ISSN: 2029-4913 / eISSN: 2029-4921

VILNIUS TECH
Vilnius Gediminas Technical University

TECHNOLOGICAL and ECONOMIC DEVELOPMENT of ECONOMY

2026
Volume 32
Issue 2
Pages 631–661
https://doi.org/10.3846/tede.2026.25942

ENSURING FAIR TREATMENT OF INVESTORS: A NOVEL APPROACH FOR REVALUATION OF LIABILITIES FROM UNISSUED AND UNREDEEMED INVESTMENT SHARES IN COLLECTIVE INVESTMENT FUNDS

Adam P. BALCERZAK [1,3]✉, Roman SKALICKÝ [1], Marek ZINECKER [1,2], Tomáš MELUZÍN [1], Stanislav ŠKAPA [1], Michał Bernard PIETRZAK [1,4]

[1]*Faculty of Business and Management, Brno University of Technology, Brno, Czechia*
[2]*Faculty of Economic Sciences and Management, Nicolaus Copernicus University in Toruń, Toruń, Poland*
[3]*Faculty of Economic Sciences, University of Warmia and Mazury in Olsztyn, Olsztyn, Poland*
[4]*Faculty of Management and Economics, Gdańsk University of Technology, Gdańsk, Poland*

Article History:
- received 03 November 2025
- accepted 10 December 2025

Abstract. In the dynamic world of open-ended investment funds, where investors continuously enter and exit, and in funds with multiple classes of investment shares, a critical issue often goes unnoticed: the revaluation of liabilities from unissued and unredeemed shares. These liabilities, typically left unsettled and unrevalued for extended periods, can significantly skew the Net Asset Value per Share (NAVpS), leading to unfair treatment of different groups of investors. In this paper, a novel methodological framework designed to adjust the NAVpS is introduced that not only ensures fair treatment among all groups of investors, but also provides unbiased performance information to potential investors. It also addresses the complexities of non-revalued liabilities in funds with multiple investment classes, which can disrupt class allocation ratios. The practical implications of the framework are profound. The issues of fair allocation across multiple investment classes and mitigating distortions arising from unrevalued liabilities related to unissued and unredeemed shares are addressed. As demonstrated in focused case studies, these distortions can become significant, depending on the size of the liabilities and changes in the value of underlying assets. We believe that our approach contributes to a more transparent investment landscape for all stakeholders.

Keywords: collective investment funds, UCITS, AIFs, fair treatment, valuation, revaluation, liabilities, unissued, unredeemed, investment shares, IFRS.

JEL Classification: G12, G23, G28, K22.

✉Corresponding author. E-mail: ***a.balcerzak@uwm.edu.pl***

1. Introduction

The Undertakings for Collective Investment in Transferable Securities (UCITS) and Alternative investment Funds (AIFs) represent important types of collective investment schemes in the financial industry of the European Union (EU). They offer a wide range of investment opportunities to various types of investors and play a prominent role in mobilising capital and promoting economic growth (Fagetan, 2021; Schmies, 2024).

Recently, the issue of fair valuation and reporting of the assets and liabilities of investment funds has attracted considerable attention from both the scientific community and practitioners (Agarwal et al., 2023; Altamuro & Zhang, 2013; Andrejcik et al., 2021; Balcerzak

et al., 2023; Liao et al., 2021). According to IFRS 13 (International Accounting Standards Board [IASB], 2011), the fair value is "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".

The ability to determine the fair value of an asset significantly influences investment decision making (Elbannan, 2022). Recently, Andrejcik et al. (2021) provided a comprehensive literature review on the role of Fair Value Accounting (*FVA*) in the context of financialisation and globalisation of economies and identified a shift in financial reporting from the stewardship function toward the facilitation of investment decision making. In collective investment undertakings, the calculation of the fair value of investment shares is essential not only from the perspective of investors entering or exiting the fund, but also from the perspective of potential investors evaluating the investment opportunity. In principle, the difference between assets revalued to fair value under international accounting standards and funds' liabilities revalued to fair value represents the liability for investment shares issued (fund capital, net asset value), which is the basis for determining the price of the investment share or unit.

In the case of open-end funds (also mutual funds), the issuance of new investment shares for incoming investors or the redemption of shares for existing investors who are terminating their investment in the fund takes place at the predetermined price. Based on the orders received for the subscription of new investment shares, the fund incurs an obligation to issue a certain quantity of new investment shares corresponding to the amount paid by the investor and the determined value of the investment share (number of shares = investment amount / predetermined price). Based on the orders received for the redemption of investment shares, the fund incurs an obligation to pay the investor the specified amount, calculated from the number of redeemed shares and the predetermined price of the investment share.

As a result of various (regular or irregular) factors, typically stemming from the fact that the processes leading to the determination of the investment share price are time-consuming, it is not uncommon for many funds to face situations where these obligations are not settled by the next pricing date of the investment share. This means that these obligations become part of the process of determining the fund's liabilities from the issued investment shares and subsequently influence the share price at the next pricing date. The obligations arise from unissued investment shares that have already been paid for by investors and the obligation to pay the amount for the redeemed investment shares whose value has already been determined.

Liabilities from unissued investment shares are typically not revalued to fair value on the next pricing date of the investment share but remain at their nominal value (based on the number of investment shares to be issued multiplied by the price at which they are to be issued). Liabilities from unsettled redemptions are fixed. Their amount is determined by the number of shares being redeemed multiplied by the already established price. Upon settlement of this liability, the corresponding number of fund investment shares will be cancelled. However, their value generally fluctuates. A common approach to determining the new Net Asset Value per share (*NAVpS*) is to continue to allocate changes in fund capital (*Net Asset Value / NAV*) to these investment shares, which are to be redeemed at a fixed price (the price previously determined multiplied by their number).

In the first instance, the fact is overlooked that for unissued investment shares – whose price has already been set – there will need to be a future adjustment to align their value with that of the shares already issued at that point in time. In the second instance, a portion of the fund's results are allocated to investment shares that cannot longer absorb these NAV changes, and in the future, after their actual redemption, any gains or losses allocated to these shares from the moment their redemption price was established will be reabsorbed by the remaining investment shares of the fund.

This approach violates the principle of fairness between investors who enter, exit, and remain at the current and future *NAV* determination dates. In the case of (a) a failure to revalue liabilities from unsettled redemptions of investment shares related to the previous (or even earlier) *NAV* determination periods and (b) a subsequent decline in *NAVpS* at the new pricing date, the newly determined *NAVpS* is inflated (due to the allocation of *NAV* across all existing investment shares). This occurs because the approach fails to account for the fact that a portion of the fund's investment shares has a higher fixed value from the previous period, which will eventually be paid out. When these previously fixed liabilities from investment shares are eventually settled, the difference will be borne by the remaining investment shares (and investors) who remain in the fund. Investment shares (and investors) who submit redemption requests before this future settlement will benefit from an unfair advantage. The burden will also fall on new investors who purchase investment shares at a price higher than what accurately reflects the liability from unsettled redemptions.

In the case of an increase in *NAVpS* on the new pricing date, a higher amount than the corresponding liability would be allocated to investment shares whose value was contractually fixed in the previous period. This would unjustly burden investors who chose to sell their investment shares at the newly established price. In contrast, new-entry investors and those who remain in the fund would gain an unfair advantage. They would realise this benefit at the time of settlement of these previously unsettled redemptions. In the event that the liabilities from unissued investment shares of the previous period are not revalued and a subsequent increase in *NAVpS*, the *NAVpS* becomes overvalued because the capital gain of the fund is not allocated to these unissued shares. This allocation occurs only abruptly once the shares are issued. Such a situation unjustly benefits investors submitting redemption requests, while disproportionately burdening those entering the fund or remaining in it.

Taking into account the above, the main objective of this paper is to contribute to the discussion on the fair treatment of all investors in collective investment funds by proposing a novel method for revaluing liabilities from unissued and unredeemed investment shares to prevent the preferential or disadvantageous treatment of certain groups of investors. Moreover, in this paper we propose a model tackling the issue of non-revaluation of liabilities from unissued and unredeemed own investment shares in funds that issue multiple classes of investment shares. In these funds, the non-revaluation of liabilities from unissued and unredeemed own investment shares can permanently alter the allocation ratios of the classes, thereby affecting the relative positions of the different classes of investors.

Based on the research objectives, the following research questions are derived to address specific aspects of our research: (a) Under what conditions do open-ended fund structures, with continuously entering and exiting investors, experience distortions in the calculated

NAVpS due to the non-revaluation of liabilities arising from unissued and unredeemed own investment shares? (b) Which investors are adversely affected by such a situation? (c) Which variables the magnitude of the distortion is sensitive to? (d) How to adjust the calculated *NAVpS*, which was determined without revaluing the liabilities arising from unissued and unredeemed own investment shares, so as to eliminate the distortion and ensure that no group of investors is disadvantaged?

The methodological approach introduced here addresses an essential issue related to the fair distribution of the fund's capital among its investors. This includes investors entering, exiting, or remaining in the fund, particularly in the case of open-ended structures, as well as investors from different investment classes within the fund. To our best knowledge, the proposed mechanism for revaluing liabilities from unissued and unredeemed investment shares, the application of corrections to published prices, or the integration of the revaluation of such liabilities into the allocation mechanism represent a significant extension of the methods described in the financial theory so far.

The methodological framework introduced in this paper has practical implications, as it addresses the issue of fair allocation across multiple investment classes when distortions arise from un-revalued liabilities related to unissued and unredeemed investment shares. Depending on factors such as the size of unrevalued liabilities and the change in the value of the underlying assets, these distortions can reach significant values.

The remainder of the paper is organised as follows. In the literature review, an in-depth analysis of existing research on fair valuation in collective investment vehicles is performed. Next, the methodology section describes our data and research design. The actual proposal of the novel valuation method is presented in the research results section, which is followed by a discussion and conclusions.

2. Literature review

Undertakings for Collective Investment in Transferable Securities (UCITS) and Alternative Investment Funds (AIFs) play an important role in the development of the EU financial market, as they boost investor confidence by enforcing strict liquidity and risk management rules and encourage participation of both retail and institutional investors in economic development (Eling & Faust, 2010; Gregoriou, 2006). The regulation is mainly based on two Directives and related ancillary legislation: Directive 2009/65/EC of 13 July 2009 on "the coordination of laws, regulations, and administrative provisions relating to undertakings for collective investment in transferable securities" (UCITS Directive) (The European Parliament & the Council of the European Union, 2009) and Directive 2011/61/EU of 8 June 2011 on "Alternative Investment Fund Managers" (AIFMD) (The European Parliament & the Council of the European Union, 2011). While the UCITS Directive is intended to regulate retail investment funds invested in securities and other financial tools and their management structures, the AIFMD focusses mainly on the regulation of "alternative investment fund managers (AIFM) with respect to their management and marketing of alternative investment funds (AIF)' (Fagetan, 2021; Schmies, 2024).

As noted by Hoffmann and Paetzmann (2018), the AIFM Directive of 2011 for the first time established extensive valuation principles for UCITS and AIFs (alternative investment funds). In

article 19 of the AIFM Directive, a set of basic valuation rules with respect to the calculation of the NAV is defined. A further specification of these principles for the valuation of assets by AIFM provided in Article 19 (11) can be found in Section 7 of the separate Regulation of International Accounting Standards Board [IASB], (2011).

The objective of the AIFM Directive is to "ensure a reliable and objective asset valuation in order to protect the interests of investors" (Hoffmann & Paetzmann, 2018). This objective should be achieved by additional provisions regarding the purpose of the valuation, valuation approaches, the frequency, authorised valuers, and valuation rules (Hoffmann & Paetzmann, 2018).

The assets and liabilities of UCITS/AIFs in the EU are valued according to the Commission Regulation (EU) 2023/1803 of 13 August 2023 (The European Parliament & the Council of the European Union, 2023) adopting certain international accounting standards in accordance with Regulation (EC) No. 1606/2002 of the European Parliament and of the Council of 19 July 2002 (The European Parliament & the Council of the European Union, 2002). Furthermore, in the European area, AIFs follow Directive 2011/61/EU on AIFMD, which also regulates the principles and procedures for the valuation of their assets and liabilities (The European Parliament & the Council of the European Union, 2011). The AIFMD sets out the details of the valuation process for AIFs' assets, which is carried out in accordance with the valuation rules set out in the legislation of the country in which the particular AIF is domiciled. These national regulations generally ultimately refer to international accounting standards and fair value measurement under IFRS 13 (International Accounting Standards Board, 2011) adopted by Regulation EU/2023/1803 (The European Parliament & the Council of the European Union, 2023, for more details on current regulations, see, e.g., Gortsos, 2017).

A continuous and proper determination of the Net Asset Value (NAV) and its disclosure to investors is essential for the investment decision-making process (Brown et al., 2023; Migliavacca et al., 2021). In this sense, the quality of accounting information is crucial (Biddle et al., 2009). Any factor adversely affecting the quality of financial statement information leads to an increase in the cost of processing accounting data, which in turn is reflected in the level of the risk premium and the increased risk of adverse selection (Leuz & Wysocki, 2016; Migliavacca et al., 2021; Roychowdhury et al., 2019). Distorted accounting information can cause a "vicious circle" in which unreliable information gradually reduces the medium- and long-term value of the firm (Migliavacca et al., 2021).

Recently, Fair Value Measurement/Accounting (FVM/FVA) has become a prominent concept with respect to the determination of the NAV in collective investment funds. Both the International Financial Reporting Standards/IFRS (International Accounting Standards Board, 2011) and the US Generally Accepted Accounting Principles (GAAP) refer to fair valuation (Marra, 2016; Santoni & Salerno, 2023). Fair value is defined as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants on the measurement date" (Balcerzak et al., 2023; Busso, 2015; International Accounting Standards Board, 2011). Proponents of FVM believe that fair value reporting can reduce information asymmetry and increase transparency while, e.g., capturing changes of business conditions in valuations in a timely manner (Ferreira et al., 2019; Henderson & Mamo, 2025; Migliavacca et al., 2021). The benefits of FVM should be obvious in crisis

periods, in particular, since information based on fair valuation provides greater information content than information based on historical cost (Liao et al., 2021). However, there are also some critics of FVM, emphasising that this potentially reduces its relevance to some categories of stakeholders. The most common concerns about the reliability of FVM are related to inefficient, illiquid or non-existent markets, and when managers are stimulated to "act strategically when applying judgments and estimates to determine fair values" (Ferreira et al., 2019). Furthermore, using this accounting practice could be associated with "procyclicality, financial instability, or inadequacy in illiquid markets or specific business models" (Marra, 2016; Mora et al., 2019). Some authors (e.g., Hitz, 2007; Ronen, 2008; Whittington, 2008) have also emphasised that the increasing implementation of FVM could shift "the stewardship function of financial reporting towards the facilitation of investment decision making" (see also Andrejcik et al., 2021).

Given the definition of fair value according to IFRS 13 (IASB, 2011) and Commission Regulation (EU) 2023/1803 (The European Parliament & the Council of the European Union, 2023) it can be said that FVM is a dynamic concept where an asset or liability is subjected to a series of assessments in changing circumstances after initial recognition. Essential to the relevance and reliability of the reported value of the funds' investment shares is not only the corresponding FVM of the assets, but also the FVM of the liabilities. This can be documented in a study by Elbannan (2022) following the question of whether fair values provide useful information for management decision making in the US banking sector. The author presents empirical evidence that FVM, particularly of liability items, can improve stock price informativeness for decision makers, however, always with respect to the account type (asset or liability) and the investment area. In conclusions, Elbannan (2022) suggests that fair values could be of particular importance to market participants if they (a) equip managers with new information which are relevant for decision-making, (b) are less influenced by opportunistic managerial discretion, and (c) are less subject to uncertainty given by recent external developments. Jenkinson et al. (2020) analysed whether fair value estimates of fund Net Asset Values (NAVs) in the private equity industry are a precise and unbiased predictor of expected cash flows discounted to present value. The calculations revealed that the estimated NAVs are in general reliable predictors of future cash flows of the funds; however, the NAV of venture capital funds are significantly more biased compared to the buyout funds in the period studied (1988–2016). This conclusion is essential for investors in private equity funds when considering the relevance and reliability of NAV estimates provided by fund managers.

In a previous study, Altamuro and Zhang (2013) also made an important contribution to the academic discussion on the measurement of assets and liabilities at fair value. With reference to Statement of Financial Accounting Standard (FAS) 157, the authors used the defined input hierarchy (Level 1, Level 2, and Level 3) to be used in the measurement of fair value. The fair value of mortgage service rights (MSRs) was calculated while applying managerial input (level 3) and market input (Level 2) to uncover which of the input levels better reflects the cash flow and risk characteristics of the underlying asset. The main conclusion of the study is that managers can produce higher quality fair value estimates than market inputs. The reason behind this is that managers have an information advantage, especially during inactive and illiquid periods on the market with the underlying asset. Furthermore, Lawrence et al.

(2016) focused on revaluating the generally accepted conclusion that the Level 3 fair value measurements deliver less relevant results than Level 1 and Level 2 fair value measurements. They analysed a sample of 710 closed-end funds that ranged from equity funds reporting predominantly Level 1 fair values to restricted fixed income and mortgage-backed security funds reporting substantial Level 3 fair values. The research results suggest that there are only small differences in value relevance across the fair value hierarchy. To be more specific, the authors provide empirical evidence that the fair values of Level 3 are of similar value relevance to the fair values of Level 1 and Level 2, which contradicts prior studies (Song et al., 2010).

The issue of preferential treatment of some groups of investors in investment funds due to unfair valuation techniques has been neglected in academic debates. To our best knowledge, there is only one study dealing with this topic: De Luca (2021) examined preferential treatment in investment funds under Italian jurisdiction, focussing on Class A and Class B shares in "reserved" Alternative Investment Funds (AIF). Class A shares have seniority and minimum interest privileges, protecting them from losses and guaranteeing a minimum return. This impacts Class B shares, reducing their value proportionately. The analysis concludes that preferential treatment is acceptable if it enhances the overall welfare of the fund's investors. However, any preferential treatment that causes a "wealth shift" from one investor or class to another violates the "non-contagion" principle and is considered unfair. The valuation aspect, however, remains untouched even in this paper.

3. Methodology

A mixed methods approach is used here to study the question of *how to revalue liabilities from unissued and unredeemed investment shares in collective investment funds to prevent the preferential or disadvantageous treatment of certain groups of investors*. This methodological approach is useful in exploring emerging or under researched topics, particularly when empirical data are limited or when exploring the implications of new models. According to Lurtz et al. (2021), it incorporates the use of both qualitative and quantitative data.

In our specific case, qualitative data is represented by the regulatory framework (e.g., IFRS, GAAP) and deep expert knowledge across multiple domains of finance, accounting, and market behaviour. This enables us to provide context and justification for the novel valuation method and construct reality, i.e., exploring the complex, context-rich phenomena (research gap) under study (Lim, 2024). Without strong expertise in the research field, a new valuation approach introduced in this paper could face the risk of being inaccurate, non-compliant, or failing to gain acceptance by market participants.

The novel valuation model was developed based on established financial theory, current law, and expert insights to incorporate market-specific input variables. A thought experiment was adopted to advance the existing theory. In the area of finance, thought experiments are often applied to support researchers, e.g., when there is a need to develop performance measures and "form a more accurate picture of the performance construct" (Aguinis et al., 2023). A set of realistic scenarios was designed to model the impact of the failure to capture or revalue liabilities on *NAV*. In the academic financial literature, scenario modelling is an important approach to forecast an uncertain future (Varum & Melo, 2010; Wang et al., 2024;

Wack, 1985; Zioło et al., 2022). The purpose of scenario modelling does not consist in forming a specific forecast, but in supporting users to gain understanding of key factors affecting the phenomena under study (Cropper & Cowton, 2025, 2021).

In the first step, our scenario analysis involves the construction of initial situations that illustrate the consequences of failing to capture or revalue liabilities (S1: Failure to capture liabilities from repurchase requests received; S2: Non-revaluation of liabilities from unissued investments shares). Second, we examine the scenarios of *NAVpS* development and their impact on investors entering or exiting the fund. We also examine the evolution of NAVpS from the perspective of investors remaining in the fund. Third, theoretical valuation equations were derived for the following situations: (a) the impact of price on investment shares (*NAVpS*) in the case of unissued investment shares; (b) the impact on the price of investment shares (*NAVpS*) in the case of unredeemed investment shares; (c) the impact on the price of investment shares (*NAVpS*) in the case of own investment shares not yet issued and redeemed; (d) the impact on the price of investment shares (*NAVpS*) in the case of own investment shares not yet issued and redeemed for multiple measurement periods. As many funds offer investors the opportunity to invest in multiple investment share classes, we have to adjust the allocation ratio to reflect existing liabilities from unissued investment shares and unredeemed investment shares whose prices are already fixed at the date of determination of the current price.

This research paper adopts the case study approach to verify the effectiveness of the designed valuation concept. The use of case studies for validation is well-established in prior research; several authors have employed this method to test the applicability and performance of their models or conceptual frameworks in practice (Balcerzak et al., 2023; Hu et al., 2024; Skalický et al., 2022).

Therefore, we first model the impact of not revaluing liabilities from unissued and unredeemed investment shares on the financial returns of different groups of investors and then use the case study approach to validate whether the proposed valuation concept delivers the appropriate results. Among others, Sachan et al. (2024) and Palepu (2020) adopted the case study approach to illustrate the application of valuation methods while using micro-level financial data from mutual funds. Sachan et al. (2024) analysed the performance of the Axis Bluechip fund using a proposed machine learning technique. This involved linear regression analysis on the Yahoo Finance dataset to predict the Net Asset Value (*NAV*) of mutual funds. The study compared various algorithms to determine the accuracy of the models.

We introduce two case studies, which are based on authentic business examples to show how the designed methodology can be applied by users who encounter situations where the risk of unfair treatment of certain groups of investors arises. These case studies are meticulously chosen to reflect real-world scenarios, ensuring that the methodology's practical relevance is clearly demonstrated.

The methodological approach shown in Figure 1 can be described as follows.

(a) Financial background explanation: each case begins with a concise, yet comprehensive overview of the financial background. This includes details such as the type of business, the financial instruments involved, and the specific circumstances that led to the potential risk of unfair treatment. By providing this context, we aim to ground the reader in the real-world setting of the case.

(b) Demonstration of limitations and gaps: Following the financial background, we highlight limitations and gaps in current Net Asset Value (NAV) calculation approaches. This section is critical, as it sets the stage for the necessity of the novel methodology. We discuss specific shortcomings, such as inaccuracies in valuation, lack of transparency, and potential biases that could lead to unfair treatment of certain investor groups.

(c) Application of the novel methodological approach: The core of each case study involves applying the novel method described in the Research Results section, specifically using Eqs. (1)–(15d). This application is done with real numerical data to ensure authenticity and practical relevance. We walk through the step-by-step process of implementing the method, providing detailed calculations and explanations at each stage.

(d) Comparison of results: To enhance understanding, we present the calculation results in both tabular and graphical formats. This dual presentation allows for a clearer comparison and better visualisation of the outcomes. By comparing the traditional NAV calculation results with those obtained using the novel method, we illustrate the improvements and benefits of the new approach. This comparison significantly helps to understand the problem-solving process and the effectiveness of the methodology.

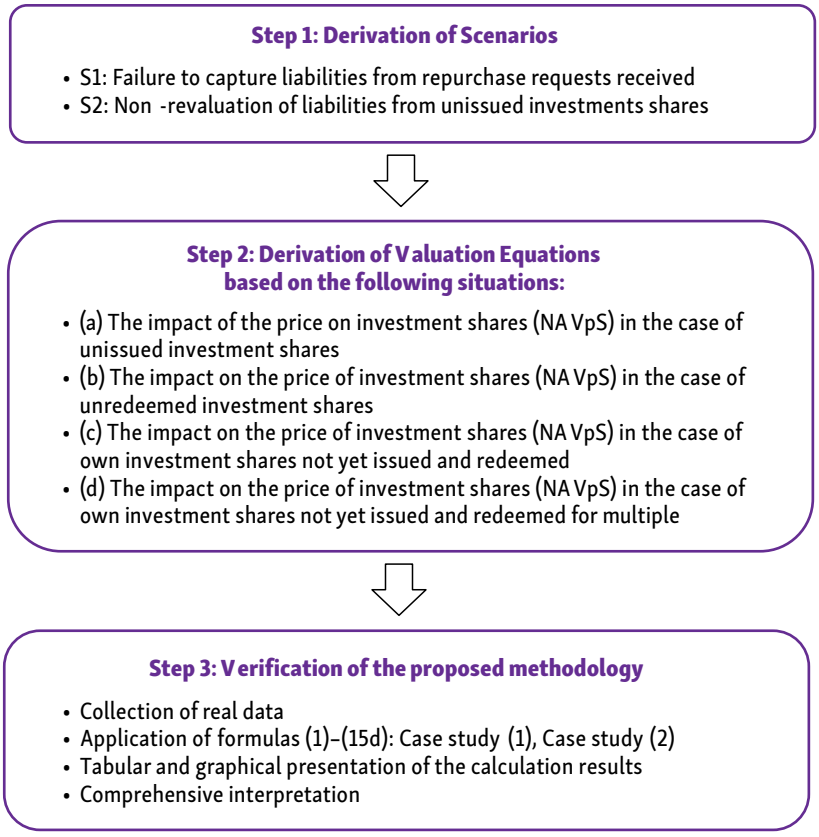

Figure 1. Methodological framework (source: authors, 2025)

We believe that this structured approach, which combines a detailed financial background, critical analysis of existing methods, practical application of the new method, and comprehensive comparison of results, significantly improves understanding of the problem-solving process. It not only demonstrates the efficacy of the novel methodology but also provides a clear, practical guide for users facing similar challenges in real-world scenarios.

4. Research results – a novel methodological framework

Although funds for qualified investors in the EU revalue their assets and liabilities at fair value according to IFRS 13 (International Accounting Standards Board, 2011), this usually does not apply to (a) liabilities from unissued investment shares of the fund itself, where the issuance price has already been determined but the shares have not yet been issued; (b) liabilities from investment shares of the fund that have not yet been repurchased, where the repurchase price has already been set but the actual repurchase has not yet occurred.

If liabilities from unissued investment shares from the previous period are not revalued and there is a decrease in the *NAV* per share (*NAVpS*), the current value of the NAVpS is undervalued. This situation disadvantages investors who are requesting a repurchase in the current period, while benefiting those who are either entering the fund or remaining in it. On the contrary, if the value of the *NAVpS* increases, the value of the investment shares is temporarily overvalued. If the liabilities from investment shares that have not yet been repurchased, whose price has already been set, are not revalued, the *NAVpS* decreases, leading to a temporary overvaluation of the share price.

The impact of these different scenarios on (a) new investors entering the fund at the current *NAVpS*, (b) investors exiting the fund at the current *NAVpS*, and (c) investors remaining in the fund is illustrated in Figure 2.

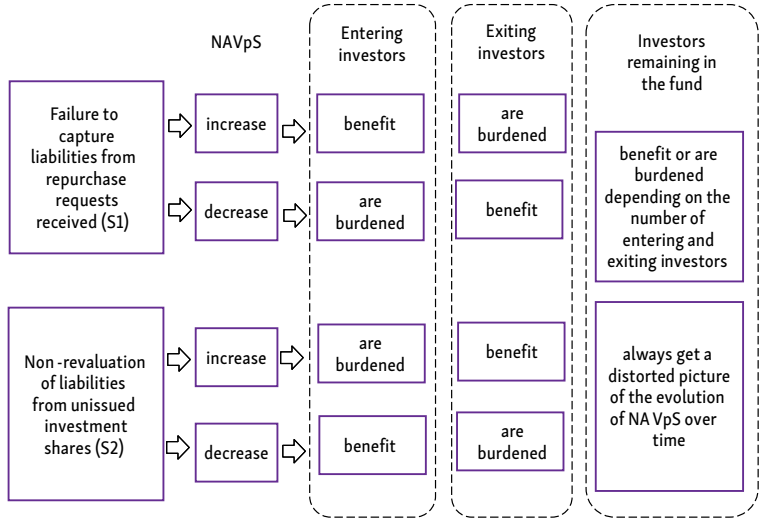

Figure 2. Scenario analysis – *NAVpS* resulting from failure to capture or revalue liabilities (source: authors, 2025)

The importance of not revaluing the liability from unissued or unredeemed investment shares on announced *NAVpS* varies depending on the change in the fund's net asset value and the relative amount of unissued or unredeemed investment shares relative to existing (already issued) investment shares.

4.1. Own investment shares not issued yet

The price impact on investment shares (*NAVpS*) in the case of unissued investment shares can be expressed by the Eq. (1):

$$\frac{NAVpS_{\text{with the effect of unissued investment shares}}}{NAVpS_{\text{excluding the effect of unissued investment shares}}} = \frac{NAV_1 \times I_0 + NAV_0 \times I_{NE}}{NAV_1\left(I_0 + I_{NE}\right)}, \quad (1)$$

where: NAV_0 is the *NAV* of the fund at time T_0 when determining the price of investment shares that have not yet been issued; I_0 is the number of investment shares of the fund; I_{NE} is the number of investment shares that have not yet been issued at the price already set at time T_0 but have not yet been issued. *Note*: At time T_1, the *NAV* of the fund is equal to NAV_1. The impact depends on the number of unissued investment shares relative to the number of existing investment shares at time T_0 and the change in the fund's *NAV* between T_0 and T_1.

Denoting the percentage change in *NAV* between time T_0 and T_1 as n and the ratio of the number of unissued investment shares to the number of issued investment shares as e, we can express the percentage deviation of the investment share price at time T_1 accounting for the change in the liability from unissued investment shares relative to the investment share price that does not account for the change in the value of that liability as follows:

$$\frac{NAVpS_{\text{with the effect of unissued investment shares}}}{NAVpS_{\text{excluding the effect of unissued investment shares}}} - 1 = \frac{-ne}{\left(1+n\right)\left(1+e\right)}. \quad (2)$$

4.2. Own investment shares not redeemed yet

The impact on the price of investment shares (*NAVpS*) in the case of unredeemed investment shares can be recorded according to Eq. (3).

$$\frac{NAVpS_{\text{with the effect of unredeemed investment shares}}}{NAVpS_{\text{excluding the effect of unissued investment shares}}} = \frac{NAV_1 * I_0 - NAV_0 \times I_{NB}}{NAV_1\left(I_0 - I_{NB}\right)}, \quad (3)$$

where: NAV_0 is the *NAV* of the fund at time T_0 when the price of the investment shares is determined (these have not been, however, repurchased by the investment fund); I_0 is the number of investment shares issued by the fund. I_{NB} is the number of unredeemed investment shares that should have been redeemed at the price set at time T_0 but are not yet redeemed at time T_1. *Note*: At time T_1, the *NAV* of the fund is NAV_1. The impact on the new investment share price depends on the number of unredeemed investment shares relative to the number of investment shares at time T_0 and the change in the *NAV* of the fund between T_0 and T_1.

If we denote the percentage change in the *NAV* between T_0 and T_1 as n and the ratio of the number of unredeemed investment shares to the number of issued investment shares as b, we can write the percentage deviation of the price at time T_1 reflecting the change in the

liability on unredeemed investment shares relative to the investment share price that does not reflect the change in the value of that liability as follows:

$$\frac{NAVpS_{\text{with the effect of unissued investment shares}}}{NAVpS_{\text{without the effect of unissued investment shares}}}-1=\frac{nb}{\left(1+n\right)\left(1-b\right)}. \tag{4}$$

4.3. Own investment shares not issued yet and not redeemed yet

If we capture both effects simultaneously, the percentage deviation of the investment share price at time T_1, after revaluing the liability for unissued investment shares and the liability for unredeemed investment shares from the investment share price without revaluing these liabilities, will be as shown in Eq. (5), depending on the proportion of unissued investment shares, the proportion of unredeemed investment shares, and the percentage change in the fund's *NAV*:

$$\frac{NAVpS_{\text{with the effect of unissued and unredeemed investment shares}}}{NAVpS_{\text{excluding the effect of unissued and unredeemed investment shares}}}-1=\frac{n\left(b-e\right)}{\left(1+n\right)\left(1+e-b\right)}. \tag{5}$$

If there is a simultaneous non-revaluation of unissued and unredeemed investment shares, the impact of this fact (non-revaluation) on the price of investment shares at time T_1 tends to offset each other. If there are equal numbers of unissued investment shares and unredeemed investment shares, the impact on the price of the liabilities arising from these facts is zero.

The most significant impact on the price can be expected if, at any given time, there is only a failure to issue or redeem investment shares at an already established price. The impact of this fact increases with the proportion of investment shares not issued or redeemed and with the percentage change in the *NAV* of the fund. Both values (the proportion of unissued/unredeemed investment shares and the percentage change in the *NAV* of the fund) have the same effect.

4.4. Own investment shares not issued yet and not redeemed yet for multiple measurement periods

The above formulas are valid assuming that there are no issues or repurchases of investment shares in the period T_0 to T_1 and the number of shares issued is constant. In real world, however, it is often the case that (a) only a portion of the investment shares to be issued or repurchased at the previous price are issued or repurchased, or (b) investment shares are unissued or unredeemed for multiple measurement periods. The above deviations are then cumulative over multiple measurement periods. For multiple periods with unissued investment shares, the percentage change in the impact on the investment share price at time T is as follows:

$$\frac{NAVpS_{\text{with the effect of unissued investment shares}}}{NAVpS_{\text{without the effect of unissued investment shares}}}-1=\frac{\sum_{i=-1}^{-m} I_{NE_i}\left(NAVpS_i-NAV\right)}{NAV\left(I+\sum_{i=-1}^{-m} I_{NE_i}\right)}, \tag{6}$$

where: *NAV* is the *NAV* of the fund corresponding to the present time T_1; I is the number of investment shares of the fund actually issued at the present time T_1; i represents the past

valuation periods; I_{NEi} is the number of unissued investment shares from the *i-th* valuation period; $NAVpS_i$ is the corresponding past price at which those investment shares are to be issued; m is the most distant past valuation period at which some investment shares are not issued.

In the case of multiple periods with unredeemed investment shares, the percentage change in the price of the impact on the investment share at time T_1 can be recorded as follows:

$$\frac{NAVpS_{\text{with the effect of unissued investment shares}}}{NAVpS_{\text{without the effect of unissued investment shares}}} - 1 = \frac{\sum_{i=-1}^{-m} I_{NB_i}\left(NAV - NAVpS_i\right)}{NAV\left(I - \sum_{i=-1}^{-m} I_{NB_i}\right)}, \quad (7)$$

where: NAV is the fund's NAV at time T_1; I is the number of investment shares actually issued by the fund at time T_1; i represents past valuation periods; I_{NBi} is the number of unredeemed investment shares from the *i-th* valuation period; $NAVpS_i$ is the price at which those investment shares are to be redeemed; m is the furthest past valuation period at which some investment shares are not redeemed as of the date the current investment share price is determined.

For multiple periods with unissued and unredeemed investment shares, the percentage change in the impact on the investment share price at time T_1 can be recorded as follows:

$$\frac{NAVpS_{\text{with the effect of unissued investment shares}}}{NAVpS_{\text{without the effect of unissued investment shares}}} - 1 = \frac{\sum_{i=-1}^{-m}\left(I_{NE_i} - I_{NB_i}\right)\left(NAVpS_i - NAV\right)}{NAV\left(I - \sum_{i=-1}^{-m}\left(I_{NE_i} - I_{NB_i}\right)\right)}, \quad (8)$$

where: NAV is the fund's NAV at time T_1; I is the number of investment shares actually issued by the fund at time T_1; i is the number of past valuation periods; I_{NE_i} is the number of unissued and I_{NB_i} is the number of unredeemed investment shares from each past valuation periods; $NAVpS_i$ is the corresponding determined price at which those investment shares are to be issued or redeemed; m is the most distant past valuation period at which some investment shares are not issued or redeemed at the date of determination of the present price of the investment share.

Eq. (8) shows that if there has not yet been an issue of investment shares in a previous period and there has not been a repurchase in the same period, the effect of these facts on the variation in the price of investment shares in the current valuation period is offset. The formula can be used to determine the adjustment to the investment share price and, by multiplying by the number of investment shares issued (I) at the price determination date, the amount of the change in the fund's liability for unissued and unredeemed investment shares can be calculated.

4.5. Multi-asset class investment funds

The solutions set out in the above paragraphs apply to funds with a single investment asset class. However, funds may have assets in several investment classes. In such cases, the exclusion of unissued and unredeemed investment shares from the calculation: (a) does not only affect the price of the investment shares in the valuation period (respecting the fact that when

the actual issuance or redemption of investment shares whose price is already fixed from previous periods occurs, the deviation in *NAVpS* is eliminated and only investors who entered or exited the fund in the periods concerned are affected), but (b) also affects the allocation of the fund's capital between the investment classes. These changes may be permanent.

Assume that the allocation mechanism of the fund's capital to each investment class is as follows:

$$A\left(i\right)_T = \frac{gNav\left(i\right)_{T-1} - MF\left(i\right)_{T-1} + Enter\left(i\right)_T - Exit\left(i\right)_T}{gNav\left(F\right)_{T-1} - MF\left(F\right)_{T-1} + Enter\left(F\right)_T - Exit\left(F\right)_T}, \tag{9a}$$

where: $A(i)_T$ is the allocation ratio of investment class (i) to the fund capital of the fund; $gNav(i)_{T-1}$ is the fund capital of investment class (i) before the performance fee of the relevant (e.g., accounting) period and before the specific fee of class $MF(i)_{T-1}$ in the previous valuation period ($T - 1$) when the price of investment shares of class i was determined.

The exception is the first valuation during the valuation period for which the allocation ratio takes the form Eq. (9b):

$$A\left(i\right)_T = \frac{Nav\left(i\right)_{T-1} + Enter\left(i\right)_T - Exit\left(i\right)_T}{Nav\left(F\right)_{T-1} + Enter\left(F\right)_T - Exit\left(F\right)_T}, \tag{9b}$$

where: $Nav(i)_{T-1}$ is the fund capital of class (i) at the end of the previous valuation period, which is the basis for the calculation of the performance fee after all fees; $Nav(F)_{T-1}$ is the fund capital at the end of the previous valuation period, which is the basis for the calculation of the performance fee after all fees. In Eqs. (9a) and (9b): $Enter(i)_T$ is the issuance of investment shares in investment class (i) from the last price determination to the current price determination date; $Exit(i)_T$ is the redemptions of investment shares in investment class (i) of the fund from the last price determination to the current price determination date; $gNav(i)_{T-1}$ in Eq. (9a) is the fund capital of class (i) before performance fees of class (i) of the assessment (e.g. accounting) period and the specific fees related to class (i) $MF(i)_{T-1}$ of the last past valuation period ($T - 1$) when the price of class i shares was determined; $gNav(F)_{T-1}$ in Eq. (9a) is the fund capital before performance fees related to the classes of the assessment (e.g. accounting) period and before specific fees related to the $MF(F)_{T-1}$ class of the most recent past assessment period ($T - 1$) when the investment share price was determined. The following relationship applies:

$$MF\left(F\right)_{T-1} = \sum_{i=1}^{n} MF\left(i\right)_{T-1}, \tag{10a}$$

where: $Enter(F)_T$ is the issuance of investment shares of the fund from the last price determination to the current price determination date; $Exit(F)_T$ is the redemptions of investment shares of the fund from the last price determination to the current price determination date. Therefore:

$$Enter\left(F\right)_{T-1} = \sum_{i=1}^{n} Enter\left(i\right)_{T-1} l; \tag{10b}$$

$$Exit\left(F\right)_{T-1} = \sum_{i=1}^{n} Exit\left(i\right)_{T-1}. \tag{10c}$$

Furthermore, it also applies:

$$gNav\left(F\right)_{T-1} = \sum_{i=1}^{n} gNav\left(i\right)_{T-1}. \tag{10d}$$

The *gNav* of investment class (*i*) at time *T* is then determined according to the following equation:

$$gNav\left(i\right)_T = A\left(i\right)_T \times gNav\left(F\right)_T. \tag{11}$$

Assume that the class specific fee *MF*(*i*) is determined by multiplying *gNav*(*i*) by some investment class specific percentage *m*(*i*):

$$MF\left(i\right)_T = m\left(i\right) * gNav\left(i\right)_T. \tag{12}$$

The performance fee is then formulated as a share of the appreciation of the fund capital of the class over a certain (here accounting) period net of the issuance of new investment shares and redemptions of investment shares of the class during that period. This share of the appreciation achieved is specific to each investment class. The calculation of the class performance fee is then based on the following equation:

$$PF\left(i\right) = f\left(i\right) \times \max\left[0; gNav\left(i\right)_T - MF\left(i\right)_T - NAV\left(i\right)_{start} - \sum_{start}^{T} inputs + \sum_{start}^{T} outputs\right], \tag{13}$$

where: *PF*(*i*) is the performance fee of class (*i*); $gNav(i)_T$ is the fund capital of class (*i*) at time *T* before the specific fee $MF(i)_T$ of class (*i*) at period *T* and the investment class performance fee of the assessment (accounting) period; $NAV(i)_{start}$ is the *NAV* of the investment class at the beginning of the assessment (accounting) period; $\sum_{start}^{T} inputs$ represent issuance of new investment shares of the investment class in each period of the assessment period; $\sum_{start}^{T} outputs$ represent repurchases of investment class shares in the same period.

If we were to adjust the price of the investment share, for example, according to Eq. (8), to account for the effect of revaluation of liabilities from unissued or unredeemed investment shares of the fund for which the price has already been fixed, we would not account for the change in these individual class liabilities in the allocation ratios of class *A*(*i*), and there would be a distortion further down the line. This is because the revaluation of the individual liabilities of the not yet issued and not yet repurchased but already contracted for investment shares applies only to the classes concerned. The change in these liabilities should therefore not affect other investment classes.

Therefore, when there are multiple investment classes, it is also necessary to adjust the allocation ratio in such a way that it considers existing liabilities from unissued investment shares and unredeemed investment shares whose prices are already fixed at the date of determination of the current price. Therefore, the subject of the class allocation should not only be the capital of the fund but also liabilities from unissued and unredeemed investment shares whose price is already fixed.

4.6. Modification of the allocation ratio for the distribution of liabilities from unissued and unredeemed investment share classes

Consistent with the above assumptions, assume that at time (*T* – *1*), $gNav(i)_{T-1}$ corresponds to the specific fee of class $MF(i)_{T-1}$ and the number $I(i)_{T-1}$ of investment shares of class (*i*) issued. The following relationship applies:

$$gP\left(i\right)_{T-1} = \frac{\left[gNav\left(i\right)_{T-1} - MF\left(i\right)_{T-1}\right]}{I\left(i\right)_{T-1}}, \tag{14}$$

where: $gP(i)_{T-1}$ is the gross price of investment shares of class (i) before the performance fee $PF(i)$ entering the calculation of the allocation ratio at time T.

If the allocation ratio were based on the number of all investment shares, regardless of whether they are issued or whether there is only a commitment to issue or repurchase investment shares at an already determined price, the allocation ratio could take the following form:

$$A.mod\left(i\right)_T = \frac{gP\left(i\right)_{T-1}\left[I\left(i\right)_{T-1} + I_{NE}\left(i\right)_{T-1} - I_{NB}\left(i\right)_{T-1}\right]}{\sum_{i=1}^{n} gP\left(i\right)_{T-1}\left[I\left(i\right)_{T-1} + I_{NE}\left(i\right)_{T-1} - I_{NB}\left(i\right)_{T-1}\right]}, \tag{15a}$$

The subject of this modified allocation is not only the fund capital of $gNav(i)_T$, but also the liabilities from outstanding issues and outstanding repurchases of investment shares. The motivation for this allocation is (a) to prevent performance carryover over time and (b) to transfer performance between investment classes through a reflection of the fact that:

- A part of the funds deposited for the issuance of investment shares is not part of the fund's capital (investment shares have not yet been issued), but constitutes a source of performance of the fund (class i), and in the future this performance will have to be matched for these unissued investment shares due to their already fixed price.
- Although some investment shares are still part of the fund's capital (investment shares have not yet been redeemed), their redemption value is already fixed, and it will not be possible to allocate the fund's gains and losses to them.

Because the value of the liability from unissued and unredeemed investment shares varies depending on the valuation of the investment shares, the allocation ratio is based on multiplying the gross value of the investment shares $gP(i)$ by the sum of the number of issued $I(i)$, unissued $I_{NE}(i)$, and unredeemed $I_{NB}(i)$ investment shares of the class.

Liabilities on unissued and unredeemed investment shares are revalued during the allocation process according to the value of fund capital attributable to issued and unissued investment shares.

In the chosen fee structure, where class (i) fund capital is burdened by a specific Class $MF(i)$ fee, but not the liability from unissued class (i) investment shares, the weighting of the liability from unissued investment shares in the allocation needs to be reduced accordingly. After the allocation of gross fund capital to the classes, this fund capital will be lower by an amount equal to $m(i)\times gNav(i)$ and the liability from unissued investment shares would thus be too high. In the same way, a specific $MF(i)$ class charge should be taken into account when revaluing investment shares for which a redemption price has already been set but which have not yet been redeemed ($I_{NB}(i)$).

Given the assumed form of the fee in (12), we reduce the weight of the liability allocation portion of the allocation ratio by $(1\text{-}m(i))$, because the following specific fee $M(i)$ will reduce the liabilities from the unissued investment shares by this value relative to the value of the investment shares already issued. Similarly, the specific charge $M(i)$ is not applied to investment shares of the relevant class not yet redeemed.

$$A.mod(i)_T = \frac{gP(i)_{T-1}\left\{I(i)_{T-1} + \left[I_{NE}(i)_{T-1} - I_{NB}(i)_{T-1}\right]\left[1-m(i)\right]\right\}}{\sum_{i=1}^{n} gP(i)_{T-1}\left\{I(i)_{T-1} + \left[I_{NE}(i)_{T-1} - I_{NB}(i)_{T-1}\right]\left[1-m(i)\right]\right\}}. \quad (15b)$$

In addition to the delayed issuance of I_{NE} and I_{NB} from previous periods, whose effect on undesirable changes in fund capital over time and across investment classes is eliminated by the modified allocation, there are also new orders for issuance of investment shares in the current period (*OrderEnter*) and new orders for redemptions in the current period (*OrderExit*). Due to the *MF*(*i*) charge, similar to the case of prior-period investment shares not yet issued and prior period investment shares not yet repurchased, the weighting of these amounts relative to current-period investment shares issued must be adjusted by a factor of (1-*m*(*i*)), see Eq. (15c).

$$A.\mathrm{mod}(i)_T = \frac{gP(i)_{T-1}\left\{I(i)_{T-1} + \left[I_{NE}(i)_{T-1} - I_{NB}(i)_{T-1}\right]\left[1-m(i)\right]\right\} + \left[Enter(i)_T - Exit(i)_T\right]\left[1-m(i)\right]}{\sum_{i=1}^{n}\left(gP(i)_{T-1}\left\{I(i)_{T-1} + \left[I_{NE}(i)_{T-1} - I_{NB}(i)_{T-1}\right]\left[1-m(i)\right]\right\} + \left[Enter(i)_T - Exit(i)_T\right]\left[1-m(i)\right]\right)}. \quad (15c)$$

Their value is shown in the modified allocation separately from the delayed issuance of new shares and delayed repurchases. The value is based on the number of investment shares in the order and the price of that order, i.e., the price of the investment share of class (*i*) at the previous valuation ($NAVpS(i)_{T-1}$), i.e., not $gP(i)_{T-1}$ as in the case of delayed pending issues of investment shares of the relevant class and delayed pending repurchases of investment shares of the relevant class. This is because the fund capital of the relevant investment class will be reduced by this amount in the future. The amount will also be entered, inter alia, into the calculation of the class performance fee under Eq. (13).

In the case of the first valuation period of the assessment period, the modified allocation according to Eq. (15c) is also subject to an analogous adjustment as in the case of the basic allocation according to Eq. (9a). The default allocation of fund capital to investment classes is *P*(*i*) instead of *gP*(*i*):

$$A.\mathrm{mod}(i)_T = \frac{P(i)_{T-1}\left\{I(i)_{T-1} + \left[I_{NE}(i)_{T-1} - I_{NB}(i)_{T-1}\right]\left[1-m(i)\right]\right\} + \left[Enter(i)_T - Exit(i)_T\right]\left[1-m(i)\right]}{\sum_{i=1}^{n}\left(P(i)_{T-1}\left\{I(i)_{T-1} + \left[I_{NE}(i)_{T-1} - I_{NB}(i)_{T-1}\right]\left[1-m(i)\right]\right\} + \left[Enter(i)_T - Exit(i)_T\right]\left[1-m(i)\right]\right)}. \quad (15d)$$

5. Application

The significance of revaluing liabilities from unissued investment shares, for which the price has already been determined, can be demonstrated in the following case studies. In the calculations, the methodology presented above is applied.

5.1. Case study 1

5.1.1. Background and evaluation of the case

An Alternative Investment Fund (AIF) invests in a specific asset whose price has decreased significantly. An additional demand from existing investors has arisen for new investment share

issues. However, by the next pricing date (31/3/2023), the investment shares had not been issued to the Fund (the delays were due to closing operations and an audit). By 31/3/2023, there was another significant decline in the price of the underlying asset. Failure to revalue the liability from the unissued investment shares had a significant impact on the announced value of the Fund's investment shares at 31/3/2023. It affected both investors entering the Fund on that date (issuance of new investment shares) and investors exiting the Fund at that date (redemptions of the Fund's investment shares). The specific NAV and price of the investment shares are shown in Table 3.

With the *NAV* halved if the number of investment shares remained constant and the liability from unissued investment shares was not revalued, the value of the investment shares also halved from EUR 5 to EUR 2.5. However, if the value of the underlying asset had not changed by the next investment share price determination date (30 June 2023), the Fund had no other income and expenses and the ordered investment shares had been issued, the liability from unissued investment shares would have lapsed. This would increase the *NAV* of the Fund, and the value of the investment shares would also increase (see Table 4).

Table 3. Scenario analysis – NAVpS resulting from failure to capture or revalue liabilities (source: authors, 2025)

NAV of the fund	Date	Number of investment shares issued	Price of investment shares
€ 20,000,000	31/12/2022	4,000,000	€ 5.0
Note: The value of investment shares is the simple quotient of the NAV of the fund as determined by the revaluation of assets and liabilities and the number of investment shares.			
Orders for new investment shares	Date	Number of investment shares issued	Price of investment shares
€ 10,000,000	31/12/2022	2,000,000	€ 5.0
Note: The number of investment shares is determined as a ratio of the size of the investment (in EUR) and the quoted price of the investment shares on the relevant date.			
Real issues of investment shares	Period	Number of newly issued investment shares	Price of investment shares
0 EUR	From 31/12/2022 to 31/3/2023	0	€ 5.0
Note: There was no actual issue of investment shares during the period, the issue price of which was set at 31/12/2022.			
NAV of the fund	Date	Number of investment shares	Price of investment shares
€ 10,000,000	31/3/2023	4,000,000	€ 2.5
Note: The price of investment shares is the simple ratio of the NAV of the Fund as determined by revaluation of assets and liabilities and the number of investment shares. However, there has been no revaluation of the liabilities from unissued investment shares at the price at 31/12/2022.			
Liability from unissued investment shares	Date	*Note*: The liability from unissued investment shares at the price at 31/12/2023 remains unchanged at 31/3/2023.	
€ 10,000,000	31/3/2023		

Table 4. The effect of extinguishing an unrevalued liability from unissued investment shares on investment shares of the Fund (source: authors, 2025)

Real issue of investment shares	Period	Number of investment shares issued	Price of investment shares
€ 10,000,000	From 31/3/2023 to 30/6/2023	2,000,000	€ 5.0
Note: Based on the original order, 2,000,000 new investment shares have been issued, for which funds of € 10,000,000 have been deposited. This extinguishes the liabilities from unissued investment shares.			
NAV of the fund	Date	Number of investment shares issued	Price of investment shares
€ 20,000,000	30/6/2023	6,000,000	€ 3.33
Note: The real issue of investment shares resulted in a greater increase in the NAV of the Fund than the number of investment shares issued.			

Only because investment shares have been issued, the price of investment shares has increased by 33% between 31/3/2023 and 30/6/2023. Investors who sold their investment shares at the price on 31/3/2023 are affected. They will receive only EUR 2.5 per share. By contrast, investors who subscribed to investment shares at the 31/3/2023 price benefit substantially. Although the underlying assets of the fund have not changed in value by 30.6.2023, this group of investors can report a return of 33%. Potential investors are exposed to the risk of distortion in the performance of the fund over time. For details, see Figure 3.

5.1.2. Proposed solution and conclusions

Adjusting the price of the investment shares as of 31/3/2023 in the presence of a liability from the unissued investment shares can be made according to Eq. (5). The inputs to the calculation are shown in Table 5. *Obviously, the application of the model proposed in the research findings section results in a 33% change in the investment share price from € 2.5 to € 3.33.*

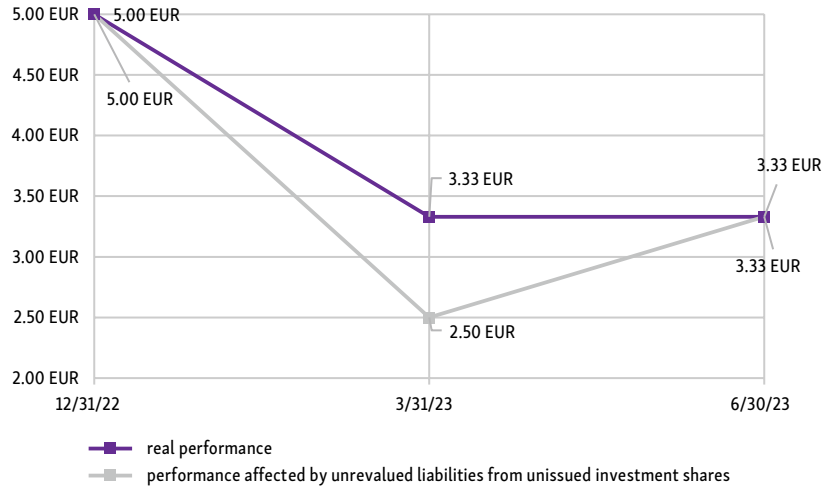

Figure 3. Performance of the investment shares and the performance of the Fund as a whole as affected by the unrevalued liability from unissued investment shares (source: authors, 2025)

Table 5. Inputs to the adjustment of the price of the calculation of investment shares (source: authors, 2025)

Variable		Value
Change in NAV since last valuation excluding the effect of the liability from unissued and unredeemed investment shares of the Fund (in %)	n	–0.5
Share of unredeemed investment shares in the number of issued investment shares of the Fund	b	0
Share of unissued investment shares in the number of issued investment shares of the Fund	e	0.5

5.2. Case study 2

5.2.1. Background and evaluation of the case

In the next example, we consider a fund with multiple investment share classes. In this case, the allocation mechanism for dividing the fund's capital into classes is affected when liabilities on unissued and unredeemed investment shares are not settled. The prices of investment shares that are not issued or repurchased are also affected.

We are considering a fund with four investment classes. The classes have common assets and liabilities and differ only in the amount of the specific investment class fee $MF(i)$ and the performance fee $PF(i)$. The fee structure of $MF(i)$ and $PF(i)$ is as set out in Equations (12)–(13). Investment classes *A* and *B* have a specific $MF(i)$ fee of 1% p.a. of the gross fund value of the class $gNAV(i)$ and a performance fee $PF(i)$ of 10% of the return achieved over the assessment period. In investment classes *C* and *D*, the specific $MF(i)$ class fee is 3% p.a. of the $gNAV(i)$ class gross fund capital. The performance fee $PF(i)$ is 30% of the return achieved over the assessment period. The valuation period of the Fund is 1 month. The $MF(i)$ fee is charged pro rata over the valuation periods, and the valuation period for the calculation of the performance fee $PF(i)$ is set at one calendar year. An accrual is made for the amount of remuneration during the valuation period on the date of determination of the rate based on the performance achieved. The NAV and the number of shares in the investment class as of 31 December 2023 are shown in Table 6.

The total $NAV(F)$ of the fund is € 4,000,000 as of 31.12.2023. By 31.1.2024, the NAV(F) has increased to € 4,200,000. A liability of € 500,000 from the unissued investment shares has arisen in Class A (this results from the application received for the issue of 5,000 Class A investment shares with an issue price of EUR 100 per share as of 31.12.2023). In class C, a liability of EUR 100,000 from investment shares not yet repurchased (this results from the accepted repurchase of 1,000 Class C investment shares with an issue price of EUR 100 on 31 December 2023).

Table 6. Fees, NAV, number of investment shares, and share prices of the Fund's investment share classes as at 31.12.2023 (source: authors, 2025)

Investment class	Class A	Class B	Class C	Class D	Fund
$M(i)$ in % p. a.	1	1	3	3	
$PF(i)$ in % p. a.	10	10	30	30	
Investment share price $P(i)$ in €	100	100	100	100	
Number of investment shares issued (i)	10,000	10,000	10,000	10,000	
$NAV(i)$ in €	1,000,000	1,000,000	1,000,000	1,000,000	4,000,000

There was no revaluation of the liabilities from unissued and unredeemed investment shares, and at the same time, these liabilities did not enter into the determination of the allocation ratio. The values of *MF*(*i*), *PF*(*i*) and finally *P*(*i*) as at 31.1.2023 are shown in Table 7.

Table 7. Allocation of the Fund's capital to investment classes and determination of their price as at 31/1/2024 without the effect of liabilities from unissued and unredeemed investment shares of the Fund and without their revaluation (source: authors, 2025)

Investment class	Class A	Class B	Class C	Class D	Fund
Number of unissued and unredeemed investment shares	5,000	0	–1,000	0	
Price of unissued and unredeemed investment shares in €	100	100	100	100	
Liabilities from unissued and unredeemed investment shares in €	500,000	0	–100,000	0	400,000
gNAV(*F*) in €					4,200,000
Allocation ratio in %	25.0	25.0	25.0	25.0	100.0
gNav(*i*) in €	1,050,000	1,050,000	1,050,000	1,050,000	
M(*i*) in €	875	875	2,625	2,625	7,000
PF(*i*) in €	4,913	4,913	14,213	14,213	38,250
NAV(*i*) in €	1,044,213	1,044,213	1,033,163	1,033,163	4,154,750
P(*i*) in €	104.4	104.4	103.3	103.3	

The allocation ratio was determined according to Eq. (9b) as this was the first valuation period within the assessment (accounting) period. All classes have a 25% share in NAV (F) as of 31/12/2023. There have been no issues or redemptions of the Fund's investment shares up to 31/1/2024 ($Enter(F)_{31/1/2024}$ *and* $Exit(F)_{31/1/2024} = 0$). The splitting of *gNAV*(*F*) into classes based on the allocation ratio results in *gNAV*(*i*). Determining *MF*(*i*) and *PF*(*i*) according to Eqs. (12)–(13) and subtracting them from *gNAV*(*i*) *result* in *NAV*(*i*). Subsequently, by dividing by the number of investment shares issued (Class *IA*(*i*)), the price of Class *P* (*i*) *can be calculated* on the date.

There were no issuances of investment shares or redemptions in February 2024 due to the Fund's accounting closing operations. Thus, the allocation of the Fund's capital to the investment classes, the *MF*(*i*), *PF*(*i*) and *P*(*i*) determinations, occurs without the impact of liabilities from unissued and unredeemed investment share classes and without revaluation. The results are shown in Table 8.

As this is not the first assessment period, the allocation of fund capital to classes is calculated according to Eq. (9a). In the following, the procedure for determining the price as at 29/2/2024 is similar to that as at 31/1/2024. Only a different value of the fund capital is allocated (before the valuation period *MF*(*F*) and the assessment period *PF* (*F*), i.e., € 4,500 thousand vs € 4,200 thousand) because the fund capital has increased in the interim period.

In March 2024, the issuance of the Fund's investment shares and the repurchase of the Fund's investment shares pursuant to the above orders have already been completed. As a result, the liability from unissued and unredeemed Fund investment shares has been extinguished. The proceeds from these issues and redemptions enter the Fund's allocation of

capital to the Fund's investment classes as *Enter*(*A*) = € 500,000 and *Exit*(*C*) = € 100,000 and thus affect the value of *P*(*i*).

As a consequence of the fact that liabilities from unissued and unredeemed investment shares were not revalued on an ongoing basis and the results of these revaluations were allocated only to the investment classes to which they relate, there was a divergence in the *P*(*i*) prices of investment shares of investment classes that have the same parameters (and therefore should have the same performance).

Table 8. Allocation of the Fund's capital to investment classes and determination of its price as at 29/2/2024 without the effect of liabilities from unissued and unredeemed investment shares of the Fund and without their revaluation (source: authors, 2025)

Investment class	Class A	Class B	Class C	Class D	Fund
Number of unissued and unredeemed investment shares	5,000	0	–1,000	0	
Price of unissued and unredeemed investment shares in €	100	100	100	100	
Liabilities from unissued and unredeemed investment shares in €	500,000	0	–100,000	0	400,000
gNAV(*F*) in €					4,500,000
Allocation ratio in %	25.0	25.0	25.0	25.0	100.0
gNav(*i*) in €	1,125,000	1,125,000	1,125,000	1,125,000	4,500,000
M(*i*) in €	938	938	2,813	2,813	7,500
PF(*i*) in €	12,406	12,403	36,656	36,656	98,125
NAV(*i*) in €	1,111,656	1,111,656	1,085,531	1,085,531	4,394,375
P(*i*) in €	111.2	111.2	108.6	108.6	

Table 9. Allocation of the Fund's capital to investment classes and determination of its price at 31/3/2024 following the issue and redemption of the Fund's investment shares without revaluation of the related liabilities (source: authors, 2025)

Investment class	Class A	Class B	Class C	Class D	Fund
Issue volume in €	500,000	0	–100,000	0	400,000
Number of investment shares issued and repurchased	5,000	0	–1,000	0	
Total number of investment shares	15,000	10,000	9,000	10,000	
gNAV(*F*) in €					5,100,000
Allocation ratio in %	33.2	23.0	20.9	23.0	100.0
gNav(*i*) in €	1,691,327	1,70,918	1,066,837	1,170,918	5,100,000
M(*i*) in €	1,409	979	2,667	2,927	7,980
PF(*i*) in €	18,992	16,994	49,251	50,397	135,634
NAV(*i*) in €	1,670,925	1,152,948	1,014,919	1,117,594	4,956,386
P(*i*) in €	111.4	115.3	112.81	111.81	

There are more investment shares in investment class *A* at the valuation of 31/3/2024. As their price has increased since their issue price was determined, this representation is inadequate in an allocation that considers their accretion via *Enter*(*A*). This is because *Enter*(*A*) corresponds to lower (past) levels of *P*(*A*) prices. This is reflected in the lag of *P*(*A*) compared to *P*(*B*).

Class *C* continues to be assigned increments of *gNAV*(*F*) even though the value of the *IA*(*C*) portion has already been fixed by the repurchase request. Once the *IA*(*C*) is repurchased, these increments are spread among the remaining *IA*(*C*). Class *C* achieves higher performance, *P*(*C*) > *P*(*D*), compared to Class *D*, despite having the same parameters. This is a consequence in the form of the implementation of *IA*(*C*) buybacks. These changes are permanent nature. The results are shown in Table 9.

5.2.2. Proposed solution and conclusions

The distortion of the allocation ratio between the classes (and, as a consequence, the relative values of the investment shares of each class) as a result of the delay between the fixing of the order to issue new investment shares or the fixing of the order to repurchase and the actual realisation is corrected by the modified allocation according to Eqs. (15c)–(15d), respectively, for the first valuation period within the assessment period.

The default values for the Fund and for each investment class are the same as in Table 5. However, the shares from the unissued and unredeemed investment class enter the allocation ratio. In Table 10, the allocation of the class according to Eq. (15d) is divided into the allocation of the fund and the liability allocation from the unissued and outstanding investment class.

The *MF*(*i*) fee is calculated on the gross fund capital of the *gNAV*(*i*) classes. Once *PF*(*i*) is determined, the value of the investment shares of the *P*(*i*) classes as at the valuation date is determined from the *NAV*(*i*) and allocated liabilities of the classes, on the one hand, and the number of issued investment shares of the *IA*(*i*) class and the number of unissued and unredeemed investment shares of the $I_{NE}(i)$ and I_{NB} (*i*) *classes*, on the other.

Compared to the allocation at 31/1/2024 (see Table 6), the resulting *NAV*(*F*) is lower. This is because *gNAV*(*F*) has increased. A'reserve' has had to be made for the IA (A) – *class A investment shares that are not* yet issued, which will be applied when they are issued. Otherwise, there would be a sharp reduction in *NAVpS*. *Note*: In the case of Class *C*, the opposite effect is at work, the Class *C* investment shares not yet bought back. This effect is overlaid by the greater extent of unissued Class *A*. The consequence is that the growth in *P*(*i*) is slower in January 2024.

The result of the the modified allocation of gross fund capital *gNAV*(*F*) to investment classes and the determination of the the value of investment shares *P*(*i*) as of 29/2/2024 according to Eq. (15c) is shown in Table 11.

Compared to the results by baseline allocation shown in Table 8, there is again a slower growth in *P*(*i*). This is because the increase in *gNAV*(*F*) is due to the revaluation of the liability from unissued and unredeemed investment shares from € 400,000 to € 4444,886. The modified allocation at 31/3/2024 is already after settlement of the liabilities from unissued and unredeemed investment shares.

Table 10. Modified allocation of the Fund's capital to investment classes and determination of its price as at 31/1/2024, taking into account the liabilities from unissued and unredeemed investment shares of the Fund and their revaluation (source: authors, 2025)

Investment class	Class A	Class B	Class C	Class D	Fund
gNav(F) in €					4,200,000
Allocation ratio I (fund capital allocation) in %	22.7	22.7	22.7	22.7	90.9
gNAV(*i*) in €	1,045,494	1,045,494	1,045,494	1,045,494	4,181,977
M(*i*) in €	871	871	2,614	2,614	6,970
Allocation ratio II (allocation of liabilities from outstanding orders of investment shares) in %	11.4	0.0	–2.3	0.0	9.1
Gross liabilities from investment shares in €	522,311	0	–104,288	0	418,023
gP(*i*) in €	104.5	104.5	104.3	104.3	
Number of investment shares issued and repurchased	5,000	0	–1,000	0	
Total number of investment shares	15,000	10,000	9,000	10,000	
PF(*i*) in €	669	446	1,158	1,286	3,560,000
NAV(*i*) in €	1,040,161	1,040,161	1,030,016	1,030,016	4,140,354
P(*i*) in €	104,0	104,0	103,0	103,0	
Allocation ratio in %	33.2	23.0	20.9	23.0	100.0
gNav(*i*) in €	1,691,327	1,70,918	1,066,837	1,170,918	5,100,000
Revalued liabilities from investment shares (*i*) in €	520,080	0	–103,002	0	417,079

Table 11. Modified allocation of the Fund's capital to investment classes and determination of their price as at 29/2/2024, considering the liabilities from unissued and unredeemed investment shares of the Fund and their revaluation

Investment class	Class A	Class B	Class C	Class D	Fund
gNav(*F*) in €					4,500,000
Allocation ratio I (fund capital allocation) in %	22.7	22.7	22.7	22.7	90.9
gNAV(*i*) in €	1,118,366	1,118,366	1,116,500	1,116,500	4,469,733
M(*i*) in €	932	932	2,791	2,797	7,446
Allocation ratio II (allocation of liabilities from outstanding orders of investment shares) in %	11.4	0.0	–2.3	0.0	9.1
Gross liabilities from investment shares in €	558,717	0	–111,371	0	447,346
gP(*i*) in €	111.7	111.7	111.4	111.4	
PF(*i*) in €	17,615	11,743	30,701	34,113	94,173
NAV(*i*) in €	1,105,691	1,105,691	1,079,596	1,079,596	4,370,574
P(*i*) in €	110,6	110,6	108,0	108,0	
Revalued liabilities from investment shares (*i*) in €	552,845	0	–107,960	0	444,886

The results are shown in Table 12. The values of the *P* (*i*) investment shares of comparable classes (*A and B*, *C*, and *D*) correspond to each other.

The formula to calculate the modified allocation ratio (15c) is essentially the same as the basic allocation ratio Eq. (9a) for zero commitments on outstanding issues and repurchases of own investment shares. The difference in the resulting investment share price *P*(*i*) as of 31/3/2024 under the basic allocation ratio (9a) and under the modified ratio (15c) was already caused in previous periods by including liabilities from unsettled investment shares in the allocation, revaluing them and allocating them to different investment classes.

Table 12. Modified allocation of the Fund's capital to investment classes and determination of their price as at 31/3/2024 after settlement of the liabilities from unissued and unredeemed investment shares of the Fund

Investment class	Class A	Class B	Class C	Class D	Fund
Issue volume in €	500,000	0	–100,000	0	400,000
Number of investment shares issued and repurchased	5,000	0	–1,000	0	
gNAV(*F*) in €					510,000
Allocation ratio I (allocation of fund capital) in %	34.4	23.0	20.2	22.4	100.0
gNav(*i*) in €	1,756,537	1,171,025	1,029,050	1,143,389	5,100,000
M(*i*) in €	1,464	976	2,573	2,858	7,871
Allocation ratio II (allocation of liabilities from outstanding orders of investment shares) in %	0.0	0.0	0.0	0.0	0.0
Gross liabilities from investment shares in €	0	0	0	0	0
gP(*i*) in €	115.3	115.3	109.8	109.8	
PF(*i*) in €	25,507	17,005	37,943	42,159	122,614
NAV(*i*) in €	1,729,566	1,153,044	988,534	1,098,371	4,969,515
P(*i*) in €	110.6	110.6	108.0	108.0	

6. Discussion

In this article, our objective was to contribute to the expanding body of research on the fair valuation and reporting of assets and liabilities in collective investment funds (Altamuro & Zhang, 2013; Andrejcik et al., 2021; Liao et al., 2021). More specifically, we respond to calls to develop reliable and objective asset valuation techniques that protect the interests of all investors (Hoffmann & Paetzmann, 2018) and abandon preferential treatment of some groups because of unfair valuation techniques (De Luca, 2021). We also contribute to discussions on the importance of continuous and accurate determination of net asset value based on real-time accounting data and its timely disclosure to investors (Biddle et al., 2009; Leuz & Wysocki, 2016; Migliavacca et al., 2021; Roychowdhury et al., 2019). Nevertheless, our most significant contribution lies in the introduction of a novel methodological approach for revaluing liabilities from unissued and unredeemed investment shares. By implementing

corrections to published prices and incorporating the revaluation of these liabilities into the allocation mechanism, this approach represents a considerable advancement beyond the methods currently delineated in financial theory.

The correction mechanism introduced here adjusts *NAVpS* to consider the extent of the liabilities and the conditions under which they arise. This is set without considering the revaluation of liabilities from outstanding issues and outstanding redemptions of the fund's own shares. The mechanism results in the estimation of such a value of *NAVpS* that provides a level playing field for the participating investor groups. The adjusted value also provides unbiased information about the performance of the fund's underlying assets to potential investors who use the *NAVpS* for decision making.

We also consider the situation in funds that issue multiple investment share classes. In these funds, in addition to the above, the failure to revalue the liabilities from unissued and unredeemed fund shares may permanently alter the class allocation ratios, and thus the relative positions of the various investor classes. The proposed solution considers the different fee structures of the different classes. This affects the size of the revaluation that arises and the allocation of the fund capital to the classes. This fact (incurring liabilities from unissued and/or unredeemed own investment shares of the fund) cannot lead to situations where some investors are favoured and others are disadvantaged.

The proposed approach assumes that the liabilities from the outstanding issues of the fund's own shares and the liabilities from the outstanding redemptions of the fund's own shares will be met. To be more specific, the ordered/agreed issue of new fund shares will occur, and the repurchase order received to redeem the fund's own investment shares will ultimately result in the actual redemption of those investment shares at the stated price.

In the real world, however, events may occur that cause these obligations to lapse or change in amount (e.g., the dissolution or death of the investor subscribing for new investment shares of the fund; the inability of the fund to meet the redemption price of its own investment shares; events that have a different impact on the fund's investors and the fund's creditors and their claims). Potential future investors who have applied to subscribe for new shares in the fund and have a set price at which they will purchase new investment shares are treated as if they are already investors in calculating the price of the fund's investment share classes. Conversely, investors who have made a redemption request and have a redemption price are treated as if they are no longer investors in the fund when calculating the prices of the fund's investment share classes. Although this temporal difference in the treatment of investors in terms of the calculation of the prices of investment shares (the points at which they enter and cease to enter into the calculation of the prices of investment shares) compared to their legal position in relation to the fund (the points at which they are or cease to be investors in the fund) is not a barrier in normal situations, there may be events making the proposed approach to price calculation problematic.

The problem of adequately allocating fund capital to investment classes that are subject to different fee structures is not only related to outstanding liabilities from unissued and unredeemed fund equity. The issue of the choice of the level of specific class fees, their frequency, and the choice of the so-called crystallisation period in terms of the calculation of performance fees is also part of the problem. The capture of these values secondarily affects

the allocation of the fund's investment classes. A related question is whether some classes that are more heavily burdened by class-specific fees may be secondarily burdened again through a decrease in their share of the fund's allocation to each investment class.

7. Conclusions

In the case of open-ended structures with continuous entries and exits of investors and in the case of structures with multiple classes of investment shares, the liabilities from the issuance of new investment shares and from redemptions of the fund's own investment shares are not settled for a certain period. These liabilities are usually not revalued. Through focussed case studies, we demonstrated that these unrevalued liabilities can affect the determination of the corresponding *NAVpS*. Failure to include the revaluation of these liabilities in the *NAVpS* calculation may result in a deviation of the determined price from the fair value and in unfair treatment of some groups of investors. We showed that without an appropriate revaluation of these liabilities, either group of investors may be unduly advantaged or disadvantaged. These include investors who recently entered the fund, investors who exit the fund, or investors who continue to remain in the fund.

In this paper, we introduce a novel methodological approach to adjust the *NAVpS* by accounting for liabilities from unissued and unredeemed investment shares, ensuring fair treatment among investor groups. The mechanism provides unbiased performance information to potential investors and also addresses the issue of not revaluing liabilities in funds with multiple investment classes, which can affect class allocation ratios. The approach assumes liabilities will be met, but acknowledges that real-world events may impact this. It also considers different fee structures to prevent favouring or disadvantaging any investor group, ensuring an accurate and compliant valuation.

In response to the research questions posed, the study demonstrates that:

(a) In the case of an increase in *NAVpS*, and a failure to capture the liabilities arising from repurchase requests received, entering investors benefit, whereas exiting investors bear the burden within the fund structure. Conversely, in the case of a decrease in *NAVpS* combined with a failure to capture these liabilities, exiting investors benefit and entering investors are adversely affected. (b) In the case of an increase in *NAVpS* and a non-revaluation of the liabilities stemming from unissued investment shares, exiting investors benefit, while entering investors are burdened within the fund structure. Conversely, when *NAVpS* decreases and these liabilities are not revalued, entering investors benefit and exiting investors bear the burden. (c) The magnitude of the distortion increases with the percentage change in *NAVpS* over the assessment period, with the rising ratio of unissued investment shares to issued investment shares, and with the rising ratio of unredeemed investment shares to issued investment shares. These ratios, however, offset one another: when they are of equal size, no distortion arises; likewise, no distortion occurs when the percentage change in *NAVpS*. (d) In Equation (5), we proposed, for simple single-class fund structures, a correction mechanism for the *NAVpS* that arises when liabilities from unissued and unredeemed own investment shares are not revalued, so as to prevent distortions. In the case of more complex fund structures with multiple investment classes featuring different fee arrangements, the correction

mechanism interacts with the allocation mechanism of the classes. In its most general form, the correction mechanism is set out in Eqs. (15b)–(15c).

The methodological framework introduced in this paper has also policy and managerial implications as it addresses the issue of fair allocation across multiple investment classes when distortions arise from un-revalued liabilities related to unissued and unredeemed investment shares. These distortions can become significant, depending on factors such as the size of the unrevalued liabilities and changes in the value of the underlying assets. The correction mechanisms derived for both simple and more complex fund structures constitute a practical proposal for mitigating distortions arising from unsettled liabilities associated with unissued and unredeemed own investment shares. While regulatory guidelines exist to ensure the fair and proper treatment of different investor classes, they do not specifically address the management of such liabilities. To prevent potential distortions, these guidelines should be extended to cover this issue.

We believe that the proposed method can serve as a basis for further modifications in the upcoming research. This concerns particularly the issue of the influence of class-specific fees on the allocation mechanism for distributing the funds capital across its investment classes. Hence, the follow-up research should focus on (a) the possibility of finding an appropriate period for projecting the effects of different fee structures into allocation ratios; (b) shielding these effects on investment class allocation ratios; (c) finding an appropriate compensation for the shift in allocation ratios caused by different fee structures; and (d) the possibility of redistributing and implementing fee structures only at the level of the allocation mechanism dividing fund capital into different investment classes. Another area of research could also be to model the impact of taxes on the fee structure and allocation mechanism in the case of unissued and unredeemed but already fixed investment shares.

The case studies presented in this paper demonstrate that the non-revaluation of liabilities from unissued and unredeemed own investment shares can substantially affect the entitlements of different investor classes. To our knowledge, however, no study has examined a broader sample of funds to assess how widespread this phenomenon is or the magnitude of the resulting distortions. A further avenue for research would be also the analysis of retail funds and ETFs, for which the extent of potential distortions has not yet been documented.

References

Agarwal, V., Barber, B., Cheng, S., Hameed, A., & Yasuda, A. (2023). Private company valuations by mutual funds. *Review of Finance*, *27*(2), 693–738. https://doi.org/10.1093/rof/rfac037

Aguinis, H., Beltran, J. R., Archibold, E. E., Jean, E. L., & Rice, D. B. (2023). Thought experiments: Review and recommendations. *Journal of Organizational Behavior*, *44*(3), 544–560. https://doi.org/10.1002/job.2658

Altamuro, J., & Zhang, H. (2013). The financial reporting of fair value based on managerial inputs versus market inputs: Evidence from mortgage servicing rights. *Review of Accounting Studies*, *18*, 833–858. https://doi.org/10.1007/s11142-013-9234-y

Andrejcik, D., Singh, G., & Halari, A. (2021). Fair value accounting: Perspective on stewardship function. *Journal of Accounting and Taxation*, *13*(4), 226–242. https://doi.org/ 10.5897/JAT2021.0483

Balcerzak, A. P., Zinecker, M., Skalický, R., Rogalska, E., & Doubravský, K. (2023). Technology-oriented start-ups and valuation: A novel approach based on specific contract terms. *Technological Forecasting and Social Change*, *197*, Article 122876. https://doi.org/10.1016/j.techfore.2023.122876

Biddle, G. C., Hilary, G., & Verdi, R. S. (2009). How does financial reporting quality relate to investment efficiency? *Journal of Accounting & Economics*, *48*(2), 112–131. https://doi.org/10.1016/j.jacceco.2009.09.001

Brown, G. W., Ghysels, E., & Gredil, O. R. (2023). Nowcasting net asset values: The case of private equity. *The Review of Financial Studies*, *36*(3), 945–986. https://doi.org/10.1093/rfs/hhac045

Busso, D. (2015). Does IFRS 13 improve the disclosure of the fair value measurement?: An empirical analysis of the real estate sector in Europe. *GSTF Business Review* (*GBR*), *3*, Article 1. https://doi.org/10.7603/s40706-014-0029-3

Cropper, P., & Cowton, C. J. (2021). Financial scenario modelling: a study of UK universities. *Journal of Higher Education Policy and Management*, *43*(6), 592–606. https://doi.org/10.1080/1360080X.2021.1888846

Cropper, P., & Cowton, C. (2025). A mixed methods study of influences on perceived budgeting accuracy in UK universities. *Journal of Applied Accounting Research*, *26*(2), 306–332. https://doi.org/10.1108/jaar-11-2023-0337

De Luca, N. (2021). Share classes in investment funds and fair treatment of all investors. *European Business Law Review*, *32*(4), 727–741. https://doi.org/10.54648/EULR2021025

Elbannan, M. A. (2022). Managerial learning and the informational role of fair values. *The Journal of Corporate Accounting & Finance*, *33*(2), 49–67. https://doi.org/10.1002/jcaf.22535

Eling, M., & Faust, R. (2010). The performance of hedge funds and mutual funds in emerging markets. *Journal of Banking & Finance*, *34*(8), 1993–2009. https://doi.org/10.1016/j.jbankfin.2010.01.008

Fagetan, A. M. (2021). Regulation of hedge funds in the EU. In *The regulation of hedge funds* (pp. 49–122). Palgrave. https://doi.org/10.1007/978-3-030-63706-4_2

Ferreira, P. H., Kräussl, R., Landsman, W. R., Borysoff, M. N., & Pope, P. F. (2019). Reliability and relevance of fair values: Private equity investments and investee fundamentals. *Review of Accounting Studies*, *24*, 1427–1449. https://doi.org/10.1007/s11142-019-09509-9

Gregoriou, G. N. (2006). *Fund of hedge funds*: *Performance*, *assessment*, *diversification*, *and statistical properties* (Vol. 10). Elsevier.

Gortsos, C. (2017). *The scope of the EU Alternative Investment Fund Managers Directive (2011/61/EU) and its significance for EU investment funds law*. SSRN. https://ssrn.com/abstract=3000356

Henderson, D., & Mamo, K. (2025). A survey of research on fair value accounting for financial institutions. *Accounting Perspectives*, *24*(2), 307–342. https://doi.org/10.1111/1911-3838.12391

Hitz, J. M. (2007). The decision usefulness of fair value accounting – a theoretical perspective. *European Accounting Review*, *16*(2), 323–362. https://doi.org/10.1080/09638180701390974

Hoffmann, B., & Paetzmann, K. (2018). Investor protection, valuation methods and the German alternative funds industry. *Journal of Risk Finance*, *19*(2), 174–189. https://doi.org/10.1108/JRF-06-2017-0101

Hu, Y., Al-Barakati, A., & Rani, P. (2024). Investigating the Internet-of-Things (IoT) risks for supply chain management using q-rung orthopair fuzzy-SWARA-ARAS framework. *Technological and Economic Development of Economy*, *30*(2), 376–401. https://doi.org/10.3846/tede.2022.16583

International Accounting Standards Board. (2011). *IFRS 13*: *Fair value measurement*. IFRS Foundation. https://www.ifrs.org/issued-standards/list-of-standards/ifrs-13-fair-value-measurement/

Jenkinson, T., Landsman, W. R., Rountree, B. R., & Soonawalla, K. (2020). Private equity net asset values and future cash flows. *The Accounting Review*, *95*(1), 191–210. https://doi.org/10.2308/accr-52486

Lawrence, A., Siriviriyakul, S., & Sloan, R. G. (2016). Who's the fairest of them all? Evidence from closed-end funds. *The Accounting Review*, *91*(1), 207–227. https://doi.org/10.2308/accr-51152

Leuz, C., & Wysocki, P. D. (2016). The economics of disclosure and financial reporting regulation: Evidence and suggestions for future research. *Journal of Accounting Research*, *54*(2), 525–622. https://doi.org/10.1111/1475-679X.12115

Liao, L., Kang, H., & Morris, R. D. (2021). The value relevance of fair value and historical cost measurements during the financial crisis. *Accounting and Finance*, *61*(S1), 2069–2107. https://doi.org/10.1111/acfi.12655

Lim, W. M. (2024). What is qualitative research? An overview and guidelines. *Australasian Marketing Journal*, *33*(2), 199–229. https://doi.org/10.1177/14413582241264619

Lurtz, M. R., Archuleta, K., Kothakota, M., & Jorgensen, T. J. (2021). A deeper dive: A mixed methods approach to risk tolerance. *Financial Planning Review*, *4*(2), Article e1112. https://doi.org/10.1002/cfp2.1112

Marra, A. (2016). The pros and cons of fair value accounting in a globalized economy: A never ending debate. *Journal of Accounting*, *Auditing* & *Finance*, *31*(4), 582–591. https://doi.org/10.1177/0148558X16667316

Mora, A., McGeachin, A., Barth, M. E., Barker, R., Wagenhofer, A., & Joos, P. (2019). Fair value accounting: The eternal debate – AinE EAA Symposium, may 2018. *Accounting in Europe*, *16*(3), 237–255. https://doi.org/10.1080/17449480.2019.1664754

Migliavacca, A., Rainero, C., & Palea, V. (2021). Accounting for equity investments under IFRS 13: Are market multiple evaluations accurate? *Corporate Ownership* & *Control*, *18*(4), 152–174. https://doi.org/10.22495/cocv18i4art11

Palepu, K. G., Healy, P. M., & Bernard, V. L. (2000). *Business analysis and valuation*: *Using financial statements*, *text and cases* (2nd ed.). South-Western College Publishing.

Ronen, J. (2008). To fair value or not to fair value: A broader perspective. *Abacus*, *44*(2), 181–208. https://doi.org/10.1111/j.1467-6281.2008.00257.x

Roychowdhury, S., Shroff, N., & Verdi, R. S. (2019). The effects of financial reporting and disclosure on corporate investment: A review. *Journal of Accounting* & *Economics*, *68*(2–3), Article 101246. https://doi.org/10.1016/j.jacceco.2019.101246

Sachan, R. K., Kumari, S., Khandelwal, V., & Kumar, T. (2024). Machine learning approach for predicting the Net Asset Value (NAV) of mutual funds based on portfolio holdings. *Procedia Computer Science*, *233*, 154–163. https://doi.org/10.1016/j.procs.2024.03.205

Santoni, A., & Salerno, F. (2023). Financial assets valuation. In *How to value a bank*: *From licensing to resolution* (pp. 87–93). Springer. https://doi.org/10.1007/978-3-031-43872-1_8

Schmies, C. (2024). Third country relations and the equivalence regime: Treatment of collective investment schemes. *European Business Organization Law Review*, *25*, 167–181. https://doi.org/10.1007/s40804-024-00313-w

Skalický, R., Zinecker, M., Balcerzak, A. P., Pietrzak, M. B., & Rogalska, E. (2022). Valuation of embedded options in non-marketable callable bonds: A new numerical approach. *Technological and Economic Development of Economy*, *28*(4), 1115–1136. https://doi.org/10.3846/tede.2022.17060

Song, C. J., Thomas, W. B., & Yi, H. (2010). Value relevance of FAS No. 157 fair Value hierarchy information and the impact of corporate governance mechanisms. *The Accounting Review*, *85*(4), 1375–1410. https://doi.org/10.2308/accr.2010.85.4.1375

The European Parliament & the Council of the European Union. (2002). *Regulation* (*EC*) *No 1606/2002 of the European Parliament and of the Council of 19 July 2002 on the application of international accounting standards* (2002, July 19, No. 1606/2002). Official Journal, L 243. https://eur-lex.europa.eu/eli/reg/2002/1606/oj

The European Parliament & the Council of the European Union. (2009). *Directive 2009/65/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities* (*UCITS*) (2009, July 13, No. 2009/65/EC). https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0065

The European Parliament & the Council of the European Union. (2011). *Directive 2011/61/EU of the European Parliament and of the Council of 8 June 2011 on Alternative Investment Fund Managers and amending Directives 2003/41/EC and 2009/65/EC and Regulations* (*EC*) *No 1060/2009 and* (*EU*) *No 1095/2010* (2011, June 8, No. 2011/61/EU). Official Journal of the European Union, L 174/1. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011L0061

The European Parliament & the Council of the European Union. (2023). *Commission Regulation* (*EU*) *2023/1803 of 13 August 2023 adopting certain international accounting standards in accordance with Regulation* (*EC*) *No 1606/2002 of the European Parliament and of the Council* (2023, August 13, No. 2023/1803). Official Journal of the European Union, L 237/1. https://eur-lex.europa.eu/eli/reg/2023/1803/oj

Varum, C. A., & Melo, C. (2010). Directions in scenario planning literature – a review of the past decades. *Futures*, *42*(4), 355–369. https://doi.org/10.1016/j.futures.2009.11.021

Wack, P. (1985). Scenarios: Shooting the rapids. *Harvard Business Review*, *63*(6), 139–150.

Wang, S., Fang, Z., & Wu, D. (2024). Internet of things-enabled tourism economic data analysis and supply chain modeling. *Technological and Economic Development of Economy*, *30*(2), 423–440. https://doi.org/10.3846/tede.2022.17120

Whittington, G. (2008). Fair value and the IASB/FASB conceptual framework project: An alternative View. *Abacus*, *44*(2), 139–168. https://doi.org/10.1111/j.1467-6281.2008.00255.x

Zioło, M., Spoz, A., Bąk, I., & Oesterreich, M. (2022). Fuzzy model of sustainable development with the inclusion of financial variables. *Technological and Economic Development of Economy*, *28*(5), 1368–1391. https://doi.org/10.3846/tede.2022.17144