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The use of management's prospective financial information: a focus on fair value measurement using discounted cash flow techniques

David C. Dufendach

Management-prepared forecast and projections, collectively referred to as prospective financial information (PFI), serve as the critical foundation for discounted cash flow methods. The purpose of this article is focus on the proper use of PFI in the measurement of fair value for financial reporting purposes, with an emphasis on the application of discounted cash flow techniques. Our recommendations, while not necessarily affecting conclusions of value in monetary terms, would result in valuations and related reports that are better supported, more clear, and consequently result in fewer questions upon review.

Introduction

Management-prepared forecasts and projections, collectively referred to as prospective financial information (PFI), serve as the critical foundation for discounted cash flow methods. In addition, PFI typically provides key inputs for the application of forward multiples under various market approach-based techniques. This article will focus on the use of PFI in the measurement of fair value for financial reporting purposes, using discounted cash flow techniques.

With respect to valuations for financial reporting purposes, there is a long history of guidance regarding fair value measurement. ASC 820 (formerly SFAS No. 157), which was originally issued in 2006, attempted to harmonize pre-existing guidance. IFRS 13 followed in 2011. In 2017, two additional documents providing suggested guidance for valuation professionals were issued:

- Mandatory Performance Framework (MPF[1]);
- Application of the Mandatory Performance Framework (AMPF – see note[1]).

In 2019, these documents were supplemented by the issuance of Frequently Asked Questions (FAQ – see note[1]), which clarified certain sections of the MPF and AMPF. This article addresses key aspects of the MPF and AMPF that impact the review and acceptance of management's PFI, and the subsequent application of discounted cash flow techniques, including the following concepts:

- professional skepticism;
- reasonably objective basis;
- discount rate development;
- documentation.

In addition, pre-existing guidance that is closely related to the proper evaluation and use of PFI for the purpose of fair value measurement will be reviewed, including:

- Discount rate techniques (ASC 820, IFRS 13);
- AICPA Guide to Prospective Financial Statements (issued in 1986).

ASC 820 and IFRS 13 guidance regarding discount rate techniques is often addressed implicitly. This article will include suggestions that valuation professionals can consider adopting to improve their analyses and reports by explicitly incorporating the source material above into management interviews, work files and valuation reports.

Mathematically, discounted cash flow techniques can be described as numerators (estimated periodic cash flows) and denominators (factors developed from discount rates). We will focus on the evaluation, support, and documentation of PFI employed in discounted cash flow techniques, and, critically, the development of discount rates that are consistent with the identified risk profile of the PFI.

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[1] Mandatory Performance Framework (MPF), Application of the Mandatory Performance Framework (AMPF), and Frequently Asked Questions (FAQ)

The article will:

- Define key terms;
- Describe generic types of PFI and related risk profiles;
- Discuss the implications of the MPF and AMPF guidance;
- Review the concept of "reasonably objective basis" for PFI;
- Discuss development of discount rates consistent with the identified risk profile(s).

Throughout the article, we will refer to a case example to illustrate key points, beginning with the following summary PFI, which we assume has been provided by the management team of SRJ, Inc., a hypothetical client:

SRJ Inc.		Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Revenue		12,000	12,600	**38,230**	42,642	46,211	48,522
EBIT margin		1,200	1,260	**2,573**	4,264	5,254	5,516
Debt-free cash flow		720	756	**1,544**	2,558	3,152	3,310
Revenue Growth			5.0%	**203.4%**	11.5%	8.4%	5.0%
EBIT Growth			5.0%	**104.2%**	65.7%	23.2%	5.0%

Further information, comments and questions:

- Year 1 and 2 revenue and margins are supported by historical results;
- What is happening in Year 3?
- Can we use this PFI without adjustments?
- How do we develop an appropriate discount rate?
- What questions might we have for management?
- How do we follow the fair value-related guidance?

Assume that, based upon our initial questions, management provides the following additional information:

- A new product line (Product B) is expected to be introduced at the beginning of Year 3;
- Product B targets a new market previously not served by the Company's existing product line (Product A);
- Management provides a revised "forecast" segmented by product lines.

SRJ Inc.		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Terminal**
Product A		**12,000**	**12,600**	**13,230**	**13,892**	**14,586**	**15,315**
Product B				**25,000**	**28,750**	**31,625**	**33,206**
Revenue		**12,000**	**12,600**	**38,230**	**42,642**	**46,211**	**48,522**
Contribution - A		**1,200**	**1,260**	**1,323**	**1,389**	**1,459**	**1,532**
Contribution - B				**1,250**	**2,875**	**3,795**	**3,985**
EBIT margin		**1,200**	**1,260**	**2,573**	**4,264**	**5,254**	**5,516**
Debt-free cash flow		**720**	**756**	**1,544**	**2,558**	**3,152**	**3,310**

Further information (based on management representations):

- Product Line A has stable historical margins (10%) and growth (5%) that are expected to continue;
- Product Line B expectations are based on preliminary market research and other internal data.

It is critical to note at this initial stage that our example is greatly simplified for illustrative purposes. For example, a new product introduction of this magnitude and importance to the enterprise's future value would likely require non-negligible pre-launch costs (which could be subject to a different level of uncertainty than Product B's estimated post-launch revenues and profits) and would also be uncertain with respect to time of launch. Both factors are ignored in order to keep the example as simple as possible.

Given the above PFI and related management representations, how should the valuation professional:

- Evaluate the risk of the PFI?
- Document this assessment?
- Develop a discount rate (or rates) consistent with the risk(s) identified?

A useful and very simple framework to employ at this early stage in the evaluation (that originally appeared in the 1986 AICPA Guide), appears below.

Existing product **Existing market** **LOWEST RISK**	**Existing product** **New market** **INCREASED RISK**
New Product **Existing Market** **INCREASED RISK**	**New product** **New market** **HIGHEST RISK**

It is important to note that the higher risk quadrants often involve sources of risk such as technological feasibility, regulatory approval, and customer acceptance, concepts that will be addressed only implicitly herein.

Continuing with our case example, the valuation professional's need for an appropriate level of skepticism and more information is clear. While the existing product line appears to fall in the lowest risk quadrant, Product B (new product targeted at a new market segment) is at the opposite end of the risk spectrum. Thus, even at this early stage, the professional would be considering issues such as:

- Do we need a higher discount rate for either the entire enterprise or for Product B?
- What is the impact on debt/equity structure due to the increased uncertainty related to Product B?
- Should we request multiple scenarios for the PFI pertaining to Product B?

Definitions

Before key issues are further addressed, it is important to define certain terms that are often used imprecisely. First, we present *definitions (in italics below)* that originally appear in the 1986 AICPA Guide, supplemented with comments (underlined below). As a reminder, this 1986 Guide was not originally intended for valuation professionals, but rather, for third-party providers such as CPAs that were assisting clients in the preparation of prospective financial statements, including prospective balance sheets, income statements, cash flow statements, and related notes. However, many of these definitions have been considered important enough to be included in subsequent AICPA guides that address the measurement of fair value for financial reporting purposes.

Prospective financial statements *- Either financial forecasts or financial projections including the summaries of significant assumptions and accounting policies. Pro forma financial statements and partial presentations are not considered to be prospective financial statements.* [Reminder: Pro forma information is not prospective or forward-looking, but rather a restatement of historical information.]

Financial forecast *- Prospective financial statements that present, to the best of the responsible party's knowledge and belief, an entity's expected financial position, results of operations, and cash flows. A financial forecast is based on the responsible party's assumptions reflecting the conditions it expects to exist and the course of action it expects to take.*

Financial projection *- Prospective financial statements that present, to the best of the responsible party's knowledge and belief, given one or more hypothetical assumptions, an entity's expected financial position, results of operations, and cash flows. A financial projection is based on the responsible party's assumptions reflecting conditions it expects would exist and the course of action it expects would be taken, given one or more hypothetical assumptions.* [Key point: The critical difference between a forecast and a projection is that a projection contains a hypothetical assumption that, for example, may be dif-

ferent from management's expectations, or outside of the control of management – see next definition.]

Hypothetical assumption - *An assumption used in a financial projection to present a condition or course of action that is not necessarily expected to occur, but is consistent with the purpose of the projection.* [Examples of events that management assumes will occur but depend on outside parties and/or uncertain events could include successful renegotiation of a key contract, or receiving government approval for a new drug or medical device.]

Key factors - *The significant matters on which an entity's future results are expected to depend. Such factors are basic to the entity's operations and thus encompass matters that affect, among other things, the entity's sales, production, service, and financing activities. Key factors serve as a foundation for prospective financial statements and are the bases for the assumptions.*

Returning to our example, the valuation professional can now define, and begin to assess, management's PFI with more precision, and put a sharper focus on some key foundational questions.

SRJ Inc.	Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A	12,000	12,600	13,230	13,892	14,586	15,315
Product B			25,000	28,750	31,625	33,206
Revenue	12,000	12,600	38,230	42,642	46,211	48,522
Contribution - A	1,200	1,260	1,323	1,389	1,459	1,532
Contribution - B			1,250	2,875	3,795	3,985
EBIT margin	1,200	1,260	2,573	4,264	5,254	5,516
Debt-free cash flow	720	756	1,544	2,558	3,152	3,310

- Is this a forecast, or a projection?
- Does it matter?
- What are the key assumptions?
- Are any of them hypothetical?

At this point, we know that management intends to introduce Product B, but we do not yet know if this product launch is largely under management's control, or conversely, if there are significant internal or external risks that management has assumed will be resolved favorably. For example, if Product B is a new pharmaceutical product or medical device, it would likely be subject to technological risk and government approval, and thus its introduction and revenue generation in year 3 may be more properly characterized as a hypothetical assumption. For purposes of fair value measurement, the distinction between a forecast and a projection is probably not a critical one, because the professional would become aware of the conditional nature of Product B assumptions, and the increased risk of prospective Product B cash flows relative to Product A, regardless of the "label" on this PFI. However, it is recommended throughout this discussion that the valuation professional refer to this as management's "PFI," which is both a more general and, at this point, a more accurate label than either "forecast" or "projection."

Our next set of *definitions (in italics below)* and supplemental comments address the development of discount rates that are consistent with the nature of the PFI; the definitions are extracted from ASC 820 and IFRS 13. Like our previous definitions, these have been included in subsequent AICPA guides that address fair value measurement issues:

The Discount Rate Adjustment Technique (DRAT) *uses a single set of cash flows from the range of possible estimated amounts, whether contractual or promised (as is the case for a bond) or most likely cash flows. In all cases, those cash flows are conditional upon the occurrence of specified events (for example, contractual or promised cash flows for a bond are conditional on the event of no default by the debtor). The discount rate used in the discount rate adjustment technique is derived from observed rates of return for comparable assets or liabilities that are traded in the market. Accordingly, the contractual, promised, or most likely cash flows are discounted at a rate that corresponds to an observed market rate associated with such conditional cash flows (market rate of return).* [Note: In contrast to the Expected Present Value Technique described below, the DRAT is the appropriate technique for situations in which the valuation professional is provided with only a single PFI scenario that is conditional on the favorable outcome of one or more uncertain events, and thus represents a more aggressive/less conservative PFI which suggests the need for a relatively higher discount rate than the other methods below.]

The Expected Present Value Technique (EPVT) *uses as a starting point a set of cash flows that, in theory, represents the probability-weighted average of all possible cash flows (expected cash flows). The resulting estimate is identical to expected value, which, in statistical terms, is the weighted average of a discrete random variable's possible values where the respective probabilities are used as weights. Because all possible cash flows are probability weighted, the resulting expected cash flow is not conditional upon the occurrence of any specified event (as are the cash flows used in the discount rate adjustment technique).*

Method 1 of the expected present value technique adjusts the expected cash flows for the systematic (market) risk by subtracting a cash risk premium (risk-adjusted expected cash flows). These risk-adjusted expected cash flows represent a certainty-equivalent cash flow, which is discounted at a risk-free interest rate. [Note: This variant of the EPVT is valid but rarely used; Method 2 below has historically been favored.]

Method 2 of the expected present value technique adjusts for systematic (market) risk by adding a risk premium to the risk-free interest rate. Accordingly, the expected cash flows are discounted at a rate that corresponds to an expected rate associated with probability-weighted cash flows (expected rate of return). Models used for pricing risky assets, such as the Capital Asset Pricing Model, can be used to estimate the expected rate of return. [Note: This definition presumes that assumptions subject to greater uncertainty will be probability-weighted; conditional events are primarily addressed in the **numerator**, whereas the DRAT adjusts for them in the **denominator**.]

Because the discount rate used in the discount rate adjustment technique is a rate of return relating to single scenarios that often contain conditional, favorable assumptions regarding future cash flows, a DRAT-based rate likely will be higher, all else equal, than the discount rate used, e.g., in Method 2 of the expected present value technique, which is an expected rate of return relating to expected or probability-weighted cash flows. It is worthwhile to observe at this time that many discussions about the applicability and magnitude of company-specific risk adjustments (CSRA, further discussed herein) might be more productive if the parties first agree on whether or not the PFI being discounted contains unweighted conditional assumptions (a "DRAT PFI" which would likely require a CSRA to compensate) or does not (an "EPVT Method 2 PFI" which may or may not require a CSRA).

Continuing with our example:

SRJ Inc.	Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A	12,000	12,600	13,230	13,892	14,586	15,315
Product B			25,000	28,750	31,625	33,206
Revenue	12,000	12,600	38,230	42,642	46,211	48,522
Contribution - A	1,200	1,260	1,323	1,389	1,459	1,532
Contribution - B			1,250	2,875	3,795	3,985
EBIT margin	1,200	1,260	2,573	4,264	5,254	5,516
Debt-free cash flow	720	756	1,544	2,558	3,152	3,310

Some key questions that will affect our evaluation of this PFI and our subsequent development of a relevant discount rate would include:

- Is this PFI conditional?
- Is this PFI probability-weighted/expected?
- If yes, will we apply Method 1 or Method 2?
- Could this PFI be both conditional and expected?

Based on our ASC 820/IFRS 13 definitions, it may be that we have a "mixed" or "hybrid" PFI at this point in the valuation process, in which its components applicable to Product A may represent a weighted, EPVT Method 2 case, but the components applicable to Product B are conditional, akin to a DRAT scenario. This has important implications for the proper development of the risk-adjusted discount rate.

Mandatory Performance Framework (MPF)

As mentioned in the Introduction, the MPF was issued relatively recently. It addresses a number of topics which deal with the process of conducting a valuation engagement, as opposed to guidance regarding the application of valuation approaches, methods and techniques. The MPF focuses on "how much support, in terms of scope of work and documentation, should be prepared or obtained when designing, implementing, and conducting valuations... for financial reporting purposes." Following the MPF is mandatory for professionals who have obtained the Certified in Enterprise and Intangible Valuations (CEIV) credential

and are performing valuations covered by the MPF, particularly valuations for financial reporting purposes.

One key area addressed by the MPF (which has been subsequently clarified and supplemented by the issuance of FAQs) is professional skepticism. Skepticism, as described in the MPF, is related to the concept of "reasonably objective basis," and many of the FAQs which clarify the guidance on skepticism also overlap with this concept.

Skepticism

The MPF (*in italics below*) states: *Every valuation professional must exercise professional skepticism during each engagement where the valuation professional is providing a conclusion of value that will be used to support management's assertions in financial statements issued for financial reporting purposes.* [Reminder: MPF guidance is **not required** unless the valuation professional has obtained the CEIV.]

Professional skepticism requires that the valuation professional have an attitude that emphasizes the following:

- ***Evidential skepticism.*** *Valuation professionals must exercise due professional care by regularly questioning and critiquing all information and data with the appropriate level of skepticism. The level of skepticism should be based on the potential for bias within the information and data (for example, multiple sources of external corroboration versus a management-generated estimate with no external corroborating support).*
- ***Self-skepticism.*** *The valuation professional must regularly monitor his or her own client-based presuppositions that could detract from evidencing skepticism as a result of comfort level or familiarity with the client, industry, or both.*

When evaluating management-generated and management-provided information, the valuation professional must consider the experience of management and the sufficiency of the documentation and analyses provided by management throughout the valuation engagement. The valuation professional should not presume management is biased; however, the valuation professional should not accept and rely on less-than-persuasive evidence because the valuation professional believes management is unbiased. This requirement extends to third-party specialists retained by management, their competence, and the sufficiency of their work product.

Returning to our case example:

SRJ Inc.	Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A	12,000	12,600	13,230	13,892	14,586	15,315
Product B			25,000	28,750	31,625	33,206
Revenue	12,000	12,600	38,230	42,642	46,211	48,522
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Debt-free cash flow	720	756	1,544	2,558	3,152	3,310

What factors might we wish to discuss with management and document to evidence our application of professional skepticism, consistent with MPF guidance? As previously discussed with respect to generic risk profiles, Product B represents a new product line that is targeted at a new market. Thus, the professional might particularly focus on Product B assumptions such as:

- Time of launch (is Year 3 reasonable?);
- Costs prior to launch date;
- Support for initial year revenue and margin (is it reasonable to expect profits in the year of launch?);
- Growth and profitability assumptions beyond Year 3.

As mentioned, certain FAQs are particularly relevant to the issue of professional skepticism. FAQ #28, for example, provides a link between the topics of skepticism and discount rate development. How does the valuation professional develop a discount rate that is consistent with the risk profile of the PFI? This FAQ suggests that the addition of any "CSRA factor" is a subsequent step in the process, implying that the professional should first perform appropriate due diligence procedures such as those outlined in the MPF.

FAQ #28

What is the underlying guidance driving the PFI discussion in the MPF? Is there an overarching principle?

a) Encourage valuation professionals to apply professional skepticism and conduct an appropriate amount of due diligence over client-provided PFI by making comparison to any available relevant external data, performing backtesting and other procedures

b) Determine if the PFI provided by management is consistent with any observable relevant data by applying the procedures outlined in these FAQs and the MPF documents. In such a case, the appropriate discount rate might be a market participant WACC without a company specific risk adjustment (CSRA) (sometimes also referred to as 'alpha') as the basis for rates of return

c) Use the procedures to adjust the PFI as noted in the MPF and apply a market participant WACC, or

d) Apply DRAT, note why it is applied, document any CSRA factor utilized by referring to these procedures, and provide the appropriate quantitative and qualitative support for the selected CSRA.

FAQ #28 appears to be consistent with many of the issues discussed thus far:

- What are the key generic risks? In our case example, Product A may have a significant amount of "observable relevant data" to support the PFI's assumptions, while Product B may have very little.
- What is the nature of the PFI – conditional vs. expected? As discussed, a single, conditional scenario presumes the application of the DRAT, and thus likely will require the addition of a CSRA factor to make the discount rate consistent with identified conditional risks. Experienced professionals often perform this step implicitly. This article suggests that this process be made explicit, i.e., identify any conditional risks and link them clearly to the CSRA. Conversely, if the PFI is determined to represent an appropriately weighted set of expected cash flows, this could also be explicitly identified, explaining the reduced magnitude of any CSRA.

These points are further emphasized in the AMPF, which also discusses management's role with respect to the preparation of the PFI, and for making any adjustments thereto:

The valuation professional is responsible for evaluating whether the prospective financial information (PFI) provided by management is representative of expected value and properly supported. In circumstances in which the PFI is not representative of expected value, properly supported, or both, the valuation professional must determine the most appropriate way to align PFI and expected value. The valuation professional may elect to:

- *Request management to revise its PFI* [section 1.4.1(a)];
- *Adjust assumptions in PFI* [section 1.4.1(b)];
- *Use either another present value method (for example, discount rate adjustment technique (DRAT), expected present value technique method 1 or 2 (EPVT1 or EPVT2, respectively))* [section 1.4.1(c)]; *or*
- *Use an entirely different approach from the income approach.*

FAQ #29 also discusses management's role regarding the appropriateness of the PFI:

FAQ #29

How should a valuation professional proceed when he or she has applied the steps in AMPF section 1.4.1 (a), (b), and (c) and still believes management's PFI is unsuitable for use in the valuation analysis?

When the valuation professional believes that management's PFI is unsuitable for use in the valuation analysis (for example, because it is substantially inaccurate and incomplete or there is material inconsistency with other information), the valuation professional should discuss the matter with management and request management to revise the PFI. If changes cannot be made to satisfy the valuation professional about those matters, he or she should determine whether to continue with the engagement or withdraw from the engagement. If the valuation professional decides to continue with the engagement, he or she should value the subject interest or entity using an entirely different approach from the income approach (that is, market or cost approach), if appropriate in the circumstances.

Supplementing the MPF's guidance with respect to professional skepticism, the AMPF reminds the valuation professional of a fundamental concept: the PFI must have a **reasonably objective basis**:

Since PFI represents future expectations, it is, by its very nature, imprecise. Therefore, the assumptions used in preparation of the PFI must be reasonable and supportable.

Does this mean the professional is responsible for attesting to the reasonableness of the PFI? FAQ #25 clearly says this is not required, but then provides a reminder that an appropriate level of due diligence is expected:

FAQ #25

What is the valuation professional's responsibility with regards to the PFI? What does 'reasonable' mean in the context of evaluating PFI for use in a valuation?

It was the intent of the Performance Workstream to draft AMPF section A1.4 (Prospective Financial Information) to provide valuation professionals with guidance to help them assess whether it is reasonable to rely upon management's PFI for use in the valuation analysis. This section should not be interpreted as a requirement for the valuation professional to take responsibility for management's PFI and attest to its accuracy or achievability. Thus, although the valuation professional is not expected to attest to PFI's reasonableness, he or she should not simply accept PFI from management without investigating management's basis for the PFI and its suitability for use in the valuation analysis.

The AMPF provides some general guidance with respect to this investigation:

Part of the valuation professional's responsibility is to

evaluate the PFI provided by management for reasonableness in general, as well as in specific areas. Factors and common procedures to consider when performing this assessment may include, but are not limited to, these:

- *Comparison of PFI for an underlying asset of subject entity to expected values of the entity cash flows;*
- *Frequency of preparation;*
- *Comparison of prior forecasts with actual results;*
- *Mathematical and logic check;*
- *Comparison of entity PFI to historical trends;*
- *Comparison to industry expectations;*
- *Check for internal consistency.*

As our case example suggests, these steps will be easier to perform for Product A; there will be no "prior forecasts" to compare with "actual results" for Product B, for example.

FAQ #26 further clarifies the intent of the AMPF guidance and role of the professional with respect to "expected cash flows," which as previously discussed is defined in both U.S. GAAP and IFRS as a set of cash flow scenarios which have been appropriately weighted. As discussed herein, a weighted set of scenarios may be preferable to a single scenario, particularly when certain key assumptions are conditional upon successful outcomes, but the full development of a set of expected cash flows is not required.

FAQ #26

A1.4 refers to 'expected cash flows'. What is the meaning of 'expected cash flows' in the context of the MPF guidance?

It was the intent of the Performance Workstream for the phrase 'expected cash flows' to be interpreted practically as PFI that represents a neutral and unbiased projection (not a conservative or aggressive / optimistic case estimate) of the company's or intangible asset's future cash flows. While this is not meant to require the valuation professional to evaluate, review or analyze multiple scenarios when analyzing PFI when using an EPV technique, the objective remains for the cash flow projections to reflect an expected case from a market participant perspective.

Separately, it is not the intent of the AMPF to prescribe a scenario based or a probability based expected cash flow model. Rather, the use of the term 'expected cash flows' is intended to highlight the need for the PFI to be free from bias (neither overly conservative nor optimistic) and thereby provide a reliable basis for the valuation analysis.

The AMPF goes on to provide further guidance regarding the due diligence process:

Valuation professionals should be aware of the purpose for which the PFI was prepared. Valuation professionals should strive for objective, reasonable, and supportable PFI relevant for use in the valuation process with the understanding that management bias may exist and, if present, should be properly adjusted to expected cash flows (reflecting market participants' assumptions) in the analysis. In order for the valuation professional to assess the quality and reliability of the PFI, the key components of the PFI should be identified. These components commonly include, but are not limited to, the following:

- *Base year metrics;*
- *Revenue forecasts or revenue growth rates;*
- *Gross margins;*
- *EBITDA/EBIT margins;*
- *Depreciation and amortization (book and tax);*
- *Effective tax rate;*
- *Capital expenditures;*
- *Debt-free net working capital (DFNWC) requirements.*

FAQ #27 further clarifies that this guidance does not require the professional to develop a PFI consistent with the technical requirements of "expected cash flows" per ASC 820 (and IFRS 13 by analogy).

FAQ #27

In [the AMPF], the valuation professional is required to compare PFI to the 'expected cash flows' of the subject interest or entity. What does 'compare' imply in this context?

The intent of the Performance Workstream here is to guide the valuation professional to execute a suitable level of care and due diligence when assessing the PFI provided by management, whether it is for an individual asset or the overall entity. Specifically, the intent of the "compare" requirement is to evaluate management's PFI to assess whether it approximates expected cash flows, as discussed previously. It is not intended to be a literal comparison of management's PFI to a set of expected cash flows that generally do not exist. The guidance in AMPF A1.4.7 provides a set of considerations that may be useful to the valuation professional in evaluating the reasonableness of management's PFI.

Finally, the AMPF provides minimum requirements for documenting this process of skepticism and due diligence with respect to the review of the PFI:

The valuation professional, at a minimum, must document the following in writing within the work file, if applicable:

The identification of the party or parties responsible for preparation of the PFI;

The process used to develop the PFI from the perspective of market participants;

The explanation of key underlying assumptions used in the PFI such as revenue forecasts, percentage of market share captured by the entity, or how the projected profit margins compare to those of other market participants;

The steps used in, and results of, testing the PFI for reasonableness, including, but not limited to

- *A comparison of the PFI to expected cash flows;*
- *A comparison of the PFI to historical performance;*
- *A comparison and evaluation of prior year's PFI against actual historical results (when prior PFIs are available), and*
- *An analysis of the forecast relative to economic and industry expectations;*
- *An analysis of any evidence that contradicts management's assumptions or conclusions used in their PFI;*

- *The rationale for any adjustments made to management's PFI;*
- *Evidence that a mathematical and logic check was performed;*
- *The components of the prospective balance sheet and cash flow statements, if available.*

The MPF and related AMPF guidance discussed in this section contain some policy implications for the valuation report, in addition to the work file. As mentioned, one issue that is usually addressed implicitly is the generic character of the PFI:

- Conditional (e.g., Product B?)
- Expected value (e.g., Product A?)
- Certainty-equivalent
- Hybrid (combined PFI for Product A and B?)

A valuation report that explicitly identifies the PFI(s) in these terms will likely provide a stronger foundation for the development of, and support for the discount rate(s), as discussed later.

Reasonably Objective Basis

Before we move on to the critical topic of discount rate development and its explicit linkage with the risks identified in the PFI, it is useful to further discuss, as a separate topic, the concept of reasonably objective basis, which was addressed in the 1986 AICPA Guide. As a reminder, the context and purpose of this document was to provide guidance to professionals regarding how to assist their clients with the preparation of forecasts and projections which would potentially be utilized by third parties such as lenders. The Guide speaks in terms of a "responsible party" (for example, management of the entity) that is developing the forecast or projection (PFI):

The responsible party should have a reasonably objective basis to present a financial forecast. Because financial forecasts are presentations of information about the future, they are inherently less precise than information about past events. Nevertheless, financial forecasts present, to the best of the responsible party's knowledge and belief, the entity's expected financial position, results of operations, and cash flows. For a projection, the responsible party need not have a reasonably objective basis for the hypothetical assumptions. Considerable judgment is required to evaluate whether a reasonably objective basis exists to present a financial forecast. Sufficient knowledge of the entity's business and industry is essential in making the evaluation.

Thus, the Guide calls for the responsible party to be knowledgeable about the business and industry, and to use that knowledge to provide a supportable, credible foundation (a reasonably objective basis) for the PFI, with the exception of any hypothetical assumptions. If there are any hypothetical assumptions, they need not have a reasonably objective basis, but the responsible party must:

1) Identify them as hypothetical, so any third-party user is appropriately informed about the heightened risk of such assumptions;

2) Label the entire document as a "projection," so the third-party user is clearly aware of the presence of such hypothetical assumptions.

The Guide then describes how the professional might arrive at a reasonably objective basis, by developing "sufficiently objective assumptions" for each "key factor" (again, other than hypothetical assumptions):

The responsible party has a reasonably objective basis to present a financial forecast if sufficiently objective assumptions can be developed for each key factor. The following matters should be considered when evaluating whether such assumptions can be developed:

- *Can facts be obtained and informed judgments made about past and future events or circumstances in support of the underlying assumptions?*
- *Are any of the significant assumptions so subjective that no reasonably objective basis could exist to present a financial forecast?*
- *Would people knowledgeable in the entity's business and industry select materially similar assumptions?*
- *Is the length of the forecast period appropriate?*

The evaluation of whether sufficiently objective assumptions can be developed for each key factor should be made within the following context:

- *A factor is evaluated by considering its significance to the entity's plans and the dollar magnitude and pervasiveness of the related assumption's potential effect on forecasted results;*
- *The responsible party's consideration of which key factors have the greatest potential impact on forecasted results is a matter of judgment. A key factor having the greatest potential impact on forecasted results is one in which omission or misstatement of the related assumption would probably, in light of surrounding circumstances, change or influence the judgment of a reasonable person relying on the financial forecast;*
- *The responsible party should seek out the best information that is available in order to develop the assumptions. Cost alone is an insufficient reason not to acquire needed information. However, the cost of incremental information should be commensurate with the anticipated benefit to be derived;*
- *A conclusion that a reasonably objective basis exists for a forecast might be easier to support if the forecast were presented as a range.*

The Guide goes on to provide a brief outline to assist the preparer of the PFI in developing sufficiently objective assumptions, which may also serve as a useful tool for valuation professionals in the review and evaluation of management's PFI. The common-sense chart below has appeared in a number of subsequent AICPA guides:

Sufficiently Objective Assumptions — Matters to Consider

Basis	Less Objective	More Objective
Economy	Subject to uncertainty	Relatively stable
Industry	Emerging or unstable; high rate of business failure	Mature or relatively stable
Entity:		
Operating history	Little or no operating history	Seasoned company; relatively stable operating history
Customer base	Diverse, changing customer group	Relatively stable customer group
Financial condition	Weak financial position; poor operating results	Strong financial position; good operating results
Management's experience with:		
Industry	Inexperienced management	Experienced management
The business and its products	Inexperienced management; high turnover of key personnel	Experienced management
Basis	**Less Objective**	**More Objective**
Products or services:		
Market	New or uncertain market	Existing or relatively stable market
Technology	Rapidly changing technology	Relatively stable technology
Experience	New products or expanding product line	Relatively stable products
Competing Assumptions	Wide range of possible Outcomes	Relatively narrow range of possible outcomes
Dependency of assumptions on the outcome of the forecasted results	More dependency	Less dependency

Returning now to the case example, our evaluation can proceed in accordance with the guidance discussed above. The valuation professional performs procedures to ascertain whether the PFI has a reasonably objective basis, i.e., are the **key factors** based on **sufficiently objective assumptions**?

SRJ Inc.	Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A	12,000	12,600	13,230	13,892	14,586	15,315
Product B			25,000	28,750	31,625	33,206
Revenue	12,000	12,600	38,230	42,642	46,211	48,522
Contribution - A	1,200	1,260	1,323	1,389	1,459	1,532
Contribution - B			1,250	2,875	3,795	3,985
EBIT margin	1,200	1,260	2,573	4,264	5,254	5,516
Debt-free cash flow	720	756	1,544	2,558	3,152	3,310

Upon further consideration, are we satisfied that this PFI has a reasonably objective basis?

- Support for Product A assumptions?
  - Existing product, existing market
  - Can be compared with specific historical metrics
  - Still need to question whether historical results are relevant in current environment
- Product B assumptions?
  - New product, new market
  - No specific historical metrics
  - Do we understand how the "responsible party" developed and supported these assumptions?

To conclude this discussion regarding the reasonableness of the PFI, it is important to consider some policy implications for valuation professionals. Presumably, most professionals are already performing procedures such as those described above, but are they documenting them in accordance with the MPF, AMPF and related FAQs? Combining the older concepts of "reasonably objective basis" and "sufficiently objective assumptions" with the newer MPF guidance, this article recommends that support for the reasonably objective basis of management's PFI be documented in work files and report sections, particularly where dealing with the discussion of key PFI assumptions.

Finally, these concepts (all of which are "numerator" factors) should be linked as explicitly as possible with the development of discount rate(s) consistent with the risks identified, evaluated, and documented.

Discount Rates

As mentioned, **the most critical concept in this article** is the importance of developing a discount rate that is linked to, and consistent with, the risks of the future cash flows in the PFI to be discounted. It should be clear that the discount rate should not be developed independent of the evaluation of the PFI, but rather, after the professional has determined factors such as the character of the PFI (expected value vs. conditional) and its generic risk profile, and completed an evaluation of the support for the significant assumptions, i.e., the support for a reasonably objective basis. At this point in the valuation process, we should be able to demonstrate that our risk-adjusted discount rate (or multiple rates, as discussed below) is appropriate and supportable.

To return to our example:

SRJ Inc.	Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A	12,000	12,600	13,230	13,892	14,586	15,315
Product B			25,000	28,750	31,625	33,206
Revenue	12,000	12,600	38,230	42,642	46,211	48,522
Contribution - A	1,200	1,260	1,323	1,389	1,459	1,532
Contribution - B			1,250	2,875	3,795	3,985
EBIT margin	1,200	1,260	2,573	4,264	5,254	5,516
Debt-free cash flow	720	756	1,544	2,558	3,152	3,310

Summarizing what we have learned in our evaluation of the subject company's PFI:

- It is an "enterprise" value; the cash flows do not address debt service, or preferred stock dividends, if applicable
- The PFI combines two very different business plans and risk profiles
- Product Line A has a track record supporting key assumptions
  - stable margins (10%)
  - stable growth (5%)
- Product Line B is a "yet to come" revenue stream, expected to be introduced at the beginning of Year 3
  - It is targeted at a new market segment
  - By Year 5, both growth and margins are expected to exceed Product A
  - Cash flow estimates for Product B are subject to greater uncertainty

What more might we wish to know before proceeding with the development of a discount rate or rates? Let us assume for illustrative purposes that, based upon further discussions with management, the PFI pertaining to Product B represents a "High Case" with a relatively low (less than 50%) probability, and that management has now supplemented the previous single scenario for Product B with "Base Case" and "Low Case" scenarios. At this point, the valuation professional is faced with multiple alternatives:

- Continue to use the original High Case, knowing that it will require a higher CSRA;
- Exchange the High Case for the Base Case, under the assumption that this scenario is closer to the concept of "expected value" and will not require a significant CSRA adjustment; note that a "Base" or "Most Likely" Case is NOT the same thing as a set of weighted scenarios, as will be further discussed; or
- Weight the three scenarios (assuming they appropriately represent a reasonable range of potential outcomes) to arrive at an "expected value" PFI for Product B.

Below, the enterprise PFI now contains the newly provided "Base Case" for Product B:

SRJ Inc.		Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A		12,000	12,600	13,230	13,892	14,586	15,315
Product B				15,000	16,500	17,325	18,191
Revenue		12,000	12,600	28,230	30,392	31,911	33,507
Contribution - A		1,200	1,260	1,323	1,389	1,459	1,532
Contribution - B				300	1,320	2,079	2,183
EBIT margin		1,200	1,260	1,623	2,709	3,538	3,714
Debt-free cash flow		720	756	974	1,625	2,123	2,229

Assuming the due diligence process is now substantially complete, the valuation professional will develop a single discount rate (if the combined PFI for both Products A and B are to be valued in a single step), or multiple rates (if the values of Product A and Product B are to be separately determined and then combined). If done properly, of course, the enterprise value should be approximately the same either way, although we will see that in our hypothetical example, separating the PFI into these two components will make the discount rate development, as well as the overall valuation conclusion, more clear.

We have already summarized key definitions and concepts contained in ASC 820 and IFRS 13, and will focus the remainder of this discount rate discussion on the procedures and documentation requirements contained in the AMPF *(in italics below)*, supplemented by underlinedcomments:

Given the spectrum of discount rate models that exist, the valuation professional must carefully assess which model is most appropriate for a particular task and ensure that rationale is well documented in the engagement work file. The valuation professional, at a minimum, must document the following in writing within the work file, if applicable:

Cost of equity

- *The rationale for the selection of a discount rate model or models.*
- *The source of the risk free rate used in the calculation and explain the rationale for its selection.*
- *The source or calculation of the equity risk premium and rationale for its use.*
- *An explanation of the calculation of beta of the guideline public companies (or other industry risk adjustments)*

and the rationale for the method used (or rationale for the use of another source of beta) when using CAPM.

- *The rationale for selecting the specific beta when using CAPM, including "adjusted betas".*
- *The amount of size premium, the source of the premium data and the rationale for selecting the concluded premium (even if that premium is zero) when applicable.*
- *The amount of company-specific risk adjustment, if any, the rationale for application of the adjustment, and the objective and quantitative data sets used to develop the specific concluded adjustment. This is typically the most subjective part of the derivation of the cost of equity capital and, therefore, documentation related to this feature should be the most extensive. Comparisons to internal rate of return (IRR) calculations or to the results of other discount rate models may aid in supporting a company-specific risk adjustment.* [Note: As discussed at length herein, the need for, and magnitude of, any CSRA will be driven by factors such as conditional (DRAT) vs. expected value scenarios, and the generic risk profile of the relevant PFI.]
- *The amount of country-specific risk adjustment the source of the adjustment data (if applicable), and the rationale for selecting the concluded adjustment (even if that adjustment is zero).*
- *Other significant assumptions should be clearly explained and documented as well as other inputs that may apply depending on the models chosen by the valuation*

Cost of debt

- *The source(s) of data used and the rationale for use of the source(s)*
- *The rationale to support the selection of the pretax cost of debt and any additional source documents*
- *The rationale for the statutory tax rate used to adjust the pretax rate to an after tax rate.*

Capital Structure

- *The capital structures of the guideline public companies, industry sector, or subject company and rationale for selection of the time frame over which they are measured, as applicable.*
- *The market participant capital structure selected in the calculation of the WACC and rationale for its selection.*

When other discount rate models are used instead of CAPM or WACC [Note: Examples might include risk-neutral option-based models, and adjusted present value (APV) techniques, as well as situations in which the capital structure may vary over time, such as in leveraged buyout valuations]*, the valuation professional must provide within the work file details on*

- *the model specification,*
- *inputs chosen and the sources of those inputs,*
- *sub-methodological selections made, and*
- *why, if applicable, any adjustments were made to the model results.*

Section Summary

Most of the critical guidance regarding discount rates has been in effect for many years. However, the precise terms and techniques defined in this guidance may not explicitly appear in many valuation reports. To clarify the procedures performed and documented in the work files, therefore, the following narrative report policies are suggested:

- Describe the nature of the discount rate technique(s) selected:
  - DRAT
  - EPVT Method 1
  - EPVT Method 2
  - Hybrid (combinations of the techniques above)
- Describe the rational for the selected technique(s), in language consistent with the guidance of ASC 820 and/or IFRS 13. Providing such explicit reasoning and linkage with the PFI may reduce the potential for disagreements regarding components of the discount rate, particularly with respect to the CSRA.

Case Study

To repeat, discounted cash flow techniques are about numerators (estimated cash flows) and denominators (discount rates), and the valuation professional must strive for consistency between them. In the context of the case study utilized throughout, we should now ask ourselves the following:

- Do we now understand the nature of the subject PFI and its key assumptions?
- Does the PFI have a reasonably objective basis?
- Do we know enough to develop an appropriate discount rate?
  - Might there be more than one rate?
  - Should it/they contain a CSRA?

We begin our example regarding discount rate development by selecting EPVT Method 2. EPVT methods, as discussed, are based on the assumption that conditional factors have been neutralized via employment of a sufficient number of scenarios which have been appropriately weighted; as also discussed, this does NOT mean that the analysis presents all such scenarios, but rather that, if a single set of future cash flows is presented, that this scenario reflects the end result of an appropriate weighting process. In our example, even after application of a disciplined analysis, potential issues remain, due to the significant difference in the risk profiles of Product A vs. Product B. For example, the operating segment responsible for Product A (Division A) might be expected to have a greater capacity for debt, and at a lower cost of debt, as well as a lower

estimated beta. Division B, on the other hand, does not yet exist as an operating segment. So, for illustrative purposes, we will divide the enterprise PFI into its two major components, and develop a separate discount rate for each:

	Division A	Division B
After tax cost of debt	4.0%	4.5%
Weight	35.0%	25.0%
Weighted cost	1.4%	1.1%
Cost of equity		
Risk-free rate	3.0%	3.0%
ERP	6.0%	6.0%
Beta	1.05	1.25
	6.3%	7.5%
Size premium	4.0%	4.0%
Cost of equity	13.3%	14.5%
Weight	65.0%	75.0%
Weighted cost	8.6%	10.9%
WACC (rounded)	10.0%	12.0%

Since we divided the subject company into two segments for purposes of discount rate development, we will initially value each separately and combine. And because we are attempting to utilize EPVT Method 2, we must ensure that each discount rate is applied to probability-weighted estimates of future cash flows, but NOT to risk-adjusted/certainty-equivalent cash flows (EPVT Method 1).

We now proceed with the initial estimate of value for Division A. Based on our various analyses and discussions with management, the divisional WACC of 10% is considered reasonable based on Division A's consistent historical results and the anticipated low variability in future revenues and profits, all of which are reasonably captured in the divisional PFI; the result of this analysis is an estimated value of $15.1 million:

Division A		Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A		12,000	12,600	13,230	13,892	14,586	15,315
Product B							
Revenue		12,000	12,600	13,230	13,892	14,586	15,315
Contribution - A		1,200	1,260	1,323	1,389	1,459	1,532
Contribution - B				-	-	-	-
EBIT margin		1,200	1,260	1,323	1,389	1,459	1,532
Debt-free cash flow		720	756	794	833	875	919
Terminal value							18,378
Discount factor		0.9535	0.8668	0.7880	0.7164	0.6512	0.6512
Present value		686	655	626	597	570	11,969
Total		15,103					

Moving on to Division B, we know that the technically correct application of our EPVT Method 2 discount rate necessitates that we utilize and weight our three scenarios for Division B, starting with the High Case, followed by the Base and Low Cases:

Product Line B – High Case: Probability: 20%; Discount rate: 12%

Division B		Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A							
Product B				25,000	28,750	31,625	33,206
Revenue		-	-	25,000	28,750	31,625	33,206
Contribution - A		-	-	-	-	-	-
Contribution - B				1,250	2,875	3,795	3,985
EBIT margin		-	-	1,250	2,875	3,795	3,985
Debt-free cash flow		-	-	750	1,725	2,277	2,391
Terminal value							34,155
Discount factor				0.7533	0.6726	0.6005	0.6005
Present value		-	-	565	1,160	1,367	20,510
Total		23,603					

Product Line B – Base Case: Probability: 40%; Discount rate: 12%

Division B		Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A							
Product B				15,000	16,500	17,325	18,191
Revenue		-	-	15,000	16,500	17,325	18,191
Contribution - A		-	-	-	-	-	-
Contribution - B				300	1,320	2,079	2,183
EBIT margin		-	-	300	1,320	2,079	2,183
Debt-free cash flow		-	-	180	792	1,247	1,310
Terminal value							18,711
Discount factor				0.7533	0.6726	0.6005	0.6005
Present value		-	-	136	533	749	11,236
Total		12,653					

Product Line B – Low Case: Probability: 40%; Discount rate: 12%

Division B		Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A							
Product B				10,000	10,500	11,025	11,576
Revenue		-	-	10,000	10,500	11,025	11,576
Contribution - A		-	-	-	-	-	-
Contribution - B				-	525	882	926
EBIT margin		-	-	-	525	882	926
Debt-free cash flow		-	-	-	315	529	556
Terminal value							7,938
Discount factor				0.7533	0.6726	0.6005	0.6005
Present value		-	-	-	212	318	4,767
Total		5,296					

It is important to note that, under the discount rate technique consistent with EPVT Method 2, we apply the same discount rate to all three scenarios, which is mathematically equivalent to first weighting the cash flows and applying this single rate to a single weighted scenario. As discussed above, due to the absence of historical results, lower expected debt capacity and higher anticipated variability, our WACC for Division B, 12%, is higher than for Division A.

Combining our weighted scenarios, we arrive at an estimate of value for Division B, $11.9 million:

Division B	Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
High case	-	-	750	1,725	2,277	34,155
Base case	-	-	180	792	1,247	18,711
Low case	-	-	-	315	529	7,938
Debt-free cash flow (weighted)	-	-	222	788	1,166	
Terminal value (weighted)						17,491
Discount factor			0.7533	0.6726	0.6005	0.6005
Present value	-	-	167	530	700	10,503
Total	11,901					

To wrap up our initial valuation example, we observe:

- If we used only the High Case scenario, we would have applied a higher discount rate because we would no longer be discounting a weighted set of scenarios, but rather a single conditional PFI requiring a higher, DRAT-based discount rate
- If we used only the Base Case, our value would be much closer to the value above, but in our example it is clear that the Base Case does NOT represent a weighted, expected case in the sense defined by ASC 820 and IFRS 13; compare the weighted EPVT value of $11.9 million above with the Base Case scenario calculation of $12.65 million
- This preliminary result does not address the impact of debt and debt service on the estimated future cash flows
- Applying the previously discussed guidance regarding professional skepticism, we may want to review whether we have employed a sufficient number of scenarios, and obtained sufficient support for the assigned weights

It is worth repeating that the above example illustrates a very strict technical application of "expected value" and EPVT Method 2, whereas FAQs #26 and #27 (discussed previously) provide the valuation professional with some flexibility; we are not required to develop such a strict expected value-based PFI, but rather, to take appropriate steps to arrive at a PFI that is free from bias.

For comparative purposes, we will now value Division B a second time using only the High Case, which we know is clearly conditional upon assumptions such as very rapid customer acceptance in the year of introduction, as evidenced by Year 3 revenue and profits. There are a number of issues to consider in the development of a discount rate appropriate for the High Case scenario:

- How do we select a discount rate, including a CSRA factor, that properly adjusts for the conditional risks identified?
- Will the CSRA selected also capture the uncertainty regarding the timing of the launch, e.g., what if there is some probability that Product B will not be ready until later in Year 3?
- Will the CSRA properly capture the uncertainty regarding the pre-launch costs to be incurred?
- As the company's capital structure changes during the pre-and post-launch periods, how should we address the potential variation in the WACC?

The following analysis will illustrate the difficulties with respect to the first issue. The others are not addressed herein, but worthy of further discussion.

If Division B is to be valued using the original "success" (High Case) scenario, we will migrate from an EPVT discount rate of 12.0 % to a higher conditional DRAT rate. Based on our previous example using EPVT Method 2, we found the value of Division B to be $11.9 million. Solving for the implicit conditional discount rate consistent with the High Case produces a rate of 17.5%; this further implies a CSRA of 7+% over the equity component of our EPVT discount rate (with no CSRA) of 14.5%. In other words, the equity component would have to be increased to approximately 22% to arrive at a conditional WACC of 17.5%. How would we have arrived at this conditional WACC without first generating and weighting multiple scenarios? Presumably, the experienced valuation professional would have gathered sufficient information concerning a) the likelihood that the company will achieve these conditional results, and b) what less favorable outcomes and their probabilities might look like, arriving at a similar CSRA and WACC without

going through this full process. However, the quantification of the selected CSRA and resulting WACC is more clearly explained by the details contained in our multiple scenario example.

The value of Division B based on the High Case, discounted with the adjusted WACC of 17.5%, is shown below:

Division B	Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A						
Product B			25,000	28,750	31,625	33,206
Revenue	-	-	25,000	28,750	31,625	33,206
Contribution - A	-	-	-	-	-	-
Contribution - B			1,250	2,875	3,795	3,985
EBIT margin	-	-	1,250	2,875	3,795	3,985
Debt-free cash flow	-	-	750	1,725	2,277	2,391
Terminal value						19,204
Discount factor			0.6689	0.5695	0.4849	0.4849
Present value	-	-	502	982	1,104	9,312
Total	11,900					

In the examples above, we have bifurcated our analysis, valuing a single (but expected case) Division A scenario at $15.1 million, and the riskier Division B at $11.9 million utilizing multiple scenarios, for a total enterprise value of $27.0 million. Our final example below shows, for comparative purposes, the enterprise value using a combined scenario which includes the expected case scenario for Division A plus the Base Case scenario for Division B, and calibrates this combined PFI to the total value of $27.0 million.

SRJ Inc.	Year 1	Year 2	Year 3	Year 4	Year 5	Terminal
Product A	12,000	12,600	13,230	13,892	14,586	15,315
Product B			15,000	16,500	17,325	18,191
Revenue	12,000	12,600	28,230	30,392	31,911	33,507
Contribution - A	1,200	1,260	1,323	1,389	1,459	1,532
Contribution - B			300	1,320	2,079	2,183
EBIT margin	1,200	1,260	1,623	2,709	3,538	3,714
Debt-free cash flow	720	756	974	1,625	2,123	2,229
Terminal value						36,191
Discount factor	0.9485	0.8533	0.7676	0.6906	0.6212	0.6212
Present value	683	645	748	1,123	1,319	22,484
Total	27,000					

The single implicit rate that is consistent with this estimate of value is approximately 11.2%. How should we interpret this implicit rate? Let's first review the key issues presented herein with the following questions:

• What is the nature of this PFI?

- It is part expected value (Division A).

- It is part conditional (Division B) because the Base Case has been shown to overstate the "true" value based on a more disciplined weighting of the three scenarios.

- The contribution of Division A relative to Division B varies significantly over the next five years. In Years 1 and 2, Division A represents 100% of the expected cash flows; beginning in Year 3, Division B (subject to more uncertainty) represents more than 50% of the company's revenues, and by Year 5, more than 50% of its profits.

• What discount rate technique should we apply?

- We should apply a discount rate based on EPVT Method 2 for the Division A component.

- We should (in a strict technical sense) apply a discount rate based on DRAT for the Division B component, although we may alternatively judge that the Base Case sufficiently approximates a set of weighted scenarios (refer to FAQ #27), and apply EPVT Method 2.

If we had not separated these two divisions, and valued the subject company with this combined PFI, we would somehow have needed to consider 1) different risk profiles, 2) different types of PFI (expected and conditional), and 3) varying contributions of each division over time to arrive at our single risk-adjusted discount rate of approximately 11.2%. Although we would anticipate that an experienced professional would have come very close to this result – after all, the original estimate of a risky rate for Product A was 10%, and for Product B, 12%, so a less disciplined approach might have produced a single rate that approximates our implicit rate – it would have been more difficult for this professional to describe either the nature of the PFI or the technique used to develop the single discount rate, at least in terms of the language of ASC 820, IFRS 13, the MPF and AMPF. And although our case example is hypothetical, the single combined hybrid PFI and related single hybrid discount rate may have resulted in a number of auditor-generated questions upon review. Such questions would be more readily answerable based on our disaggregated, multiple scenario example presented earlier.

Summary and Recommendations

In conclusion, the purpose of this article is focus on the proper use of PFI in the measurement of fair value for financial reporting purposes, with an emphasis on the application of discounted cash flow techniques. We reviewed pertinent guidance from multiple sources; our key recommendations are summarized below.

• Interviews, work files, schedules and reports should discuss PFI in terms of generic types (per ASC 820 and IFRS 13):

- Conditional
- Expected
- Certainty-equivalent
- Hybrid

• Valuation professionals should increase their familiarization regarding MPF and AMPF guidance (even though it may not be required!) with respect to PFI:

- Professional skepticism
- Due diligence procedures
- Reasonably objective basis
- Documentation

• Valuation professionals should strive to develop discount rates that are explicitly consistent with the nature of the PFI and its identified risks, as defined in ASC 820 and IFRS 13:

- DRAT
- EPVT Methods 1 and 2

It seems reasonable to expect that adoption of these recommendations, while not necessarily affecting conclusions of value in monetary terms, would result in valuations and related reports that are better supported, more clear, and consequently result in fewer questions upon review.

Early warning signs (value based) of imbalances in troubled firms

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The article describes the crucial role played by valuations in the diagnosis and early resolution phases, due to their ability to identify structural imbalances, regardless the accounting choices made by the troubled firm. In the early diagnosis of a crisis valuations are carried out for decision-making purposes. This means that it is necessary to have available several estimates that can express: the value that can be extracted from the use of the assets; the price that should be incurred to replace its assets; the price that could be fetched by selling it as a whole or by selling it piecemeal. The article gives few examples of financial and operating imbalances and their consequences on firm's value.

1. Business crisis

Insolvency is rarely a sudden event (generally it materializes as a combination of lower revenues and/or profits and a reduced operating efficiency), yet many businesses wake up exceedingly late to the need to restructure. Inertia has a cost. Timely restructuring actions can generate much more value and are more likely to succeed than restructuring activities undertaken when bankruptcy looms. The earlier the diagnosis of a business crisis, the greater the number of options available to address it and the more effective the actions taken.

In fact, if the operating and/or financial imbalance is dealt with promptly:

1) the probability of success of the corrective action is higher;

2) the corrective action is less drastic and incisive;

3) the stakeholders' confidence is not compromised;

4) corrective actions can be taken with positive long-term effects, without jeopardizing the firm' existence;

5) it might not be necessary to share the turnaround plan with lenders;

6) shareholders and management continue to exercise control over the activities.

As the crisis exacerbates, these conditions no longer hold and the turnaround may take longer, due to the simultaneous need: to share decision-making power with creditors; for more incisive actions to obtain faster results with respect to cash shortfalls; for management replacement etc. The longer the delay, the greater the amount of indirect distress costs and the greater the urgency to obtain effective results with the corrective action. The need for results in a short period of time, management replacement and the inability to adopt more far-reaching actions (at least in the early stages) entail in turn greater risks of failure.

Why do companies react late to a crisis if a delay is costly? Reasons might include weak management or management errors or lack of accurate and timely management information. Alternatively, management may not feel responsible for the downside as well as the upside and the deterioration may be due to the compounding of a series of small mistakes. In smaller firms, owners are often reluctant to accept reality because the business is an extension of their ego and acknowledging distress is tantamount to admitting one's errors. Another reason might be the deliberate attempt by management to hide the crisis not to incur indirect distress costs.

Whatever the reasons, however, it should be in the creditors' best interest to use monitoring and bonding tools capable of diagnosing a crisis sufficiently early and to prevent it. Actually, in many cases these tools are ineffective because performance measures are accounting-based, not value-based, and the deterioration of a company starts long before the problem shows up in the financial statements. This article intends to describe the crucial role played by valuations in the diagnosis and early resolution phases, due to their ability to identify structural imbalances, regardless of the accounting choices made.

However, these are special valuations. In fact, business valuations can serve different purposes, though they are all designed to achieve five main objectives:

- valuations to measure business performance. In these cases, a valuation is intended to estimate economic profit (or economic value added), taking as reference accounting-based measures of the firm;
- valuations for financial reporting. In these cases, the valuation is intended to estimate the fair value and or the value in use of a business;
- valuations for decision-making purposes. In these cases, the valuation is designed to compare value in

use with value in exchange of a business (hold vs. divest strategy);

- valuations for negotiation purposes. In these cases, the valuation is intended to express potential value (ask price) or value "as is" (bid price) of a business;
- valuations for transaction purposes. In these cases, the valuation is intended to express the market value of a business.

In the early diagnosis of a crisis valuations are carried out for decision-making purposes. This means that it is necessary to have available several estimates that can express: the value that can be extracted from the use of the company; the price that should be incurred to replace its assets; the price that could be fetched by selling it as a whole or by selling it piecemeal.

In most countries, insolvency laws encourage a consensual resolution of business crises. Valuations are the cornerstone of the entire restructuring process. However, both to access negotiated solutions and to manage the process under the protective shield of the insolvency law, valuations become the tool through which the parties negotiate to advance their interests. Thus, if management, shareholders and junior claimants are interested in overstating the benefits of the restructuring plan (plan value) and in understating forced liquidation value, senior creditors' best interests lie at the opposite end of the spectrum. Thus, when the crisis has emerged and negotiations get under way, estimates diverge radically because valuations are transformed from a decision-making to a bargaining tool. The conflicting interests of the different creditor categories give rise to biased valuations. There is evidence in the literature that valuations can differ to a significant extent[1], and in any case more than the valuation uncertainty related to troubled firms would warrant.

It is precisely the distortion of the valuations performed to support conflicting interests during a full-blown crisis that is considered by certain authors[2] the main reason for the failure of the systems that encourage the consensual reorganization of distressed firms. Many restructurings carried out under court supervision might just delay the liquidation of the firm, with resulting value destruction that an immediate auction sale of the distressed firm could have avoided. Thus, an auction would be the best way to fix the problem, as it would certify the true value of the firm without resorting to valuers[3].

This article focuses on valuations undertaken to diagnose a state of distress. The objective is to perform an early diagnosis of the distress, through objective valuations. If valuations when court protection is sought re the triumph of hope, valuations conducted to diagnose distress need to be realistic.

A good part of the literature on distressed firms concern companies that are in a full-blown crisis and, as

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[1] Stuart C. Gilson, Edith S. Hotchkiss, Richard S. Ruback, Valuation of Bankrupt Firms, The Review of Financial Studies, Spring 2000, Vol. 13, No. 1, pp. 43-74

[2] Michael C. Jensen "*Corporate control and the politics of finance*", Journal of Applied Corporate finance, 13-33 (Summer 1991). Jensen adopts the following classification for companies that reorganize under court supervision (chapter 11):

1. Companies with profitable operations but the "wrong" capital structures. In these cases the cash flow available to the company without compromising the company's profitability is lower than the payment obligations with claimants and a rescheduling of debt to match the cash flow generated from operating activities is necessary;

2. Companies with profitable operations whose value is being maximized under the current management team, but whose total firm value for reasons now beyond management's control is below the (nominal) value of total liabilities. In such cases, it is not enough to reschedule debt in a way that matches the cash flow from operating activities but it is necessary to reorganize the firm's financial structure, through the partial conversion of financial debt into equity and a dilution of the current shareholders and management;

3. Companies with potentially profitable, but poorly managed, operations that could meet their total obligations provided the firm's management team is changed and a restructuring is undertaken. In these cases the strategy is wrong and needs to be changed, together with the financial structure to provide adequate incentives to the new management team;

4. Companies that cannot meet their contractual obligations and whose liquidation value exceeds their going concern value. In these cases the company is worth more "dead" than "alive" and the liquidation must satisfy creditors on the basis of the priority of their claims (absolute priority rule).

Jensen's classification supports the Author's argument that the absolute priority rule is frequently violated, through claims awarded to shareholders and junior creditors (unsecured or subordinated) also when senior creditors receive partial settlements, due to the fact that "in-court" restructurings typically require:

a) leaving the current management team in place;

b) approval or reorganization plans by all creditor categories.

These restructuring methods end with the expropriation (at least in part) of senior creditors by shareholders (the debtors) and unsecured or subordinated creditors by setting off long attempted-restructuring processes, which result in higher distress costs and no real benefit. Jensen regards this circumstance also as the cause of debt capital rationing by parties that might be interested in restructuring the company.

[3] Not every author agrees with this view. There are two schools of thought regarding business insolvency:

a) The first school of thought considers insolvency the direct effect of competition and entrepreneurial dynamism, with companies that thrive and achieve success, on one side, and companies that are progressively marginalized through a creative destruction process, on the other. Anything that prevents companies from being pushed out of the market hurts competition. This school of thought takes its inspiration from laissez-faire economics and thinks that the loss of value for the stakeholders after a forced sale of the insolvent firm is lower than the costs that would be incurred to keep alive companies without viable market prospects;

b) The second school of thought, for its part, thinks that business crises are not necessarily due to competitive pressures, but might be originated from management errors (and more generally mismanagement), adverse cyclical phases, the loss of key employees, etc., that is circumstances that can be mostly remedied (if dealt with promptly). For this school of thought the death of companies that could be turned around would lead to an unnecessary loss for stakeholders; that's why it is necessary to draw a distinction between companies that can be restored to health and companies that cannot.

such, focuses on the causes of the distress, not on the early signs of the distress[4]. Yet, most troubled firms feature inadequate value-based performance measures, which might bring to light in a timely manner the signs of fundamental imbalances. As with medicine, the best care requires early diagnoses. Shortcomings in information systems are themselves a cause of distress, as they entail company inaction or otherwise an inordinately long period of time before necessary corrective actions are implemented. Only the early awareness of serious potential imbalances can make it possible to summon the energy necessary to meet challenges.

Since they are made for decision-making purposes, such valuations require a comparison between value in use and value in exchange and, as such, are founded on the estimation of different bases of value.

A troubled firm incurs indirect distress costs (loss of key employees, key customers, key suppliers, etc.). Indirect distress costs are reversible but their reversibility depends on the gravity of the distress. This means that, to diagnose the state of distress, value estimates must include the negative effects of indirect distress costs, unlike what happens when the valuation is conducted to estimate the potential value that the firm might attain as a result of a restructuring capable of removing indirect distress costs. In other words, it is necessary to separate the estimates for the diagnosis of distress from the estimates intended to calculate the expected value on the basis of the restructuring. The former includes indirect distress costs and the latter do not include them or otherwise project them as progressively falling.

2. Structural operating imbalance and structural financial imbalance

A correct diagnosis of corporate distress requires first of all the identification of the nature of the firm's imbalance. Accordingly, it is necessary to distinguish between structural operating imbalance and structural financial imbalance. Often the two overlap as companies experiencing serious operating distress are also experiencing financial distress and financially distressed firms sooner or later enter a state of operating distress (as financial difficulties affect operational choices).

For our purposes, the two concepts will be kept separate, at least initially.

Structural operating imbalance

Structural operating imbalance refers to the firm's inability to recover the value of its assets through their use. More simply, the firm experiencing a structural operating imbalance reflects badwill with respect to the replacement cost of its assets. In addition, the firm is unable to recover its maintenance capex (which, as such, represents investments with a negative net present value) through the cash flows and profits generated from operating activities. It is important to underscore that the focus is on the value in use of the firm's assets and the capital invested at replacement cost, not the capital invested originally by the firm.

In fact, there are two measures of invested capital:

i. Invested Capital (measured) at reproduction cost (or effective or historical invested capital) (IC_e), which is the original capital invested by the firm and is independent of its assets' earning power. Many companies in structural decline show an invested capital in excess of the earnings that they can extract from it, due to bad investment decisions made in the past or mismanagement or an industry crisis that reduced the original earning power of the assets in place. Effective invested capital is the historical cost of the firm's investments (net of consumption) and is a measure that reflects past choices (backward looking);

ii. Invested Capital (measured) at replacement cost (IC_{rc}), which represents the investment necessary to replace the assets currently used by the firm and depends on the earning power of such assets. Capital invested at replacement cost reflects the capital expenditure necessary for the firm to maintain unaltered its operating activities and differs from effective invested capital (reproduction cost) because it does not include all the excess costs incurred in the past, all the management errors made and expresses instead the highest and best use (HBU) of the assets from the perspective of market participants. In this sense, capital invested at replacement cost reflects the capital that the firm needs to run its business prospectively (forward looking). If the firm cannot generate an adequate return on capital invested at replacement cost it means that it cannot deploy its assets at their HBU. Capital invested at replacement cost is not the same as realizable value from the sale of assets, because it represents an entry price and not an exit price and because it is a price prevailing in an orderly market and not the price obtained by the firm as a result of a forced sale of its assets.

If in the past the firm made bad investment decisions or investments that did not result in the expected earning power (thus it incurred excess costs in the form of excess investment or costs too high for a specific investment), or if it was hit by an economic recession or an industry crisis that reduced the value of its assets, capital invested at replacement cost is lower than effective invested capital ($IC_{rc} < IC_e$). This is the most frequent situation for declining companies.

[4] Except for the strand of the literature that deals with corporate default forecasts pioneered by Robert Altman.

It is worth noting that effective invested capital and capital invested at replacement cost are not necessarily reflected by their book value, because the book value of invested capital does not include investments in intangible assets developed internally, on one side, and may have been written down, on the other.

The fact that effective invested capital (reproduction cost) is backward looking while capital invested at replacement cost is forward looking implies also that the returns calculated on the two different value bases reflect two different performance measures. In fact, one is backward looking in that it reflects a return based on past decisions (lower, to the extent that effective invested capital is greater than capital invested at replacement cost) and the other is forward looking and shielded from the consequences of past mistakes (typically higher, but still to the extent that effective invested capital is greater than capital invested at replacement cost). Consistently, the difference between the return on effective invested capital and cost of capital measures value created or destroyed with respect to past investments (and thus it is of no use for decision-making purposes) while the difference between the return on capital invested at replacement cost and cost of capital reflects the value that the firm can create or destroy on the basis of the current value of its assets (and can be used for decision-making purposes).

A firm exhibits a structural operating imbalance when the average expected return on capital invested at replacement cost is lower than its cost of capital.

It should be noted that the return on capital invested at replacement cost sterilizes the negative effects of two causes of distress:

a) macroeconomic or industry-related causes beyond the firm's control which reduce the replacement cost of assets;

b) bad investment decisions made in the past by the firm, which do not affect capital invested at replacement cost.

For this reason, in the case of distressed firms, the return on capital invested at replacement cost is always greater than the return on effective invested capital.

While it frees the company from past errors and the negative effects of adverse economic conditions, return on capital invested at replacement cost does not eliminate the negative effects of mismanagement.

Assets' replacement cost expresses the fair market value of assets, thus their highest and best use (HBU)[5] which, in case of economic or industry-related crisis, reflects the deteriorated conditions of the general economy. Accordingly, if the firm is unable to generate a return equal to or greater than cost of capital, despite the sterilization of the negative effects coming from an external source or due to past choices, it means that:

- the firm is unable to deploy its assets at their HBU in their new conditions of use;
- the firm will not be able to replace its assets (at the end of their remaining useful lives), as the new investment entails value destruction (negative net present value);
- the enterprise value is lower than assets' replacement cost (Q ratio lower than 1).

Earlier in the paper it has been mentioned that an imbalance results from a difference in values. In this case the difference concerns the capital invested at replacement cost and enterprise value (calculated on the basis of the specific entity's expected stream of economic benefits). When enterprise value is lower than capital invested at replacement cost the company features a structural operating imbalance, as it is unable prospectively to preserve the value of its assets and thus to recover the investments necessary to continue to operate. The firm is in a structural imbalance as it destroys value prospectively, not because it destroyed value in the past.

Structural financial imbalance

Financial imbalance concerns instead choices made in the past and the destruction of effective invested capital that has already occurred (due to management errors, adverse economic conditions or mismanagement). The loss of value refers in this case to effective invested capital and the way in which the firm is funded. A firm experiencing a financial imbalance exhibits an enterprise value lower than the face value of its debt, from which it follows that its equity is out of the money[6].

This can be seen clearly in the case of real estate or shipping companies (i.e. companies that invest in assets with an active secondary market) that in the past purchased real estate or ships at high prices (due to a phase of industry growth), leveraging their assets extensively. If the loss of value of the firm's assets (purchased in the past) exceeds equity, the value of such assets will be lower than the face value of the firm's debt and the company is in a structural financial imbalance.

If the destruction of value is due to past management errors or adverse economic conditions, the enterprise value might be greater than capital invested at replacement cost. This is why financial imbalance is con-

[5] Typically, the market value of assets adapts to the normal prospective earning power of the market participant (a strategic buyer). If the specific firm is unable to generate normal prospective earnings from the assets in question it means that it is unable to keep up with the profits that other market participants might extract.

[6] In fact, if the firm's equity is considered as a call option written on the value of the EV of a functioning business, with an exercise price equal to the face value of the firm's debt (D), when EV of a functioning business < D, the call option is out of the money.

ceptually different from structural operating imbalance. In theory, the firm experiencing a financial imbalance can express goodwill in relation to capital invested at replacement cost.

The circumstance that in actual reality financial imbalance often goes hand in hand with structural operating imbalance is due to indirect distress costs. The firm experiencing a financial imbalance is considered riskier by its stakeholders, as it is financially insolvent. This entails a deterioration of the terms of trade with customers, suppliers, employees and lenders, with the resulting decline in profitability. To a certain extent, indirect distress costs are reversible as, by rebalancing the firm's financial structure (for example by converting part of the debt into equity), the insolvency risk falls away and the terms of trade of the firm can improve. This is why the enterprise value of firms in distress is never independent of its financial structure. Enterprise value can be lower than capital invested at replacement cost because enterprise value suffers from indirect distress costs while assets' replacement value reflects the recoverable amount on the basis of the assets' HBU. As the firm approaches the insolvency zone (i.e. enterprise value slightly greater than the face value of debt) it begins to be saddled with indirect distress costs.

This is why financial restructurings (even though they concern only the financial structure) - which eliminate, in whole or in part, indirect distress costs - can enhance substantially enterprise value. By sterilizing the negative effects of indirect distress costs, enterprise value calculated on the basis of normalized profits expresses the potential value that the firm can recover once it is restructured financially.

The materialization of indirect distress costs is the first symptom of business crisis: the loss of key employees, key customers, key suppliers etc. are a proxy of a company decline which in turn results in a loss of earning power. One of the main reasons why distress is addressed late is due precisely to the underestimation of the indirect distress costs. The loss of key employees, key customers, key suppliers is often regarded as a one-time negative event, while in the absence of restructuring actions indirect distress costs can only increase, thereby accelerating the company downfall. This is why to diagnose the real state of distress of a firm it is necessary not to sterilize the negative effects of indirect distress costs.

3. A few examples

Below, examples are provided to show the differences in relation to three cases, structural operating imbalance, structural financial imbalance and a combination of operating and financial imbalances. For the sake of simplicity, the examples exclude tax effects and assume cash flow from operating activities as equal to EBITDA (no change in working capital and no maintenance capex).

Structural operating imbalance

Suppose a firm has effective invested capital of 100, represented by a single asset with a remaining useful life of four years, which was financed with debt equal to 40% of the asset's value (= 40% x 100 = 40). Suppose also that due to external negative events the asset's replacement value is 60 (i.e. historical cost reflects excess cost in the amount of 40). A structural operating imbalance is predicated on a return on capital invested at replacement cost lower than cost of capital. The example assumes that this return (ROIC) is 3% in each of the four year of the asset's remaining life and that the cost of capital (WACC) is 6%. The consequence is that the enterprise value (hereinafter EV) (= 56) is lower than the capital invested at replacement cost (60).

The example assumes also that the debt is repaid in equal instalments (10 per annum for four years) and that the cost of debt is 4% of the remaining capital at the beginning of each year. Lastly, it is assumed that the cost of debt reflects the borrower's credit standing[7] (this assumption will be removed in the next example) and that, as such, the market value of the debt is the same as its book value (= 40).

If EV is equal to 56 and the value of the debt is 40, the current equity value is 16 (= 56 – 40). Since the firm's effective invested capital is 100 and its debt (loan-to-value) is 40%, the original equity investment by the shareholders was 60, which is also the book value of equity. The destruction of value of the original equity investment – i.e. 44 (= 60 – 16) – reflects the destruction of the firm's effective invested capital (= 100 – 56 = 44).

In accounting terms, a firm in this situation might:

a) keep the asset at historical cost (=100). In this case, the annual depreciation would be 25 (=100/4) and would entail accounting losses. The initial equity of 60 would drop to 20.5 after four years and would reflect the cash available to shareholders (FCFE);

b) write down the asset by aligning its value to the current replacement cost (=60). In this case the initial equity would decrease by 40 (= difference between asset replacement cost and historical cost = 60 – 100). The annual depreciation of the asset would decline to 15 (=60/4) and would return the firm to slight profitability. After the initial decrease, equity would be

[7] This might be the case where the loan agreement has covenants that the firm has breached, with the resulting renegotiations of the original terms and conditions to reflect the issuer's greater risk.

now 20 (= 60 – 40) and would rise to 20.5 after four years, reflecting once again the cash available to the shareholders;

c) write down the asset aligning it to the EV (= 56). In this case the initial equity would decrease by 44 (difference between EV of the functioning business and historical cost = 56 – 100). In this case the asset's annual depreciation would fall to 14 (=56/4) and would cause the firm to be even more profitable than in the previous case. After the initial decrease, equity would be now 16 (= 60 – 44), would rise to 20.5 at the end of the fourth year and would correspond once again to cash available to the shareholders.

The example shows that operating imbalances do not necessarily mean that the firm operates at a loss. In fact:

- Reported results depend on the choice to spread the loss over time or to recognize the full amount of the loss early, so as to return rapidly the company to profitability (earnings management);
- In solutions b) and c), following the original write-down, the fact that the company recorded an accounting profit does not mean that it restored its operating health.

Thus, financial statements provide a distorted picture of the real situation of the firm.

Whatever the accounting solution adopted, at the end of the fourth year, if it wants to continue to operate, the firm needs to refinance the capital invested at replacement cost (=60) but without the original creditworthiness. In fact, even assuming that the firm can borrow funds for up to the original loan-to-value ratio (40%), the company could receive from its lenders 24 (= 40% x 60). Cash available would be 20.5 and the firm would be forced to ask its shareholders to inject fresh equity for the difference (= 15.5 = 60 – 24 – 20.5). The shareholder would hardly be willing to provide more capital to a firm that:

- destroyed value equal to 66% of the initial equity (= 20.5/60 – 1);
- continues to generate a return on capital invested at replacement cost (= 60) lower than its cost of capital. Following the purchase of the new asset at replacement cost (= 60), and since the firm is unable to provide a return in line with the cost of capital (3% vs. 6%), the enterprise value right after the purchase of the asset would decline to 56, with a value destruction equal to 11% of equity post capital increase [= (56-60)/(20.5+15.5)] and equal to 25% of the new equity injection [=(56-60)/15.5].

Table 1. Example of firm experiencing operating imbalance (with cost of debt in line with credit standing of the firm)

Years	0	1	2	3	4	Cumulative
Original Invested capital @reproduction cost (IC_e)	100	100	75	50	25	
Invested capital @replacement cost (IC_{rc})	60	60	45	30	15	
EBITDA (= UFCF)		16,8	16,35	15,9	15,45	
Depreciation @replacement cost		15	15	15	15	
Ebit (net of depreciations @replacement cost = $EBIT_{rc}$)		1,8	1,35	0,9	0,45	
ROIC @replacement cost = $EBIT_{rc}/IC_{rc}$ BoP		3%	3%	3%	3%	
Depreciations @reproduction cost		25	25	25	25	
Ebit (net of depreciations @reproduction cost = $EBIT_e$)		-8,2	-8,7	-9,1	-9,6	
ROIC @ reproduction cost = $EBIT_e/IC_e$		-8%	-12%	-18%	-38%	
WACC	6,00%					
Discount factor		0,943	0,890	0,840	0,792	
PV UFCF @wacc		15,8	14,6	13,3	12,2	
EV	56,0					
Loan-to-value (Leverage)	40%					
Debt	40	40	30	20	10	
Repayment of principal		10	10	10	10	
Cost of debt	4%					
Interest expenses		1,6	1,2	0,8	0,4	
NI @reproduction cost ($EBIT_e$ - Interest expenses)		-9,80	-9,85	-9,90	-9,95	
NI@replacement cost ($EBIT_{rc}$ - Interest expenses)		0,20	0,15	0,10	0,05	
Depreciation @ IC = EV		14	14	14	14	
EBIT (net of depreciations@IC=EV)		2,80	2,35	1,90	1,45	
NI @ IC = EV		1,20	1,15	1,10	1,05	
FCFE = UFCF - repayment of principal - interest expenses		5,2	5,15	5,1	5,05	20,5
Cost of equity	10,9%					
Discount factor		0,902	0,813	0,733	0,661	
PV FCFE @coe		4,69	4,19	3,74	3,34	
Equity value	16,0					
Original equity = Invested capital @reproduction cost - debt	60					
Equity value destroyed	-44,0					
Book Value of Equity w/o write off (EoP)	60	50,2	40,4	30,5	20,5	
Book Value of Equity w/write off (=IC_{rc})	20	20,2	20,4	20,5	20,5	
Book value of equity w/write off (= EV)	16,0	17,2	18,3	19,4	20,5	

Below, the case illustrated above is discussed after removing the (not too realistic) assumption that the terms and conditions governing the loan agreement are in line with credit standing of the firm. Since the firm purchased the asset for 100, with debt for 40, it destroyed value and saw its creditworthiness inevitably deteriorate. The original interest rate on the debt is lower than the firm's marginal cost of debt.

The same data as the previous case apply: a single asset with a remaining useful life of four years; historical cost of 100; asset value at replacement cost 60; return on capital invested at replacement cost equal to 3%; debt equal to 40 with an original interest rate of 4%.

Compared to the previous case, it is assumed that the lender has not been able to adjust the cost of capital to reflect the greater risk.

More realistically with respect to the previous case, it is assumed that the higher risk attributable to the firm translates into a higher cost of capital (= WACC = 10% vs. 6% in the previous example), hence a lower EV (51.3 vs. 56). EV is 4.7 lower than in the previous case (=51.3 – 56). The greater loss of value compared to the previous example does not reflect in this case entirely on the equity but also on the debt. In fact, if the cost of debt is contractually set (4%) and the lender could not adjust it to reflect the greater risk (which would result in a higher cost of debt, in the example 6%), the current value of the debt will be 1.78 lower than its face value (= 38.22 – 40). Also equity is lower than in the previous case (=13.08 vs. 16), but its loss of value (= 2.92) is lower than the loss of value of the asset (= 4.7) by an amount exactly equal to the loss of value of the debt (= 1.78 = 4.7 – 2.92). Given that, compared to the previous example, only discount rates changed but not the contractual cost of debt and the cash flow from operating activities, at the end of the fourth year the firm has the same amount of cash on hand as that of the previous example. Since the value destroyed was greater, the firm is faced with an even greater challenge to refinance the investment and continue the activity.

Table 2. Example of firm experiencing operating imbalance (with debt settlement not in line with credit standing of the firm)

Years	0	1	2	3	4	
Original Invested capital @reproduction cost (IC_e)	100	100	75	50	25	
Invested capital @replacement cost (IC_{rc})	60	60	45	30	15	
EBITDA (= UFCF)		16,8	16,35	15,9	15,45	
Depreciations @replacement cost		15	15	15	15	
Ebit (net of depreciations @replacement cost = $EBIT_{rc}$)		1,8	1,35	0,9	0,45	
ROIC @replacement cost = $EBIT_{rc}/IC_{rc}$ BoP		3%	3%	3%	3%	
Depreciations @reproduction cost		25	25	25	25	
Ebit (net of depreciations @reproduction cost = $EBIT_e$)		-8,2	-8,7	-9,1	-9,6	
ROIC @ reproduction cost = $EBIT_e/IC_e$		-8%	-12%	-18%	-38%	
WACC	10,00%					
Discount factor		0,909	0,826	0,751	0,683	
PV UFCF @wacc		15,3	13,5	11,9	10,6	
EV	51,3					
Loan-to-value (Leverage)	40%					
Debt	40	40	30	20	10	
Repayment of principal		10	10	10	10	
Cost of debt (nominal)	4%					
Interest expenses		1,6	1,2	0,8	0,4	
cost of debt (market rate)	6,0%					
Discount factor		0,943	0,890	0,840	0,792	
PV (repayment of principal and interest expenses)		10,943	9,968	9,068	8,238	
Market value of debt	38,22					
NI @reproduction cost ($EBIT_e$ - Interest expenses)		-9,80	-9,85	-9,90	-9,95	
NI @replacement cost ($EBIT_{rc}$ - Interset expenses)		0,20	0,15	0,10	0,05	
Depreciation @ IC = EV		12,83	12,83	12,83	12,83	
EBIT (net of depreciations@IC=EV)		3,98	3,53	3,08	2,63	
NI @ IC = EV		2,38	2,33	2,28	2,23	
FCFE = UFCF - repayment of principal - interest expenses		5,2	5,15	5,1	5,05	
Cost of equity	20,9%					
Discount factor		0,827	0,685	0,566	0,469	
PV FCFE @coe		4,30	3,53	2,89	2,37	
Equity value	13,08					
Original equity = Invsted capital @reproduction cost - debt	60					
Equity value destroyed	-46,9					
Book Value of Equity w/o write off (EoP)	60	50,2	40,4	30,5	20,50	
Book Value of Equity w/write off (=IC_{rc})	20,0	20,2	20,4	20,5	20,50	
Book value of equity w/write off (= EV)	13,1	15,46	17,78	20,06	22,28	
Difference between face value of debt and market value of debt					1,78	= 40 - 38,22
Book value of equity w/wiite off (= EV) and market value of debt					20,50	

Financial imbalance

This example has the same elements as the initial example but with a number of changes. The unchanged elements are as follows: a single asset with a remaining useful life of four years; historical cost of 100; asset value at replacement cost 60; cost of capital (WACC) 6%. Unlike the initial example, in this case the following assumptions hold:

- return on invested capital (at replacement cost) is equal to 8% and is, as such, greater than the cost of capital (WACC) of 6%
- the original loan-to-value ratio is 70%.

The consequence is that EV is greater than capital invested at replacement cost (= 63.1 vs. 60) but lower than the face value of debt (= 63.1 < 70 = 70% x 100). Thus, even though it destroyed value (EV < original invested capital), the firm is not in a structural operating imbalance, given that when it will be called upon to refinance the investment at replacement cost it will be able to generate a return greater than its cost of capital. The problem in this case is that the firm financed the initial investment with much higher leverage than in the previous example (70% vs. 40%), which means that the face value of the current debt of 70 (= 100 x 70%) is greater than the firm's EV. The table shows that this circumstance results in a negative cash flow for the shareholders in each of the four years of the asset's remaining life, thus making the business unsustainable unless the shareholders make up for the cash shortfall (4.5) and refinance the new investment to keep the firm operational. In this case, shareholders are expected to step in, given that prospectively they are in a position to generate value (by investing 60 they have assets worth 63.1).

Table 3. Example of firm in financial imbalance

Years	0	1	2	3	4	Cumulative
Original Invested capital @reproduction cost (ICe)	100	100	75	50	25	
Invested capital @replacement cost (ICrc)	60	60	45	30	15	
EBITDA (= UFCF)		20	18,75	17,5	16,25	
Depreciations @replacement cost		15	15	15	15	
Ebit (net of depreciations @replacement cost = $EBIT_{rc}$)		5	3,75	2,5	1,25	
ROIC @replacement cost = $EBIT_{rc}/IC_{rc}$ BoP		8%	8%	8%	8%	
Depreciations @reproduction cost		25	25	25	25	
Ebit (net of depreciations @reproduction cost = $EBIT_e$)		-5,0	-6,3	-7,5	-8,8	
ROIC @ reproduction cost = $EBIT_e/IC_e$ iniziale		-5%	-8%	-15%	-35%	
WACC	6,00%					
Discount factor		0,943	0,890	0,840	0,792	
PV UFCF @wacc		18,9	16,7	14,7	12,9	
EV	63,1					
Loan-to-value (Leverage)	40%					
Debt	70	70	52,5	35	17,5	
Repayment of principal		17,5	17,5	17,5	17,5	
Cost of debt	4%					
Interest expenses		2,8	2,1	1,4	0,7	
NI @reproduction cost ($EBIT_e$ - Interest expenses)		-7,80	-8,35	-8,90	-9,45	
NI @replacement cost ($EBIT_{rc}$ - Interest expenses)		2,20	1,65	1,10	0,55	
Depreciation @ IC = EV		15,78	15,78	15,78	15,78	
EBIT (net of depreciations@IC=EV)		4,22	2,97	1,72	0,47	
NI @ IC = EV		1,42	0,87	0,32	-0,23	
FCFE = UFCF - repayment of principal - interest expenses		**-0,3**	**-0,85**	**-1,4**	**-1,95**	**-4,5**

Financial imbalance and structural operating imbalance

The last example illustrates a situation of operating and financial imbalance, that is a situation where EV is lower than both the face value of debt and capital invested at replacement cost (IC_{rc}).

The example uses the same data as the previous case, except for the return on capital invested at replacement cost which is set at 3% (as opposed to 8% in the previous example). As the cost of capital (WACC) is 6%, EV is lower than both capital invested at replacement cost (56 vs 60) and the debt raised to purchase the asset at the original cost (70 = 100 x *Loan-to-value* = 100 x 70%). The consequence is that the firm generates lower cash flows from operating activities (as in the example there is no change in working capital or maintenance capex, the cash flow from operating activities is equal to EBITDA) and, with the same amount of debt, has a higher financial imbalance (in terms of cash flows available to the shareholders). In fact, if in the previous example the cumulative cash shortfall was 4.5, in this example it increases to 12.5. The difference with the previous example is that EV is lower than the assets' replacement cost and the shareholders have no interest in making up for the cash shortfall.

Table 4. Example of firm in operating and financial imbalance

Years	0	1	2	3	4	Cumulative
Original Invested capital @reproduction cost (IC_e)	100	100	75	50	25	
Invested capital @replacement cost (IC_{rc})	60	60	45	30	15	
EBITDA (= UFCF)		16,8	16,35	15,9	15,45	
Depreciations @replacement cost		15	15	15	15	
Ebit (net of depreciations @replacement cost = $EBIT_{rc}$)		1,8	1,35	0,9	0,45	
ROIC @replacement cost = $EBIT_{rc}/IC_{rc}$ BoP		3%	3%	3%	3%	
Depreciations @reproduction cost		25	25	25	25	
Ebit (net of depreciations @reproduction cost = $EBIT_e$)		-8,2	-8,7	-9,1	-9,6	
ROIC @ reproduction cost = $EBIT_e/IC_e$ iniziale		-8%	-12%	-18%	-38%	
WACC	6,00%					
Discount factor		0,943	0,890	0,840	0,792	
PV UFCF @wacc		15,8	14,6	13,3	12,2	
EV	56,0					
Debt	70	70	52,5	35	17,5	
Repayment of principal		17,5	17,5	17,5	17,5	
Cost of debt	4%					
Interest expenses		2,8	2,1	1,4	0,7	
NI @reproduction cost ($EBIT_e$ - Interest expenses)		-11,00	-10,75	-10,50	-10,25	
NI @replacement cost ($EBIT_{rc}$ - Interest expenses)		-1,00	-0,75	-0,50	-0,25	
Depreciation @ IC = EV		14,00	14,00	14,00	14,00	
EBIT (net of depreciations@IC=EV)		2,80	2,35	1,90	1,45	
NI @ IC = EV		0,00	0,25	0,50	0,75	
FCFE = UFCF - repayment of principal - interest expenses		**-3,5**	**-3,25**	**-3**	**-2,75**	**-12,5**

3. The different degrees of structural imbalance

A diagnosis of a firm's distress starts with the comparison between enterprise value (estimated on the basis of prospective earning power) and four (asset-based) value metrics:

a) Original invested capital. If Enterprise Value is lower than effective invested capital (but greater than capital invested at replacement cost and the face value of debt), the firm destroyed value (underperforming firm), but did not jeopardize its operating and financial balance;

b) Capital invested at replacement cost. If Enterprise Value is lower than capital invested at replacement cost the firm is in a structural operating imbalance (stressed firm);

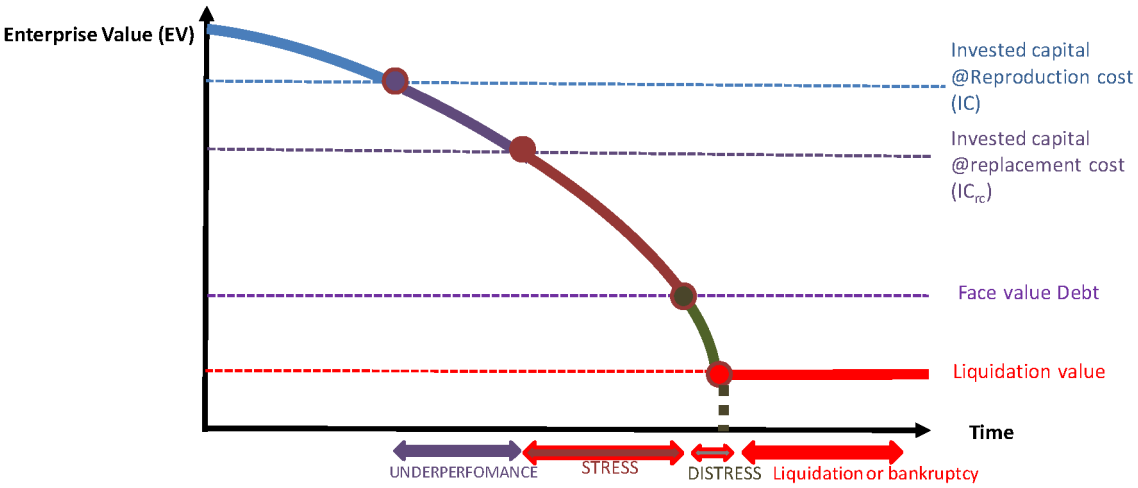
c) Face value of debt. If Enterprise Value is lower than the face value of debt the firm is in a financial imbalance (distressed firm);

d) Liquidation value. If Enterprise Value is lower than liquidation value the firm is no longer a going concern (gone concern).

As the face value of debt can exceed the assets' replacement cost, the firm can be distressed but not stressed.

Figure 1 shows the changes in enterprise value in the final phases of a firm's lifecycle, from maturity, when the firm still generates value but starts to lose its competitive advantage, to liquidation (ceases to exist).

Figure 1. The different degrees of structural imbalance: from underperformance to liquidation



The chart depicts Enterprise Value on the vertical axis and time on the horizontal axis and exhibits the four categories of firms described previously and defined in essence as underperforming, stressed, distressed and in a liquidation state. The different firm categories are identified on the basis of the comparison between enterprise value and four different thresholds of decreasing value, represented in the chart by as many horizontal broken lines.

Special emphasis is placed on the relationship between capital invested at replacement cost and liquidation value. Capital invested at replacement cost expresses the value of the firm's assets at their highest and best use (physically, legally, and financially achievable by market participants) and represents the entry price that the firm should incur to upgrade its assets to carry out business activities. Capital invested at replacement cost expresses the market value of assets that the firm utilized in its operations. Liquidation value is instead an exit price characterized by a forced sale and can refer to the firm as a whole or to the individual assets. The difference between capital invested at replacement value and liquidation value indicates the value lost when senior creditors force the liquidation of a company that should have been kept operational[8].

The chart shows how enterprise value diminishes at an increasingly faster rate. Unless corrective action is taken, the graver the structural decline phase the faster the loss of enterprise value. Each of the four decline phases identified in the chart reflects a situation of imbalance that, due to its nature, cannot persist over time. If it is not addressed it can only deteriorate. The loss of value is accelerated by the so-called indirect distress costs. These are the negative effects that normally hit firms in structural decline as a result of the reaction of employees, customers, suppliers and competitors to the firm's troubles. Such reaction can take shape in many different ways: from the loss of talent to the lack of financial resources to grasp opportunities or to react to competition, to the loss of key suppliers or customers, to the inability to bid for contracts, etc.[9].

Chart 2 shows the case where the face value of debt is greater than the capital invested at replacement cost. This occurs when the firm is leveraged to the tilt to finance its effective invested capital (at historical reproduction cost). In these cases it is enough for enterprise value to fall even slightly below the effective invested capital to drive the firm to insolvency.

[8] Replacement cost represents the market value of a firm's assets. "Market value (...) has no applicability in the forced-sale context: indeed, it is the very antithesis of forced-sale value.

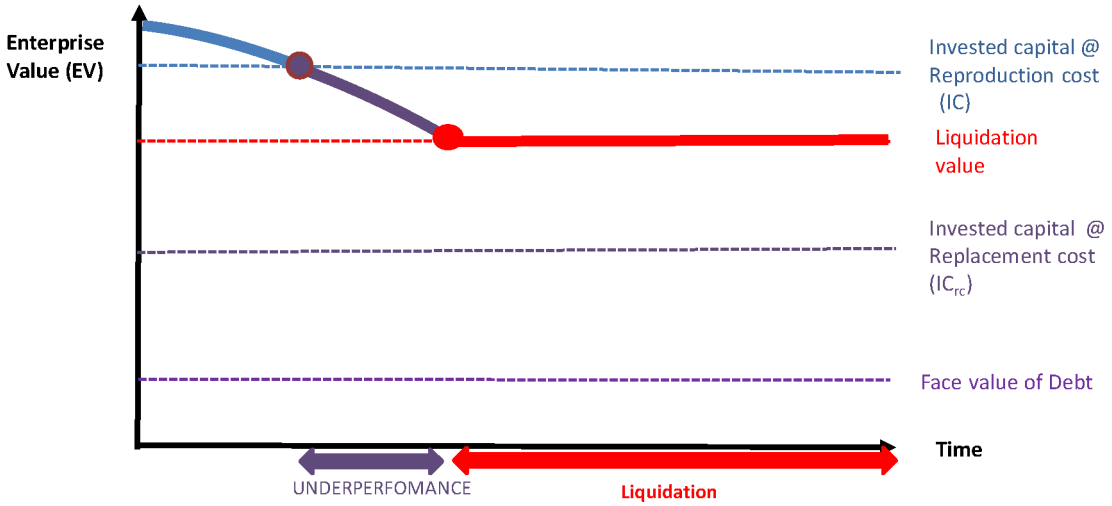
Comparing the conditions of a forced sale with the conditions viewed as necessary for markets to function efficiently helps one understand why a forced-sale price is likely to represent a significant discount from an asset's fair market value. First, unlikely a voluntary sale, under a forced sale the seller and/or buyer is not a willing participant in the transaction, so he or she cannot be described as "typically motivated". Second, the buyer at a forced sale is often not very informed about the property being sold. In many instances, prospective buyers have insufficient time to gather quality information about the property being sold. In other instances, the sale procedures those conducting the sale must follow by court order or by statute effectively prevent prospective buyers from gathering the type of information one would gather if the property were being sold on the open market" Thomas W. Mitchell, Stephen Malpezzi, Richard K. Green, Forced Sale risk: class, race and the double discount, in *Florida State University Law Review*, 2010, Vol. 37, Issue 3, pp. 589-658.

[9] The literature defines distress costs as all the costs directly attributable to the firm's distress (advisory and legal costs) and the indirect costs represented by the loss of customers, suppliers, employees, and business opportunities typically experienced by troubled firms. Indirect distress costs relate to the stakeholders' reaction to the firm's distress and are one of the drivers of the downfall and the operating and financial imbalances.

Distress costs rise with the increase of the difficulties of the firm and the probabilities of the firm's liquidation. For this reason the management of a declining firm may be led to delay the adoption of drastic restructuring or turnaround action, fearing that knowledge of the distress might give rise to indirect distress costs capable of accelerating the firm's decline. This is a very common behaviour which is often the first obstacle to timely restructuring action.

A key feature of distress costs is the fact that they may be reduced significantly, or even eliminated, by the adoption of credible restructuring plans. This is a particularly important circumstance in the valuation of a reorganized firm, as the removal of indirect distress costs is one of the main benefits associated with the restructuring.

Figure 2. The different degrees of structural imbalance when the face value of debt exceeds the assets' replacement value



More generally, it can be said that the distance between the four value thresholds (invested effective capital, capital invested at replacement value, face value of debt and liquidation value) depends on the causes of the business distress. The reasons can be seen by way of example.

Consider three firms affected by three different types of problem:

a) past overinvestment (overexpansion, acquisition problems, overdiversification, etc.) by a firm with high asset specificity and a financial structure in line with the industry average;

b) Industry crisis (business cycle), suffered by a firm with low asset specificity and very high leverage;

c) mismanagement (marketing weaknesses, customer and product focus problems, indecisiveness in adapting assets to new technologies, etc.) by a company with low asset specificity and a financial structure in line with the industry average.

but with the same:

i. original invested capital (IC_e), in the amount of €70 million;

ii. five alternative scenarios in terms of earning power. In particular, scenarios are assumed with a progressively falling ability to generate EBITDA (from €15 million in scenario 1 to €1 million under scenario 5);

iii. enterprise value, which varies in relation to each scenario on the basis of a constant EV/EBITDA multiple, i.e. 5x. Thus, the spectrum of the enterprise value ranges from €75 million (= 15 x 5) under scenario 1 to €5 million (= 1 x 5) under scenario 5. Enterprise value is lower than invested effective capital for all the scenarios, except scenario 1.

The three firms differ in terms of invested capital at replacement cost, face value of debt and liquidation value, in relation to the different causes of troubles. In fact:

a) In the case of the firm with past overinvestment it was assumed that:

- Invested Capital at replacement cost equals 60% of effective invested capital (which includes overinvestment);
- Liquidation value is 15% of the capital invested originally (thus expressing a substantial discount to the assets' replacement value due to the high specificity of the assets);
- The face value of debt is 50% of the capital invested originally (equal to the average loan-to-value ratio of the industry).

b) In the case of overall industry crisis it was assumed that:

- Invested capital at replacement cost equals 40% of the capital invested originally (due to the crisis that hit the industry, the assets' reduced earning power for all the companies in the industry translates in a steeped decline of their market price);
- Liquidation value is equal to 30% of the capital invested originally (due to the high substitutability/low specificity of the firm's assets, the liquidation value reflects a lower discount to the assets' replacement value);
- The face value of debt is 70% of the capital invested originally (= *Loan-to-Value* reflects a measure close to the industry average, before the crisis, and is higher in relation to the assets that are more readily realizable).

c) In the case of mismanagement, it was assumed that:

- Invested Capital at replacement cost equals 80% of the capital invested originally (as the crisis is due to mismanagement, the assets' replacement value is closer to their original cost);
- Liquidation value is equal to 70% of the capital

invested originally (also in this case, due to mismanagement the assets' liquidation value is slightly lower than their replacement cost);

- The face value of debt is 50% of the capital invested originally (= *Loan-to-Value* in in line with the average for the industry).

The table 5 identifies the nature of the imbalances of each firm, in relation to the five different scenarios.

Table 5. Three troubled firms for different reasons (overinvestment, business cycle, mismanagement) in five different scenarios

Five scenarios						
	Scenarios	*1*	*2*	*3*	*4*	*5*
Ebitda		15	10	8	4	1
EV/Ebitda multiple		5	5	5	5	5
EV		**75**	**50**	**40**	**20**	**5**
A) Overinvestment						
	% of original invested capital					
IC_e (Invested Capital @reproduction cost)	100%	70	70	70	70	70
IC_{rc} (Invested Capital @ replacement cost)	60%	42	42	42	42	42
Liquidation value	15%	10,5	10,5	10,5	10,5	10,5
Face value of debt	50%	35	35	35	35	35
relation between EV and value thresholds		*$EV>IC_e$*	*$IC_e>EV>IC_{rc}$*	*$IC_{rc}>EV>$ Face value debt*	*Face value debt$>IC_{rc}>EV$*	*$EV<$Liquidation value*
		health firm	underperforming firm	stressed firm	stressed and distressed firm	liquidation
B) Business Cycle						
	% of original invested capital					
IC_e (Invested Capital @reproduction cost)	100%	70	70	70	70	70
IC_{rc} (Invested Capital @ replacement cost)	40%	28	28	28	28	28
Liquidation value	30%	21	21	21	21	21
Face value of debt	70%	49	49	49	49	49
relation between EV and value thresholds		*$EV>IC_e$*	*$IC_e>EV>IC_{rc}$*	*Face value debt$>EV>IC_{rc}$*	*$EV<$ Liquidation value*	*$EV<$liquidation value*
		healt firm	underperforming firm	distressed firm	liquidation	liquidation
C) Mismanagement						
	% of original invested capital					
IC_e (Invested Capital @reproduction cost)	100%	70	70	70	70	70
IC_{rc} (Invested Capital @ replacement cost)	80%	56	56	56	56	56
Liquidation value	70%	49	49	49	49	49
Face value of debt	50%	35	35	35	35	35
relation between EV and value thresholds		*$EV>IC_e$*	*$EV<IC_{rc}$*	*$EV<$ Liquidation value*	*$EV<$ Liquidation value*	*$EV<$ Liquidation value*
		healt firm	stressed	liquidation	liquidation	liquidation

Table 5 shows that:

1) Under Scenario 1 (best): when EBITDA is equal to 15, all three firms create value. They have the same EV (=75 = 15 x 5) higher than the (same) original invested capital (=IC_e= 70);

2) Under Scenario 2: when EBITDA is equal to 10, given the same EV (=50 = 10 x 5), the firm that overinvested in the past and the firm in the industry in crisis underperform ($IC_e>EV>IC_{rc}$), while the mismanaged firm is already stressed ($EV<IC_{rc}$);

3) Under Scenario 3: when EBITDA is equal to 8, given the same EV (=40 = 8 x 5), the firm that overinvested in the past is stressed ($EV<IC_{rc}$), the firm in the industry in crisis is distressed (Debt>EV>ICcr), while the mismanaged firm is already in liquidation (EV<Liquidation value);

4) Under Scenario 4: when EBITDA is equal to 4, given the same EV (= 20 = 4 x 5) the firm that overinvested in the past is distressed (Face value of debt > IC_{rc}>EV), the firm in the industry in crisis and the mismanaged firm are in liquidation

5) Under Scenario 5: when EBITDA is equal to 1, given the same EV (= 5), all three firms are in liquidation.

4. Zombie and distressed firms

So far it has been shown how valuation can be used as a tool to diagnose a business crisis, but not how the crisis can evolve.

Moving from the diagnosis of a business crisis to the identification of solutions, valuation must act as a decision-making tool. To that end, it is necessary to distinguish between firms that can be turned around and firms that cannot be turned around. However, this difference is an excessive simplification for two main reasons:

a) many distressed firms are still kept in operation as, even though they destroy value, they are worth more alive than dead (i.e. zombie firms);

b) firms can be restored to health when it is more likely than not that their restructuring is successful, though such an outcome is far from certain. This involves that even if enterprise value is lower than the face value of debt, equity has value and its value is greater than the implied discount of the current value of debt to its face value.

Let us see why.

Zombie firms

A structural operating imbalance should not be sustainable over time as the firm not only is unable to recover the invested capital (at replacement cost) but it is also unable to recover the investments necessary to continue to operate. Yet, many firms with a structural imbalance continue to survive. They are called zombie firms.

A zombie firm is a business with a structural operating imbalance featuring all of the following:

a) its enterprise value is greater than its forced-sale value, as often the forced-sale value is close to zero;

b) continuing operations until the end of the remaining useful life of its assets (without maintenance capex) allows the recovery of more invested capital than it would be possible with a forced sale;

c) when continuation of operations without maintenance capex is not an option and a forced sale entails a significant loss of value, continuing business operations for an indefinite period of time by making the necessary maintenance capex might be a preferable alternative, even though capex entails further value destruction (investments with a negative net present value);

d) restructuring of the firm requires zero net present value investments. In this way, the firm can be turned around, though without benefits in terms of enterprise value vis-à-vis continuation of operations until the end of the assets' remaining useful life (without maintenance capex).

Table 5 shows these different cases. The table consists of two sections. The first shows a firm without any imbalance, with an enterprise value equal to invested capital at replacement cost (no goodwill, no badwill). The replacement cost is 100 and two different situations are compared which return the same enterprise value (100):

a) Finite life perspective. In this case, the firm does not incur maintenance capex and produces constant unlevered cash flows (26.38 in the example) for the remaining useful life of the assets (5 years in the example). The Unlevered Cash Flows (UCF) reflect exactly the return on and the return of the assets at replacement cost, thus their present value is 100;

b) Indefinite life perspective. In this case the firm must incur maintenance capex. Thus, the available cash flow declines as the Unlevered Free Cash Flows (UFCF) reflect only a return of the assets at replacement cost, equal to 10. As these capex ensure the firm's functioning over time, the enterprise value reflects the present value of a constant perpetuity equal to the return on assets (= 10).

The second section of the table shows the case of the zombie firm, which has an enterprise value lower than the Invested capital at replacement cost, as the annual Unlevered Cash Flows are lower than in the previous case (20 instead of 26.38) while the assets' replacement cost is also 100 (and their remaining useful life is also 5 years). The liquidation value is assumed to be equal to 25% of replacement cost (25 = 25% x 100), due to the high asset specificity.

There are five situations considered for zombie firms:

a) Perspective of definite life corresponding to the assets' remaining useful life. The UCF for the assets' five-year remaining useful life allow the recovery of an amount (enterprise value) equal to 75, which is lower than replacement cost, as UCF are lower than the sum of the return on and the return of assets at replacement cost;

b) Indefinite life perspective. In this case, the enterprise value falls to about half (36 vs. 75) of the amount recoverable by maintaining the firm alive until the end of the assets' remaining useful life, as maintenance capex have a negative net present value. Nevertheless, enterprise value is greater than forced-sale value (25);

c) Indefinite life perspective, under the assumption that after the first five years the firm is no longer in distress, without any restructuring. This would be the case of the firm that became distressed due to temporary adverse economic conditions. In this case enterprise value is equal to the amount recoverable through the definite life perspective (75), as the distress is only temporary and lasts until the end of the assets' remaining useful life.

d) Indefinite life perspective, under the assumption that the turnaround requires restructuring investments for five years and that such investments have a zero net present value, as the present value of the benefits of the restructuring from the fifth year on is exactly equal to the present value of the investments necessary to generate such benefits. In this case, the enterprise value is 36, that is the case of the firm that continues to operate without restructuring;

e) Indefinite life perspective, under the assumption that the restructuring investments generate benefits with a positive net present value equal at least to the difference between enterprise value in the definite life perspective (75) and enterprise value in the indefinite life perspective without restructuring (36).

All the situations considered entail an enterprise value lower than the invested capital at replacement cost, but greater than liquidation value. Firms in this situa-

tion destroy value but survive as they hold their lenders "hostage", under the threat of greater losses in case of forced sale. Zombie firms are structurally unable to recover both the assets' replacement value and the maintenance capex value, but since they are worth more alive than dead, they are kept in life. They may be firms that the competitive process cannot remove from the market (due to the support they receive from their lenders, which do not want to incur liquidation losses), or firms that play an important role in the supply chain of an industry and whose removal from the market could give rise to negative externalities.

Table 6. State of equilibrium and zombie firm

	Years	*0*	*1*	*2*	*3*	*4*	*5*	*TV*
case 1: state of equilibrium health firm (Enterprise value = value of the assets @replacement cost)								
	Finite life							
a	Value of the assets @ replacement cost	100						
b	wacc	10%						
c	Unlevered Cash Flows (UCF)		26,38	26,38	26,38	26,38	26,38	0
d	Discount factor		0,909	0,826	0,751	0,683	0,621	0
e=c*d	PV (UCF)		23,98	21,80	19,82	18,02	16,38	0
f	Enterprise value (finite life)	100						
	Indefinite life							
g	Manteinance capex		16,38	16,38	16,38	16,38	16,38	16,38
h = c-g	Unlevered Free Cash Flows (UFCF)		10,00	10,00	10,00	10,00	10,00	10,00
i	Present value UFCF		9,09	8,26	7,51	6,83	6,21	
l	Sum of PV(UFCF)	37,91						
m	Terminal Value							100
n	Present value TV	62,09						
o=l+n	Enterprise value (indefinite life)	100						
case 2: state of stress (zombie firm) (Enterprise value < value of the assets @replacement cost; forced sale value < replacement cost)								
	Finite life							
p	Unlevered Cash Flows		20	20	20	20	20	0
q	Present value Unlevered Cash Flows		18,18	16,53	15,03	13,66	12,42	0
r	Enterprise value (finite life)	75,82						
	Indefinite life w/out restructuring							
s = g	Maintenance capex		16,38	16,38	16,38	16,38	16,38	16,38
t=p-s	Unlevered Free cash Flows		3,62	3,62	3,62	3,62	3,62	3,62
u	Present value UFCF		3,29	2,99	2,72	2,47	2,25	
v	Sum of PV(UFCF)	13,72						
w	Terminal Value							36,20
y	Present value TV	22,48						
z =v+y	Enterprise value (indefinite life)	36,20						
	Indefinite life w/ restoring of normal earnings power							
aa=g	Maintenance capex		16,38	16,38	16,38	16,38	16,38	16,38
ab =p-aa	Unlevered Free cash Flows		3,62	3,62	3,62	3,62	3,62	10,00
ac	Present value UFCF		3,29	2,99	2,72	2,47	2,25	
ad	Sum of PV(UFCF)	13,72						
ae	Terminal Value							100,00
af	Present value TV	62,09						
ag =ad+af	Enterprise value (indefinite life)	75,82						
	Indefinite life w/restructuring (NPV of restructuring =0)							
ah = g	Maintenance capex		16,38	16,38	16,38	16,38	16,38	16,38
ai	Restructuring opex & capex (net of divestments)		12,00	11,00	10,50	9,50	8,43	0,00
al = p-ah -ai	Unlevered Free cash Flows		-8,38	-7,38	-6,88	-5,88	-4,81	10,00
am	Total cash flow undiscounted (= new finance)	-33,33						
an	Present value UFCF		-7,62	-6,10	-5,17	-4,02	-2,99	
ao	Sum of PV(UFCF)	-25,89						
ap	Terminal Value							100,00
aq	Present value TV	62,09						
ar = ao + aq	Enterprise value (indefinite life)	36,20						
	Indefinite life w/restructuring (NPV of restructuring >0)							
as = g	Maintenance capex		16,38	16,38	16,38	16,38	16,38	16,38
at	Restructuring opex & capex (net of divestments)		12,00	11,00	10,50	9,50	8,43	0,00
au = p-as -at	Unlevered Free cash Flows		-8,38	-7,38	-6,88	-5,88	-4,81	16,38
av	Present value UFCF		-7,62	-6,10	-5,17	-4,02	-2,99	
aw	Sum of PV(UFCF)	-25,89						
ay	Terminal Value							163,80
az	Present value TV	101,71						
az + aw	Enterprise value (indefinite life)	75,82						
	Forced sale							
aaa	Forced sale value (auction)	25						

Firms to be restructured

Unlike a zombie firm, a firm to be restructured can make restructuring investments capable of bringing its enterprise value above its assets' replacement value. The probability of success of the restructuring is negatively correlated to the gravity of the firm's imbalance and positively correlated to the reversibility of indirect distress costs. Restructuring, however, is a risky pursuit and may not turn out well. This is the reason why enterprise value must reflect, on one side, the restructuring perspective and, on the other, the possible liquidation. This is why enterprise value is never a good predictor of future value. Assuming for the sake of simplicity that equity value can be estimated to be equal to 100 under the successful restructuring scenario and to zero under the liquidation scenario and that the liquidation probability is 30%, equity value is equal to 70. However, 70 is a bad predictor of future value because, depending on which scenario comes to pass, equity value is either 100 or zero, but never 70. Thus, the enterprise value of firms in structural decline is an intrinsically unstable amount. With a wordplay, one might say that the enterprise value of a firm with a structural imbalance must also be unstable, as it can either turn into the value of the restructured firm or the value of the liquidated firm.

This instability carries with it an important consequence that is easy to bring to light by reference to the simple case where there are only two alternative scenarios (successful turnaround or liquidation). Typically, equity is positive when the restructuring is successful and zero in case of liquidation (as in case of liquidation not even debt can be recovered fully). Thus, whatever the probability assigned to either scenario (provided that the probability of the success scenario is different from zero):

- current equity value, calculated as the weighted average of the two amounts, is necessarily positive also when enterprise value is lower than he face value of debt (insolvent firm);
- current value of debt is at a discount to face value also when the current value of assets exceeds the face value of debt (firm in structural decline, though not insolvent).

Let's see why, through an example. The table below considers two alternative scenarios, involving restructuring or liquidation. For the sake of simplicity, both scenarios are assigned the same probability of occurrence (50%). The current value of the firm's assets is calculated as the weighted average of the expected values under the two scenarios. The face value of debt is 100.

Based on the definitions introduced previously the firm is technically insolvent when the (current) value of its assets is lower than the face value of debt. The table shows that this case does not assume that equity value is nil, but that the implied discount of the market value of the firm's debt to the debt's face value is greater than the current equity value [10].

The table shows the two cases of insolvency (EV < face value of debt) and non-insolvency (EV > face value of debt), highlighting that:

a) current equity value is positive in both cases;

b) current value of debt is at a discount to the debt's face value in both cases;

c) in case of insolvency, the discount to the nominal debt exceeds equity value, while in the non-insolvency case such discount is lower.

Table 7. Equity value and discount on debt: stressed and distressed firms

	Reorganization value	Probability of success	Liquidation value	Probability of liquidation	Current value (=weighted average)
Distressed firm (current value of equity < discount on face value of debt)					
EV	120	50%	60	50%	90
market value of debt	100	50%	60	50%	80
market value of equity	20	50%	0	50%	10
Face value of debt	100		100		100
Discount on face value of debt	0		40		20
Stressed firm (current value of equity > discount on face value of debt)					
EV	120	50%	90	50%	105
market value of debt	100	50%	90	50%	95
market value of equity	20	50%	0	50%	10
Face value of debt	100		100		100
Discount on face value of debt	0		10		5

[10] Gregory A. Horowitz, *Market Pricing in Solvency Valuation and Testing*, in R. j Stark, H.L. Siegel, E.S. Weisfelner, *Contested valuation in corporate bankruptcy*, LexisNexis, 2011.

5. Conclusions

The decline of a firm is rarely an unpredictable event. Except for the cases when the firm is "vaulted" into a state of distress due to unpredictable events (acts of God), in the other cases the decline originates from an obsolete business model or from the inability of the firm to adapt to changes in demand, technology or by long and adverse economic conditions which result in excess production capacity industry-wide. A decline normally gives life to indirect distress costs, such as loss of key employees, customers, suppliers, among others.

If decline is (to a large extent) predictable and most firms end up going through all its phases, it means that the monitoring and bonding systems that should signal promptly the decline conditions and prevent further deterioration are mostly ineffective or otherwise cannot trigger a timely and effective reaction by firms.

In the literature it is a well-known fact that monitoring and bonding systems

a) can never be totally effective, in the sense of ensuring that a breach of the maximum risk level set ex ante never occurs (as they should be capable of predicting all the risky situations in which the firm may find itself);

b) are costly and, as such, are analysed in view of the expected benefits (for example a continuous monitoring system of all management actions might in theory be the most effective control solution, but would entail a duplication of the management structure, with unbearable costs);

c) are not always incurred solely by the firm's shareholders; in particular, in the presence of free riding, they may be incurred also by creditors;

d) unless they are balanced, can exacerbate instead of solving conflicts of interest among; shareholders and creditors; different categories of shareholders; different categories of creditors (for example performance-based compensation for management – without any risk mitigants – may encourage management to undertake risky investments to the detriment of the firm's creditors);

e) are more effective in preventing firms from taking actions that might give rise to risks without returns, rather than encouraging them to react to difficulties in the interest of all the stakeholders.

The question that needs to be addressed before designing any monitoring or bonding system concerns the identification of the information necessary to diagnose correctly the state of decline and possible solutions.

The article has shown why, to be effective, monitoring a declining firm needs to be based on valuation measures.

The information necessary to estimate the value of a firm is of a strategic or management-based nature. Such information may be prospective (plans and budgets), current and historical (key performance indicators) of a private nature, which firms do not always have internally or, if they do have it, do not want to communicate externally to protect themselves from the competition. To make monitoring and bonding systems effective, it is thus necessary to operate on two fronts:

f) within the firm, with boards of directors and control bodies so that the company might implement a strong reporting system. Firms in decline typically show poor board governance processes, poor command of key financial and non-financial drivers, disordered priorities. Early diagnoses of distress requires an awareness that only informed and proactive governance allows the firm to identify problems on time and to solve them. Every firm has its own Achilles' heel, to be kept under control and monitored. Every board must be aware of what can "kill" the firm;

g) outside the firm, through independent parties (valuers) that can use private information and translate it into value estimates that can be used to determine whether the firm is operating profitably and building value or is instead destroying value prospectively. It is about using specialized advisors that would solve the problem of reporting strategic and management information to the outside world, in a credible form by putting their reputational capital on the line.

The mix of external value-based performance measures and the translation of those measures in reliable value estimates represents a good governance solution, as it can allow the early management of states of distress, through long-term remedial action.

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