



**FORECASTING YOUR FINANCIAL PERFORMANCE IN A TIME OF CRISIS:  
A STATISTICAL REVIEW OF MARKET DATA TO FACILITATE THE ANALYSIS  
OF THE EFFECTS OF COVID-19 ON COMPANY FORECASTS**



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## ABOUT THIS DOCUMENT

This document restricts its analysis to the valuation of the shares of companies (i.e. equity value) as well as to the valuation of whole businesses (enterprise value.)

It is not intended to cover all aspects of a valuation assessment (e.g. the 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 nor 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 a going concern business to one in liquidation.

The thoughts presented in this document have neither prescriptive force nor force of recommendation and they are 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 modelling exercise. It is up to the reader who wishes to use such a process to make the necessary adaptations in order to meet their needs in their specific case.

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# INTRODUCTION

The Covid-19 pandemic reminds us of the inherent difficulties in factoring the impact of a crisis into financial forecasting and 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 appears much more uncertain and the field of possibilities is much wider.

Similarly, in times of crisis, common forecasting and valuation approaches present their own set of difficulties. On one side, market-based approaches are influenced by:

- highly **volatile**<sup>1</sup> market data;
- information on listed companies and their **fragmented**<sup>2</sup> perspectives on business performance during and after the crisis.

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

- the ability to **re-forecast** in a context of uncertainty;
- the uncertainty over the level of risk associated with these forecasts, and to what extent any **risk premium** should be applied when using them as a basis for valuation.

Not all valuation exercises can be postponed until a business gains visibility of when a crisis will end. On the contrary, the performance of some valuation exercises can have major knock-on effects: for example, impairment tests on goodwill, for which impairment losses are recognised by companies are irreversible.

This document will focus on analysing in more detail market-based methods of valuation, notably multiple of earnings approaches. In doing so, the study will connect these methods with income approaches (DCF<sup>3</sup>) and will highlight a number of risks and pitfalls to be aware of 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**<sup>4</sup> of **the effects of the crisis**. This configurable model could help to increase understanding of the decreases in the performance of financial markets in times of crisis, while helping businesses take a suitable course of action when forecasting during these times.

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

2. Listed companies have widely withdrawn their pre-crisis forecasts, without immediately replacing them with new ones. In the meantime, 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: a 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 modelling 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

While the exceptional nature of a crisis leads to questions arising over the methods traditionally used during valuation exercises, the reality is that those methodologies remain valid. Rather you need to pay close attention to how you use them: for example, the simple application of pre-crisis valuation inputs to crisis affected financial metrics can indeed prove to be flawed, in some cases by overestimating the effects of the crisis, or, on the contrary, by underestimating the loss of value.

Initially, this document discusses 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 flawed valuation.

By using observable market information, the document considers a constructive approach in order to (i) re-calibrate the multiples that are applied in

the market approach or (ii) adjust the discount rate (through a risk premium) to the forecasted cash flows in the application of an income approach.

The suggested approach is based on the premise 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.

An easy option in determining the extent of the effect of the crisis on a company's forecasts would be to position itself amongst its peers for comparison purposes (the aforementioned 20% drop is only an average for peer companies, individual companies within the group may have performed worse or better.) A company could perform this benchmarking assessment with confidence where the 20% drop could be broken down into several explanatory factors.

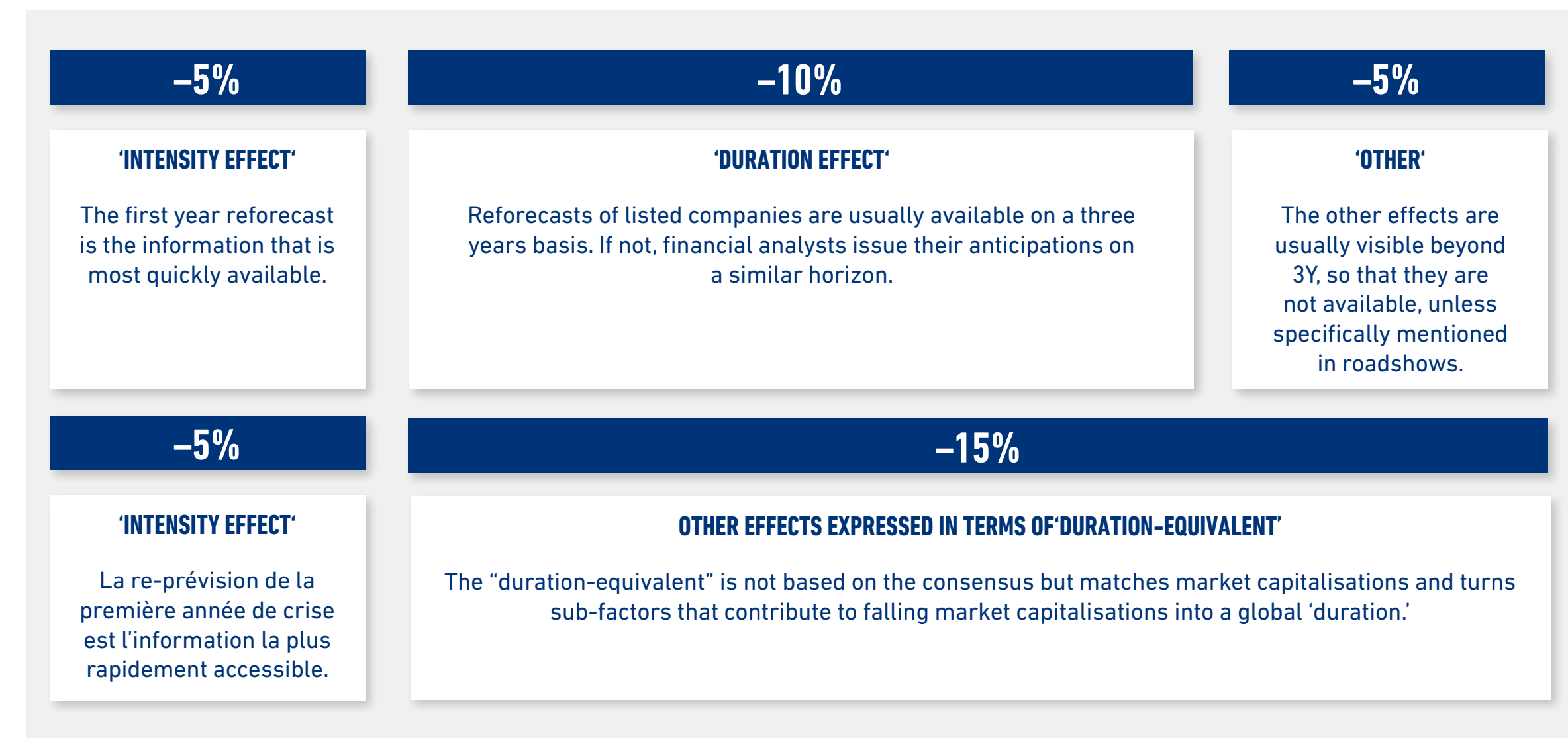
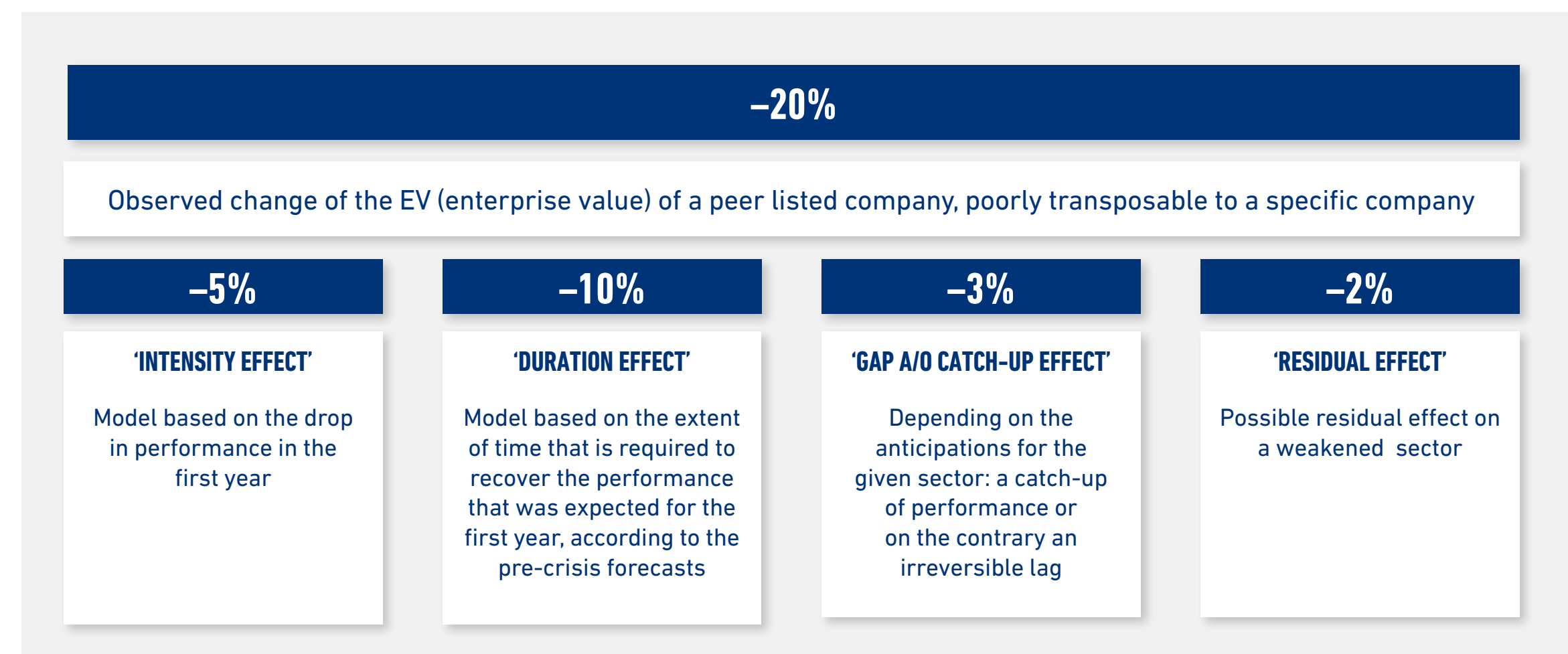
Below is an example of such an approach, where a market rationale for the decrease in performance can be explained by different 'effects':

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) that are being analysed.

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 a "comparable approach" (comparison 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 arrive at a range of possibilities for the forecasts of the company.



For practical reasons, the available information on listed companies can restrict the above-mentioned breakdowns to the following simplified rationales:





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

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

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

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 case highlighted in Figures 13 and 15, the pre-crisis multiple of FCF of **16.8x** (based on a 9% WACC for a company whose pre-crisis forecasts reached a 7%/Year CAGR) would reduce by **-1.8x** (-2.7x + 0.9x) (thus experiencing a -11% decrease). This case considers 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 analyse: for example, a 3Y crisis would lead to a **-2.3x** adjustment, and if combined with an increased crisis intensity, for instance -80 %, the total effect would amount to **-2.8x** (-3.8x + 1.0x).

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” derived from this methodology. Of course, other parameters than the ones identified in the present study could prove more relevant for a given industry. Nonetheless, the methodology remains similar: providing a rationale for stock market prices changes, expressed in terms of operational factors that are easier to understand and analyse.

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

For illustrative purposes, the study has been conducted based on the decrease in market values of a number of macro-sectors:

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

This document acknowledges that a number of precautions must be taken when generally accepted valuation approaches are applied when facing a crisis event and, specifically, in terms of the use of multiple based or DCF approaches.





These elements are summarised below.

The first issues 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 a contract or fund internal rules, or of guidelines such as IPEV) , and finally an analysis of the relevance of current approaches:

<b>FRAMEWORK &amp; ENVIRONMENT OF THE VALUATION</b>	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 the determination of valuation parameters?
<b>AN ARGUED AND TRANSPARENT PROCESS</b>	Does the valuation process include documentation of: <ul style="list-style-type: none"> <li>• The fact that the method in place is effectively unsuitable, in the context of the current crisis?;</li> <li>• The relevance and description of each change and choice made?</li> </ul> Does the information transmitted to the stakeholders interested in the valuation include: <ul style="list-style-type: none"> <li>• A description of the changes introduced and their limitations, given reduced visibility over the future performance of the subject to the valuation?</li> <li>• A sensitivity analysis that encompasses an extended range of values due to this reduced visibility?</li> </ul>
<b>MULTI-CRITERIA APPROACH</b>	Relying on a single method is risky. In times of crisis even more so. A multi-criteria approach is generally recommended.
<b>MARKET APPROACHES</b>	Does the process include: <ul style="list-style-type: none"> <li>• Verification of the level of trading volumes on the security observed?</li> <li>• Investigation as to whether multiples derived from recent transactions are representative considering Covid-19;</li> <li>• Analysis of changes in the share price, so that a more representative price other than a spot price may be retained (does the standard/framework allow it)?;</li> <li>• Review of the peer group and identification of possible subgroups with differentiated behavior during the crisis?</li> </ul>
<b>INCOME APPROACHES</b>	Does the process allow for the lack of visibility that makes it difficult to construct the forecasts, for example through: <ul style="list-style-type: none"> <li>• Issuance of a set of forecast scenarios?;</li> <li>• Documentation of parameters through cross-checking with other approaches based on external data (e.g. market approaches and risk premiums)?</li> </ul>

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

These risks may be summarised as follows:

<b>POTENTIAL DOUBLE COUNTING OF THE EFFECT OF THE CRISIS</b>	Care needs to be taken to not use Covid adjusted forecasts and Covid adjusted multiples to avoid double counting the same effect.
<b>EXPOSURE TO VOLATILE MARKET DATA</b>	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 it difficult to rely on it in a simplistic manner without considering the nuances of the volatility.
<b>EXPOSURE TO PEER DATA OVERLY SENSITIVE TO THE SPECIFIC SITUATION OF EACH COMPARABLE COMPANY</b>	The re-forecasts and/or consensus forecasts 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.
<b>INADEQUATE TRUNCATION OF THE BUSINESS PLAN</b>	The typical horizon of business plans could be insufficient in times of crisis, given that the crisis generates a lag in growth dynamics: a longer horizon could be considered, so as not to truncate any part of the value that may be present in the pre-crisis plan and, in particular, in the terminal value.
<b>INAPPROPRIATE EXTENSION OF THE RECOVERY DYNAMICS</b>	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 context, such techniques may overestimate the post-crisis growth and consequently overestimate the calculated values.
<b>PROFUSION OF NON-ANALYSED FLAWED APPROACHES</b>	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.

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.



# 1. FIRST THOUGHTS IN A CRISIS SITUATION

## FRAMEWORK AND/OR PRESCRIPTIVE ENVIRONMENT

While the exceptional nature of a crisis leads to questions arising over the methods traditionally used during valuation exercises, the reality is that those methodologies still remain valid, rather you need to pay close attention to how you use them: for example, the simple application of pre-crisis valuation inputs to crisis affected financial metrics can indeed prove to be flawed, in some cases by overestimating the effects of the crisis, or, on the contrary, 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<sup>5</sup> advocate the general acceptance 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 must be performed opens the possibility for changes in the valuation approach. Should the case arise, terms and conditions are usually enclosed.

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

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 need to be modified or excluded due to the circumstances,
- A rationale for the relevance of each amendment introduced to the adopted method,
- A detailed description of the said amendments intended for any 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 process is questioned.

Finally, the concept of transparency obviously encompasses a description of the approach implemented, its underlying rationale, and information in terms of the 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** consisting of:

- Considering all valuation approaches,
- Analysing them individually, dismiss them or retain them according to the particular context of the asset to be evaluated,
- Implementing the selected approaches,
- Comparing the different results obtained, gauge the advantages and disadvantages of each method,
- Finally, exercising expert judgment in order to arbitrate a range of reasonable values.

The underlying premise for such an approach is that no valuation method alone, can 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 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.



In a crisis context where the various methods at hand are all inhibited, 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 inhibitions 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 over future performance. 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 interesting to take a closer look at the most common valuation approaches, which are generally classified according to the following categories: market-based approaches and income-based approaches. Although Covid-19 will present a myriad of opportunities to use the cost approach – liquidations and insolvencies are going to happen, this approach is 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.<sup>6</sup>

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

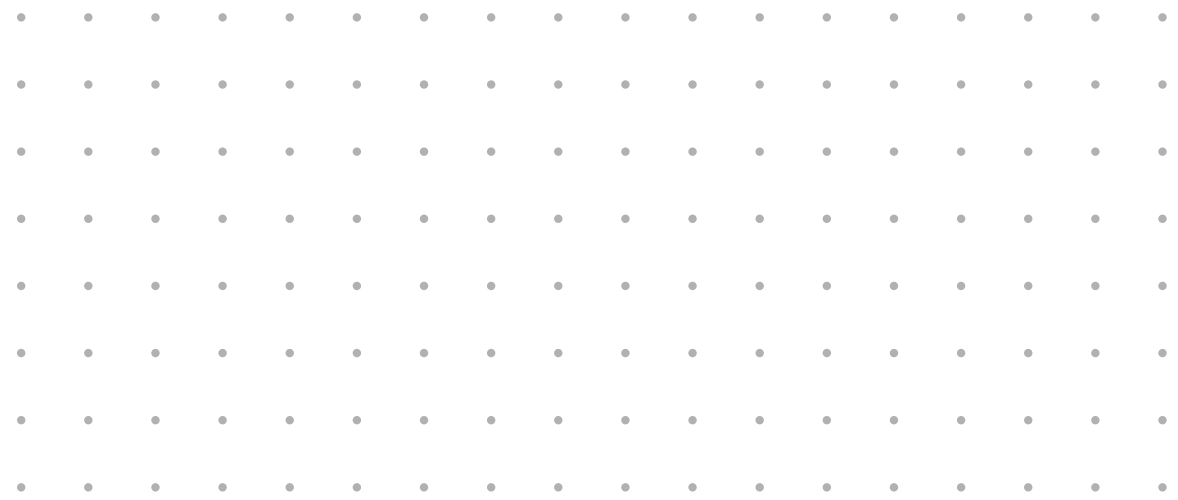
In times of crisis, stock market prices demonstrate increased temporary volatility. This volatility reflects:

- Rational factors, including in particular (i) the quasi-continuous flow of information relating to the crisis which, depending on their content<sup>7</sup>, leads to increases or decreases in volatility 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;
- Irrational factors caused by uncertainty which are difficult to quantify.

### ACTIVE BUT SHAKEN FINANCIAL MARKETS

Financial markets have remained active, the trade volumes are generally significant.

Markets are affected by rational factors related to the crisis, but also by a partly-temporary volatility, in connection with the loss of visibility while at the heart of the crisis.



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.<sup>8</sup>

It is important to understand that risk is always prevalent and can be measured to a certain extent. Uncertainty cannot be measured – this is what the Crisis has caused.

- **A temporary uncertainty:** 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 uncertainty:** 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 must be noted that number of transactions concerning large blocks of shares, such as IPOs or public offers, has significantly dropped. Likewise, over-the-counter acquisitions and disposals have also been significantly 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<sup>9</sup>.

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).

### DIMINISHING RECENT TRANSACTIONS

Transactions have globally dried-up. There are less likely to be recent transactions (i.e. including the crisis event) to assess, or even relevant peer companies.

And even if such transactions would have occurred, it is unlikely that they reflect normal conditions (including, arm’s length principle and no external constraint.)

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. This information concerns 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” uncertainties 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” discounts (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 influenced 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 solution 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)
2. Demonstrate representativeness of each comparable recent transaction (this can be difficult.)
3. Where the standard/framework allows it, consider an average of prices over a relevant period of time, rather than a spot price to date.
4. 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 the value of a relevant block of shares, and is even less reflective 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. In such cases, 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 relevant to the company being assessed, then a thorough analysis of the transaction is recommended. The objective is to assess whether the economics of the transaction are reasonably transferable to the company that is subject to the valuation: for example, has the transaction been 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-out provision? It is obviously less easy to access such detailed information for non-listed company transactions, but information can be found with access to the right databases.
- **Comparable 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 differentiated multiples 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.<sup>10</sup>

10. For example, within a given industry, business models based on subscription or remote services are more resilient to the particular Covid-19 crisis than those based on physical sales. 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 cash flows used 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 an income approach requires:


- The construction of **forecasts** over a time horizon which is enough 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 particular 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 the application of a rate which is commensurate to the risks associated with those cash flows).

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

- Not all companies have the steering committees 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 the case even more so for smaller companies.





 **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 sometimes is not easy to calibrate the specific risk attached to a given series of forecasts. The multi-criteria approach is useful to assess whether too low a discount rate has been applied to very ambitious forecasts. 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 construction of forecast scenarios (not to mention the relative likelihood of each of them occurring) is 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 the beta parameter in the WACC.)

**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.

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

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 still represent a “collective understanding” of 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.)

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:

- Under both methodologies it is important to separate out crisis affected financial data and crisis affected metrics to avoid a double count;

- The company should position itself the metrics by using matched data (e.g. where the markets price a 3Y duration of the crisis, the forecasts of the company should not match a six month, or on the contrary, a 6Y crisis.)

 **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, I analyse various 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 supply 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 a 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.

In such 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 regulatory changes. Developing re-forecasts is naturally not a priority 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 priced in market players' understanding 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, as well as 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 significant 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.

Listed Company A	Forecast Period				Market Metrics		
	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

## INITIAL DECREASE OF MULTIPLES AND RISK OF UNDERESTIMATE

Considering again the example in Figure 1: the initial multiple at 9.2x (against budget N) decreases at first by 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 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.<sup>12</sup>

Ideally, forecasts are aligned with earnings expectations, while the multiple reflects the risk-reward combination. 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

You can see in the table opposite that due to the perceived relative strengths of two similar companies by the market, the same crisis event has a proportionately different effect on each company.

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



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 caused by 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.

Consequently, 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 significantly underestimating the value. Indeed, the underlying implicit assumption, i.e. the multiple reflects the risk-reward combination, is no longer relevant during a crisis. Indeed, as long as the multiples are calculated against pre-crisis forecasts, these multiples embed not just 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.

Company to be appraised		N-1	N	EV
		Actual	Budget	
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

The wrong use of the 7.6x multiple leads to a valuation which is underestimated by 608, 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).

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 being valued (i.e. a 35 EBITDA, thus a fall of 70% against pre-crisis forecasts, while the company being valued experiences a performance drop of c.30%), yet without any notable reaction of the markets after issuance of these re-forecasts (see Figure 1.)

**RISK OF UNDERESTIMATES**

A market multiple derived from pre-crisis forecasts should not be applied to re-forecasts. The incorrect use of these multiples could generate a significant underestimate in value.

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 potentially be of great interest. For now, the analysis of multiples approaches is still to be explored 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 dividend 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 possible changes to brokers’ analyses, the “consensuses” that are built based on 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 the spread of information and the market equilibrium reflects a position where these pieces of information are considered and “priced in” to share values

Of course, the issuance by companies of their re-forecasts is one of the most important pieces of information that can be released and the market reaction to such communications may lead to a rise or fall in share prices, depending on whether these re-forecasts prove to be consistent or, on the contrary, different from expectations that were implicitly “priced in.”



**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 leads to a very significant rise of market multiples (although clearly negative forecasts complicate this issue).

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. During this crisis, the multiples (price earnings ratio) of investment banks was extremely high.<sup>13</sup>

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 expanded 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)

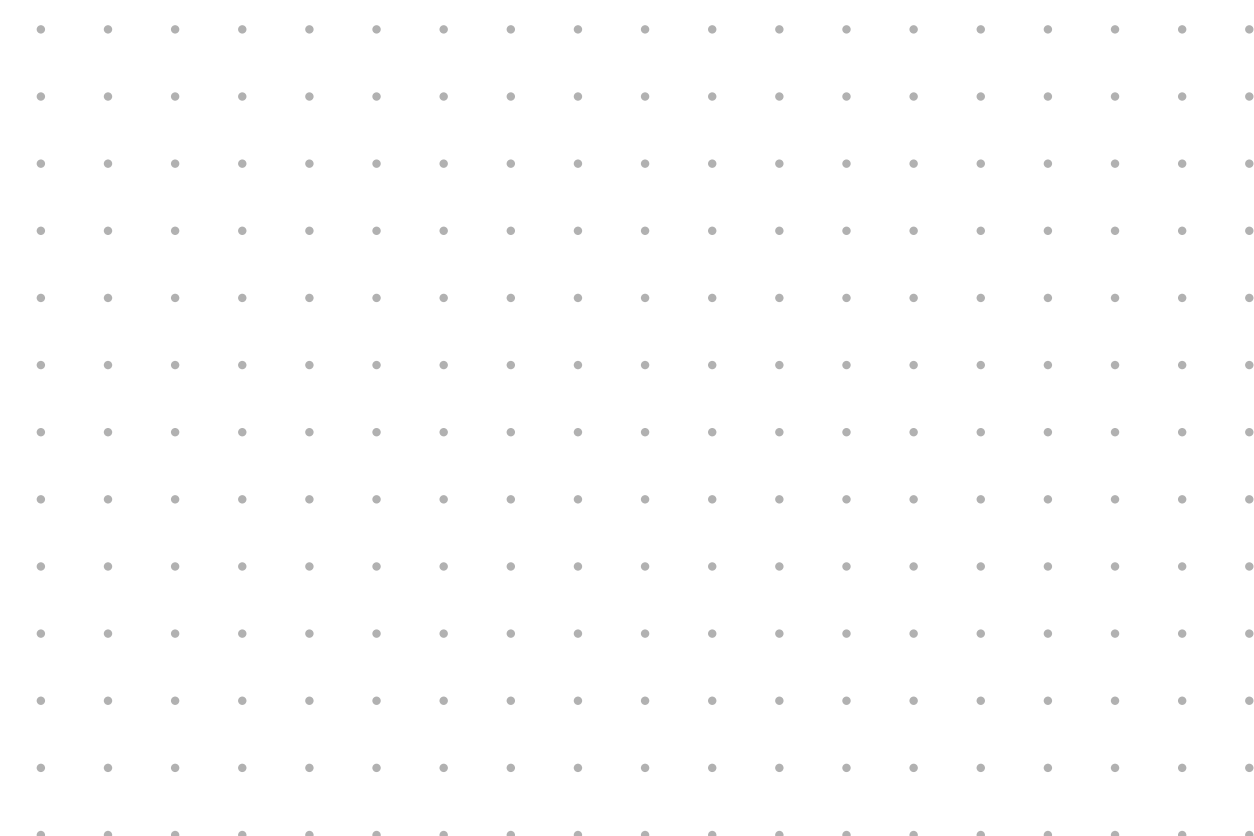
The information coming from these two companies may be used to derive valuation inputs for a third company as follows:

	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
	Highly 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
	Highly 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 of using 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 discrepancy matches the increase in risk. Such a conclusion is hasty, and 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.)<sup>14</sup>
- 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 implied multiples at the end of the forecast period (pre-crisis and crisis plans) does not only reflect the increase in risk.

However, where the end of the forecast period 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.

I believe that, as LTM multiples are not representative of the current crisis, it is better to use forward multiples. In order to do so, a (simplified) adjustment may be considered to the end-of-forecast 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 market enterprise value (market capitalisation + 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) o/w N+2 and >N+2 attributable part	980	815	1,100	820
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 optimism 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]

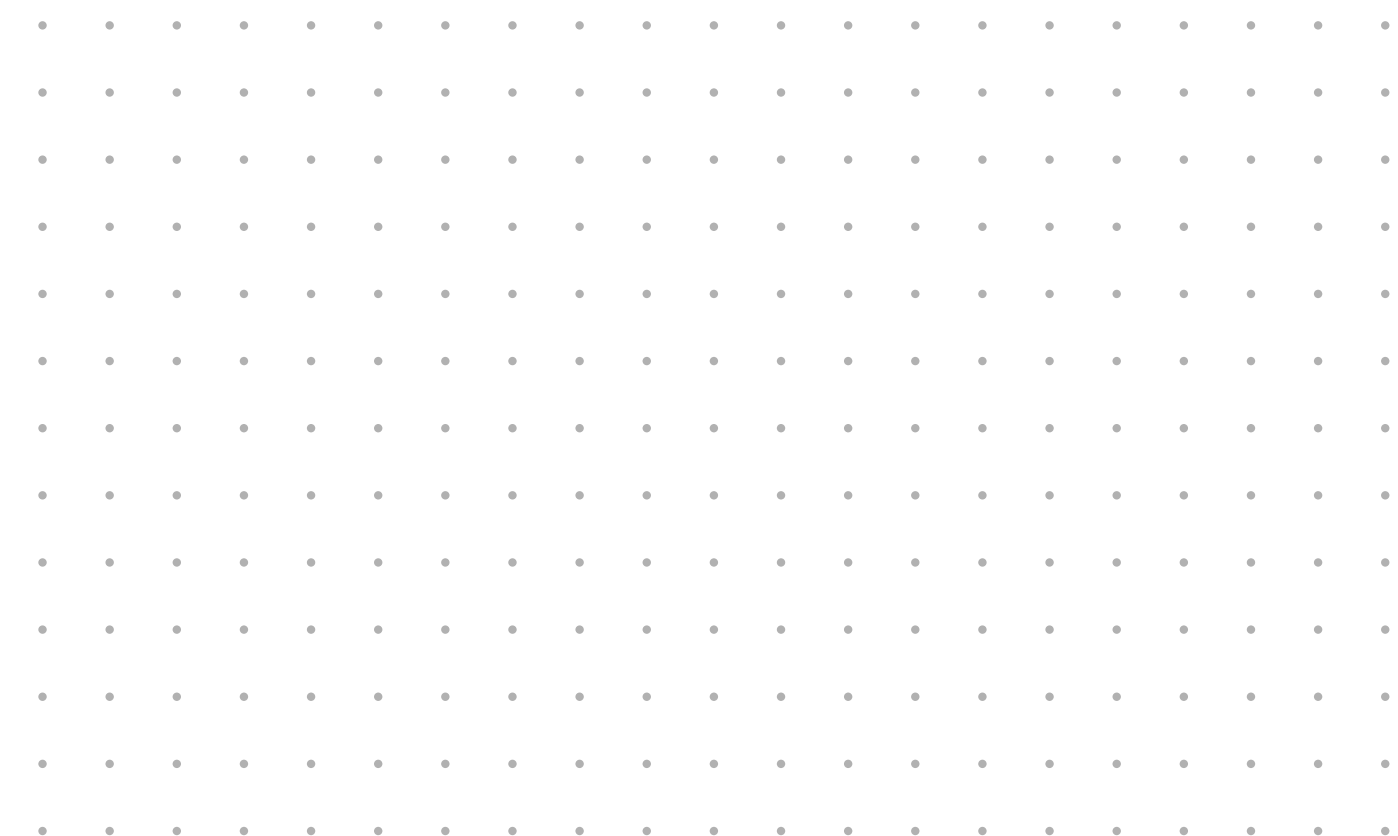
Figure 7: implementation of an exit adjusted-multiple approach

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-forecast 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. Nonetheless these parameters are likely to be common to all companies from the same sector. This 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 in times of crisis, is clearly not enough to ensure that all biases are assessed and therefore neutralised. It is 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 or conservatism deemed similar to those of listed companies.

As for 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 for internal reasons, but 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 those 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 modelling (design and implementation.)

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

15. On a first step, the risk-reward is considered unchanged. Should the analysis of a particular sector lead us 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 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. For example, market capitalisations may be rationalised as the value of a series of cash flows (and their risk-reward combination.)

The impact of the crisis may be calibrated through considering pre-crisis forecasts (that would then emulate crisis forecasts), so that, under an identical risk-reward scenario, these new forecasts would match the post-crisis market capitalisation.<sup>15</sup>

As to the transformations leading from pre-crisis forecasts to 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 a permanent shift in the level of demand:** such a situation should concern certain sectors. Some could, on the contrary, experience an upside for example to demonstrate shortages in certain equipment that the crisis would reveal.



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 financial market data as possible.

**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 in a given sector, they are mutually exclusive.

This being said, now is the time to consider the DCF approach and to examine how such an approach may be modelled using simplified business plans (reminder: to use this method correctly, you need to express the market capitalisation of each listed peer company in terms of the present value of cash forecasts whose availability is restricted to two or three years at most and where the balance of the future cash flows are accounted for in the terminal value calculation

## INITIAL MODELING : THE PRE-CRISIS SITUATION

Usually, a DCF valuation incorporates two, or 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 it 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. 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.

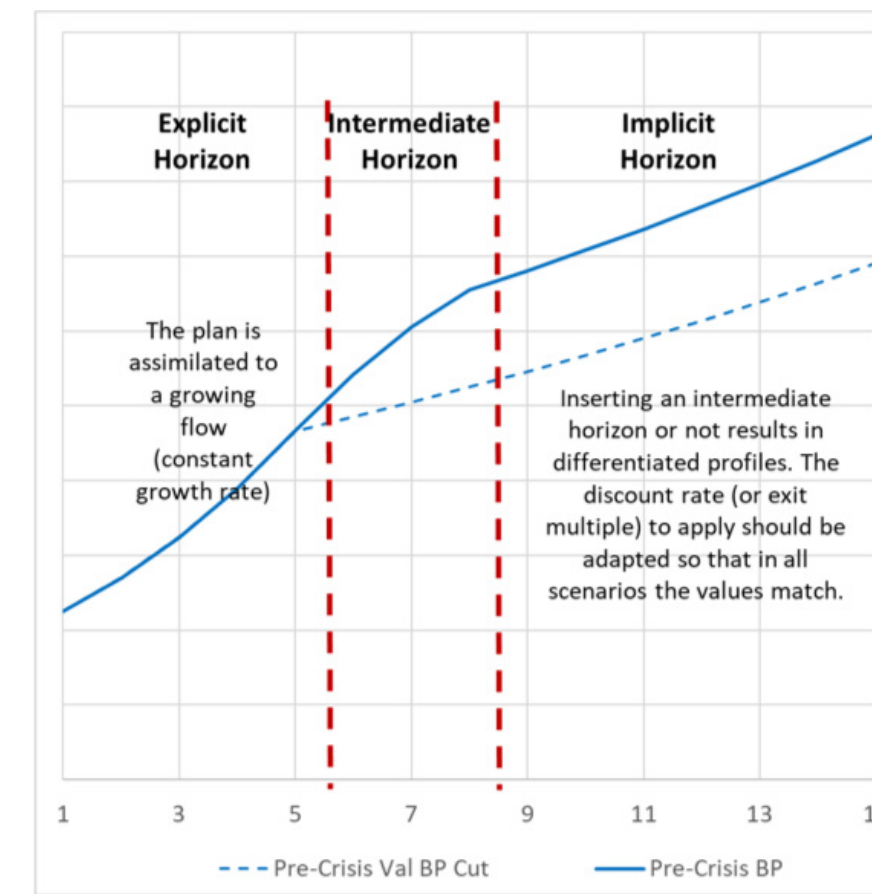


Figure 8: Pre-crisis business plan

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:

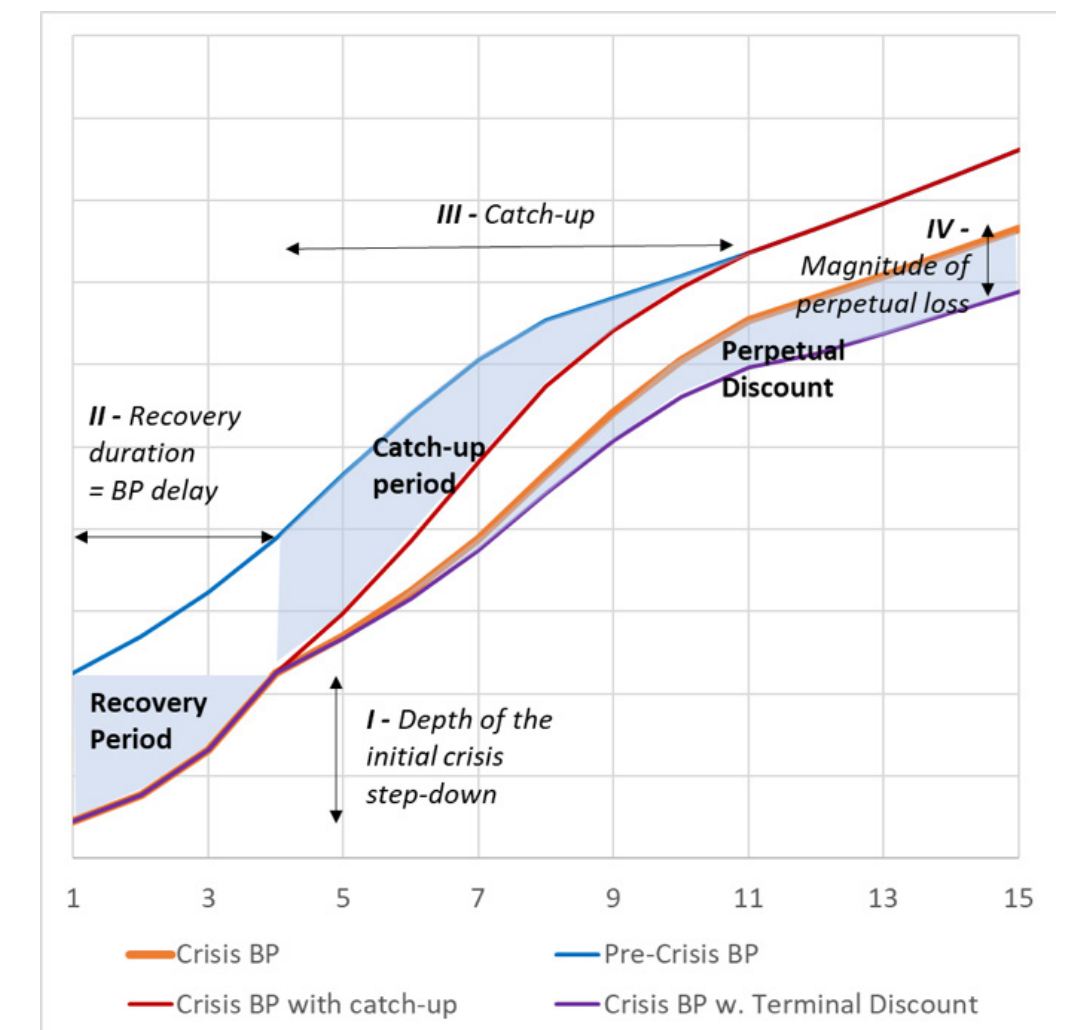


Figure 9: Passage from the pre-crisis plan to the crisis plan

Under this modelling 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 irretrievably 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: 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 predict, 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 comparable 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 constructed, 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?)



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



# 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 using an income approach, the previously described methodology can act as a check on the assumptions contained in the business plan when compared to its peers (considering a similar level of risk embedded in the forecasts). Thanks to this analysis, a risk premium can also be assessed. However, some residual risks may need to be tackled: they will be discussed below in this chapter.

When using a comparable approach, the multiples are cross checked against the adjustments used in the income approach.

## RISKS RELATING TO THE TRUNCATION OF FORECASTS

The main risk concerning the forecast time 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.

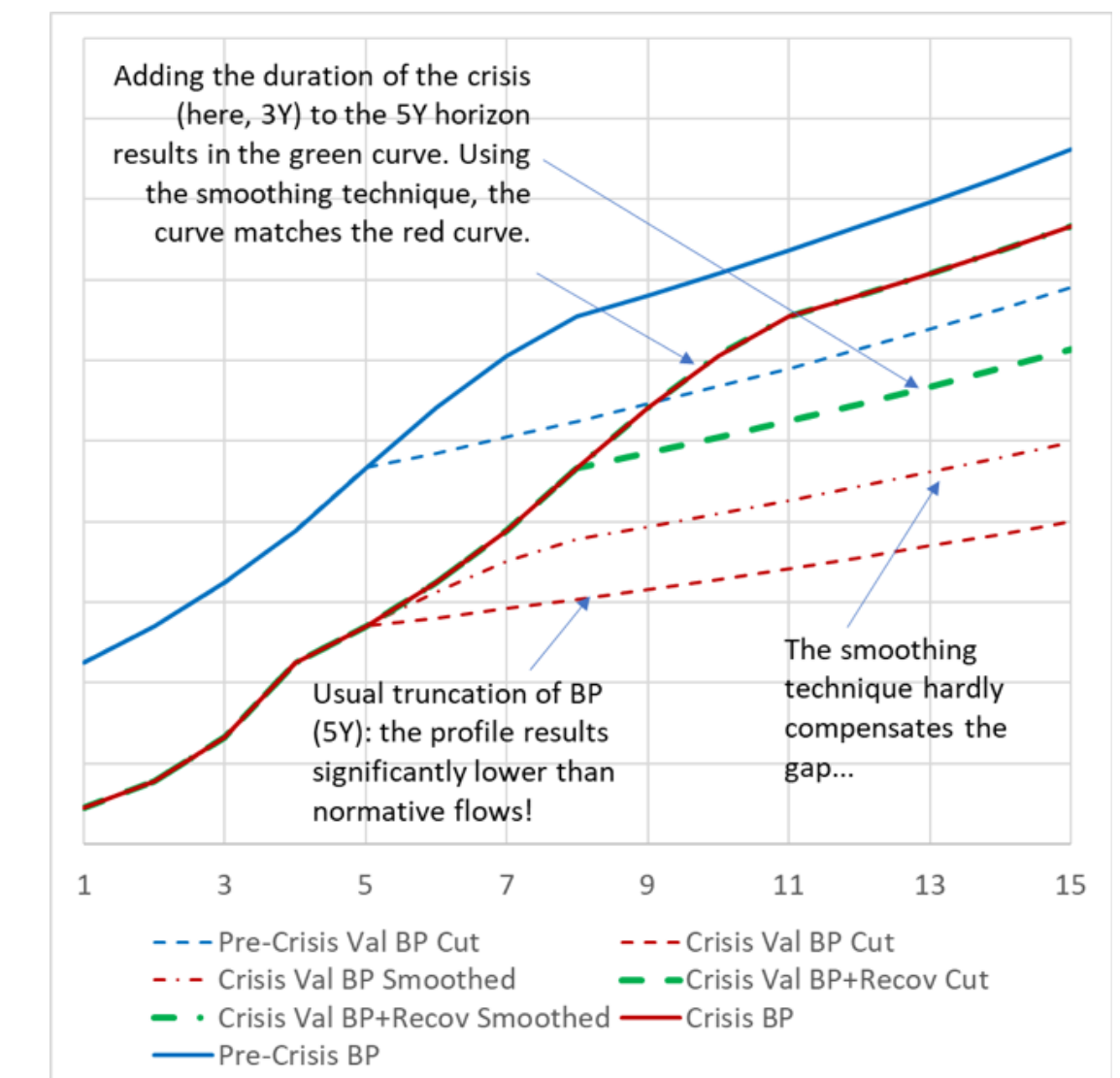


Figure 10: Four alternative BPs, depending on the selected year for truncation and on the insertion or not of an intermediate horizon (NB: no catch-up period in this example)

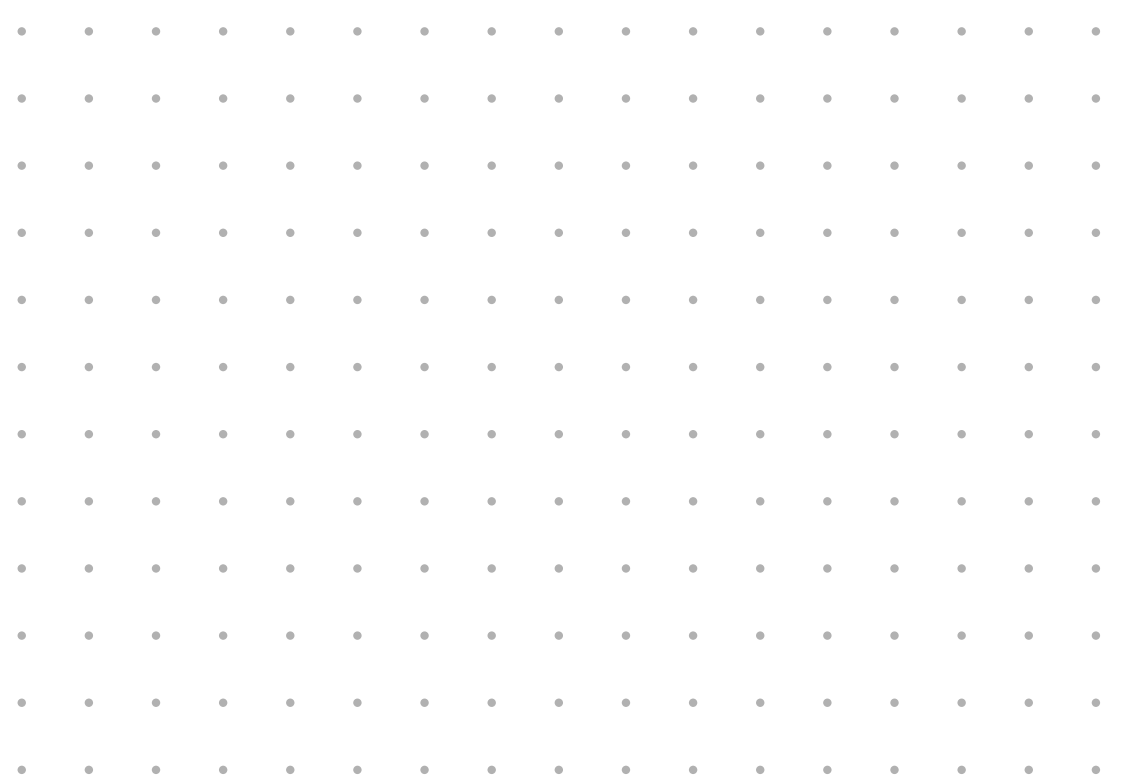
Figure 10 clearly demonstrates that the magnitude of such a risk is possibly material: any methodology that refers to pre-crisis forecasts and delay them by one way or the other, is exposed to such a risk. It is though easy to tackle, by lengthening the usual horizon of the plan.

**EXTENDING THE FORECASTS HORIZON**

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

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:





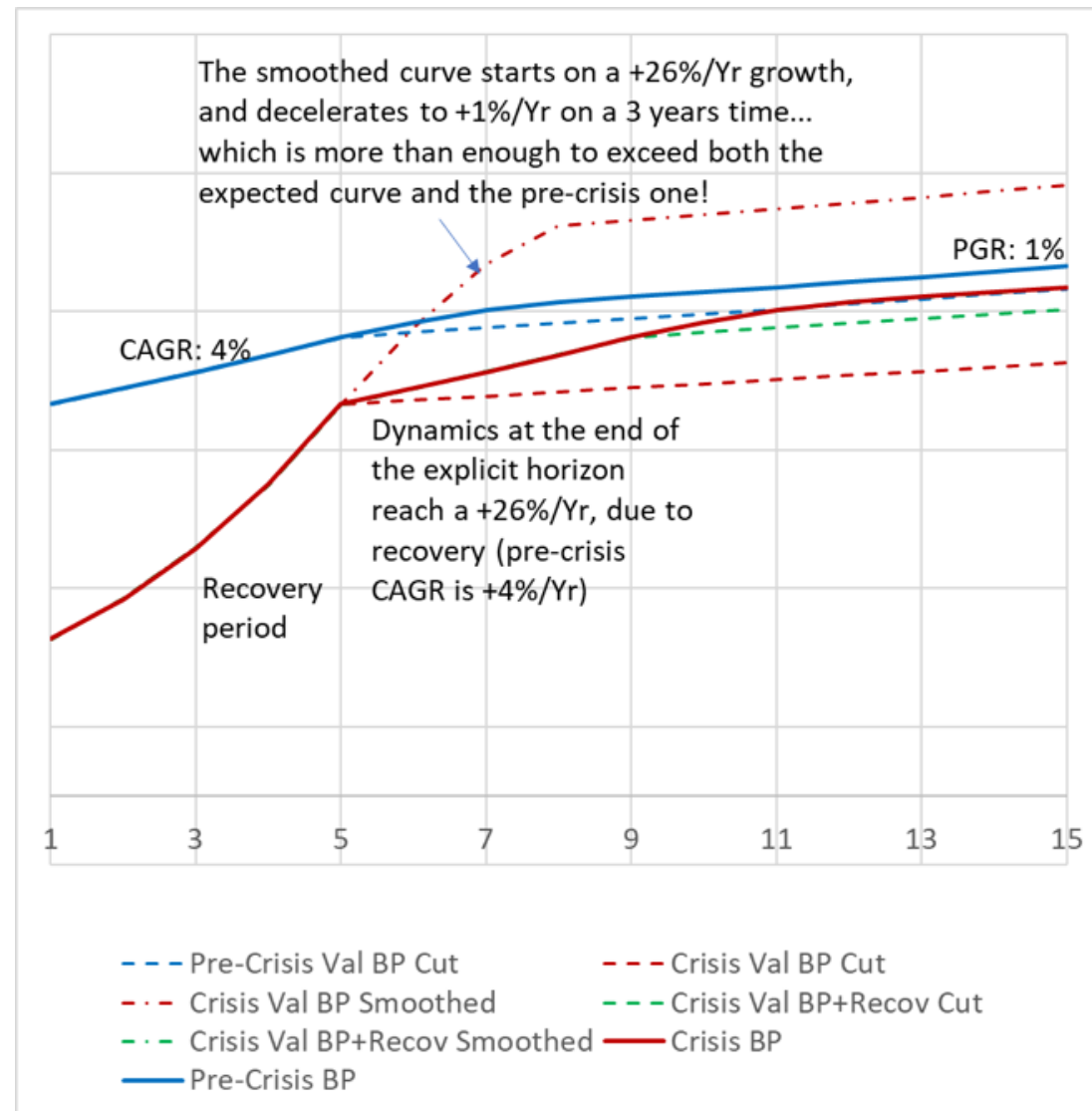


Figure 11: Situation where the growth-smoothing technique leads to an overestimate

Figure 11 shows that growth at the end of the plan should decrease at a faster pace than the one that the smoothing technique simulates.

Comparing pre-crisis forecasts to the revised forecasts may be a good way to mitigate the issues that underpin revised 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<sup>18</sup>,
- 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:

• <b>Pre-crisis Multiple:</b>	<b>17.6x</b>
• 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
• <b>Crisis Adjusted-Multiple:</b>	<b>15.6x</b>

Sensitivities are also easily available and may be run if certain changes to the parameters are considered 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 and recovery period, for a net decrease as of -0.7x, i.e. 4% of additional decrease.

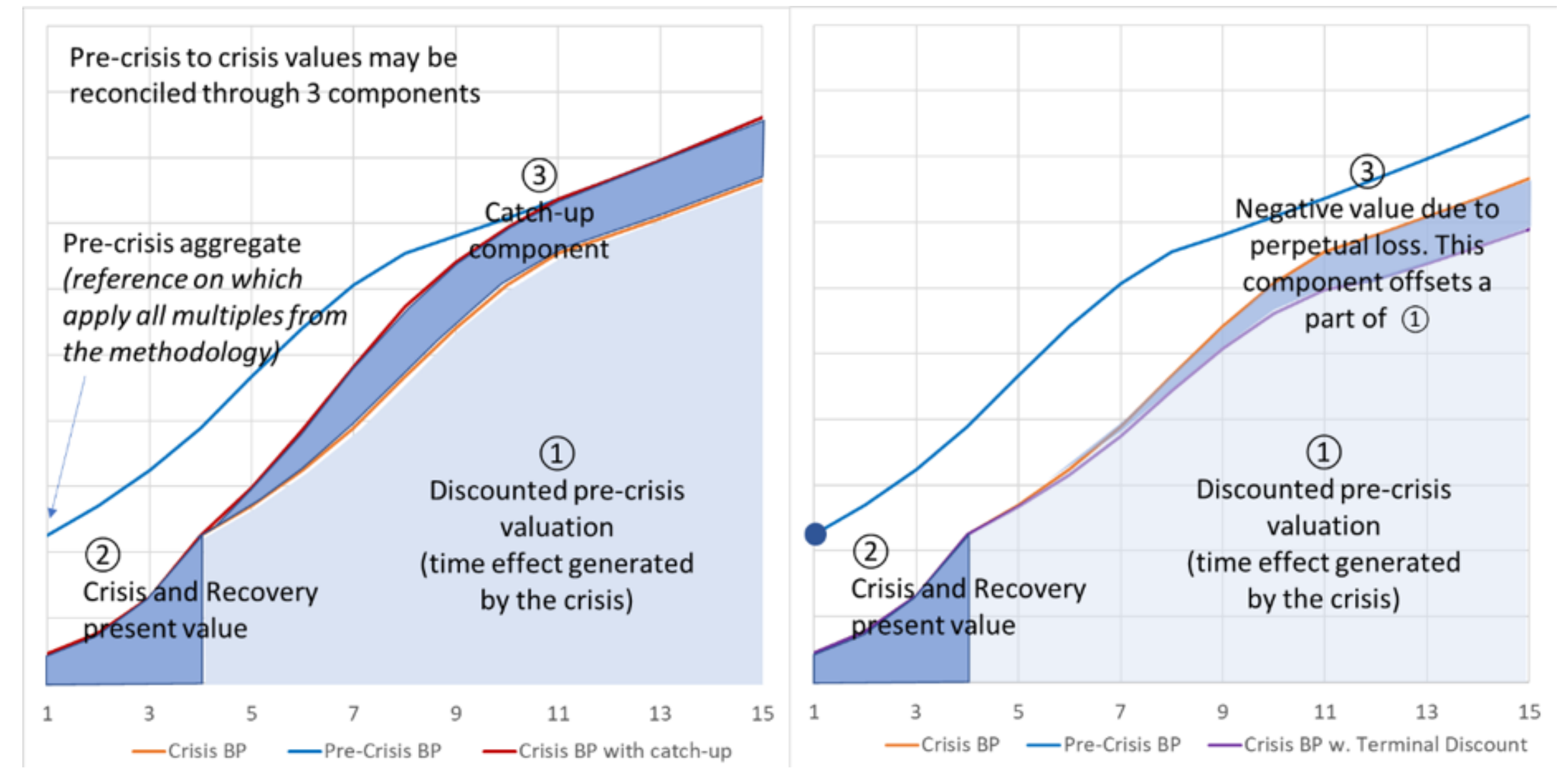


Figure 12: Breaking-down the value into three components

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 one 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 assess 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**

While EBITDA is a more common metric, I have used FCF as a basis for my multiples in the following section. This model is illustrative and gives indications on possible ways to extract further information from the markets and decrease uncertainty in the data. Any remaining uncertainty should be addressed using wider valuation expertise.

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 us 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 : 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
7%	11%	0.9x	1.6x	2.2x	2.6x	2.9x
	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%	9%	0.6x	1.0x	1.3x	1.6x	1.7x
	11%	0.7x	1.2x	1.6x	1.9x	2.1x
	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
11%	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
	1%	0.1x	0.2x	0.2x	0.3x	0.3x
	3%	0.2x	0.3x	0.4x	0.4x	0.4x
13%	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
	5%	0.1x	0.1x	0.2x	0.2x	0.2x
13%	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 growth for the BPs, thus differently priced by the financial markets).

First, an 18% and 24% decrease in EV of company A respectively B, have been experienced (Figures 1 and 4). Assuming that there is no obvious reason in this sector for a catch-up phenomenon or a perpetual loss of performance, there are still two parameters of the crisis left: the magnitude of the crisis and its duration.

The construction of re-forecast, even though limited to the first year, drastically reduces the number of pairs of parameters that might be eligible for modelling:

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 in 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 drop in performance of the peer group. The company has strong reasons to back up this 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.

This 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

I have analysed the data and I believe that the first six sectors may be intuitively considered as strongly hit by the crisis. Using the same data I also believe that the last two are less affected. 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 noting that geographies may experience different dynamics (the timing of the crisis and the response of governments have not been 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 consensus forecasts. The first parameter is straightforward (consensus of reforecast for 2020), and the second parameter (duration of the crisis) consists of 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 1<sup>st</sup>). 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.

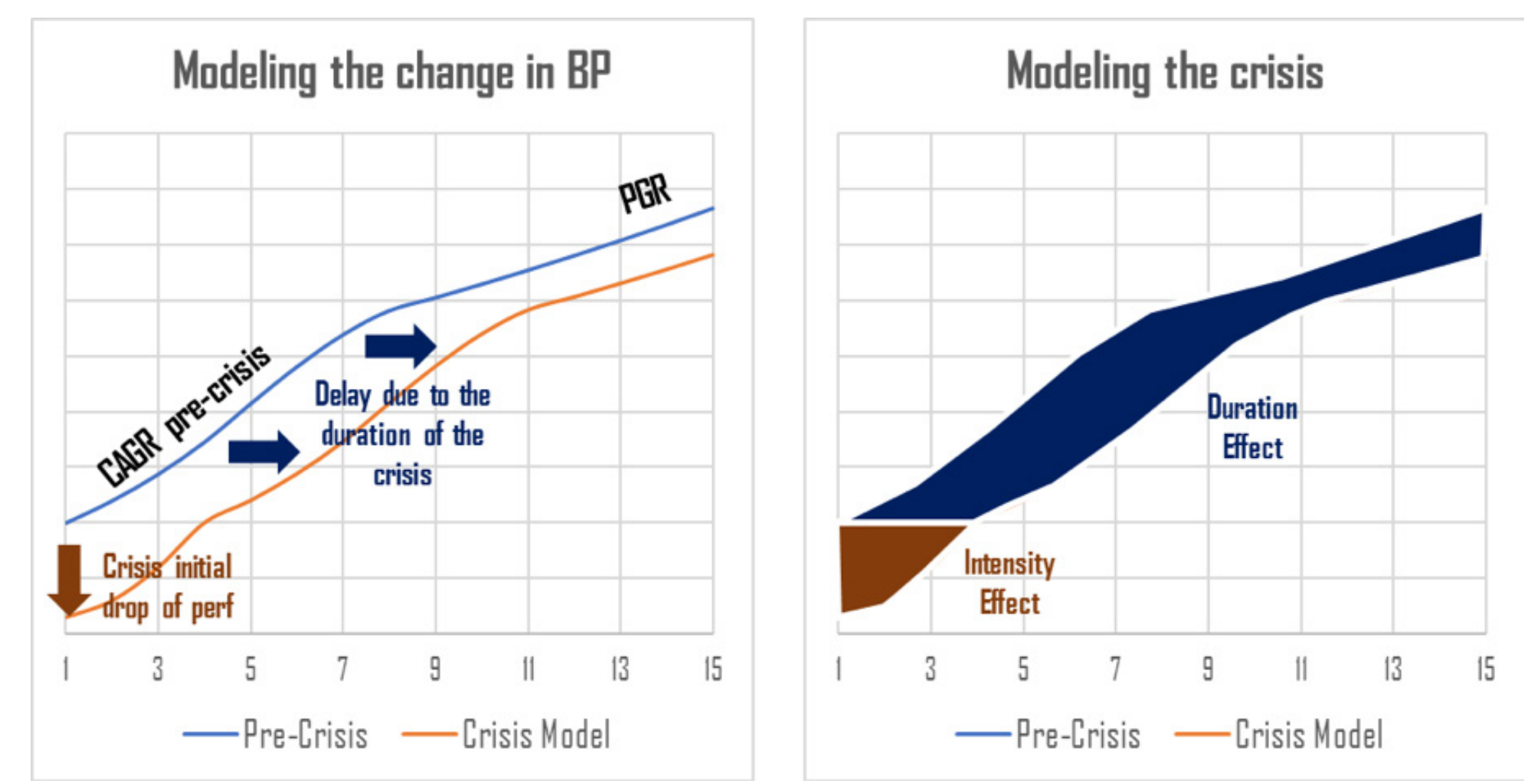


Figure 19: Turning a pre-crisis BP into a crisis BP, and breakdown of effects on valuation



## CONSENSUS AND PARAMETERS OF THE CRISIS

The analysis of consensus leads to the following:

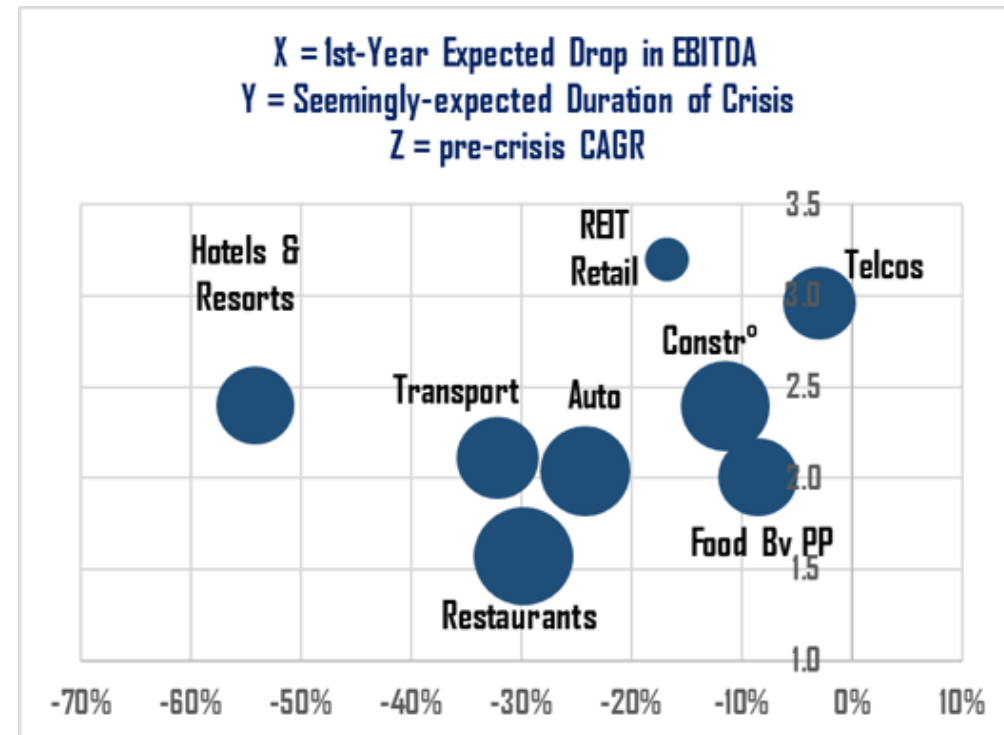


Figure 20: Initial drop of performance and duration of the crisis (from Capital IQ consensus)

Using these parameters, it will subsequently be possible to transform and turn the pre-crisis BPs into crisis BPs. Of course, consensus forecasts 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.

20. Of course, certain sectors may be concerned but not all of them, so that a study of stock prices in 2019 is to be performed in a limited number of cases (in these situations, it may also be contemplated to implement the above modelling, not between Jan 1<sup>st</sup> 2020 and May 2020, but starting at a former date in 2019)

## IMPLEMENTATION OF THE METHODOLOGY AND FIRST RESULTS

The results may be displayed as follows:

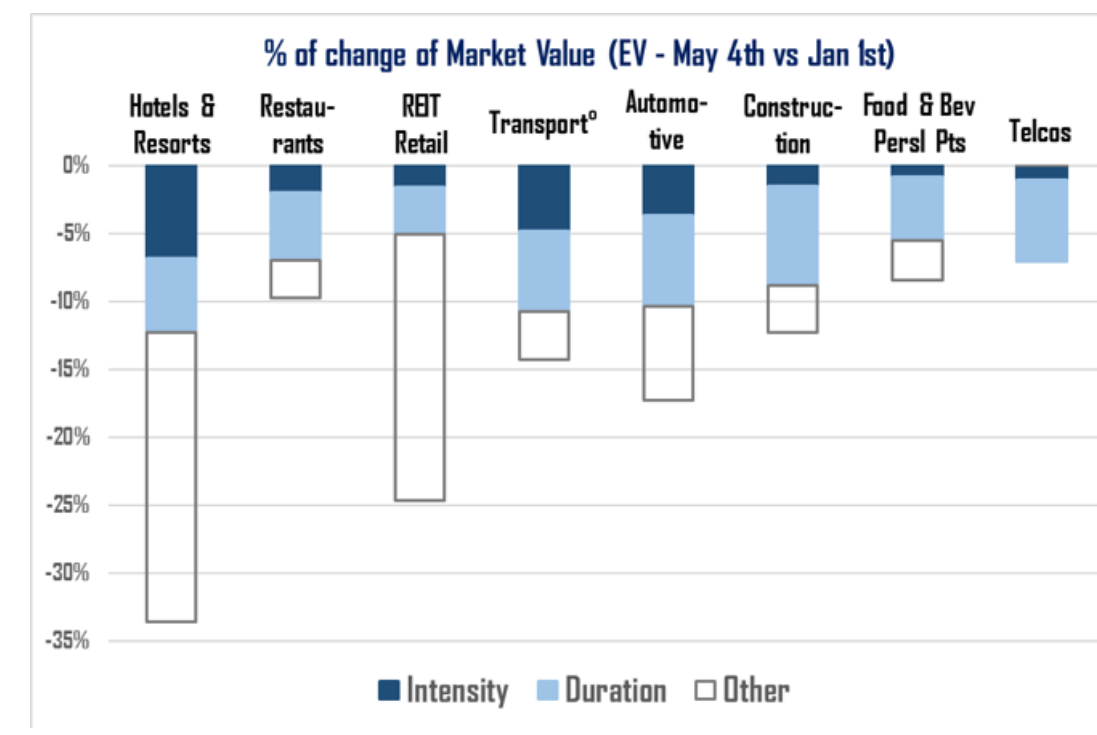


Figure 21: Intensity-Magnitude effect and Duration Effect

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 a consensus (see previous chapter);
- The gap may also relate to price adjustments following 2019 where 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)<sup>20</sup>;

- 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

The below graphs show the potential discrepancy between brokers’ re-forecasts discounted with pre-crisis IRR (derived from pre-crisis brokers’ forecasts and pre-crisis market caps) and actual market capitalisations. It may relate to a change in perceived risk from the market’s perspective, or it may relate to a disagreement between markets’ views and brokers’ views. It could also relate to changes in financial structures that the markets would consider, or to wider volatility.

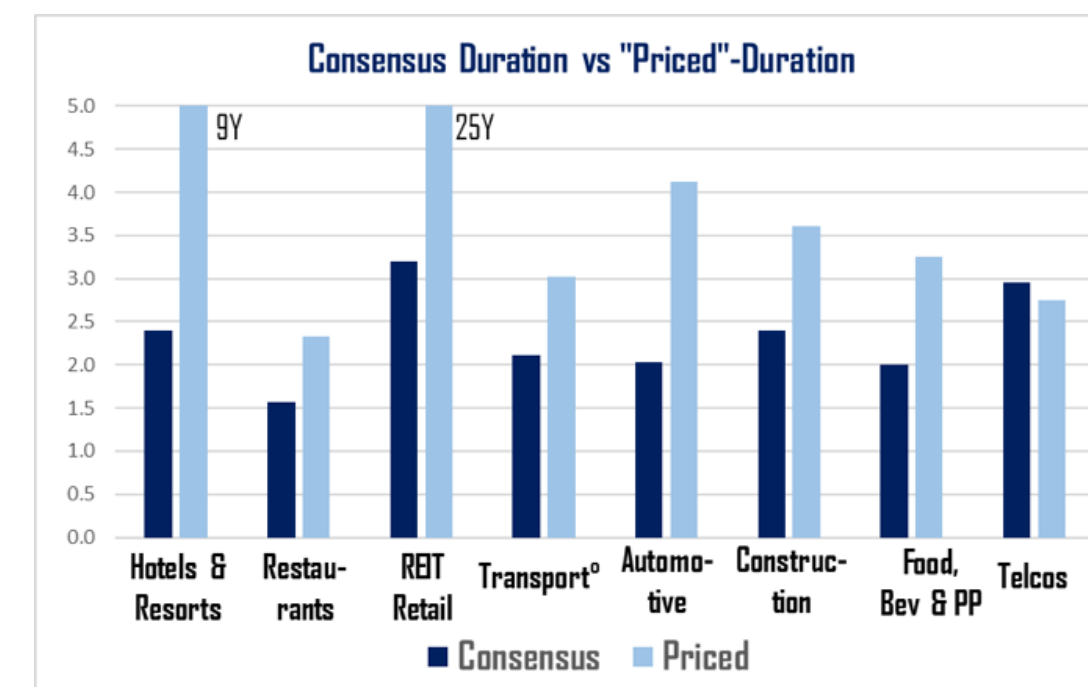


Figure 22: represents where brokers have anticipated a longer crisis duration and how long it would take to match market capitalisations. (Beg. of May)

**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 approximately 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 other sources for the gap may have to be found.



If we do not use the pre-crisis IRR, but an IRR+x% (this time sticking to the brokers' predicted crisis duration and using FCF as an aggregate for the model) - what would be the x% that would get the model to match the market cap? Such an approach provides useful information related to the magnitude of the remaining uncertainties.

	Hotels & Resorts	Restaurants	REIT Retail	Transport <sup>P</sup>	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)



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