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Valuation Risk:
A Holistic Accounting and Prudential Approach

A Whitepaper

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By Mario Onorato, Orazio Lascala, Fabio Battaglia, and Arber Ngjela


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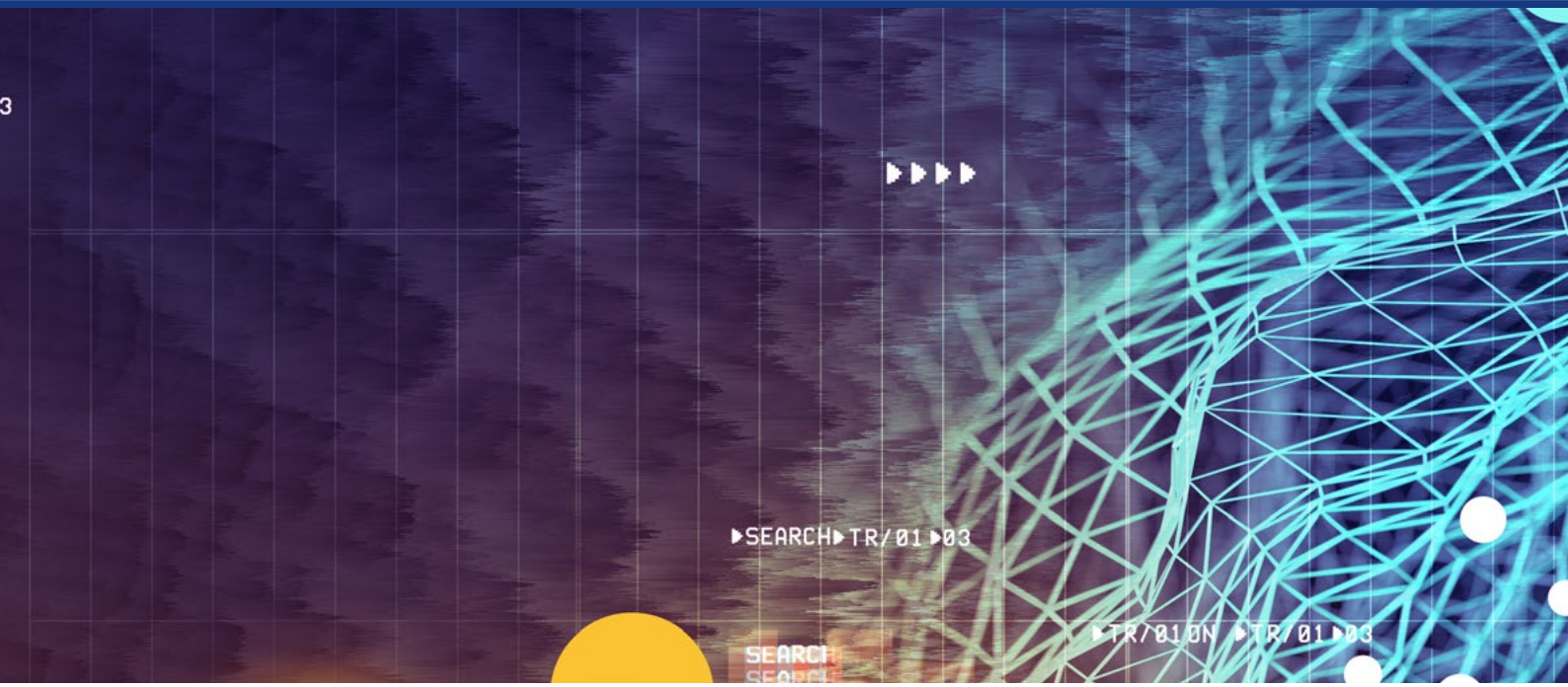

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801 17th Street, NW, Suite 1100, Washington, DC 20006 +1 202 869 9500 **promontory.com**

Executive Summary

Valuation Risk (VR) is the risk that an entity will experience a loss due to the inaccurate determination of the fair value of the financial instruments on its balance sheet. This risk is particularly significant for financial instruments with complex features, with limited-to-no liquidity, or with valuations that rely on internally developed models that may be seldom verified using actual trades.[1]

Bank VR has been drawing international supervisory attention recently. In February 2020, the European Systemic Risk Board (ESRB) warned that the substantial amounts of instruments with complex features and limited liquidity that sit on banks' balance sheets are a source of risk for the global financial system [1].[2] In a 2017 report [2], the Basel Committee on Banking Supervision (BCBS) pointed to the discretion allowed by the accounting rules for determining the fair value of financial instruments noting that, "The crisis showed that accounting values may embed a significant degree of uncertainty and, as a result, may impede the market's ability to assess a bank's risk profile and overall capital adequacy. [...] The evidence consistent with accounting discretion as contributing to moral hazard behavior indicates that (additional) prudential valuation requirements may be justified."[3]

Examples of circumstances where the use of discretion in instrument fair value measurement provides space for potential moral hazard behaviors include:

- Inflating fair value figures using pricing models and methodologies with inputs that are unobservable, internally sourced, or highly subjective, or by failing to consider an appropriate liquidity discount.
- Overestimating the significance of unobservable inputs used in pricing models to allow for a more favorable accounting classification of financial instruments.[4] This can inflate the current performance of the bank and reduce the prudential capital charge.
- Misclassifying fair valuation inputs (e.g., classifying models as observable or the set-up of hedging trades as unobservable) to allow immediate recognizing of the so-called Day-1 Profit.

In parallel, the European Central Bank (ECB) has put trading risk and asset valuations among its supervisory priorities for 2020 [3] and said it plans to execute investigations on banks with significant portfolios of complex instruments measured at fair value based on pricing models. Significantly, such scrutiny is not limited to the prudential space but extends to the accounting space, consistent with the ECB's objective to ensure the management body fulfills its responsibility of "Setting, approving and overseeing the implementation of [...] arrangements" to guarantee, "The integrity of the accounting and financial reporting systems, including financial and operational controls and compliance with the law and relevant standards." [4][5]

VR affects both the accounting and the prudential framework:

- In the accounting framework, inaccurate fair value calculations affect the profit and loss statement (P&L) and balance sheet.
- In the prudential framework, inaccurate fair values affect the calculation of regulatory capital.

Measured in terms of possible losses from fair value calculations and/or estimation errors on capital ratios, the potential impact of VR can be significant for banks with a combination of a high ratio of fair valued assets to total assets and a high leverage ratio. In such cases, even a relatively small error in determining fair values may significantly decrease the Tier 1 ratio.

From a business perspective, banks with opaque and incomplete disclosure about the methods used to estimate the fair value (and the variation thereof) of complex financial instruments may find their stock prices penalized by financial analysts.

The nature of VR differs from other banking risks. Market and credit risks, for example, are defined in terms of potential losses derived from the uncertainty about instrument prices over time (i.e., the difference in the instrument price measured at the valuation date and after a set number of days in the future, referred to as a holding period.) VR, however, measures uncertainty surrounding the difference between the reported fair value and the "true" tradeable price that a bank could obtain if it were to sell an asset or transfer a liability at a specific point in time (i.e., the valuation date).

1. Documents referenced throughout this paper are indicated with a number in square brackets, which can be used to find the full references in Section 5 — References.
2. ESRB report on Macroprudential implications of financial instruments in Levels 2 and 3 for accounting purposes [1].
3. Ibid, pages 22 and 23
4. Level 2 instead of 3 of the FVH as per the International Financial Reporting Standards (IFRS) 13 [3]), 72
5. Ibid., page 20

Prudential and accounting frameworks have designated a set of mitigation measures to deal with VR uncertainty, which are interrelated. We have conducted a comprehensive analysis of bank VR, encompassing governance, regulatory, and prudential dimensions. We have organized this resulting paper as follows:

- Chapter 1: describes the VR framework for a bank through a holistic approach
- Chapter 2: provides a detailed analysis of the relationships between the accounting and the prudential frameworks related to VR
- Chapter 3: outlines a methodological approach for the prudential treatment of VR

Our analysis led us to conclusions illustrated throughout this paper. In summary:

- Regulators will increasingly challenge banks over their fair value determination practices as part of a supervisory approach that looks for consistency and rigor across the whole valuation process. In this context, banks will face governance challenges on the clarity of the roles and responsibilities for different functions (namely, finance and risk.)
- The requirements of the current prudential regulatory framework do not ensure that banks build a capital buffer large enough to address VR. Researchers and regulators should undertake additional studies to develop a sound and agreed-upon methodology to identify and measure VR.
- Regulators should require banks to provide more extensive disclosure about their exposure to VR. Increasing clarity and transparency around bank risks will enhance public trust and enable more accurate estimations of the risk embedded in banks' balance sheets by observers and analysts. This would also be reflected in bank share prices.

1. Valuation Risk Framework

1.1. A Holistic Approach to Valuation Risk

In the years following the 2008 financial crisis, the International Financial Reporting Standards (IFRS) revised the discipline for managing risks related to measuring financial instruments at fair value. IFRS 13 [5], providing the accounting principles for fair value measurement, was substantially overhauled and the final version published in 2013. On the prudential side, major developments were set forth by a row of regulatory documents:

- Globally:
  - BCBS, Basel III regulation [6]

- At the European Union (EU) level:
  - Capital Requirements Regulation (CRR) [7]
  - CRR2, implementing the Fundamental Review of the Trading Book (FRTB) [8]
  - EU Regulation 2016/101 [9]
  - European Banking Authority (EBA) Regulatory Technical Standards (RTS) on Prudent Valuation [10]
  - EBA RTS on Risk Factor Modellability [11]
  - EBA RTS on Backtesting and Profit & Loss Attribution (PLA) Requirements [12]

The IFRS and prudential discipline updates introduced important innovations for management, detection, and measurement of VR processes. These standards have multiple points of contact, aiming to enhance both the transparency of the financial statements and the integration of the accounting logic for evaluating financial instruments with the managerial/operational logics for measuring risks and regulatory capital requirements.

In a 2017 document [2], the BCBS summarizes the findings of a workstream initiated within the Basel Committee's Research Task Force, aimed to "identify ways in which the interaction between accounting and regulatory rules provides incentives that affect the risk-taking of financial institutions." The workstream finds that "accounting values may embed a significant degree of uncertainty and, as a result, may impede the market's ability to assess a bank's risk profile and overall capital adequacy" and that there is "evidence consistent with accounting discretion as contributing to moral hazard behavior." Such evidence has "implications for understanding the merits of regulations designed to address management biases and modeling errors

inherent in banks' fair value measurements" and "indicates that (additional) prudential valuation requirements may be justified." The same document also specifies that other groups within the BCBS, like the Accounting Experts Group and other bodies, "continued to work on specific policy decisions on accounting issues from a regulatory policy perspective."[6]

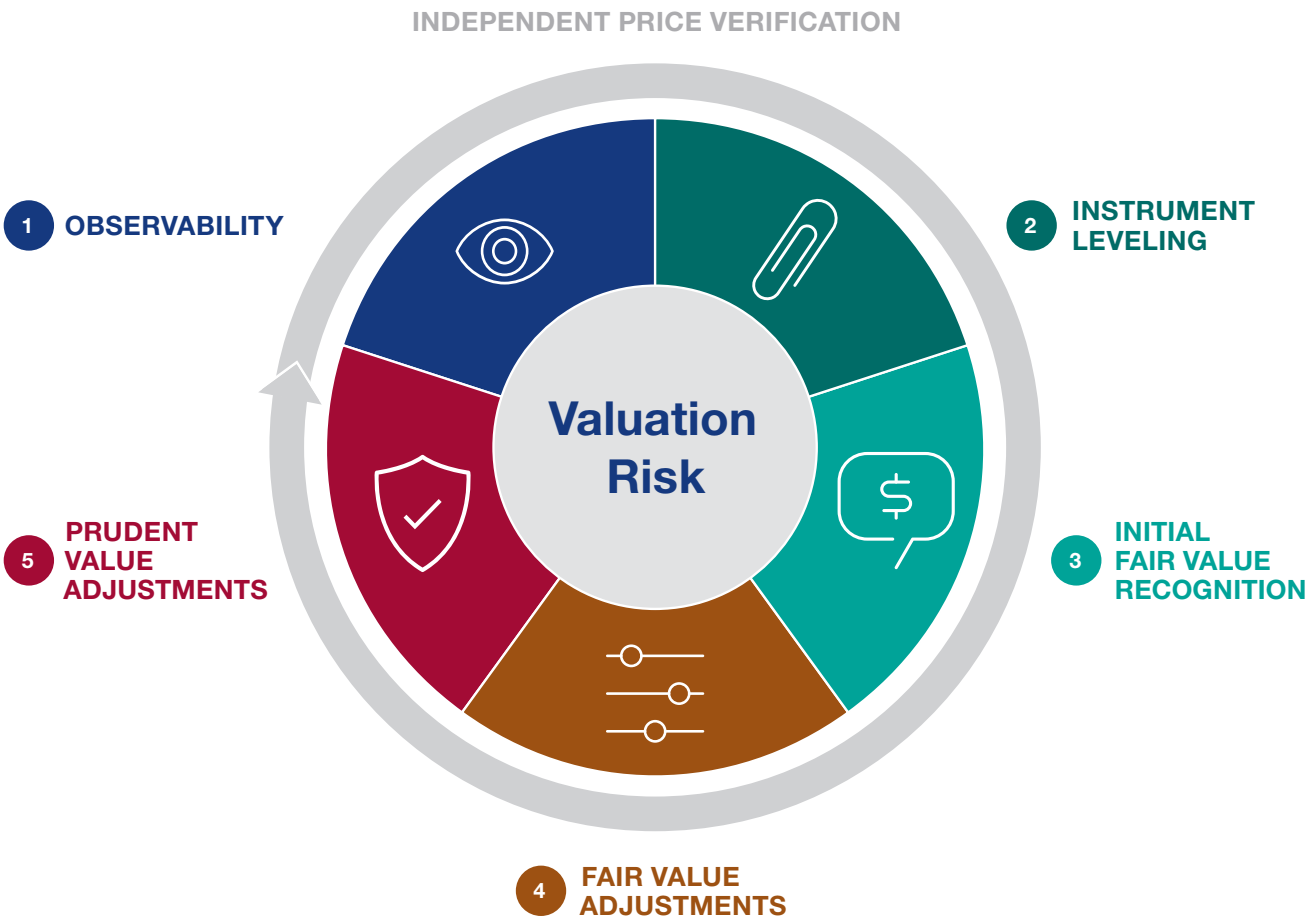
These statements highlight prudential regulators' concerns about the discretion left by accounting rules in the fair valuation process. To reduce the space for ill-tasked behavior, supervisors are increasingly challenging banks on the soundness of their fair valuation processes, including in terms of consistency of fair valuation methodologies, processes, and controls across the accounting and the prudential perspectives.

In our opinion, this calls for a review of banks' VR frameworks under a holistic approach that explicitly recognizes and transparently manages all the interconnections and interactions between the two remits.

This implies a complex governance framework, driven by the strict requirements set by the regulations. The actual organizational framework set up by each bank to comply with these tasks may vary depending on its idiosyncratic circumstances. We hope to help build a clear picture of the logic that lies behind the governance requirements set by the regulations and the tasks that should be considered by banks to ensure compliance.

Our discussion will cover the overall VR framework from a holistic perspective. Figure 1 provides a graphical representation of the main components of the framework:

Figure 1: The Components of the VR Framework for a Bank



6. Ibid., pages 1, 22 and 26

The holistic VR framework includes the following components,[7] which encompass a set of activities as follows:

OBSERVABILITY ASSESSMENT

IFRS 13 categorizes the inputs to the determination of the fair value of financial instruments into a three-level hierarchy based on their level of "observability." The observability assessment is related to the verification of whether the inputs to instrument fair valuation (i.e., market prices, market parameters, model parameters, and models) are observable and to what extent the information about the actual value of such inputs is collected according to the methodology defined for the assessment of the observability status. The result is the categorization of each input as directly observable, indirectly observable, or unobservable (so-called Level 1, Level 2, or Level 3, respectively).

INSTRUMENT LEVELING

IFRS 13 categorizes financial instruments into a three-levels Fair Value Hierarchy (FVH). The allocation of each instrument into the appropriate level of the hierarchy is based on the observability of the inputs that are significant for its fair valuation. The input observability assessment is, therefore, instrumental for the classification of the instruments.

INITIAL FAIR VALUE RECOGNITION

According to appendix B5.1.2A (Initial Measurement) of IFRS 9 [13], the best evidence of the fair value of a financial instrument at initial recognition is generally the transaction price. However, if an entity determines that the fair value at initial recognition differs from the transaction price, it shall recognize the difference as a gain or loss (the so-called Day-1 Profit or Loss), provided the fair value is determined based on Level 1 or Level 2 inputs. Whenever the determination of the fair value relies on level 3 inputs, i.e., inputs that are not observable, the entity will defer that difference by posting a reserve (the so-called Day-1 Reserve), to be later released alongside the residual life of the instrument.

FAIR VALUE ADJUSTMENTS (FVA)

To derive the fair value of a specific position, the bank may have to compute adjustments depending on the model complexity, the uncertainty of the parameters used, the credit risks related to the counterparties, or the credit spread to funds collateral/margins, and any additional component that any market counterparty would have considered in pricing the instruments.

PRUDENT VALUE ADJUSTMENTS (PVA)

A specific assessment of the volatility considered in the fair value has to be performed to compute the Additional Valuation Adjustments (AVA) to be deducted from the regulatory capital. Risks have to be mapped to one of the prescribed AVA[8] provided by the regulation. If some risks cannot be mapped, they are not considered under the AVA process.

INDEPENDENT PRICE VERIFICATION (IPV)

According to the regulations, this process is aimed at verifying the market prices or model inputs for accuracy and independence, and as such, it transversally affects all the listed activities. This is why the IPV process is represented in the figure with a circular arrow encompassing the whole framework.

7. In logical terms, the activities depicted in Figure 1 are preceded by the Model Validation, i.e. the step of the process in which the models to be used for instrument pricing are independently validated, generally following a request from the business line. Model Validation is out of scope of this document and will be seen as given for the purposes of the VR framework.
8. In the CRR [7], article 34 requires institutions to perform a prudent valuation of the positions measured at fair value while article 105 disciplines the AVA. The relevant EBA RTS [10] outlines the applicable methodological approaches for computing these adjustments.

Additional information about the content and the output of each activity in the VR framework at the moment of first measurement of an instrument fair value is provided in Table 1:

Table 1: Description and Output of Each Activity Phase in the VR Framework — First Fair Value Measurement

ACTIVITY	DESCRIPTION	OUTPUT
Observability Assessment	Preliminary activity of independent sourcing of market prices and other inputs required by the validated pricing model, including: • Data registry covering the counterparties census, data parametrization, deal set-up, booking set-up, corporate actions, fixing, etc. • Market data regarding collection and feeding of risk factors or variables needed for calibration and running of pricing models • Other input data required by the applied methodologies (e.g., the prepayment inputs derived from prepayment models tailored by asset class) Treatment of interpolation, extrapolation, proxy data, hedging trades, and all relevant cases have to be specifically mentioned and measured	Observability assessment verifies if the inputs (i.e., market prices, market parameters, model parameters, and models) are observable and determines if the actual value of such inputs has been collected according to the methodology as defined for the assessment of observability status. Outcomes include: • Updated data registry • Definition of the market prices and the setting of the other inputs related to market data and specific data • Definition of the input leveling (L1, L2, or L3)
Instrument Leveling	Analysis aimed at allocating each financial instrument to the appropriate level of the FVH. According to IFRS 13, the allocation is based on an assessment of the significance (i.e., materiality) of unobservable inputs to the instrument valuation, including verification of: i) contribution of the Level 3 inputs (both in isolation and combined) in determining instrument fair value. ii) comparison of the contribution of Level 3 inputs (both in isolation and combined) to the thresholds defined by the bank as a trigger for the internal definition of materiality.	Allocation of each instrument to the appropriate level of the FVH (L1, L2, and L3) based on the observability of the inputs used in the fair value measurement.
Initial Fair Value Recognition	Eligibility for Day-1 Profit or Day-1 Reserve is assessed based on the observability of the inputs within an instrument. A Day-1 Reserve is posted for any instrument whose fair value is calculated using Level-3 inputs, regardless of the materiality of the impact on fair value. In other cases, a Day-1 Profit must be recognized.	Initial Fair Value Recognition assessment defines the eligibility for Day-1 Profit or Day-1 Reserve and, when a Day-1 Reserve is posted, determines the specific conditions for the release of the reserve over time, as monitored in the ongoing phase.
Fair Value Adjustments	Adjustments reflecting uncertainty implied in the pricing model or other inputs (for a detailed description, see section 2.5.1), which may cause a deviation of the market price from the level calculated by the models.	The estimation of the instrument FVA permits consideration of all the FVA needed to consider the uncertainty in pricing inputs. The output of this activity is the instrument fair value recognized in accounting.
Prudent Value Adjustments	Adjustments based on alignment with uncertainty-implied values as provided in the FVA as well as with scenario definition of the distribution of the potential exit prices at the 90th percentile (for a detailed description, see section 2.5.2). The PVA should reflect the volatility of 9 elements of uncertainty (AVA) specified in the prudential regulation as a difference in respect of the FVA. When adjustments are made in the accounting framework outside the perimeter of the 9 AVA, prudential value adjustments are not calculated.	The estimation of the instrument PVA permits to consider the volatility of the nine elements of uncertainty (AVA) listed in the prudential regulation. The output of this activity is the instrument PVA to be deducted from Common Equity Tier 1 (CET1) capital.

The accuracy of an instrument's fair value calculation must be continually verified. The high-level tasks outlined in Table 2 should be executed to this end, with priority on figures that feed the end-of-period financial reports:

Table 2: Description and Output of Each Activity Phase in the VR Framework — Ongoing

ACTIVITY	DESCRIPTION	OUTPUT
Observability Assessment	Includes recurrent: • Preliminary checks on business line daily mark-to-market by running validated pricing models with independently sourced market prices, inputs, and calculation of the theoretical price (defined as the daily desk level P&L that is predicted by the [IPV] designed model) conditional on a realization of all relevant factors that enter the model. • Verification of whether the results of the previous input observability assessments are still valid. • Performance checks on model outcomes vs. available market quotes or available third-party price evidence (e.g., collateral disputes) to allow the bank to understand if internal marks are aligned with the tradeable prices.	The ongoing assessment consists of: • Independent, daily calculation of instrument prices. • Challenge for discrepancies between independently calculated prices and business-line daily mark-to-market. • Monthly (or more frequent) confirmation of input leveling or challenge/update in case of discrepancies.
Instrument Leveling	Recurring assessment of previous instrument categorizations in the FVH via: • Verification of ongoing validity of previous input leveling. • Verification of volatility within the input materiality assessment and review of the accepted values. In addition, a virtuous bank could forecast the volatility of the assessment in forward-pricing dates and possibly review the defined methodology/thresholds.	Confirmation of instrument leveling or challenge/update in case of discrepancy
Initial Fair Value Recognition	Assessment of the analysis for releasing the Day-1 Reserve posted for the existing instruments. The Day-1 Reserve can be released: • Gradually over the life of the instrument, according to the approach previously defined by the bank. • In one shot, in case the un-observable inputs that had caused the instrument to be ineligible for Day-1 Profit become observable.	Amount of the Day-1 Reserve to be released to P&L
Fair Value Adjustments	Recalculation of FVA based on updated values of market and model parameters. The assessment includes a review of the considerations provided at inception, demonstrating their ongoing validity.	Monthly updated FVA
Prudent Value Adjustments	Recalculation of PVA based on updated FVA and review of the scenarios defined for the distribution of the potential exit prices at the 90th percentile. The assessment includes a review of the considerations provided at inception, demonstrating their ongoing validity.	Monthly updated PVA

1.2. The Role of Independent Price Verification

The IPV is defined in BCBS [14] as "The process by which market prices or inputs are verified for accuracy." The same document also clarifies a distinction between IPV and the daily mark-to-market: "The prices or inputs are used to determine profit and loss figures, whereas daily marking-to-market is primarily used for management reporting between reporting dates."

Art. 4 (70) of the CRR defines the IPV as: "A process by which market prices or marking to model inputs are regularly verified for accuracy and independence." Article 105 of the CRR, which establishes the discipline for prudent valuation of the trading book, states that: "Institutions shall perform independent price verification in addition to daily marking to market or marking to model. Verification of market prices and model inputs shall be performed by a person or unit independent from persons or units that benefit from the trading book, at least monthly or more frequently, depending on the nature of the market or trading activity. Where independent pricing sources are not available or pricing sources are more subjective, prudent measures such as valuation adjustments may be appropriate."

BCBS [15] also addresses the IPV in some more length: "[50.7] Independent price verification is distinct from daily mark-to-market. It is the process by which market prices or model inputs are regularly verified for accuracy. While daily marking-to-market may be performed by dealers, verification of market prices or model inputs should be performed by a unit independent of the dealing room, at least monthly (or, depending on the nature of the market/trading activity, more frequently). It need not be performed as frequently as daily mark-to-market since the objective, i.e., independent marking of positions, should reveal any error or bias in pricing, which should result in the elimination of inaccurate daily marks. [50.8] Independent price verification entails a higher standard of accuracy in that the market prices or model inputs are used to determine P&L figures, whereas daily marks are used primarily for management reporting in between reporting dates. For independent price verification, where pricing sources are more subjective, e.g., only one available broker quote, prudent measures such as valuation adjustments may be appropriate."[9]

In this perspective, the scope of the activities of the IPV covers the review, at the outset and on an ongoing basis, of the entire set of market data input, model parameters, and models used to price instruments at fair value, including:

- The assessment of market data and market data sourcing (by considering markets, sources, quotes, liquidity, contributors, and frequency)
- The assessment of the bank's quotations and their variance with respect to other contributors for inputs or parameters that are not listed on active markets but are quoted on consensus platforms
- The verification of the ongoing validity of the methodologies/assumptions of the pricing models in use

The range of the responsibilities effectively in charge of the IPV may vary significantly according to individual banks' organizations, priorities, and circumstances, from only including a limited set of activities in strict compliance with the regulations up to encompassing the full row of verification activities listed in Table 1 and Table 2 above, that are required to define the financial reporting figures for financial instruments measured at fair value.

In this perspective, the activities of the IPV require knowledge and skills which cover both the accounting and the prudential aspects of the process, including a clear awareness and command of the methodologies adopted in both realms, their differences, and their interactions. As a result, several institutions have chosen to gather within the same organizational unit the activities connected to the IPV with relevance for both financial reporting and prudential frameworks.

9. Ibid., page 5

1.3. The Governance Challenge

As emphasized above, banks' supervisors have taken a clear stance towards requiring strong consistency between the FVA applied for financial reporting purposes, and PVA applied for regulatory capital purposes. Such consistency should be regarded given the intention, also apparent in supervisors' strategy,[10] to reduce the space left for discretion and judgment in the fair valuation of financial instruments in the accounting space. This suggests that the requirements set forth in the prudential space need to find a correspondence in similarly strict rules and approaches in the financial reporting space.

The following two requirements of the prudential regulations make the link between the treatment of fair value in the accounting and the prudential frameworks explicit:

- [15] defines a list of adjustments that banks should consider at a minimum when measuring instrument fair value; this list almost exactly coincides with the list of AVA required under the CRR [7] for prudential capital. It is worth to note that IFRS 13 provides for more adjustments than the ones provided in the CRR, and a degree of judgment is needed to map the respective adjustments, as discussed in detail in Section 2.5
- EBA [10], Article 3, requires banks to calculate the AVA's by considering the same range of market data that they use in the IPV process[11]

From a governance perspective, this implies that there are very close similarities between the tasks of the process related to the FVA and those related to the AVA determination in terms of data used, methodologies adopted, and skills required. This creates an obvious opportunity for generating cost efficiency and operational effectiveness by gathering such activities under the same "organizational roof."

This framework poses a challenge to banks given the need to set up clear and rigorous governance that achieves the task of ensuring strong oversight on all the steps of the valuation and effectively mitigating the risks relating to instrument fair value measurement.

The challenge especially affects:

- The appointment of well-defined roles and responsibilities for the different steps of the process and the key decisions to be made in each of them, by preserving independence from the business lines where required
- The articulation of first, second, and third-level controls and the relevant responsibilities

In our opinion, the fundamental interconnections and interrelations that exist in this process between activities traditionally falling into different turfs - most significantly, Finance and Risk — may make the "traditional" separation of roles and responsibilities insufficient for the tasks imposed by the regulations. An example of such issues is the articulation of controls, for instance, when certain activities relevant for fair value determination are executed by Risk even if their use in the financial reports is a responsibility of Finance.

In our experience, different banks have adopted differentiated approaches to cope with this challenge, depending on their organizations and circumstances. For instance, some banks have established inter-functional units or committees for tasks that imply a shared responsibility across multiple functions (e.g., Finance and Risk). However, the solutions implemented by the individual banks are sometimes the result of historical inheritance, not necessarily kept up to the developing expectations of the supervisors.

In general, we see a clear opportunity for banks to review their governance around the fair value measurement of financial instruments under an approach where coherence and synergies in methodologies, controls, reporting, and tools are the basis for the optimal holistic view of the entire valuation process.

Especially banks that have significant activity in complex instruments valued with unobservable inputs should be prepared to be challenged by the supervisors around the VR management governance.

10. Please see Paragraph 1.1 for a more detailed discussion.
11. Article 3.1: "Where institutions calculate AVAs based on market data, they shall consider the same range of market data used in the independent price verification ('IPV') process of Article 105(8) of Regulation (EU) No 575/2013 [7], as relevant, subject to the adjustments described in this article."

1.4. Valuation Risk Data Governance and IT implications

1.4.1. VALUATION RISK DATA GOVERNANCE

VR data governance is a key aspect along the entire fair value process to ensure the effectiveness and efficiency of the activities, controls, and reports to be provided to internal and external stakeholders. At the same time, it has grown in complexity in terms of data collection, data management, data aggregation, and data governance.

Effective VR data governance requires a unique, holistic framework integrating data owners, model owners, and all the units involved in the process along a single timeline that encompasses the different steps of the process illustrated in Figure 1 above.

Under this framework, data owners should be clearly defined, and the lineage of the different flows in the data architecture should be mapped along the workflow. In addition, banks should have a repository where data is archived and tracked to collect certified data allowing the users to be informed about the fair value process calculation chain and the specific features of the data.

It is worth mentioning that a bank's board and senior management should promote the identification, assessment, and management of data-quality risks as part of the overall VR management framework.

In this context, the VR data governance could be viewed as a framework that defines ownership and data quality-assurance roles and responsibilities. It includes the following components:

- **GOVERNANCE**
  A bank's risk data aggregation capabilities and risk reporting practices should be subject to strong governance. The framework should include the firm's policies on data accuracy, completeness, adaptability, confidentiality, integrity, reliability, and availability, as well as risk management policies. Data owners should ensure there are adequate controls throughout the lifecycle of the data and the technology infrastructure, also ensuring that data aggregation capabilities and risk reporting practices are consistent with firms' policies. A bank's board and senior management should review and approve the bank's group risk data aggregation and risk reporting framework and ensure that adequate resources are deployed. Banks must measure and monitor the accuracy of data, developing appropriate escalation channels and action plans to rectify poor data quality.
- **DATA COLLECTION, DATA AGGREGATION, AND DATA MANAGEMENT**
  Banks should develop and maintain strong risk data aggregation capabilities to ensure that management reports reflect the risks in a reliable way. A bank should be able to generate accurate and reliable data to meet normal and stress/crisis reporting accuracy requirements. Data should be aggregated on a largely automated basis to minimize the probability of errors. The IPV process should be the golden source for the data to be used throughout the fair value process as it covers the review of the entire set of market data input, model parameters, and models used to price instruments at fair value.
- **QUALITY CHECKS**[12]
  A bank should aggregate the data along the fair value process in a way that is accurate and reliable. The outcome of these controls has to be formalized. Supervisors expect banks to document and explain data aggregation processes, whether automated or manual (judgment based or otherwise). Documentation should include an explanation of the appropriateness of any manual workarounds, a description of their criticality to the accuracy of data aggregation, and any plans to mitigate the implied risk.

12. Quality checks are performed to:
    - Reconcile and align prudential and accounting data maintaining the respective purposes and regulations. The target of these activities should be defined in a unique and integrated repository
    - Detect any gap in the process and consider mitigants in place where a bank relies on manual processes and desktop applications used also for software development
    - Review and detect any deficiency towards a single repository
    - Define the accesses to ensure an appropriate aggregation, validation and reconciliation of the data to be reported

1.4.2. VALUATION RISK IT IMPLICATIONS

Senior management should identify critical data lineages and IT infrastructure initiatives through its strategic IT planning process and support these initiatives through the allocation of appropriate levels of financial and human resources evaluating limitations that prevent full data aggregation (in terms of coverage, technical or legal aspects). There are at least two critical initiatives to be considered, namely digital transformation and IT infrastructure:

1. **Digital Transformation:** a bank should be able to generate flexible and adaptable aggregated data along with all the components of the fair value process, meeting a broad range of on-demand and ad hoc reporting requests, even during stress/crises. Flexibility permits quick decision-making, efficient customization for internal and external requests, and promptly incorporating changes resulting, e.g., as from developments of business organization or changes in the regulatory framework. Banks should pursue an integrated and automated workflow that could improve the management of risks, internal and external disclosures, and prompt reporting to senior management. A coordinated and automated framework enabling a bank to execute all the steps of the process and track all the activities according to a consistent methodological and organizational approach, is a key driver of performance and can effectively address regulators' concerns.
2. **Data Architecture and IT Infrastructure:** a bank should design, build, and maintain integrated data architecture and IT infrastructure, which fully supports its data aggregation capabilities and reporting practices also during stress or crises. The integrated workflow along all the fair value process components should be implemented in a "smart" architecture, reducing the number of the flows between the Front Office, Back Office, accounting and (internal) regulatory systems, the reconciliations among them, and the ad hoc layers built to manage the synchronization of the aggregated data in terms of timing and specific features of the fair value data. In general terms, data architectures have to support the broad management of risks, the ability to aggregate risk exposures and identify concentrations quickly and accurately at the appropriate levels as required by the individual bank's context, and the ability to produce clear and timely reporting.

2. The Interplay of Accounting and Prudential Regulations

In this section, we will discuss the relationships and the interplay between the accounting and prudential regulations regarding the measurement of instruments marked at fair value. BCBS [2] clarifies the Committee's intention to work on policy decisions aimed at curbing the sources of uncertainty in the determination of fair values, not only from a prudential angle but also by directly addressing accounting issues.

In this context, we have identified three main areas where IFRS 13 allows space for discretion in the assessment of the fair value of financial instruments, as illustrated in Table 3:

Table 3: Topics in the IFRS 13 That Allow Space for Discretion

TOPIC	EXPLANATION	RELEVANCE
Definition of criteria for input observability	The inputs used in instrument valuation techniques must be categorized in one of three levels depending on observability	Allocation of financial instruments to one of the three levels of the FVH
Definition of criteria for the significance of unobservable inputs	Unobservable inputs used in valuation techniques must be assessed for significance for instrument valuation	Allocation of financial instruments to Level 2 or 3 of FVH; eligibility for Day-1 Profit or Day-1 Reserve; release of the Day-1 Reserve to P&L
Definition of the FVA to be considered in valuation	Banks must define their FVA based on the definition of fair value as an exit price	Instrument fair-value measurement

In this perspective, the BCBS appears to be working at reducing the space for banks for using discretion in the determination of fair values of assets and liabilities. As a clear step in this strategy, BCBS [15] explicitly provides indications as to the expectations of the prudential supervisors regarding banks' fair value measurement practices for financial reporting.

In accounting areas where judgment is required, and no specific supervisory guidance has been issued, banks should generally expect that supervisors will seek evidence of consistency between the methodologies and criteria used in the prudential space under supervisory guidance and those used in accounting.

In this context, the CRR [7] and the CRR2 [8] (the latter implementing in the European legislation the internationally agreed FRTB) and the related Technical Standards represent the key references for the criteria to be used in the prudential space[13] and should also be considered as providing indications for the criteria to be applied in accounting.

In the following paragraphs, we investigate how accounting rules and prudential regulations interact in view of fair value measurement. We will discuss to what extent the regulations and guidance provided in the prudential space can shed light on supervisory expectations about how banks should address aspects of fair value measurement in areas where IFRS 13 allows room for judgment and discretion.

We examine the steps that banks must perform to determine the fair value of financial instruments, as reported in Figure 1 above.

For each of these steps, we analyze the opportunity for discretion allowed by IFRS 13 and discuss the indications that can be drawn from the prudential regulations and guidance.

2.1. Background: The Scope of Fair Value Measurement

2.1.1. ACCOUNTING RULES

The IFRS framework establishes that an entity may classify assets and liabilities in its balance sheet in different categories, depending on the business model and the firm's intention to trade or hold the instruments on its balance sheet. The allocation of each asset and liability to a defined category defines how that asset or liability must be valued for the purposes of the P&L and the balance sheet. The admitted categories and the correspondent valuation methodologies include:

- Held to Collect (HTC), measured at amortized cost
- Fair Value Through Other Comprehensive Income (FVTOCI), measured at fair value with changes in fair value recorded in an equity reserve
- Fair Value Through Profit & Loss (FVTP&L), measured at fair value with changes in fair value recorded in the P&L statement

IFRS 13, i.e., the accounting standard that defines the rules for fair value measurement, applies to all assets and liabilities marked at fair value, regardless of whether they are allocated to the FVTOCI or the FVTP&L categories.

13. For a complete set of RTS on the FRTB please refer to https://eba.europa.eu/regulation-and-policy/market-risk/draft-technical-standards-on-the-ima-under-the-frtb

2.1.2. PRUDENTIAL REGULATIONS

In the prudential framework, a bank's assets and liabilities must be classified in one of two regulatory portfolios depending on the instrument's intended purpose:

- Trading Book: includes any instrument a bank holds for one or more of the following purposes: (1) short-term resale; (2) profiting from short-term price movements; (3) locking in arbitrage profits; or (4) hedging risks that arise from instruments meeting (1), (2) or (3) above. The trading book is subject to capital requirements for market risk as per BCBS [16], CRR [7], and EBA RTS 2016 [17]
- Banking Book: encompasses all instruments that are not allocated to the Trading Book. The Banking Book is subject to capital requirements for credit risk as per the CRR [7] and EBA RTS on Assessment Methodology for IRB [18].

We have identified three distinct sets of requirements in the prudential framework that may provide hints as to supervisors' expectations about fair value determination, as illustrated in Table 4. This table also shows the scope of application of these requirements, depending on their source document.

Table 4: Prudential Requirements and Scope of Application

PRUDENTIAL REQUIREMENT	SOURCE	SCOPE OF APPLICATION
Prudential valuation	• CRR [7] art. 34 and 105 • Regulation (EU) 2016/101 [9] • EBA/RTS/2015 [10]	All assets measured at fair value
Modellability of risk factors	• CRR2 [8] Art. 325 be(3) • EBA/RTS/2020/03 [11]	Only instruments subject to FRTB: • Trading desks adopting the Internal Model Approach (IMA)[14] • Instruments of the trading book
Profit & Loss Attribution (PLA) test	• BCBS [16] • CRR2 [8] Article 325bg • EBA/RTS/2020/02 [12]	Only instruments subject to FRTB: • Trading desks adopting the IMA • Instruments of the trading book

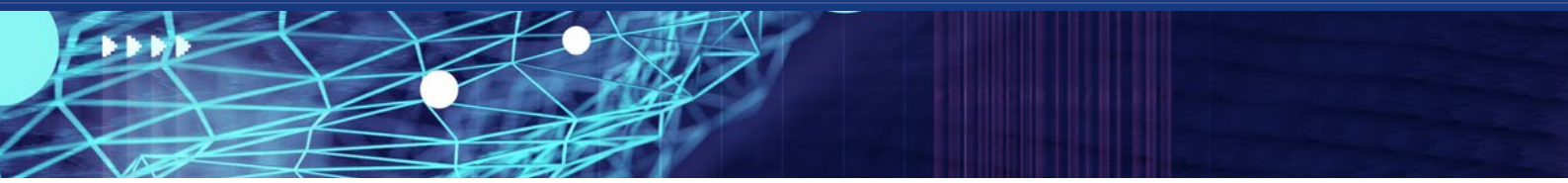
2.1.3. THE INTERPLAY OF ACCOUNTING AND PRUDENTIAL REGULATIONS

The scope of application of the supervisory requirements for prudential valuation coincides with that of IFRS 13. In fact, it covers all bank's instruments measured at fair value, irrespective of whether they are allocated:

- From a prudential perspective: to the trading book or the banking book
- From an accounting perspective: to the FVTP&L category or the FVTOCI category

The prudential requirements for the modellability of risk factors and PLA test have a more limited scope, as they only apply to trading desks adopting the IMA and to financial instruments allocated to the regulatory trading book. Nevertheless, we suggest looking at FRTB prescriptions for general hints on supervisory expectations about the methodologies that banks should adopt in the accounting space. This will likely apply even to banks that have not applied for the IMA and for financial instruments that are not allocated to the trading book.

14. Internal Model Approach for the calculation of capital requirement for market risk as disciplined in [16]



2.2. Observability Assessment

2.2.1. ACCOUNTING RULES

IFRS 13 categorizes financial instruments into a three-level FVH. The placement of each instrument within the hierarchy is based on the observability of the inputs relevant to its fair valuation. The input observability assessment is, therefore, instrumental to the classification of the instruments.

Inputs are defined in IFRS 13 as, "The assumptions that market participants would use when pricing the asset or liability, including assumptions about risk, such as both the following:

(a) the risk inherent in a particular valuation technique used to measure fair value (such as a pricing model)

(b) the risk inherent in the inputs to the valuation technique[15]

The IFRS defines these inputs as:

- **Observable Inputs:** "Inputs that are developed using market data, such as publicly available information about actual events or transactions, and that reflect the assumptions that market participants would use when pricing the asset or liability."
- **Unobservable Inputs:** "Inputs for which market data are not available and that are developed using the best information available about the assumptions that market participants would use when pricing the asset or liability."

Based on best practice, inputs are generally classified into three broad categories:

MARKET PRICES

Market prices can be collected from a variety of sources, including listed markets, organized markets with clearinghouses, official publications (e.g., ECB official prices), Other the Counter (OTC) markets, broker quotes, contribution services ("consensus platforms").

If an instrument is traded in an active market[16] and quoted prices are publicly available, such prices match the definition of observable inputs and should be used by preference over any other inputs for determining the instrument fair value, without adjustments (unless in specific circumstances).

When market prices for given instruments are not available, an entity may use transaction prices for an identical instrument or transaction prices for a similar ("comparable") instrument.

PRICING MODELS

Pricing models are used when market prices for a given instrument are not available. Pricing models can be considered as observable when there is ample consensus about their use for the valuation of the relevant instrument, with little space left for discretion about the methodology and the parameterization of the model.

MARKET AND MODEL PARAMETERS

Market and model parameters are inputs to the pricing models. We distinguish between market parameters, i.e., inputs that can be derived from the market (e.g., the Euro yield curve, that can be derived from the prices of interest rate Euro instruments), and model parameters, i.e., inputs that are calculated within the model (e.g., the correlation between risk factors). Market and model parameters can be classified as observable when they can be directly or indirectly drawn from market prices quoted on active markets using widely accepted methodologies.

15. Art. 2 of [9] defines a "valuation input" as follows: "A market observable or non-observable parameter or matrix of parameters that influences the fair value of a valuation position"
16. An "active" market is defined in IFRS 13 as follows: "A market in which transactions for the asset or liability take place with sufficient frequency and volume to provide pricing information on an ongoing basis", without further specifications. The main drivers used in industry practice to evaluate whether a market is "active" are: existence of a two-side market, number of quotes, liquidity (width of bid-ask spread), volatility and number of contributors.

2.2.2. PRUDENTIAL REGULATIONS

Prudential regulations refer to the concept of "Modellable Risk Factor" introduced by the CRR2 [8] that implements the FRTB. Given this background, the notion of Modellable Risk Factor has the same scope of application as the FRTB, e.g., it covers the instruments allocated to the regulatory trading book belonging to trading desks that adopt the IMA for market risk.

As mandated by the CRR2, the EBA has specified the requirements for the modellability of risk factors in EBA/RTS/2020/03 [11]. Here, the EBA stresses that modellability requirements are intended to ensure that risk factors used by banks in their expected shortfall (ES) models are sufficiently liquid and observable.

According to the EBA/RTS/2020/03, a risk factor is modellable if at least one of the following two criteria applies:

- Identification of at least 24 verifiable prices that are representative for the risk factor over the preceding 12 months, without any period of 90 days or longer with less than four verifiable prices that are representative for the risk factor
- Identification of at least 100 verifiable prices that are representative of the risk factor over the preceding 12 months

The EBA RTS on Risk Factor Modellability [11] also specifies that a price can only be considered verifiable and considered representative for a risk factor if there is a close relationship between the verifiable price and the risk factor. Additionally, the bank must be able to demonstrably extract the value of the risk factor from the value of the verifiable price. Additional requirements are set forth for risk factors belonging to curves, surfaces, or cubes and for bucketing.

It is worth noting in this context that the CRR criteria for the modellability assessment lack some clarity around the treatment of the risk factors whenever a completion and/or adjustment is made to match the actual features of the instrument to be valued (e.g., interpolation/extrapolation of quoted and liquid buckets of interest rate curves).

We interpret the regulation to allow banks to consider adjusted observable risk factors as modellable and to manage the potential residual VR under the P&L Attribution Test as part of the instrument price variations that are not explained by the pricing model in use.[17]

In the prudential framework, observability and liquidity as formalized in [11] are conditions for modellability but not vice versa. In other words, even if a risk factor is modellable, the input could be unobservable or illiquid, as the two criteria mentioned above on the verifiable prices may, in some cases, be not sufficient to determine observability and liquidity under the accounting criteria.

2.2.3. THE INTERPLAY OF ACCOUNTING AND PRUDENTIAL REGULATIONS

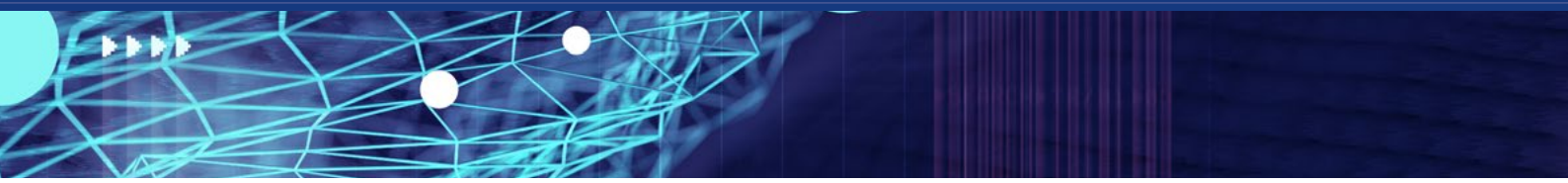
Assessing input observability is an area where banks can exercise significant discretion. The IFRS 13 requirements for input observability are largely qualitative, with the definition of specifications left to banks' methodologies and policies. This includes the definition of "active markets," which is instrumental in classifying an input as observable or unobservable.

In contrast, prudential regulators have introduced more defined requirements for the notion of "risk factor modellability." This notion should be put in close relation to that of input observability and provides useful hints as to supervisors' expectations concerning the methodology that banks should adopt when classifying inputs. The following observations support this conclusion:

- The concept of Risk Factor, as used in prudential legislation, is very close to that of Input used in IFRS 13. The two notions effectively overlap in several places (e.g., market prices and many instances of model data and parameters).
- Modellability is closely related to Observability. This view is explicitly supported by the EBA itself in the introduction to the RTS on Risk Factor Modellability [11] stating, "The concept of modellability is intentionally linked, in the present context, to the concepts of liquidity and observability of market data: a risk factor can be deemed modellable if a sufficient amount of observable market data, relative to that risk factor, is available."

Note that prudential modellability requirements are clearly aimed at simultaneously addressing the characteristics of observability and liquidity of risk factors. When applied to the accounting framework under IFRS 13, this approach reduces the space left for banks' discretion in the definition of "active" markets for the input observability assessment.

17. Please refer to paragraph 2.4.3 for more details.



The regulatory notion of modellable risk factors, as mentioned above, applies to instruments of the trading book for the IMA. In our opinion, banks subject to FRTB requirements should expect supervisors to challenge any inconsistencies between the classification of inputs for accounting purposes and the classification in the prudential space of risk factors closely related to those inputs.

In particular, if a given risk factor does not match the requirements of modellability for prudential purposes, a closely related input might not be classified as observable for accounting purposes (unless a different classification is justified in light of the regulations — i.e. when an input is observable but is so close to the date of first availability that it does not yet satisfy the requirements set by the EBA RTS in terms of number and frequency of available market prices.)

More generally, the risk factor modellability requirements defined in the prudential framework provide a view of the methodological approach that the supervisors expect banks to apply in assessing input observability. We suggest modellability requirements be regarded as minimal criteria to be monitored for input observability assessments even by banks that have not applied for the IMA or that are dealing with instruments outside of the supervisory trading book. Where internal criteria on observability assessment are stricter for accounting purposes, a coherence check should be performed on the assessment of risk factors modellability.

2.3. Unobservable Input Materiality Assessment and Asset/Liability Leveling

2.3.1. ACCOUNTING RULES

IFRS 13 [5] requires banks to categorize the financial instruments in their balance sheet into one of the three levels of the FVH based on the level of the inputs that are relevant for their valuation. IFRS 13 specifies that for each instrument, "The fair value measurement is categorized in its entirety in the same level of the FVH as the lowest level input that is significant to the entire measurement."[18]

Therefore, an asset or liability that is fair valued using techniques that leverage unobservable inputs will be classified in Level 2 or 3 of the FVH, depending on whether those unobservable inputs are significant to the instrument measurement.

Banks should use discretion in determining if an input is significant to a given instrument's valuation. IFRS 13 explicitly states, "Assessing the significance of a particular input to the entire measurement requires judgment, taking into account factors specific to the asset or liability."[19]

In practice, banks often classify assets and liabilities in sub-levels of L2 of the FVH, depending on the "closeness" of the unobservable inputs used for their valuation to market observable inputs, which implies different levels of exposure to VR. An example:

- L2.a: instruments whose fair value is determined using techniques that use L1 and L2 inputs (i.e., inputs that are indirectly observable and can be extracted from observable inputs through widely accepted methodologies) and do not use any L3 inputs
- L2.b: instruments whose fair value is determined using valuation techniques that use L3 inputs which have been determined to be not significant to the entire instrument valuation

Banks are not required to provide any disclosure about the sub-clustering of their L2 instruments. We believe that additional disclosure would be helpful in enabling external stakeholders to build a clearer view of the VR exposure of individual banks. Financial analysts could then go beyond theoretical, standardized assumptions about the share of L2 instruments that each bank holds in its portfolio, facilitating a more accurate evaluation of banks' share value.

The significance of unobservable inputs to instrument valuation is defined in terms of the materiality of the impact on the valuation. The materiality assessment is performed according to each bank's methodology and criteria. The following elements should be considered:

18. IFRS 13, 73
19. IFRS 13, 73

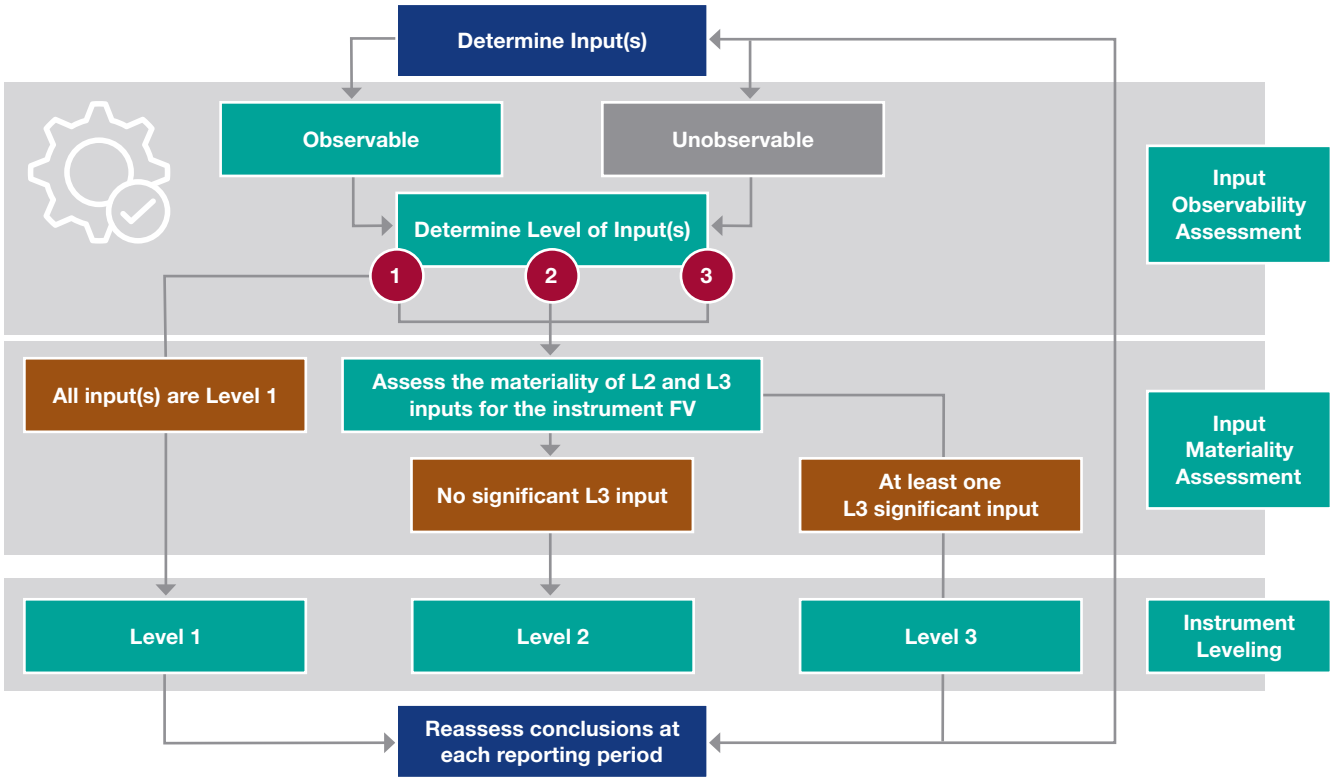
- All inputs used in the fair value measurement of the asset or liability. No input should be excluded from analysis due to an initial judgment of irrelevance, as it is implicitly assumed that an input would not have been used if not relevant for the instrument fair value.
- The importance of inputs to the overall fair value measurement, including the quantitative impact of an input on the overall fair value measurement and possible alternative assumptions for the input.

The criteria used by banks to assess the materiality of unobservable inputs generally rely on defined thresholds for the sensitivity[20] of the instrument fair value to changes in the unobservable input. In case the valuation technique makes use of more than one unobservable input, the materiality assessment needs to consider the sensitivity of the instrument fair value not only to a change in an individual unobservable input but also to a combined change in unobservable inputs, with the correlations between such inputs duly taken into account. For example, the following elements may be considered:

- Level 3 inputs that are individually significant to the fair value of the instrument but whose effects happen to offset each other
- Proportions between the combined effect of all the Level 2 inputs in respect of all Level 3 inputs
- Potential volatility of the combined effect of Level 3 inputs with respect to the threshold defined for the materiality assessment to avoid frequent changes in the instrument leveling during the life of the instrument

Here below, a representation of the steps followed to assign the fair value level of the instruments is provided.

Figure 2: Workflow of the Logical Process to Assign the Fair Value Level



[20] A sensitivity-based approach is aligned also to paragraph 93.h.i of IFRS 7 (Disclosure) [23], which requires entities performing recurring fair value measurement of instruments categorized in Level 3 of the FVH to provide a narrative description of the sensitivity of the fair value measurement to changes in significant unobservable inputs and a description of any interrelationships between those unobservable inputs.

2.3.2. PRUDENTIAL REGULATIONS

Prudential regulations describe model backtesting and the Profit & Loss Attribution (PLA) testing to assess the accuracy and effectiveness of banks' risk models in explaining price movements.

BCBS [16] sets out the specifications for backtesting and the PLA test in the context of the FRTB. These specifications have been implemented in the EU with the CRR2 that mandated EBA to develop the relevant RTS [12].

Backtesting compares the (Value at Risk) VaR of a given portfolio, as calculated with the model, to the actual P&L and the Hypothetical P&L (HPL) (i.e., the P&L determined with the positions of the previous day revalued with the prices of the current day).[21]

The PLA test compares the daily Risk Theoretical P&L (RTPL) (i.e., the daily trading desk-level P&L that is produced by the valuation engine of the trading desk's risk management model) with the daily HPL to determine whether the risk factors included and the valuation model used by the trading desk capture the material drivers of the overall P&L. The difference between the RTPL and the HPL represents the amount of the P&L that cannot be explained by this valuation technique.

BCBS [16] also defines test the thresholds for both backtesting and the PLA that, if breached, would trigger a capital add-on or, in the most critical cases, a suspension of the authorization for the relevant desk (or for the bank altogether) to use the IMA for calculating the capital requirement for market risk.

2.3.3. THE INTERPLAY OF ACCOUNTING AND PRUDENTIAL REGULATIONS

FRTB specifications for backtesting and PLA testing apply only to instruments belonging to the trading book and to portfolios in which has adopted the IMA approach for capital calculation. These specifications apply to the level of the trading desk or to the entire bank's trading book, as opposed to the individual asset or liability level needed for asset and liability leveling in the accounting framework.

Nevertheless, backtesting and PLA testing should be regarded as key methodologies for assessing the input materiality in the context of fair valuation techniques. In fact, they provide elements that describe the capacity of the bank's valuation techniques to assess the accuracy of the VaR and its variations or, from a regulatory standpoint, whether the risk models produce reliable capital requirements.[22] For instance, a high level of unexplained P&L resulting from the PLA test would suggest that at least some of the unobservable inputs in the valuation model may be significant in determining the instrument fair value.[23]

In our view, the thresholds used in the materiality assessment in order to discriminate between significant and non-significant unobservable inputs should be consistent with the thresholds of the risk factors adopted in the backtesting and PLA prudential exercises; feedback loops should be established to ensure consistency over time.

2.4. Initial Fair Value Recognition: Day-1 Profit/Loss

2.4.1. ACCOUNTING RULES

According to appendix B5.1.2A of IFRS 9 (Initial Measurement), the best evidence of the fair value of a financial instrument at initial recognition is generally the transaction price. However, if an entity determines that the fair value at initial recognition differs from the transaction price, it recognizes the difference as a gain or loss (the so-called Day-1 Profit or Loss), provided the fair value is determined based on Level 1 or Level 2 inputs. In all other cases, the entity will defer that difference by posting a reserve (the so-called Day-1 Reserve), to be later released along with the residual life of the instrument to the extent that a change in a relevant valuation factor is experienced (e.g., a non-observable input becomes observable).

The above prescription implies that Day-1 Profit cannot be recognized if the calculation of the instrument fair value involves the use of any unobservable inputs, no matter how significant. Therefore, Day-1 Profits cannot be recognized even for

21. Please notice that in the article 325bf of CRR2 both of comparisons between VaR and APL and VaR and HPL are required.
22. As reported in the Executive Summary of EBA RTS on Backtesting and PLA requirements [12].
23. This view is supported by [14], which states in Principle 4 that: "Profit and loss (P&L) attribution processes are a key aspect of valuation control. For fair valuations where changes in fair value are reflected in the P&L statement, these processes should take place no less frequently than the risk management horizon and with a priority given to portfolios with significant VR so that management understands the reliability and sources of P&L in a timely manner."

L2 instruments for whose valuation L3 inputs are used but have been defined as not significant by the institution for instrument leveling.

A position paper by the Bank of Italy [19] acknowledges that banks may have an incentive to post a Day-1 Profit as this may affect the current period P&L. It also notes that banks have developed various ways to circumvent the prohibition, including:

1. The 'substantial risk offset' approach, where a trading desk hedges a given percentage of the risks stemming from unobservable parameters included in an exposure and assumes that the residual risk is negligible.
2. The 'credible range test' approach, which consists of assessing if the impact on the estimated trading profit of a 'credible variation' of unobservable inputs is lower than a given threshold.
3. The 'worst-case scenario' method, where a bank shows that there would still be a trading profit even considering the worst possible realization of the unobservable inputs.

Another technique often used by banks is based on "back-to-back trades," defined as trades that are offsetting all cash flows under all the scenarios and till the maturity of the instrument covered.

These techniques, despite being commonly applied, may be challenged given the accounting regulation, which does not explicitly provide support for them. In many banks, their implementation is subjective and is not supported by prescriptive internal standards, which reduces both the traceability and the auditability of their application. As also noted in the Bank of Italy paper, Day-1 profit realized with complex financial products might, in fact, reflect the compensation for risks not explicitly acknowledged by the valuation methodology, or a need to recalibrate the pricing model, or a potentially 'imperfect' hedge (e.g., achieved through contractual schemes that overlook basis risk).

When Day-1 Profit cannot be recognized, banks need to post a Day-1 Reserve and release it to the P&L account during the residual life of the instrument. IFRS 9 does not prescribe any specific method for releasing the reserve, by simply stating that a deferred profit or loss may be released to the extent that a change in a factor occurs such that market participants would consider it when setting a price.

The practice adopted for the release of the Day-1 Reserve over time may be an additional source of VR. A common approach is to recognize the reserve linearly until the contractual termination date is reached. However, this practice could be questioned as it relies on the implicit assumption that the instrument valuation's sensitivity to the unobservable inputs tends to decay regularly over time. In this vein, as long as an input remains unobservable and the sensitivity to the unobservable risk factors cannot be demonstrated to have declined substantially, the prohibition should remain valid to avoid flows of unverified profits being recorded.

A more conservative approach that would be less exposed to criticism could be to release the reserves when unobservable inputs are deemed to have become observable, based on the verification of conditions including for instance:

- Improved soundness of the model (becoming a market best practice) justifying the implied considerations of unobservable inputs
- Demonstrable decline in the sensitivity of the instrument price to the (single and joint) unobservable inputs, including as a result of a duration smaller than reserve release timeframe
- Effective change in the status of the unobservable inputs that could lead to re-leveling as Level 2

2.4.2. PRUDENTIAL REGULATIONS

The initial recognition of fair value is an exclusively accounting topic. Nevertheless, in our view, the P&L Attribution (PLA) test[24] as defined in the EBA RTS on Backtesting and PLA Requirements [12] has a similar background as it is designed to verify the unexplained P&L, i.e., the difference between the HPL (the daily trading desk level P&L derived from Front Office pricing functions based on a full set of risk factors) and the RTPL[25] (the daily desk level P&L that is predicted by the pricing model used for prudential purposes conditional on a realization of all relevant factors that enter the model). In this sense, the

[24] The PLA test is based on the estimation of two indicators for the unexplained P&L, computed at desk level of the bank:
1. Spearman correlation metric (> 0.8 for the green zone);
2. Kolmogorov - Smirnov test metrics (<0.09 for the green zone)

[25] Definition of the RTPL as per [12] ,"The RTPL is the P&L (ignoring intra-day trading) calculated using the risk factors and valuation engines in the risk-management model. The desk's risk-management model takes into account all risk factors that are included in the institution's expected shortfall model and any non-modellable risk factors included in the institution's stress scenario risk measure."

instrument price that represents the instrument fair value at initial recognition is also in part or fully used in the calculation of the HPL or RTPL.

The unexplained P&L represents the uncertainty related to the pricing of the instruments embedded in the bank's model. High levels of uncertainty can push this metric out of the ranges defined by the applicable thresholds. In this case, the trading desk owning the relevant instruments may be subject to punitive capital requirements, including computing a capital surcharge with the IMA, up to computing the capital requirement with the standardized approach.

2.4.3. THE INTERPLAY OF ACCOUNTING AND PRUDENTIAL REGULATIONS

The Day-1 Profit, the Day-1 Reserve, and the unexplained P&L of the PLA Test are all calculated based on a common fair value. Specifically, the first two are computed as the difference between the Transaction Price and fair value at initial recognition, while the last one is the difference between the HPL and the RTPL, which in turn includes the same fair value.

In our view, there is a clear correspondence between the transaction price required for Day-1 recognition and the HPL required in the PLA test, as they refer to the fair values determined typically by the business unit, and both rely on the actual transacted price for the instrument and determined by their position keeping system. Similarly, there is a correspondence between the fair value at initial recognition and the Risk Theoretical Price as they refer to the fair values determined under the IPV activities.

Even if Day-1 is a price difference while the unexplained P&L is a P&L difference, in both accounting and regulatory frameworks, there is a clear principle to stimulate an internal assessment for the explanation of the degrees of uncertainty that lead to different fair value measures provided by the different units/models in a specific timeframe.

We think the unexplained P&L that respects the two metrics is the potential VR that has no impacts (or has an impact within an acceptable range) on the balance sheet values and prudential ratios of the bank. Any differences deriving from technical reasons (e.g., market data collected at different times for different phases of the process) should be identified and deducted from that value.

Implicitly, by discouraging banks from managing significant amounts of unexplained P&L to avoid the punitive capital charges that may ensue, the prudential regulation curbs banks' exposure to VR behind the marking of the exposures to fair value.

The adjustments made to derive the input data tailored for the fair value measurement should be aligned with the provisions of the prudential framework, which requires that any assumption or methodology or unjustified adjustment should be analyzed under the scope of the P&L explanation for the PLA Test.

Thus, in the case of the initial fair value recognition, the alignment between accounting and prudential regulations is implicit in the fact that they are both based on the same component, i.e., the instrument fair value. It is worth recalling that the IPV is a determinant contributor to the fair value. EBA RTS [12] states, "When computing the actual changes in the relevant portfolio's value, the institution should reflect any changes in the portfolio's value following the independent price verification (IPV) process," which establishes a formal connection between the P&L and the IPV process.

2.5. Fair Value Adjustments

2.5.1. ACCOUNTING RULES

IFRS 13 defines fair value as "The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date." As such, the fair value should reflect all the considerations that a counterparty would take into account in defining the transaction price, including the need to cover for the uncertainty inherent in the future cash flows of the instrument.

IFRS 13 prescribes that actual prices from an active market are the best evidence of the fair value of an instrument. Whenever such prices are not available, for instance, because the instrument to be valued is not traded in an active market, banks need to revert to valuation techniques (i.e., pricing models) for measuring the instrument fair value. In doing so, banks consider a set of FVA aimed at reflecting in the fair value the components that a counterparty would likely consider when defining the price for the instrument, including those aimed at remunerating the uncertainty in future cash flows.

In general, these adjustments could be related to the following areas of analysis:

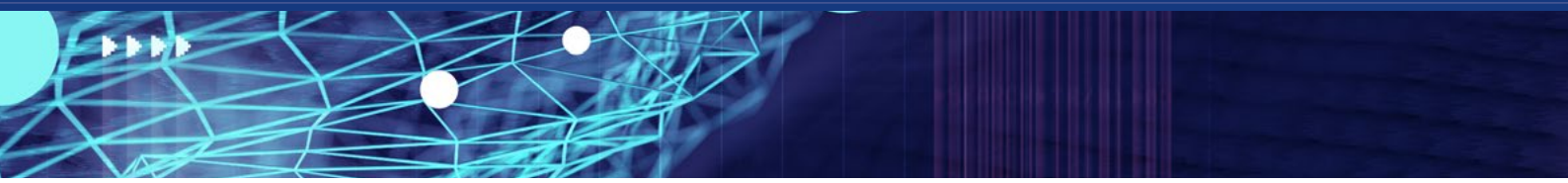
- **Market parameters**, specifically in the cases of:
  - Inputs adjustments to fit the term of the curves (interpolation, extrapolation), the implied risk (probability of default, loss given default calibrations), and other drivers that are related to the fair value process
  - Calibration under predefined functions used to estimate specific variables from observable inputs (e.g., Svensson curves for interest rates and credit spreads)
  - Existence of comparable assets that present similar characteristics to the asset being estimated. The comparability could be in terms of creditworthiness (rating, seniority/subordination level), term, country, collateral, trigger events (callability, early termination), duration/weighted average life), market worthiness (Economic Value Added (EVA)), Internal Rate of Return, etc.
- **Pricing model parameters**, specifically in case of adjustments related to the model adopted for measuring the fair value of the instrument, including model elements (e.g., correlation) that are not directly quoted although the models rely on them. Furthermore, these adjustments could be related to the calibration of parameters that are specific only to the adopted model and refer to unobservable inputs (the adjustments on the parameters also used in the benchmark model are considered under Market Parameter Uncertainty, given the assumption that the benchmark and the adopted models should generate the same results when using the same inputs).
- **Pricing models**, when multiple models could be adopted for pricing a given instrument. Adjustments should be made in the following cases:
  - Models using the same methodology but considering different sets of parameters. In this case, a bank may avoid calculating a model risk adjustment only if it adopted the "champion" or "benchmark" model.

    The focus here is on how to define a champion model. We define the champion model as the model that minimizes the difference in fair value between the firm exit price using the adopted model and the close-out value (i.e., the executable price at which an exposure could be closed). This difference must be below a specific threshold to clearly define what could be the best model for a specific trade. Furthermore, for the champion model, the following elements should be verified at the outset and over time as applicable:
    - The accuracy of the model performance over time, including assessment of the continued appropriateness of assumptions
    - Collateral disputes, checking the models/methodologies used by the counterparties, and the number of collateral disputes as it could also be an indicator of the model accuracy
    - Hedgeability of the main risks of the payoff (including the level of hedge prices)
    - The spread and volatility of the spread over time between the adopted model outputs and the consensus providers
    - The comparison of actual close-out values to model outputs
    - The presence of a two-way market (i.e., bid and ask sides)
  - Models using different methodologies capture some features differently, e.g., correlation/principal component analysis. Also, in this case, a model risk adjustment should be calculated when the different methodologies applied in the treatment of the inputs used by the champion model and the adopted model lead to systematically different results.

These adjustments are outlined in different sections of IFRS 13, leaving a degree of freedom to define and interpret the way to implement them. Market participants adopt these adjustments based on their experience and market practice. Such adjustments are sometimes collectively known as XVA, where the "X" can be replaced when necessary to refer to a particular FVA. The following list of adjustments is a comprehensive collection, based on our knowledge of industry practice, of the references to the components that can cause an adjustment.

FVA can be divided into four different clusters:

- **MARKET RISK ADJUSTMENTS**
  - **Bid-Ask Adjustments:** applying the point within the bid-ask spread that is most representative of fair value in the circumstances of the entity's net exposure to market risks factors (IFRS 13, par. 51-53), which allow instruments to be recognized at the bid or ask price based on the direction of the position. The purpose of this valuation adjustment is to quantify the risk of derivative positions in case of a reversal of the bank's exposure.



– **Significant Measurement Uncertainty Adjustment:** used to reflect significant measurement uncertainty as a result of market adjustments (e.g., when there has been a significant decrease in the volume or level of activity when compared with normal market activity for the asset or liability, or similar assets or liabilities, and the entity has determined that the transaction price or quoted price does not represent fair value) (IFRS 13, par. 88). In the accounting principles, several circumstances for this adjustment are listed under "Measuring fair value when the volume or level of activity for an asset or a liability has significantly decreased," including:

  - Indices that previously were highly correlated with the fair values of the asset or liability are demonstrably uncorrelated with recent indications of fair value for that asset or liability (IFRS 13, par. B37.d)
  - There is a significant increase in implied liquidity risk premiums, yields or performance indicators (such as delinquency rates or loss severities) for observed transactions or quoted prices when compared with the entity's estimate of expected cash flows, taking into account all available market data about credit and other nonperformance risks for the asset or liability (IFRS 13, par. B37.e)
  - There is a wide bid-ask spread or a significant increase in the bid-ask spread (IFRS 13, par. B37.f). In this case, the bid-ask spread is a driver to verify the measurement uncertainty even if a specific adjustment could be related to that driver in addition to the significant measurement uncertainty. In particular, if an entity determines that a transaction price or quoted price does not represent fair value (e.g., there may be transactions that are not orderly), an adjustment to the transactions or quoted prices will be necessary if the entity uses those prices as a basis for measuring fair value and that adjustment may be significant to the fair value measurement in its entirety (IFRS 13, par. B38)
  - There is a significant decline in the activity of, or there is an absence of, a market for new issues (i.e., a primary market) for the asset or liability or similar assets or liabilities (IFRS 13, par. B37.g)

- **CREDIT RISK ADJUSTMENTS**

  IFRS 13, par. 56 states, "The entity shall include the effect of the entity's net exposure to the credit risk of a counterparty or the counterparty's net exposure to the credit risk of the entity in the fair value measurement when market participants would take into account any existing arrangements that mitigate credit risk exposure in the event of default (e.g., a master netting agreement with the counterparty or an agreement that requires the exchange of collateral on the basis of each party's net exposure to the credit risk of the other party)." Thus, there is a significant degree of freedom in defining the credit risk adjustments. Some of these, like the Credit Valuation Adjustments (CVA), are well understood and already an integral part of the way that banks price derivatives. Others are emerging in the market by adopting a bilateral perspective for credit risk adjustments (CVA vs. Debt Valuation Adjustment (DVA)). Till these adjustments become market practice, gaps between hypothetical and theoretical prices have to be explained to avoid posting fictitious Day-1 profits or reserves. A key challenge is that a number of these adjustments need to be calculated on a portfolio basis (e.g., collateralized derivatives), not trade by trade. The credit-related XVA currently discussed in the market are:

  – **Credit Valuation Adjustment (CVA):** this adjustment (which is always negative) is primarily related to uncollateralized derivative assets.[26] It considers the scenarios where the counterparty defaults before the bank and the bank has a positive exposure towards the counterparty. In these scenarios, the bank incurs a loss equal to the replacement cost of the derivative. When using the exception in paragraph 48 of IFRS 13 to measure the fair value of a group of financial assets and financial liabilities entered into with a particular counterparty, the entity shall include the effect of the entity's net exposure to the credit risk of that counterparty or the counterparty's net exposure to the credit risk of the entity in the fair value measurement when market participants would take into account any existing arrangements that mitigate credit risk exposure in the event of default (e.g., a master netting agreement with the counterparty or an agreement that requires the exchange of collateral based on each party's net exposure to the credit risk of the other party). "The fair value measurement shall reflect market participants' expectations about the likelihood that such an arrangement would be legally enforceable in the event of default" (IFRS 13 par. 56).

  – **Debt Valuation Adjustment (DVA):** the DVA (which is always positive) is related primarily to uncollateralized derivative liabilities. The aim of this valuation adjustment is to account for the effect of non-performance risk. It considers the scenarios where the bank defaults before the counterparty, and the bank has a negative exposure towards the counterparty. In these scenarios, the bank benefits in the event of its default for an amount equal to the replacement cost of the derivative. This risk includes the entity's own credit risk. The fair value of a liability reflects the effect of non-performance risk. Non-performance risk includes, but may not be limited to, an entity's own credit risk (as defined in IFRS 7 Financial Instruments: Disclosures). Non-performance risk is assumed to be the same before and after the transfer of the liability (IFRS 13 par. 42).

26. For non-derivatives assets the counterparty risk framework applies, while for Held To Collect instruments the credit risk framework applies.

- **Funding Valuation Adjustment (FVA):** captures the funding cost of uncollateralized derivatives above the 'risk-free rate.' This valuation adjustment aims to account for the potential future funding costs. It is applied to uncollateralized or imperfectly collateralized OTC derivative transactions, and it is the net present value of the additional cost to fund the hedge of such transactions. The estimation of FVA considers scenarios in which the counterparties do not default, and the bank has a positive exposure towards them. The bank bears a funding cost related to the collateral posted for transactions closed with collateralized market counterparties that hedge transactions closed with not collateralized counterparties or with partial Credit Support Annex (CSA) agreements. The FVA depends on the survival probabilities of the counterparties and the total exposure that must be calculated, taking into account the CSA if the variation margin is rehypotecable.
- **Collateral Valuation Adjustment (COLVA):** accounts for the cost of funding a collateralized derivative position at the 'risk-free' rate. This adjustment has to be evaluated jointly with CVA/DVA/FVA as the amount at risk of the fair value could be mitigated by the cost of the collateral posted to the derivative position.
- **Capital Requirement Valuation Adjustment (KVA):** represents the cost of holding regulatory capital as a result of a derivative position. All derivative contracts are more punitive if trades are not cleared.
- **Margin Valuation Adjustment (MVA):** represents the cost of posting "initial margin" against a derivative position. Applies to derivatives that are cleared.

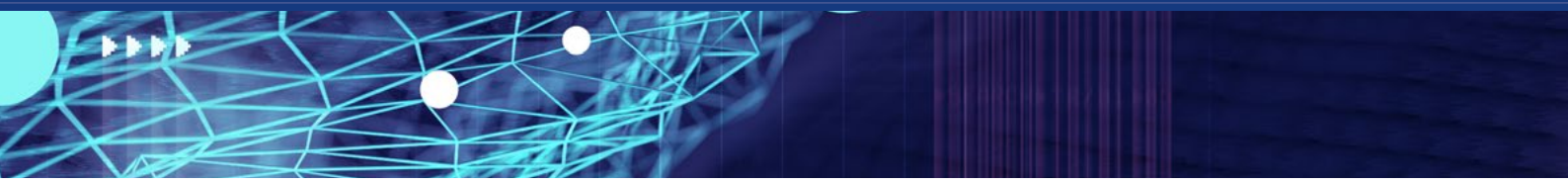
- **MODEL RISK ADJUSTMENTS**

  In the accounting principles (IFRS 13, par. 65), model risk is related to the adjustments to a valuation technique to take into account a characteristic of an asset or a liability that is not captured by the valuation technique (the need for such an adjustment is typically identified during calibration of the value calculated using the valuation technique with observable market information). In this case, the fair value of the instrument should include any uncertainty component justified by:

  - **Alternative Models:** when the valuation of a financial instrument is materially influenced by the choice of the pricing model, and there is not a widely accepted market practice, since the market participants may use different pricing models
  - **Calibration:** three categories of adjustment include: i) changes the calibration technique of the model parameters including consideration of the market movements of the calibration instruments used to imply the model parameters, which must be replicable using the model (even when they are synthetic instruments); iii) model change: fine-tuning or substitution of the pricing model so that it becomes more consistent with the market dynamics. The calculation of the model risk adjustment is based on the identification of possible directionality of the price when the model changes, understanding the behavior of the model under different market scenarios (stress tests)
  - **Sensitivity and Stress Scenarios:** high volatility in the results of the sensitivities and historical (stressed) scenarios
  - **Hedging:** efficiency in the hedging strategy suggested by the pricing model
  - **Trading:** instrument (or a similar instrument) traded at a different price in comparison to the price calculated with the model (creating potential P&L effects) or for the instrument held by the bank when it is not possible to find a counterparty that accepts the price provided by the pricing model of the bank
  - **Time Value:** the portfolio that includes the instruments valued through the pricing model and their hedging instruments are characterized by a directional P&L

  Model Risk Adjustments should be periodically reviewed, considering market developments and methodological improvements, which may lead to substantial changes in the selected models and their implementation.

- **OTHER FAIR VALUE ADJUSTMENTS:**
  - **Adjustments to Observable Inputs:** (a) the condition or location of the asset; (b) the extent to which inputs relate to items that are comparable to the asset or liability; and (c) the volume or level of activity in the markets within which the inputs are observed. (IFRS 13, par. 83). This adjustment is linked to the market risk adjustments mentioned above as the assumptions made to modify the inputs are estimated under the market perspective in terms of liquidity, volumes, and comparability
  - **Unadjusted Evidence:** when an entity uses prices from prior transactions or third party pricing information without adjustments (IFRS 13, par. 93 d). Even in this case, the link with market risk adjustments mentioned above is present, as the use of the market data evidence in some cases could be modified under a liquidity perspective and not under a different perspective



- **Control on the Underlying:** control premium or non-controlling interest discount (IFRS 13, par. 69)
- **Transferability:** consideration of the adjustments to other inputs related to the existence of a restriction that prevents the transfer of the asset (IFRS 13, par. 45)
- **Direct Costs:** installment and transportation costs (for material) (IFRS 13, B3.b)) or sale costs (IFRS 13, par. 73)

2.5.2. PRUDENTIAL REGULATIONS

The banking prudential regulation introduced the principle of a prudent valuation of financial instruments. Articles 34 and 105 of the CRR require institutions to conduct a prudent valuation of all assets recognized at fair value. The differential amount between the balance sheet fair value and the prudent value is to be deducted from the Common Equity Tier 1 (CET1) capital for prudential purposes. This amount is capped to zero, i.e., no increase in CET1 is applicable when the prudent value is higher than the balance sheet fair value.

According to the CRR, PVA (also referred to as AVA) for nine specified sources of uncertainty should be calculated and subsequently aggregated following a specific logic:

- **MARKET PRICE UNCERTAINTY**
  Takes into account the uncertainty of a valuation input when the financial instrument:
  - Is marked to market (e.g., a contributed security) and reliable price contributors are showing different prices, or the price is illiquid with a few contributors
  - Is marked to model (e.g., an OTC derivative or non-contributed security) using some valuation input (e.g., multiple yield curves based on market quotations of IRS), and there are multiple price contributors for the valuation input (e.g., multiple IRS market makers)
- **CLOSE-OUT COSTS**
  Refers to the valuation uncertainty in the exit price. Close-out costs could be assessed on a full exit price basis or on a “cost to hedge” basis, as with derivative portfolios, so the positions are maintained in the portfolio until maturity (and therefore, there are possible future administrative costs also). Typically, close-out costs adjustments are calculated as the possible evolution in scenarios for the bid or ask quotes (depending on which ones are used) or the application of these evolutions in the mid quote. In some situations, the correspondence with the accounting bid-ask adjustments could be ambiguous as the methodologies could imply diverging assumptions (in the case of bid-ask as a driver in the accounting framework, it is related to the significant measurement uncertainty that is based on the assumption that the quotes do not represent the fair value.)
- **MODEL RISK PRUDENTIAL ADJUSTMENTS**
  These refer to the same concept of uncertainty in models and calibrations used by market participants. These adjustments refer in particular to those valuation positions for which the bank estimates that there is a lack of firm exit price due to model and/or model calibration choices. Assuming that the prudential adjustment should represent the 90th percentile of the potential volatility in the fair value, the methodology to be applied in this case could use sensitivity and stress scenarios in order to achieve a more conservative amount of adjustments in respect of the accounting ones. In some cases, modeling developments and innovative modeling assumptions could add degrees of uncertainty not aligned with the regulatory purpose as they increase the number of adjustments needed to manage the potential outcomes and overall provide for a more complex fair value framework.

  The approach is to consider for each valuation model the model risk arising from the potential existence of a range of alternative models or model calibrations, estimating the resulting range of valuations associated with a 90% confidence level. Otherwise, an expert-based approach could be setup considering:
  - The complexity of products priced by mode
  - The diversity of possible mathematical approaches and model parameters (if not related to market variables)
  - The degree to which the market for the relevant products is “one-way”
  - The existence of unhedgeable risks in the relevant products
  - The adequacy of the model in capturing the behavior of pay-off of the products

  In both cases, at least an annual review of these methodologies has to be applied

- **UNEARNED CREDIT SPREAD AND INVESTING AND FUNDING COSTS**
  These are the corresponding prudential value adjustments of the accounting adjustments CVA and FVA. The methodologies should be aligned in order to define the distribution of the potential expected (accounting) and stressed (prudential at 90% confidence level) values of:
  - For CVA: Probability of Default, Loss Given Default, the eventual implied recovery rate in the market quotes of the credit spread and simulation of the exposure
  - For FVA: Probability of Default, Survival Probabilities, Loss Given Default and simulation of the funding needs
- **CONCENTRATED POSITIONS**
  Refers to concentrated exposures, measured by means of the size of the position relative to the liquidity of the market for the instrument and the average daily market volume or typical daily trading volume of the institution. In general, this AVA refers to the capability of the bank to exit a position within the time horizon implied by the market risk capitalization (10 days) without impacting the market price. In the case of homogeneous groups of exposures, the adjustment may be allocated both within a specific type of risk (intra-risk concentration) or amid different categories of risk (inter-risk concentration) [20]. It is directly linked to market risk adjustments, i.e., Market Price Uncertainty and Close-out costs, as they are both impacted by the trading volume in respect of the liquidity of the market even if in different time horizons; it also relates to the Significant Measurement Uncertainty of the accounting principles.
- **FUTURE ADMINISTRATIVE COSTS**
  Considers the valuation uncertainty emerging from possible costs and future hedging costs complementary to close-out costs. If the close-out costs are assessed on a full-exit-price basis, then no future administrative costs apply as the position disappears (matures). Where close-out costs are assessed on a "cost-to-hedge" basis, the positions are maintained. Therefore, there are possible future administrative costs in running the portfolio until maturity (possibly connected with the direct costs of the accounting principles).
- **EARLY TERMINATION**
  Takes into account the valuation uncertainty emerging from potential losses arising from non-contractual early terminations of client trades, in particular, because of litigations or commercial reasons (not directly linked to any adjustment of the accounting principles). In general, it is calculated using historically early terminated contracts and losses that arose in those cases.
- **OPERATIONAL RISKS**
  Mainly related, but not limited, to the balance sheet substantiation process and to possible legal disputes. Evidences of operational risk related to the valuation process are the inclusion of those valuation processes as part of the Advanced Measurement Approach (AMA) accounting for the mispricing, miss-selling, and process execution errors (not directly linked to any adjustment of the accounting principles).

2.5.3. THE INTERPLAY OF ACCOUNTING AND PRUDENTIAL REGULATIONS

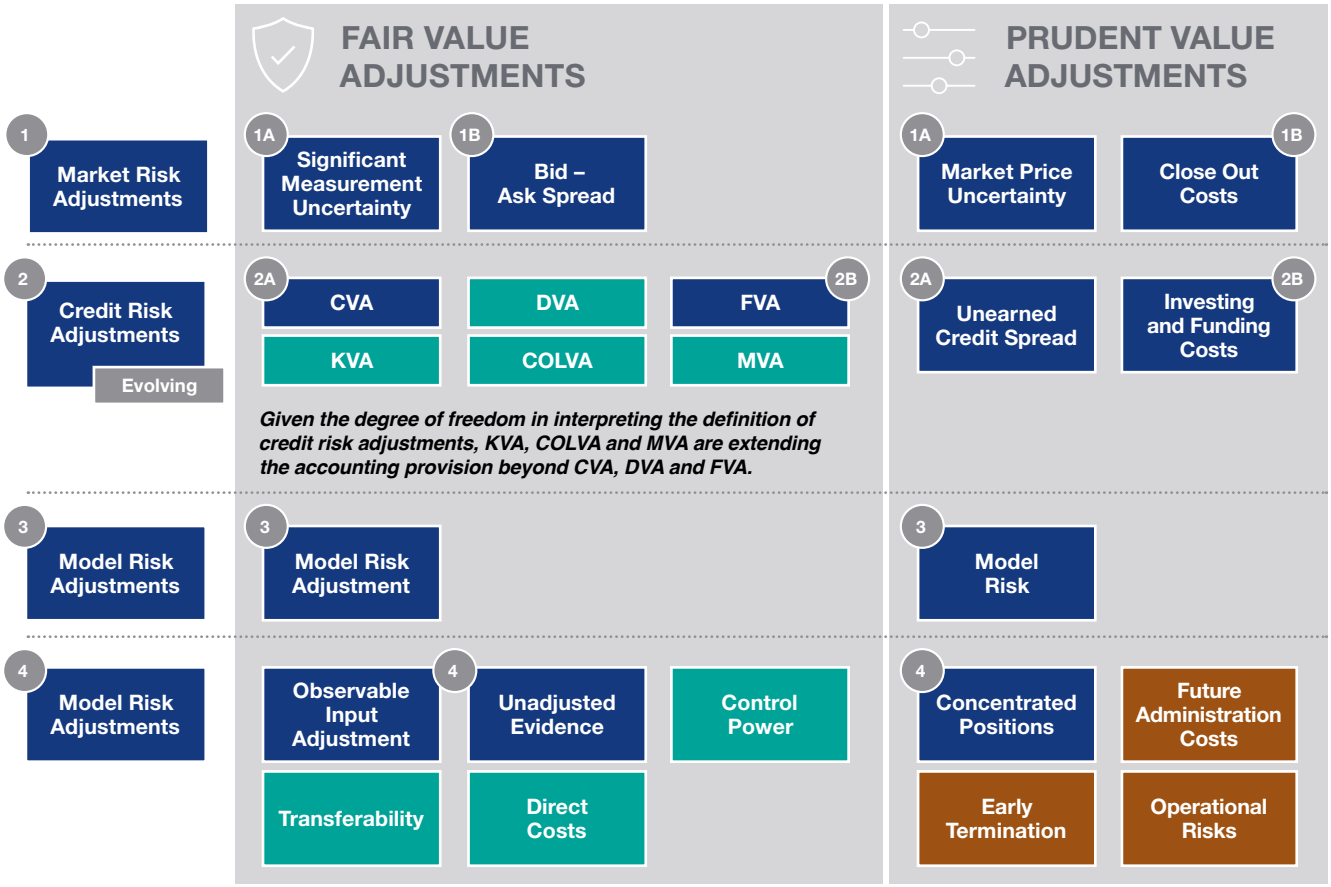
BCBS [15] marks an explicit step in the prudential supervisors' strategy to provide specific guidance for banks about addressing the areas where the accounting rules rely on judgment and discretion. In this paper, BCBS identifies a set of minimum valuation adjustments that banks must consider in the assessment of instrument fair value:

- Unearned credit spreads
- Close-out costs
- Operational risks
- Early termination
- Investing and funding costs
- Future administrative costs
- Where appropriate, model risk

These adjustments closely correspond with AVAs prescribed by the CRR for determining Risk Weighted Assets (RWA) for market risk in the context of the FRTB (with the only exceptions of Market Risk Uncertainty and Concentrated Positions, which is mentioned in the CRR but not in [15]).

Although IFRS 13 is not formally prescriptive to the FVA that banks should apply when measuring fair instrument value, an extensive set of FVA has been identified in banks' accounting practices. Such adjustments can be broadly put in relation to the AVA in terms of risk categories that they intend to capture. Figure 3 presents a possible mapping of FVA used in the accounting framework to the Additional Value Adjustments used for prudential purposes:

Figure 3: Mapping of the FVA to the Additional Value Adjustments



Notes to Figure 4: *Adjustments in blue have a direct correspondence in the accounting and prudential frameworks with mapping defined by numbers; adjustments in teal are provided only in the accounting framework and not in the prudential framework; adjustments in bronze are provided only in the prudential framework and not in the accounting framework.*

Furthermore, the Observable Inputs adjustments and Unadjusted Evidence adjustment in the accounting framework and the Concentrated Positions adjustment in the prudential regulation are strictly related to Market Risk adjustments. This is because the methodology and the main drivers used to calculate the Observable Inputs adjustments and Unadjusted Evidence adjustment are usually based on similar or related FVA already recognized in the balance sheet (that have therefore already reduced the regulatory capital.) They can be set off against the AVA, provided they correspond to one of the sources of uncertainty specified by the supervisor. Thus, a reconciliation of FVA should be carried out to reduce the amount of deduction from the regulatory capital requirement.

In addition to the AVA calculation, the prudential regulations provide further qualitative requirements for the valuation process. Alongside the documentation of the prudent value calculation procedure, checks for a review of the appropriateness of the calculation results are defined.

It is worth mentioning that banks may apply additional adjustments not explicitly ruled under the accounting or the regulatory frameworks. Such adjustments should be treated as:

- Additional FVA in the accounting framework
- Pillar II capital in the prudential framework, even if out of the scope of the PVA

3. Valuation Risk: A Prudential Perspective

3.1. A Methodological Approach for Valuation Risk

As already stated, VR for a bank can be defined as the risk of losses arising from the inaccurate determination of the fair value of financial instruments in its balance sheet. The accounting definition of fair value refers to the so-called "exit price," i.e., the price that a counterpart would be ready to pay in exchange for a bank's asset or receive for a bank's liability, in an orderly transaction. Therefore, VR relates to the uncertainty, at a specific point in time, about the difference between the fair values reported in the financial statements and the tradeable "true" price that a bank could obtain when effectively selling that asset or transferring that liability.

As highlighted in previous parts of this document, banking supervisors have expressed concern about the uncertainty of the fair values reported in banks' balance sheets due to the degree of discretion in the determination of fair values that is left to banks by accounting regulations. Consequently, supervisors have taken a clear stance on reducing such a space by requiring banks to implement strong governance of the fair value determination process and demonstrate a high level of consistency of methodologies and processes with those applied for prudential purposes under the applicable regulations.

Such a strategy may help mitigate the uncertainty about the accuracy of reported fair values that originates from banks' discretion. However, that strategy may not eliminate VR in its entirety. Even assuming that all discretion in fair value determination has been curbed and the soundest process governance possible has been enforced, a bank would still be exposed to a risk of loss due to a difference between the model-based calculated fair values and the experienced exit prices, as a consequence of imperfect predictive capacity of the models used to calculate the fair values. This may be due, for instance, to missing consideration of risk factors, inaccurate modeling of risk factors, or of the sensitivity of instrument prices to risk factors or other model errors. Model errors are likely for instruments whose fair value is determined based on models using unobservable or barely observable inputs, for which little amount of information is available.

All these components considered, VR can be viewed as the risk outstanding at the final stage of the valuation process after all the potential mitigations defined in both the accounting and prudential frameworks have been considered, and that manifests itself when a discrepancy between the fair value and the exit price is still recorded.

In a sense, VR has some similarities to the risk derived from the Non-Performing Exposures (NPE) valued at amortized cost, in that the risk is that the exit price is not aligned with the internal estimation of the instrument value (the main difference is the calculation methodology, as for NPE it is equal to the amortized cost minus the provisions calculated on the exposures).

This calls for an analysis of VR from a prudential perspective. The regulatory framework provides for capital buffers to increase banks' capacity to cope with uncertainty, possibly materializing by adverse movements of risk factors (such as market, credit, and liquidity risk factors) to which the portfolio of financial instruments is exposed. The buffers calculated against the different risks are then compounded into the regulatory capital requirement.

In this perspective, we are willing to contribute to the debate by providing a tentative response to the following questions:

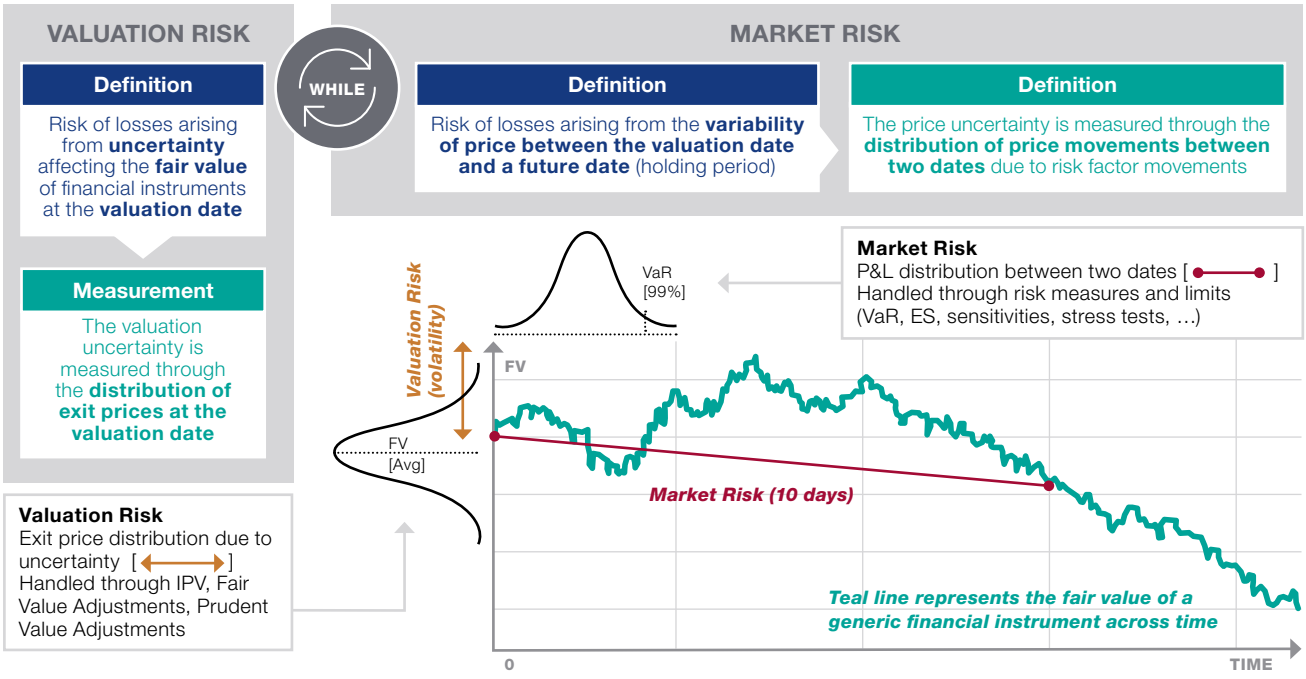
- Is VR covered by the current taxonomy of risks addressed in the banking prudential regulatory regime, or should it be considered an additional risk deserving dedicated attention?
- Does VR deserve a dedicated buffer of capital to improve banks' resilience?

3.1.1. IS VR COVERED BY THE CURRENT PRUDENTIAL RISK TAXONOMY?

VR is different in nature from other risks related to financial instruments, like market or credit risks. For these risks, the prudential objective is to measure the uncertainty concerning the possible adverse movement in the prices of a bank's financial instruments between the valuation date and a specific future point in time (a time lag generally referred to as "holding period"). Consistently, these risks are measured in terms of the probability of an adverse change during the holding period of the risk factors' values affecting the instrument price.

In contrast, VR refers to the uncertainty concerning the difference between the fair values reported in the financial statements and the exit price — the tradeable "true" price that a bank can obtain when effectively selling an asset or transferring a liability at a specific point in time. Therefore, the VR is not defined with reference to any holding period and does not depend on the change of risk factors over time. Instead, it refers to the possibility that the bank suffers a loss because the measurement of fair value demonstrates itself as not accurately predicting actual market values at a given date. This conceptual difference is graphically represented in Figure 4.

Figure 4: A Graphical Comparison Between Valuation Risk and Market Risk



In summary, we believe that the taxonomy of risks included in the current prudential regulatory framework and the accounting framework does not cover all the features with which VR can present itself. Therefore, we would find it appropriate to define VR as a risk of its own, to be addressed with a dedicated discipline.

3.1.2. SHOULD A DEDICATED CAPITAL BUFFER BE ALLOCATED FOR VR?

If we accept that VR should be considered a risk on its own, we should also acknowledge that this risk should be allocated capital to ensure bank resilience.

At the same time, we should not overlook the fact that banks already have capital buffers set aside for other risks, including market and model risk. An additional capital buffer would only be justified if it were demonstrated that VR is not fully covered and that an extra capital cushion would be required to ensure the bank's resilience.

Take the capital requirement for market risk, which is calculated over a 10-day holding period, and look at the conceptual difference between market risk and VR:

- Market risk is conceptually modeled based on the assumption that the instrument is kept in a bank's portfolio for a time equal to the holding period (10 days) from the measurement date.
- VR should instead conceptually be thought of as an instantaneous risk — manifested upon the sale or transfer of the instrument on the measurement date.

Conceptually, therefore, the two risks can be mutually exclusive. If a bank trades an instrument at any given date, it will have no longer a reason to calculate a capital requirement for market risk with respect to that instrument from that moment.

Assume that the bank trades the instrument and suffers an unexpected loss due to a difference between the experienced exit price and the fair value at which it had reported that instrument in its balance sheet. The potential loss for an asset is expressed mathematically by the following formula:

Eq. 1 $\text{Loss}(i, t_{Exit}) = \max [FairValue(i, t_{Exit}) - Price(i, t_{Exit}), 0] \; \forall i \in \{Instruments\ set\}$

where t_{Exit} is the time variable at the moment when the exit price is recorded, i.e., the trade date.[27]

The bank's capital will be affected by two different impacts:

- A negative impact on the P&L due to the loss experienced on the trade
- A positive impact due to the release of the regulatory capital set aside for market risk for the traded instrument

If the positive impact exceeds the negative one in absolute value, then the capital set aside for market risk will have proved sufficient to cushion the bank against the potential negative impact of VR as well. In a formula, the additional capital for VR is defined as:

Eq. 2 $Capital_{VR}(i, t_{Exit}) = max [Loss(i, t_{Exit}) - Capital_{MR}(i, t_{Exit}), 0] \; \forall i \in \{Instruments\ set\}$

The question is, therefore, whether the capital set aside for market risk is sufficient to provide a cushion for VR. If the answer is yes, then no additional capital for MR should be allocated. If the answer is no, then additional capital should be allocated for VR, equal to the excess of the potential loss relating to VR with respect to the capital requirement for MR.

3.2. Valuation Risks and Impacts on Capital Requirements and Liquidity Buffer

In our view, banks should set up a process to identify their exposure to VR, then measure and assess what amount of capital should be set aside for this additional risk. For the purposes of this paper, we will refer to this process as Internal Valuation Assessment Process (IVAP). The IVAP should be seen as a self-assessment of the VR framework (including both quantitative and qualitative aspects, e.g., governance and organization).

The IVAP should be supported by a sound VR measurement methodology to ensure that duplications in risk consideration are avoided (i.e., any capital buffer defined for VR does not refer to risks that are already captured in the definition of existing capital buffers). Doing so will help avoid setting aside unnecessary capital.

The IVAP should be conducted regularly to ensure the continued reliability of risk and capital figures and corroborate the figures reported in the financial statements.[28]

VR should be reflected in the overall risk appetite set by the bank's Board. The IVAP should be appropriately documented to assure key stakeholders, including supervisors and internal/external auditors, that the VR drivers relevant for the bank's business have been included and appropriately managed. The IVAP, including a comprehensive description of the bank's implemented VR framework, should then be reflected in the annual Internal Capital Adequacy Assessment Process (ICAAP).

The IVAP should also take into account possible overlap with the liquidity risk framework, which may arise in cases where VR refers to instruments that are already accounted for in the annual Internal Liquidity Adequacy Assessment Process (ILAAP).

27. For liabilities the formula should be expressed as follows: $\text{Loss}(i, t_{Exit}) = \max [Price(i, t_{Exit}) - FairValue(i, t_{Exit}), 0] \; \forall i \in \{Instruments\ set\}$
28. This process will allow to be fully compliant with the EBA Guidelines on Internal Governance [4], art 23, m, stating that "The management body's responsibilities should include setting, approving and overseeing the implementation of arrangements aimed at ensuring the integrity of the accounting and financial reporting systems, including financial and operational controls and compliance with the law and relevant standards".

4. Conclusion

Banking supervisors have prioritized their focus on VR due to its potential to create systemic risk. As a result, supervisory inspection plans are increasingly looking at banks' processes for determining the fair value of their financial instruments.

Increasingly, banks will be challenged by supervisors over their fair value determination practices under an approach that looks for consistency and rigor across the whole process. To address this, accounting and prudential requirements should be strongly coordinated. Rules, methodologies, and controls applied in the two remits must be firmly integrated and focused on ensuring that the most rigorous and coherent approach is used and that the space for fair value manipulation is removed.

From a methodological perspective, we believe the prudential regulatory framework does not ensure that a proper capital buffer is set aside by banks for this VR. We think a supplemental investigation by researchers and regulators is needed to develop an agreed perspective to address this risk. This should include identifying and enforcing a sound methodology for measuring VR — a challenge in itself as the source of the risk is exactly what makes it difficult to measure — lack of information.

Given the supervisory emphasis on the systemic importance of bank exposure to VR, we believe that regulatory action to impose a more extensive disclosure on bank exposure to VR would be welcome. Communicating increased clarity and transparency about banks' risks to the public would enhance trust and enable more accurate estimations of the risks embedded in banks' balance sheets by observers and analysts. It would also allow a bank's share prices to reflect the bank's risks more accurately.

This paper is an initial input to this debate. As a further piece of analysis, IBM will publish an impact analysis to shed further light on the level of exposure of the banking sector to VR.

These articles indicate IBM's strong willingness to continue contributing to this debate due to its potential to generate improvements in the banking prudential framework and enhance the resilience of the banking industry.

5. Works Cited

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Contact Us

Mario Onorato
Director, Head of Enterprise Risk Management, Europe
monorato@promontory.com
+39 02 3030 2231

Orazio Lascala
Director
olascala@promontory.com

Fabio Battaglia
Director
fbattaglia@promontory.com
+39 02 3030 2224

Arber Ngjela
Principal
angjela@promontory.com
+39 02 3030 2220