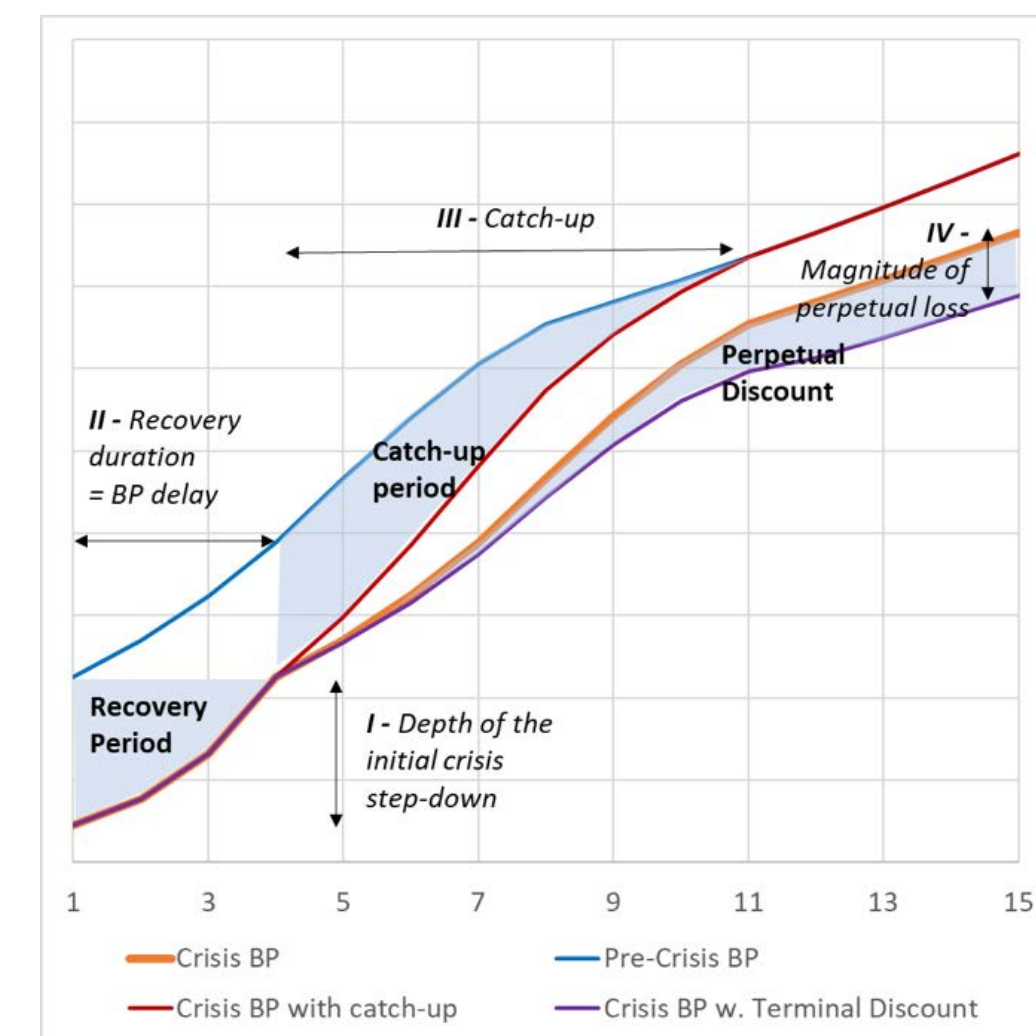
Figure 9: Passage from the pre-crisis plan to the crisis plan

Under this modeling approach, and understanding that it is not applicable to all situations, the passage from the pre-crisis situation to the crisis situation is made through three parameters (given that the two latest from the following four parameters do not co-exist):

• The initial magnitude of the crisis, expressed as the % of **decline in the performance of the first year,**

• The duration of the crisis (and of its recovery) is here expressed as the anticipated **duration between the beginning of first year and the date of recovery of**

the performance that was initially expected for the first year (according to the pre-crisis forecasts). This recovery period is simulated as the pre-crisis plan, that is to say through a constant growth rate (thus both dependent on the magnitude of the crisis and its duration),

- The catch-up period (in years) gradually lowers the gap between the two business plans (an infinite duration thus equals the default scenario, without any catch-up),

- The sector perpetual discount, expressed in % of the normative flow, emulates the cases where the considered sector would be irremediably altered by the crisis.

For each listed company, the work that has to be performed consists in calibrating the three selected parameters so that the DCF computed from the new business plan matches the market enterprise value (i.e. market capitalisation plus net financial debt).

This process calls for the following comments:

- Differentiated triplets of parameters shall lead to a similar valuation (the discrepancy in one parameter may be compensated by another one): the work to be performed here precisely consists in calibrating the parameters not only arithmetically speaking, but also using information from real operations (for example, the crisis shall not last six months, this is now certain) and from external data (for example the brokers' reports, or where available the re-forecasts of listed companies)

- As the work has to be performed for each listed company of a peer group, the calibration of triplets may be eased by the fact that certain parameters should somewhat converge within a given sector

17. The document encloses at the last part of this chapter tables that ease such a work, since the impact and sensitivity of each parameter is directly expressed in terms of an adjusted multiple

: for example the duration of the crisis, or the existence of one of the two last parameters (catch-up period or perpetual discount)

⊕⊄ CALIBRATION OF PARAMETERS

Insofar as the effects of the crisis are not emulated through one but through three parameters, each parameter may not be directly computed.

Common sense is called for when analysing the comparables, so that relevant triplets of parameters are inferred.

Of course, the fluctuations in the stock prices demonstrate that the triplets also evolve, though certain parameters are more sensitive than others, and certain of them are more likely to be common to the considered sector, which facilitates the setting of these.

Once the work is done, **market information** is then not only represented as a **global haircut which is hard to read,** but as a **more concrete, operational and meaningful set of crisis information,** for example: "between 18 and 24 months of delay in performance, no catch-up opportunity but also no perpetual discount, and an immediate loss of performance for the first year between 40% and 80%".

Such informative components, retrieved from the markets and, as such, belonging to analogical approaches, shall be an interesting starting point for a company that, afterwards, shall have to position itself among its peer group:

- Where **re-forecasts have been elaborated,** they shall be compared to the peer group analysis, so that they may (i) concur with the re-forecasts and reinforce their documentation, (ii) areas where an argued documentation is needed are better identified (for example, where in material

discrepancy with the peer group), (iii) the relevance of a risk premium may be contemplated with better acumen (for example, where the re-forecasts do not seem to be built under the same level of risk assumption than the peer group)

- Where **no re-forecasts are available** (except for the forecast for the first year, that appears necessary), the valuation is necessarily harder and less accurate, in certain cases it shall prove not reasonable to conclude on a range of values in its absence.

The characteristics and specificities of the company shall have to be assessed in light of their potential impact on the parameters of the crisis, (i) either to align them with those derived from the peer group, (ii) or to contemplate certain amendments to them (e.g. does the company benefit from specificities that makes it more resilient than most of its peers? Could its geographical footprint or its premium positioning or any other item etc., lead to a faster exit from the crisis? Is its finance structure likely to be a burden when it comes to invest time, slowing down the exit?)
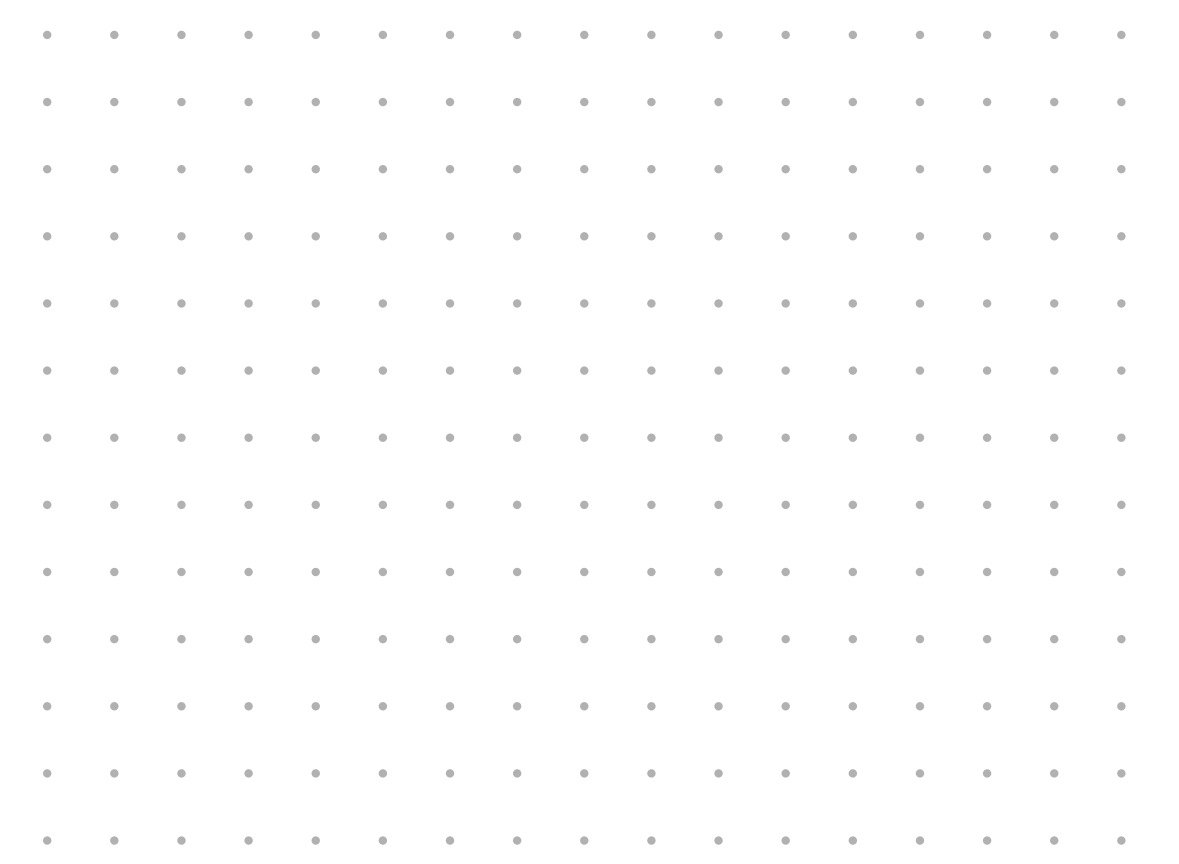
4.
MODELING THE CRISIS: CONNECTING TO THE INCOME APPROACHES

Once the parameters of the crisis are assessed (where necessary, in terms of range of values rather than a single value), the crisis plan may be derived from the pre-crisis one.

When implementing an income approach, the previously described methodology mainly serves as a consistency check for the business plan, compared to its peers (considering a similar level of risk embedded in the forecasts). Thanks to this analysis, a risk premium may also be contemplated and calibrated (see previous chapter). However, some residual risks may need to be tackled: they will be discussed below in this chapter.

When implementing an analogical approach, DCF calculations shall remain implicit: the DCF is hereafter conducted in the context of the modeling approach, so that the adjusted multiples are pre-calculated and ready to use. This document implements such an approach for the previously described parameters that emulate the effects of the crisis.

RISKS RELATING TO THE TRUNCATION OF FORECASTS

The main risk concerning horizons, already mentioned, is about the length of the explicit horizon (e.g. five years), which may truncate the profile of forecasts before full recovery of a normative level of operations.
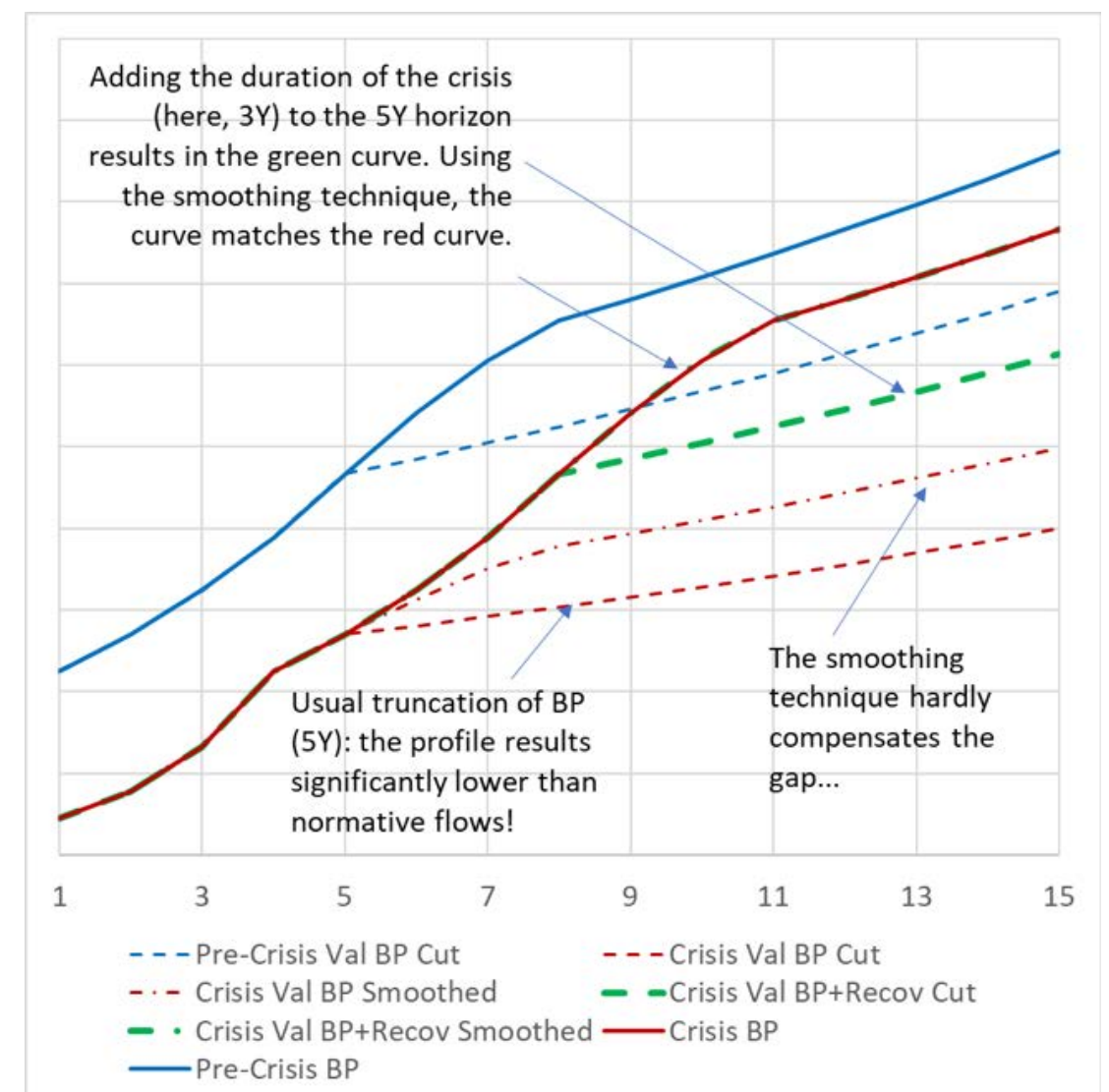
Figure 10: Four alternative BPs, depending on the selected year for truncation and on the insertion or not of an intermediate horizon (NB: no catch-up period in this example)

Figure 10 clearly demonstrates that the magnitude of such a risk is possibly material: any methodology that refers to pre-crisis forecasts and delay them by one way or the other, is exposed to such a risk. It is though easy to tackle, by lengthening the usual horizon of the plan.

⦿ EXTENDING THE FORECASTS HORIZON

In most cases, the usual retained horizon for forecasting will have to be lengthened, in order to avoid underestimation.

Extending forecasts does not appear so obvious in times of lack of visibility. However, **methodologies that consist inter alias in delaying the pre-crisis** forecasts do not experience such a difficulty: they do not require the elaboration of forecasts from scratch and on a long horizon. On the contrary they naturally provide documentation and consistency with the pre-crisis forecasts (provided that an approach introducing a delay, vanilla or with certain adjustments, may be argued as relevant for the sector, e.g by analysis of peer group, or because of real operations such as customers that postpone operations, thus delaying the backlog.)

While the truncation of the business plan may expose to a risk of underestimation, in some cases the truncation associated with the growth-smoothing technique (already described) may on the contrary generate a risk of an overestimate.

Indeed, where the business plan ends on strong dynamics (e.g. due to recovery), extending such a plan through an intermediate horizon may replicate such dynamics for too long (even though the technique progressively smooths the said growth), and may lead to an over-estimate of the normative flow:

Figure 11: Situation where the growth-smoothing technique leads to an overestimate

Figure 11 shows that the dynamics at the end of the plan should abate on a faster pace than the one that the smoothing technique simulates.

Thus, the growth-smoothing technique must be handled with precautions in times of crisis. Comparing pre-crisis forecasts to the new ones may be a good way to prevent from wrong extensions of business plans.

⊘ UNDERSTANDING THE SOURCE OF THE DYNAMICS LOCATED AT THE END OF THE PLAN

Where these dynamics are mainly due to the recovery period, the smoothing technique may lead to an overestimate.

PARAMETERS OF THE CRISIS AND ADJUSTED MULTIPLES

In order to better visualize the way such a methodology may relate market multiples with parameters that refer to forecasts (and thus that are usually rather attached to income-approaches), this document performs all calculations up to the computation of adjusted multiples, in the instance of a three-parameter model. The adjusted multiples are expressed as follows:

- It is expressed as a multiple of Year 1 pre-crisis free cash flows forecasts[18],

- It starts with the pre-crisis multiple and computes 3 add-ups, following Figure 12. The third adjustment is positive in situations of catch-up (left side of Figure 12), negative in situations of a long-term impaired sector (right side of Figure 12), nil otherwise.

For example, an adjusted-multiple approach could be summed-up as follows:

- **Pre-crisis Multiple:** **17.6x**
- 24-Month Discount (WACC 9 %): -2.8x
- Crisis+Recovery period (initial drop in perf = -67%): +0.8x
- Catch-up or LT-Discount situations (nil): +0.0x
- **Crisis Adjusted-Multiple:** **15.6x**

Sensitivities are also easily available and may be run if certain changes to the parameters areconsidered as relevant - in case of argued discrepancy between the company and the average of its peer group, for instance. For example, increasing the duration of recovery by six months changes the adjustments as follows: -4.0x for the time delay and +1.3x on the crisis+recovery period, for a net decrease as of -0.7x, i.e. 4% of additional decrease.
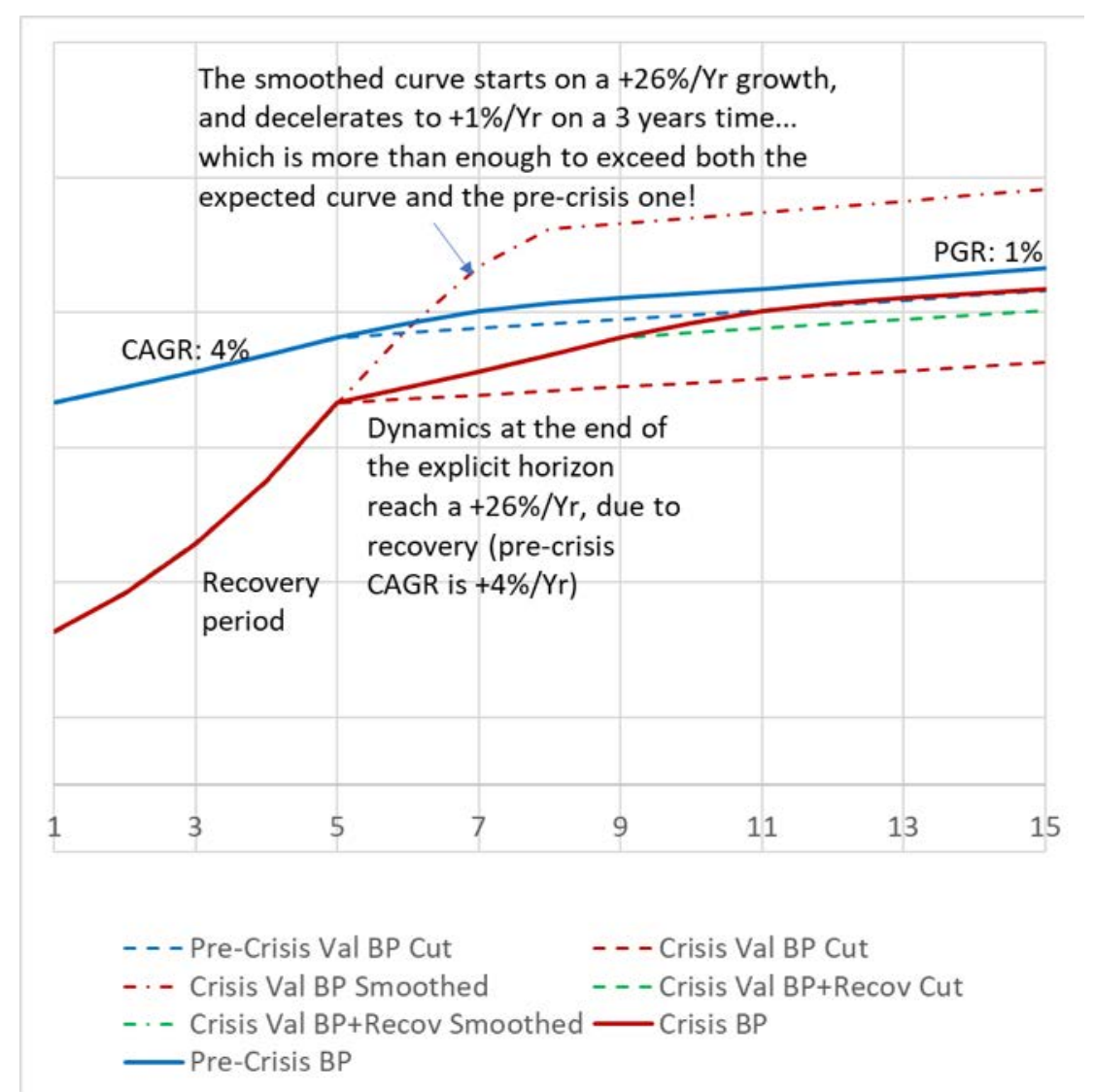

Figure 12: Breaking-down the value into three components

The following **multiple-adjustments tables** are computed using the following hyper-parameters: 5Y business plans, smoothing technique spread over 3Y, and a 1% long-term growth rate.

They deal with:

- The **time delay** due to the crisis and its recovery (Figure 13),
- The value of **flows generated during the crisis** (Figure 14).

As for the catch-up option, numerous parameters are involved in the valuation of this adjustment, and the stakes do not justify the issuance of a set of numerous tables for it.One unique adjustment table has been finally **displayed (Figure 15a)**, that provides with the level of adjustments matching the most significant catch-up, i.e. a catch-up achieved in only 1 year. Of course, where a catch-up is a serious possibility, it

shall probably spread on a longer duration. The table makes it possible to grasp the maximal magnitude at stake (for a more accurate data, the model should be performed on a spreadsheet in order to compute the adjustments; however, the accuracy of such an adjustment is also limited by the fact that it is obviously quite difficult to asses the duration required by such a catch-up, so that this duration is to be assessed as a range of values).

As to the perpetual discount, an adjustment table is **displayed in Figure 15b.**

This table matches a **–5 % discount**. Given that the adjustment is proportional to this parameter, it is therefore easy to adapt to all situations.

18. As we are dealing here with a model, it can then be assumed that the FCF/EBITDA FCF/EBIT ratio is stable, or conversely more refined assumptions may be introduced in order to bridge one aggregate with the other, etc. depending on the specific situation.

ADJUSTING MULTIPLES, DEPENDING ON THE DURATION OF THE CRISIS

Figure 13 adjustments calculates the impact on multiples of the time delay caused by the crisis and its recovery (reminder: the « recovery period » matches the time necessary to get back to a level of performance similar to the one of the first-year pre-crisis plan).

Example: a company whose pre-crisis CAGR amounted 8%, has its EV assessed at c. 9.2x EBITDA (given a 25% CIT and a 30% CAPEX/EBITDA ratio, so that 9.2x EBITDA matches 17.6x FCF). Figure 13 tables provide with a 9% WACC and with the impact of the duration of the crisis: from -1.4x FCF to 6.2x FCF for a duration from 1 to 5 years (i.e. -8% to -35% the pre-crisis value). For instance, a recovery period of 30 months would have -3.4x FCF effect (i.e. -19% of pre-crisis value).

Discount Rate	BP CAGR	Pre-crisis EV (in x FCF)	Recovery period				
			1.0	2.0	3.0	4.0	5.0
5%	1%	25.6x	-1.2x	-2.4x	-3.5x	-4.5x	-5.5x
	3%	28.2x	-1.3x	-2.6x	-3.8x	-5.0x	-6.1x
	5%	31.0x	-1.5x	-2.9x	-4.2x	-5.5x	-6.7x
	7%	34.0x	-1.6x	-3.2x	-4.6x	-6.0x	-7.4x
	9%	37.3x	-1.8x	-3.5x	-5.1x	-6.6x	-8.1x
	11%	40.9x	-1.9x	-3.8x	-5.6x	-7.3x	-8.9x

Discount Rate	BP CAGR	Pre-crisis EV (in x FCF)	Recovery period				
			1.0	2.0	3.0	4.0	5.0
7%	1%	17.2x	-1.1x	-2.2x	-3.2x	-4.1x	-4.9x
	3%	18.9x	-1.2x	-2.4x	-3.5x	-4.5x	-5.4x
	5%	20.6x	-1.3x	-2.6x	-3.8x	-4.9x	-5.9x
	7%	22.5x	-1.5x	-2.9x	-4.1x	-5.3x	-6.5x
	9%	24.6x	-1.6x	-3.1x	-4.5x	-5.8x	-7.1x
	11%	26.9x	-1.8x	-3.4x	-4.9x	-6.4x	-7.7x

Discount Rate	BP CAGR	Pre-crisis EV (in x FCF)	Recovery period				
			1.0	2.0	3.0	4.0	5.0
9%	1%	13.1x	-1.1x	-2.1x	-3.0x	-3.8x	-4.6x
	3%	14.2x	-1.2x	-2.2x	-3.2x	-4.1x	-5.0x
	5%	15.5x	-1.3x	-2.4x	-3.5x	-4.5x	-5.4x
	7%	16.8x	-1.4x	-2.7x	-3.8x	-4.9x	-5.9x
	9%	18.3x	-1.5x	-2.9x	-4.2x	-5.3x	-6.4x
	11%	19.9x	-1.6x	-3.1x	-4.5x	-5.8x	-7.0x

Discount Rate	BP CAGR	Pre-crisis EV (in x FCF)	Recovery period				
			1.0	2.0	3.0	4.0	5.0
11%	1%	10.5x	-1.0x	-2.0x	-2.8x	-3.6x	-4.3x
	3%	11.4x	-1.1x	-2.2x	-3.1x	-3.9x	-4.6x
	5%	12.4x	-1.2x	-2.3x	-3.3x	-4.2x	-5.0x
	7%	13.4x	-1.3x	-2.5x	-3.6x	-4.6x	-5.4x
	9%	14.5x	-1.4x	-2.7x	-3.9x	-5.0x	-5.9x
	11%	15.7x	-1.6x	-3.0x	-4.2x	-5.4x	-6.4x

Discount Rate	BP CAGR	Pre-crisis EV (in x FCF)	Recovery period				
			1.0	2.0	3.0	4.0	5.0
13%	1%	8.9x	-1.0x	-1.9x	-2.7x	-3.4x	-4.1x
	3%	9.6x	-1.1x	-2.1x	-2.9x	-3.7x	-4.4x
	5%	10.3x	-1.2x	-2.2x	-3.2x	-4.0x	-4.7x
	7%	11.1x	-1.3x	-2.4x	-3.4x	-4.3x	-5.1x
	9%	12.0x	-1.4x	-2.6x	-3.7x	-4.6x	-5.5x
	11%	13.0x	-1.5x	-2.8x	-4.0x	-5.0x	-5.9x

Figure 13: Impact on xFCF multiples of the time delay due to the crisis

ADJUSTING MULTIPLES, DEPENDING ON THE MAGNITUDE OF THE CRISIS

The impact of the crisis is based on the initial drop of performance (i.e. for the first year), then the growth recovery rate is automatically computed so that the performance at the end of this time reaches the first-year pre-crisis performance.

Example: The company from the former example expects an 80% drop in its performance on the first year, and afterwards a recovery period of 30 months[19]: considering the 9% WACC, the adjustment would thus amount a +0.8x FCF, mitigating the former -3.4x FCF adjustment to a -2.6x FCF net effect (-15% of the pre-crisis value).

Discount Rate	Initial Step-down	Recovery period				
		1.0	2.0	3.0	4.0	5.0
5%	-90%	0.1x	0.4x	0.7x	1.0x	1.3x
	-80%	0.2x	0.6x	1.0x	1.4x	1.8x
	-60%	0.4x	1.0x	1.5x	2.1x	2.6x
	-40%	0.6x	1.3x	2.0x	2.6x	3.3x
	-20%	0.8x	1.6x	2.4x	3.2x	3.9x
	0%	1.0x	1.9x	2.8x	3.6x	4.4x

Discount Rate	Initial Step-down	Recovery period				
		1.0	2.0	3.0	4.0	5.0
9%	-90%	0.1x	0.4x	0.7x	0.9x	1.2x
	-80%	0.2x	0.6x	1.0x	1.3x	1.6x
	-60%	0.4x	0.9x	1.5x	1.9x	2.3x
	-40%	0.6x	1.3x	1.9x	2.4x	3.0x
	-20%	0.8x	1.6x	2.3x	2.9x	3.5x
	0%	1.0x	1.8x	2.6x	3.4x	4.1x

Discount Rate	Initial Step-down	Recovery period				
		1.0	2.0	3.0	4.0	5.0
13%	-90%	0.1x	0.4x	0.6x	0.8x	1.0x
	-80%	0.2x	0.6x	0.9x	1.2x	1.5x
	-60%	0.4x	0.9x	1.4x	1.8x	2.1x
	-40%	0.6x	1.2x	1.8x	2.3x	2.7x
	-20%	0.8x	1.5x	2.2x	2.7x	3.2x
	0%	0.9x	1.8x	2.5x	3.2x	3.7x

Figure 14: Present value of the flows generated during the crisis and its recovery

19. The 80% fall of performance and the 30 months duration of the crisis should be compared / challenged with the peer group. The duration of the crisis is more likely to be a common parameter within a given sector, the drop in the performance more diverse: the documentation of the valuation process should focus on the rationale for any discrepancy between the peer group and the company.

ADJUSTING MULTIPLES, DEPENDING ON THE CATCH-UP ASSUMPTION

These tables assess the additional value to be taken into account where it is believed that a catch-up is possible (i.e. re-forecasts would match pre-crisis forecasts at some point).

The maximal effect is the only one displayed here (i.e. a 1 year catch-up, just after the recovery period).

Example: The company from the former example may contemplate a maximum of +0.9x adjustment in case a catch-up is deemed relevant. Would such a catch-up spread over a longer time (e.g. eight to nine years), then the adjustment would obviously be lower, maybe 50% lower or so (for an accurate assessment, a spreadsheet would then be needed). However, it is reminded that such an adjustment would require strong arguments as to the likeliness of such a catch-up.

Discount Rate	BP CAGR	Recovery period				
		1.0	2.0	3.0	4.0	5.0
5%	1%	0.2x	0.4x	0.6x	0.8x	1.0x
	3%	0.3x	0.6x	0.9x	1.1x	1.3x
	5%	0.5x	0.8x	1.2x	1.4x	1.6x
	7%	0.6x	1.1x	1.5x	1.8x	2.0x
	9%	0.7x	1.3x	1.8x	2.2x	2.4x
	11%	0.9x	1.6x	2.2x	2.6x	2.9x

Discount Rate	BP CAGR	Recovery period				
		1.0	2.0	3.0	4.0	5.0
7%	1%	0.2x	0.3x	0.4x	0.5x	0.6x
	3%	0.2x	0.4x	0.6x	0.7x	0.8x
	5%	0.3x	0.6x	0.8x	1.0x	1.1x
	7%	0.4x	0.8x	1.1x	1.2x	1.4x
	9%	0.6x	1.0x	1.3x	1.6x	1.7x
	11%	0.7x	1.2x	1.6x	1.9x	2.1x

Discount Rate	BP CAGR	Recovery period				
		1.0	2.0	3.0	4.0	5.0
9%	1%	0.1x	0.2x	0.3x	0.3x	0.4x
	3%	0.2x	0.3x	0.4x	0.5x	0.6x
	5%	0.3x	0.5x	0.6x	0.7x	0.8x
	7%	0.4x	0.6x	0.8x	1.0x	1.0x
	9%	0.5x	0.8x	1.1x	1.2x	1.3x
	11%	0.6x	1.0x	1.3x	1.5x	1.6x

Discount Rate	BP CAGR	Recovery period				
		1.0	2.0	3.0	4.0	5.0
11%	1%	0.1x	0.2x	0.2x	0.3x	0.3x
	3%	0.2x	0.3x	0.4x	0.4x	0.4x
	5%	0.2x	0.4x	0.5x	0.6x	0.6x
	7%	0.3x	0.5x	0.7x	0.8x	0.8x
	9%	0.4x	0.7x	0.9x	1.0x	1.0x
	11%	0.5x	0.9x	1.1x	1.2x	1.3x

Discount Rate	BP CAGR	Recovery period				
		1.0	2.0	3.0	4.0	5.0
13%	5%	0.1x	0.1x	0.2x	0.2x	0.2x
	7%	0.1x	0.2x	0.3x	0.3x	0.4x
	9%	0.2x	0.3x	0.4x	0.5x	0.5x
	11%	0.3x	0.5x	0.6x	0.7x	0.7x
	0%	0.4x	0.6x	0.8x	0.8x	0.9x
	8%	0.5x	0.8x	1.0x	1.1x	1.1x

Figure 15a: value of a very fast catch-up (ie 1 year catch-up period)

ADJUSTING MULTIPLES DUE TO A PERPETUAL SECTOR HAIRCUT

The tables below are based on a −5 % perpetual haircut (expressed in % of normative performance). These adjustments are proportional to the haircut level, so that the levels of adjustments are easy to adapt to all situations.

Example: the company from the former example belongs to a sector permanently impaired by the crisis, suffering from a 2% long-term loss. The adjustment to consider would thus amount a −0.2x (i.e. 2%/5% x the table adjustment, considering proportionality).

Discount Rate	BP CAGR	Recovery period				
		1.0	2.0	3.0	4.0	5.0
5%	3%	-1.1x	-1.1x	-1.0x	-1.0x	-0.9x
	7%	-1.4x	-1.3x	-1.3x	-1.2x	-1.2x
	11%	-1.7x	-1.6x	-1.6x	-1.5x	-1.4x
7%	3%	-0.7x	-0.6x	-0.6x	-0.6x	-0.5x
	7%	-0.9x	-0.8x	-0.7x	-0.7x	-0.6x
	11%	-1.0x	-1.0x	-0.9x	-0.8x	-0.8x
9%	3%	-0.5x	-0.4x	-0.4x	-0.4x	-0.3x
	7%	-0.6x	-0.5x	-0.5x	-0.5x	-0.4x
	11%	-0.7x	-0.6x	-0.6x	-0.5x	-0.5x
11%	3%	-0.4x	-0.3x	-0.3x	-0.3x	-0.2x
	7%	-0.4x	-0.4x	-0.3x	-0.3x	-0.3x
	11%	-0.5x	-0.5x	-0.4x	-0.4x	-0.3x
13%	3%	-0.3x	-0.2x	-0.2x	-0.2x	-0.2x
	7%	-0.3x	-0.3x	-0.3x	-0.2x	-0.2x
	11%	-0.4x	-0.4x	-0.3x	-0.3x	-0.2x

Figure 15b: Decrease in value due to a −5% perpetual haircut

ILLUSTRATION ON A THEORETICAL EXAMPLE

Considering the A and B companies, introduced in Figures 1 and 4:

Listed Company A	N budget	N+1 plan	N+2 plan	CAGR	EV	EV / Pre-crisis N
Pre-crisis BP (EBITDA)	106	115	123	8%	980	9.2x
Pre-crisis BP (FCF)	56	60	65	8%	980	17.6x

Listed Company B	N budget	N+1 plan	N+2 plan	CAGR	EV	EV / Pre-crisis N
Pre-crisis BP (EBITDA)	110	124	150	17%	1,100	10.0x
Pre-crisis BP (FCF)	58	65	79	17%	1,100	19.0x

Figure 16: Reminder of the pre-crisis data for the A and B companies

From these elements may be derived the implicit pre-crisis WACCs, using Figure 13: 9% for A and 11 to 12 % for B (a discrepancy between two companies within the same sector is not systematically inconsistent, it may relate for example on differentiated levels of ambition for the BPs, thus differently priced by the financial markets).

First, a 18% and 24% decrease in EV of company A resp. B, have been experienced (Figures 1 and 4). Assuming that there is no obvious reason in this sector neither for a catch-up phenomenon nor a perpetual loss of performance, there are still two parameters of the crisis left: the magnitude of the crisis and its duration.

The elaboration of re-forecast, even though limited to the first year, drastically reduce the number of couples of parameters that might be eligible for modeling:

Listed Company A	N budget	EV	EV / Pre-crisis N
Crisis BP (EBITDA)	35	815	7.7x
Crisis BP (FCF)	18	815	14.6x

Listed Company B	N budget	EV	EV / Pre-crisis N
Crisis BP (EBITDA)	−20	820	7.5x
Crisis BP (FCF)	−11	820	14.2x

Figure 17: Re-forecasts of companies A and B (for the first year)

The initial drop of performance would amount a −65% for company A and a −118% for company B.

Figures 13 and 14 provide with a recovery period as of about 4 years (duration that is required in order to match the decrease in market values from 14.6x to 17.6x, thus a −3.0x decrease; this adjustment matches a −5.1x time delay effect mitigated by a +1.9x recovery period effect).

As for company B, tables are less easy to use because the initial drop of performance, higher than 100%, is out of limits. Extrapolations are possible though, so that a smart use of Figures 13 and 14 provide with a three-year recovery period.

In a nutshell, the sector approach would lead to:

• A strong initial magnitude of the crisis, but felt in diverse ways within the sector (i.e. from –65 to –120%);

• A duration of the crisis for three-to-four years.

Practically, once A and B re-forecasts are made available, the recovery period may be directly assessed: according to these re-forecasts, the recovery (including the crisis) would rather last 2 years:

Listed Company A	N budget	N+1 plan	N+2 plan	CAGR	EV	EV / Pre-crisis N
Pre-crisis BP (EBITDA)	106	115	123	8%	980	9.2x
Pre-crisis BP (FCF)	56	60	65	8%	980	17.6x
Crisis BP (EBITDA)	35	60	107		815	7.7x
Crisis BP (FCF)	18	32	56		815	14.6x

Listed Company B	N budget	N+1 plan	N+2 plan	CAGR	EV	EV / Pre-crisis N
Pre-crisis BP (EBITDA)	110	124	150	17%	1,100	10.0x
Pre-crisis BP (FCF)	58	65	79	17%	1,100	19.0x
Crisis BP (EBITDA)	−20	48	107		820	7.5x
Crisis BP (FCF)	−11	25	56		820	14.2x

Figure 18: Re-forecasts of companies A and B (see also figures 1 and 4)

This discrepancy (three to four years according to the markets, two years according to re-forecasts) would mean that the financial markets do not "buy" the re-forecasts dynamics, or that they do not consider the same risk-reward couple than in the pre-crisis situation.

Would the markets have aligned with two years, then the drop of EVs for A and B would amount (according to Figures 13 and 14) a –1.9x and resp. –3.7x, i.e. –11% and –19% of pre-crisis EVs, to be compared to the actual –17% and –25%.

Said in other words, considering a 2 years crisis is possible, but such a scenario would require the application of a 6% discount on pre-crisis values (Figure 13 also provides with a risk premium equivalent of such a discount: about 50 bp to be applied on A and B WACCs).

After having analysed the peer group (in this example, only composed of companies A and B), the company to be appraised is now considered. The said company has been described in Figure 7, from which has been extracted the following table:

Company to be appraised	N-1 Actual	N Budget	N+1 plan	N+2 plan
Pre-crisis BP (EBITDA)	100	114		
Re-forecasts		80	80	114

Other input data shall be added as follows: a 9.0x pre-crisis EBITDA multiple for N (i.e. 17.1x the N FCF), and a +10% pre-crisis CAGR. Figure 13 provides with a 10% implicit WACC.

As for the peer group parameters, and in light of the company's specifics, the resulting analysis may be summed up as follows:

• The company foresees an initial drop in performance of 30%, lower than the falls in performance of the peer group. The company has strong material to support this better resilience,

• The company does not have any hint of a shorter or longer duration of the crisis than its peers. Exiting the crisis should take about the same time as any company in this sector.

These information enables the implementation of the model: Figures 13 and 14 provide with a first –4.2x to –5.4x adjustment (3 to 4 years of time delay), and a +2.0x à +2.6 adjustment to account for the performance during the crisis, so that the net adjustment amounts –2.0x et –2.8x, i.e. a –12 to –15% decrease in value.

To be noted: considering a 2 years recovery period, the net adjustment would amount a –2.9x + 1.4x = –1.5x which matches a –9% decrease. Considering the 6% discount previously mentioned when applying the 2 years duration, the total decrease would thus reach –15%... And in case of DCF, forecasts with a 2Y recovery period, an additional 50 bp risk premium would apply.

5.

APPLYING THIS METHODOLOGY TO SECTORS

In order to better understand how the above methodology may help in providing with quantitative information on the crisis and its effect on values, this chapter contemplates an implementation of this methodology on several industries. The selected sectors are as follows:

- Hotels and Resorts
- Restaurants
- REIT Retail
- Transportation
- Automotive
- Construction
- Food, Beverages and Personal Products
- Telecommunications

The first six sectors may be intuitively considered as strongly hit by the crisis, the last two are deemed less concerned. These sectors are macro-sectors: they include all geographies and many sub-sectors (e.g. for transportation: rail, airlines, airports, toll roads etc.).

Obviously, applying such a methodology on a specific case would require that such a macro-sector be narrowed into a credible peer group. It is worth noticing that geographies may experience different dynamics (the timing of the crisis and the response of governments are not the same).

SOME DETAILS ABOUT THE IMPLEMENTATION

The methodology handles two parameters of the crisis: the initial drop of performance magnitude, and the duration of the crisis.

Both parameters are primarily assessed through the analysis of consensuses. The first parameter is straightforward (consensus of reforecast for 2020), and the second parameter (duration of the crisis) consists in an analysis of the CAGR consensus (calculated through the two or three years of re-forecasts as seen by analysts) and a comparison with 2020 pre-crisis consensus, in order to derive the moment where the crisis BP should reach the 2020 pre-crisis level.

The pre-crisis BP is not discounted with a CAPM WACC, but with an IRR (internal rate of return), so that the present value of the pre-crisis BP matches the pre-crisis EV (market capitalisation plus net financial debt, as at 2020, Jan 1st). This IRR is then re-used when calculating the present value of the modeled crisis BP: this approach thus remains a multiple approach (i.e. the IRR relates to the markets, thus is similar to a market multiple), even though it seems like a DCF.

Finally, the effects of each parameter are expressed in terms different from Figures 13 and 14, in order to express each effect in terms of negative impact (rather than through a high negative term for the duration – Figure 13, partially offset by the present value of crisis performance – Figure 14). They are calculated as follows.
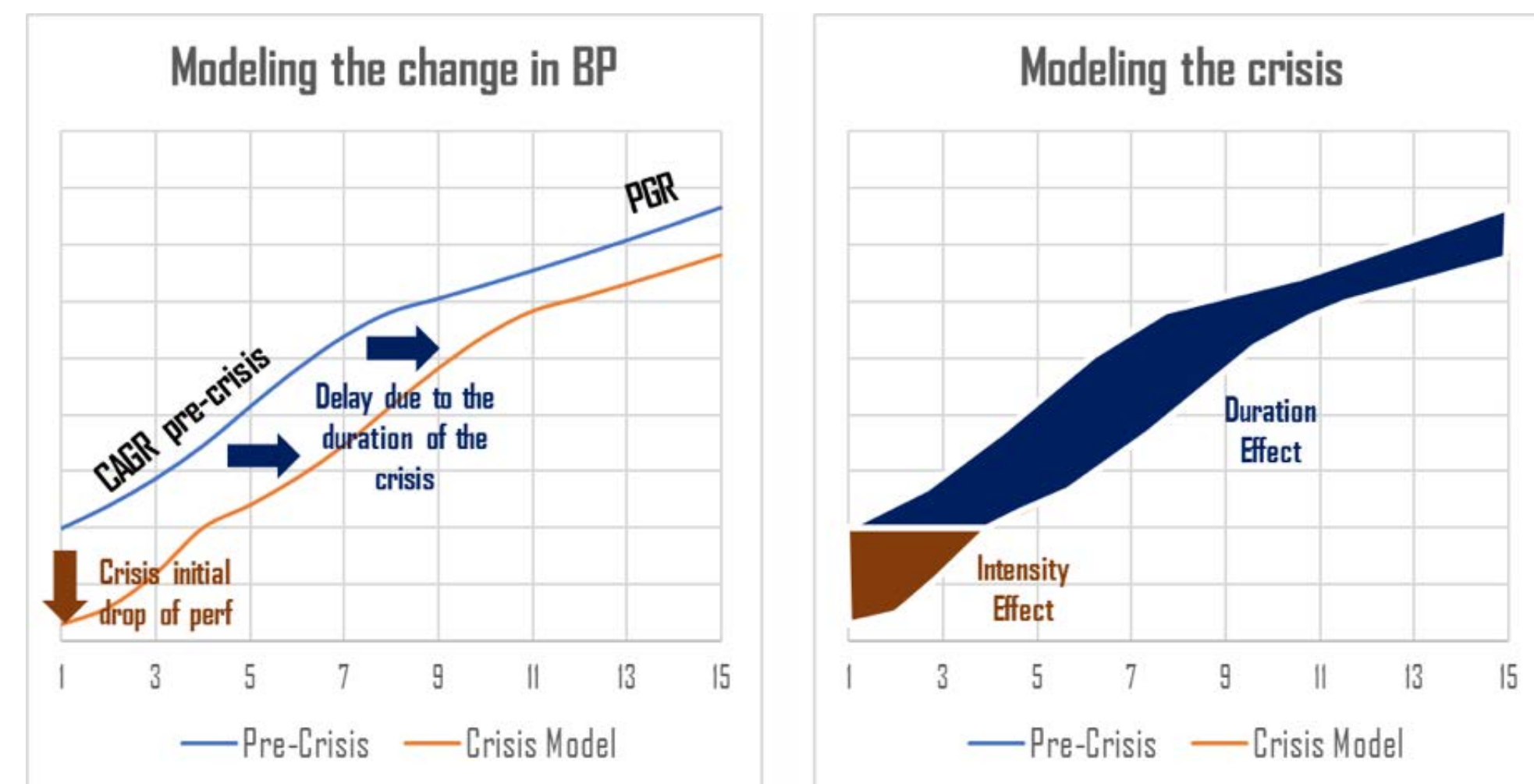

Figure 19: Turning a pre-crisis BP into a crisis BP, and breakdown of effects on valuation

CONSENSUS AND PARAMETERS OF THE CRISIS

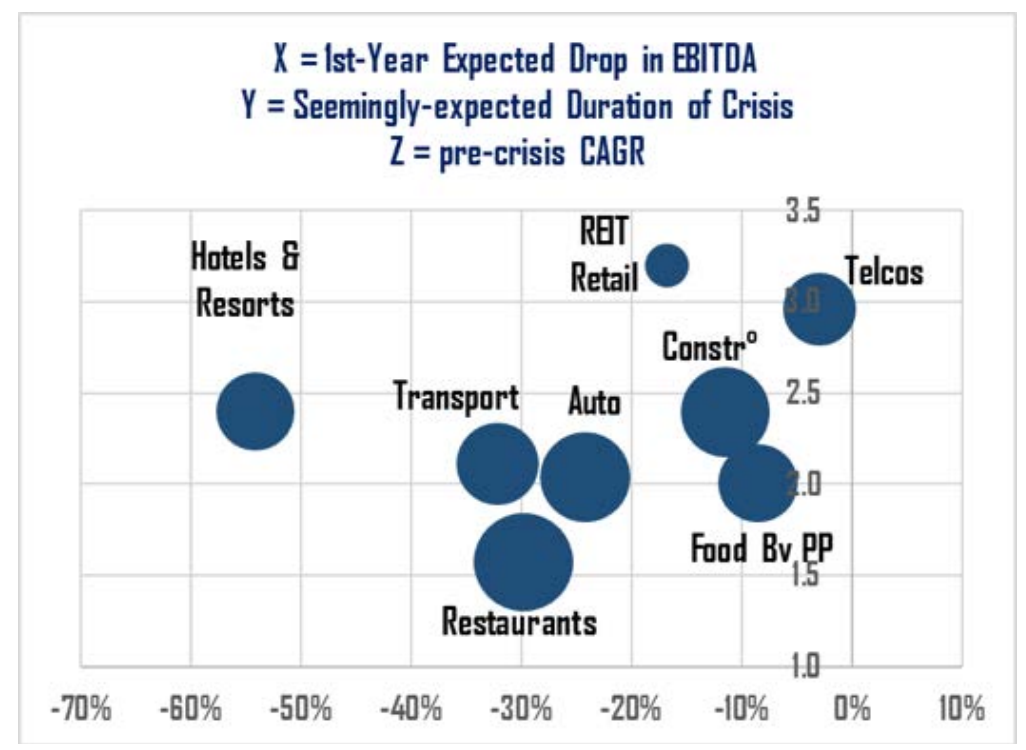The analysis of consensuses leads to the following:

Figure 20: Initial drop of performance and duration of the crisis (from Capital IQ consensus)

Using these parameters, it will subsequently be possible to transform and turn the pre-crisis BPs into crisis BPs. Of course, consensuses only reflect the views of analysts, so that the financial markets may have different views and may "price" the sector differently. On a primary step, it is interesting to emulate the consensus implied calibration of the parameters of the crisis, and then on a second step to analyse the remaining gap vs market caps.

⊕ PARAMETERS OF THE CRISIS AS ANTICIPATED BY CONSENSUS

As of May 2020, consensus anticipates the crisis to last 2 to 2.5 years for many sectors.

IMPLEMENTATION OF THE METHODOLOGY AND FIRST RESULTS

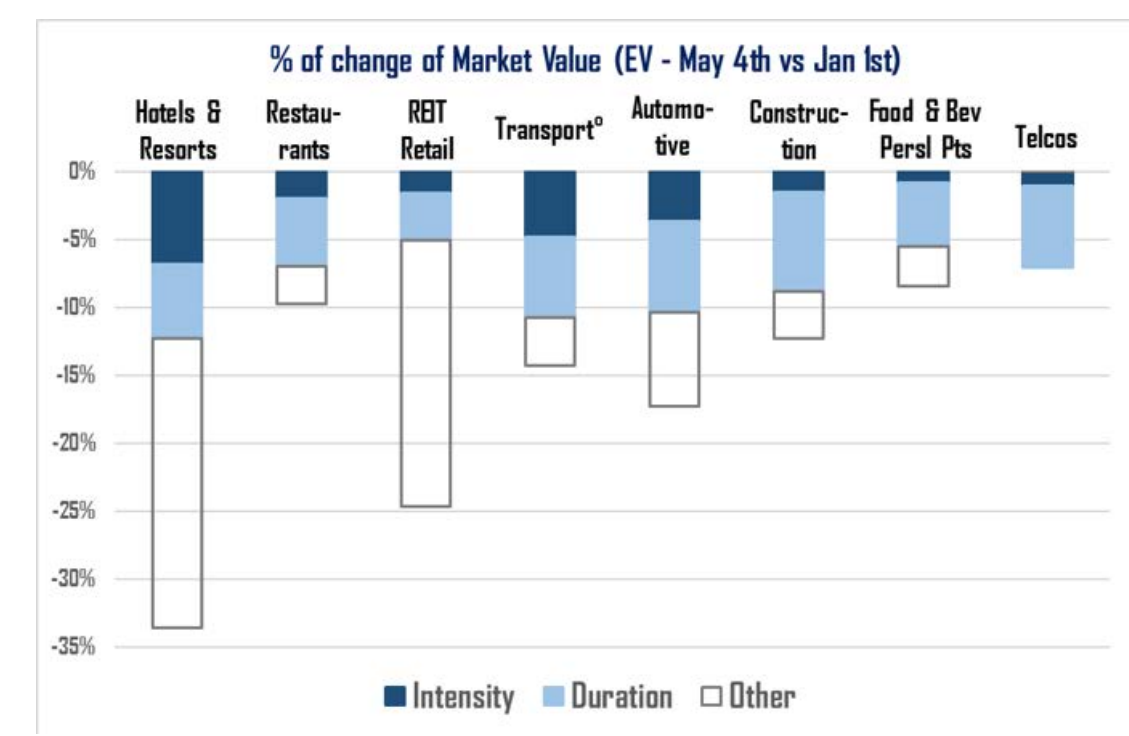The results may be displayed as follows:

Figure 21: Intensity-Magnitude effect and Duration Effect

The impact of the crisis on valuations, assessed through the initial drop of performance and the duration of the crisis effects, generally does not fully match the crisis EV (as of May 2020), though for many sectors, the remaining gap proves to be moderate.

When a remaining gap exists, further analysis will then have to be performed (the benefit of the methodology is that the potential uncertainties arising from the said analyses are limited to the remaining gap, which is of course lower than the initial drop of market capitalisations.)

- The gap may in part or in full reflect the anticipation of a longer duration of the crisis than the one derived from consensus (see following chapter)

- The gap may also relate to price adjustments following a 2019 year where the prices may have risen a lot (such a move would have nothing to do with the crisis even though the crisis may have helped in triggering it)

- The gap may reflect huge range of situations within the sector, so that more detailed analysis may be needed (sub-sectors, sub-geographies etc.)

- The gap may also mean that the level of uncertainty is still high on the considered sector, which (i) may change in the months to come (e.g. where a sector is strongly seasonal, the peak is awaited), or (ii) that may reveal a worry as to a possibility of permanent loss on the demand (e.g. the fourth parameter of Figure 15b).

Depending on these analyses, the remaining gap may have to be taken into account in part, in full, or none of it.

REMAINING GAP BETWEEN MODELLING THE CRISIS AND MARKET CAP

In order to facilitate the analysis of the remaining gap, it is useful to express it in terms of extended duration of crisis: what would be the duration of crisis that would perfectly match the market caps?
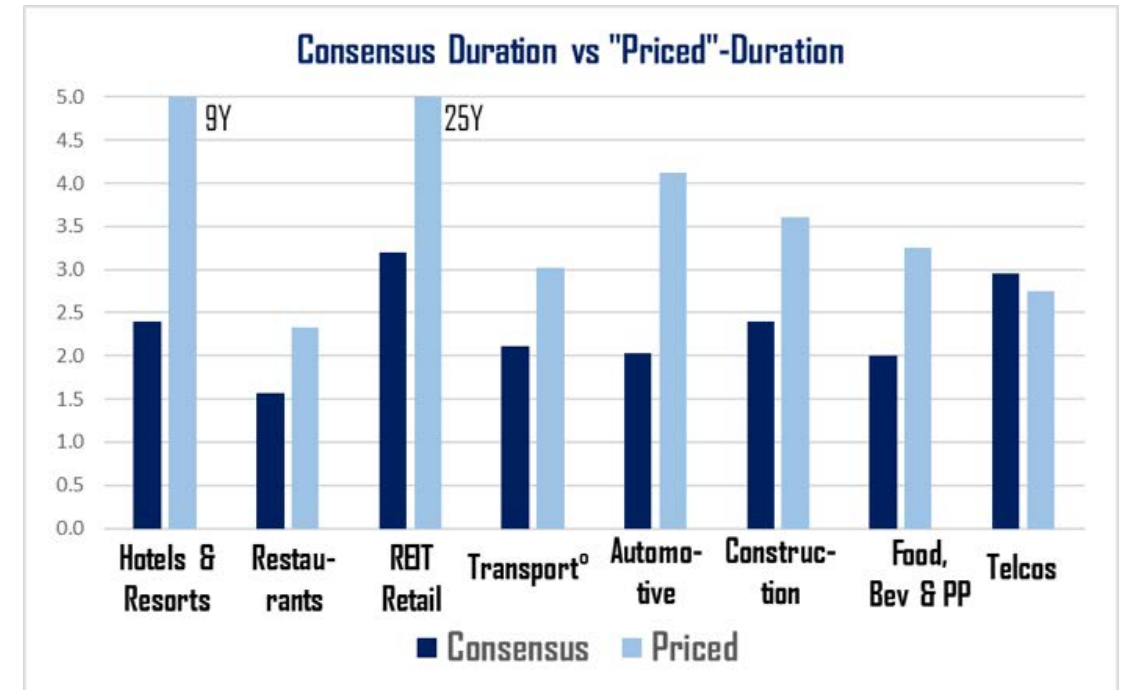

Figure 22: Duration effect that would match the Market Cap (Beg. of May)

⊕ DIFFERENTIATED RESILIENCE

Certain sectors may be badly hit in magnitude, but at the same time are supposed to recover swiftly (e.g. restaurants), for others, it is the very opposite (e.g. construction), resulting in more or less similar total effects, depending on each case.

For many sectors, the extension of duration is about one year, so that a way of introducing a reasonable range of values may consist in expressing it as a range of duration of the crisis (e.g. between two and three years.)

For other sectors, the gap may not only be about duration (e.g. for the automotive sector, the gap equals approx.. two years, which is double that of many other sectors), or its rationale is certainly not only duration (e.g. Hotels & Resorts and REIT Retail), hence the above analysis where others sources for the gap may have to get found.

The remaining gap has been expressed in terms of years of crisis, but it may also be expressed otherwise - i.e. as a risk premium:

	Hotels & Resorts	Restaurants	REIT Retail	Transport°	Automotive	Construction	Food & Bev Persl Pts	Telcos
Equivalent Risk-Premium	1.8%	0.2%	1.2%	0.4%	0.6%	0.2%	0.2%	-0.1%

Figure 23: Risk premiums to apply to crisis-BP that would match the Market Cap (May 2020)

APPLYING THESE FINDINGS TO THE VALUATION OF A BUSINESS

As the above sectors are in fact "macro-sectors", they are not fit for a precise valuation, but – for illustrative purposes - let's assume they are. Under a multi-criteria approach, the selected approaches may be either market-based approaches or income approaches. for each of these, the former analysis may provide information, as follows:

	Hotels & Resorts	Restaurants	REIT Retail	Transportation	Automotive	Construction	Food & Bev Pers Prod	Telcos
Multiple approach								
- Apply all multiples to the FY2020 pre-crisis aggregate - Retrieve pre-crisis multiple, called "M"								
- Apply the following multiple adjustment to M:	-12%	-7%	-5%	-11%	-10%	-9%	-6%	-6%
- Adapt adjustment in case First-Year drop of performance is higher/lower than peer group	nc	nc	nc	nc	nc	nc	nc	nc
- Consider drop in market cap not directly explained, and contemplate further adjustments, for example:								
Possible longer duration of crisis	nc	-0 to -3% (+0.8Yr)	nc	-0 to -4% (+0.9Yr)	-0 to -3% (+1Yr)	-0 to -4% (+1.2Yr)	-0 to -3% (+1.2Yr)	nc
Possible step-down move following 2019 dynamics	nc	nc	nc	nc	nc	nc	nc	nc
Other uncertainties	-0 to -22%		-0 to -20%		-0 to -4% (+1Yr) or to -7% (+0Yr)			
DCF approach								
Case #1: No re-forecasts								
- Retrieve the pre-crisis BP - Retrieve the pre-crisis WACC								
- Transform the pre-crisis BP, applying an initial drop of FY20 (EBITDA) performance of:	-55%	-30%	-17%	-30%	-25%	-11%	-9%	-3%
- Adapt initial drop in case of information in favor of a higher/lower drop than peer group	nc	nc	nc	nc	nc	nc	nc	nc
- Further transform the pre-crisis BP, delaying the whole BP by:	2.4Y	1.6 to 2.4Y	3.2Y	2.1 to 3.0Y	2.0 to 3.0Y	2.4 to 3.6Y	2.0 to 3.2Y	3.0Y
- Fill-in the years between the 1st one and the 1st delayed year (i.e. years during the crisis) as best as possible (no clue = constant growth)								
- Consider adding 0, part or full risk premium (NB: the longer-end of the above duration interval already captures part of it)	0% to 1.8%	0 to 0.2%	0 to 1.2%	0 to 0.4%	0 to 0.6%	0 to 0.2%	0 to 0.2%	-0.1%

Case #2: Existing re-forecasts
- Challenge re-forecasts by comparison with peer group parameters (Duration and initial Drop of performance), in order to (i) further document these BP assumptions, (ii) reconsider them where too far from peer group, (iii) contemplate a risk premium where relevant (e.g. ambitious parameters vs peer group, and risk premium analysis as in Case#1)

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