Study on cost of capital

Methodology review and update

June 2024

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1   INTRODUCTION

1   The aim of this report is to support Member States and their national supervisory authorities (NSAs) in establishing the cost of capital of air navigation service providers (ANSPs) for the fourth reference period (RP4) of the Single European Sky (SES). The use of the methodology explained in this report is without prejudice to the further review by the Commission of the planned cost of capital, in connection with the assessment of draft performance plans for RP4.

2   This report is a revision of the *"Study on Cost of Capital – Methodology review and update"* from September 2021 (hereafter also referred to as the '2021 Study') which was built upon the "*Study on Cost of Capital – Methodology review*" from August 2019 (referred to as the '2019 Study').[1] This report contains a revised methodology and updated relevant parameters for the calculation of the cost of capital. As for the previous studies, the objective is to provide guidance material to encourage ANSPs adhere to efficient capital management practices and to assimilate the cost of capital of ANSPs with the one that an efficient private company would pay to raise finance in similar market conditions.[2]

3   The study is structured as follows:

- Section 2 explains the provisions of the performance and charging regulations in respect of the definition of the cost of capital, the organisation of ANSPs and the regulatory mechanisms that mitigate the risks of ANSPs. It outlines the PRB's methodology to assess the cost of capital in performance plans;
- Section 3 analyses the impact of the recent geopolitical and economic environment on the business and financial risks of ANSPs. It provides an estimate of the efficient weighted average cost of capital (WACC) per Member State as per Option 1 of the PRB methodology;
- Section 4 presents guidance on how to report the cost of capital in the reporting tables and the performance plan; and
- Section 5 concludes the report.

4   The Annex to this report provides the technical description of the parameters relevant to WACC estimation, and the underlying data and sources.

5   Additionally, the PRB has developed a reporting tool to help Member States to determine their cost of capital amounts for RP4 and facilitate the reporting of the cost of capital components in the RP4 draft performance plan, in accordance with the methodology defined in this report. The specifics of this reporting tool are explained in section 2.5. and can be found on the Single European Sky Performance website.

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[1] The 2019 Study can be found here. The 2021 Study can be found here.
[2] An efficient company can be defined as an entity with a capital structure that optimises the weighted average cost of capital (WACC) while maximising the company market value.

2 DEFINITION AND METHODOLOGY

2.1 Weighted average cost of capital (WACC)

6 Article 22(4) of the Regulation defines the cost of capital as the product of the average total net asset base, excluding interest-bearing accounts, and the WACC:

$$Cost\ of\ capital = net\ asset\ base * WACC$$

7 Where the WACC is the weighted average of the return on equity (RoE) and the cost of debt (CoD), reflecting their respective proportions of capital structure.[3] Annex IV of the Regulation clarifies that the WACC relevant for the assessment of performance plans is the "cost of capital pre-tax rate".

8 The pre-tax WACC can be expressed as:

$$WACC = RoE * \frac{E}{E+D} * \frac{1}{(1-t)} + CoD * \frac{D}{E+D}$$

9 The return on equity (RoE) is the return expected by the shareholders of the ANSP and reflects the individual business and financial risks of the ANSP.

10 The PRB recommends the use of the capital asset pricing model (CAPM) to estimate the return on equity component. The CAPM is a market driven model which attempts to measure the relationship between the risk of a share (or stock) and its return, given the level of risk of the market. In the case of ANSPs the market for shares is either not existing or very limited, therefore the market risk should be estimated within the CAPM approach using data from comparator companies with available data on market shares.

11 The pre-tax WACC formula multiplies the return on equity by $\frac{1}{(1-t)}$.

12 The interest rate on debts or CoD is the cost of financing for an ANSP when issuing a bond or taking out a loan.

13 The last element of the WACC is the capital structure, i.e. the proportion of financing through either debt ($\frac{D}{E+D}$) or equity ($\frac{E}{E+D}$). This study also refers to gearing expressed as the ratio of debt to equity (D/E). Generally, a certain level of debt contributes to an optimal capital structure because interest payment may generate tax benefits.

Additionally, the CoD may be lower than the RoE, making it a more cost-efficient funding option. This applies as long as the level of debt does not compromise the company's ability to repay its debt obligations on time and in full. In competitive markets, companies seek to reach a capital structure which optimises the cost of capital. In regulated industries, the regulator may use a notional capital structure, which might vary from the actual structure of the regulated companies.

14 With respect to the treatment of inflation, Article 22(4) of the Regulation specifies the link between the asset base accounting method and the WACC calculation. A nominal WACC should be multiplied by a regulated asset base valued at historical cost, while a real WACC should be multiplied by a regulated asset base valued at current cost. This approach ensures that inflation is not double counted.

15 If calculating the cost of capital for a regulated asset base at current cost, the nominal WACC should be converted to real WACC using the Fisher equation:[4]

$$Real\ WACC = \frac{(1 + nominal\ WACC)}{(1 + inflation)} - 1$$

2.2 Regulated asset base definition

16 Article 22(4) of the Regulation defines the components of the regulated asset base as:

"The sum of the average net book value of fixed assets in operation or under construction and possible adjustments to total assets determined by the national supervisory authority and used by the air navigation service provider and of the average value of the net current assets, excluding interest-bearing accounts, that are required for the purposes of providing air navigation services".

17 Article 22(4) also stipulates that costs incurred from leasing fixed assets shall not be included in the calculation of the cost of capital.

18 Regarding fixed assets, capitalised costs refer to money spent by a company (in this case an ANSP) to acquire, maintain, or upgrade assets such as property, buildings, technology, or equipment.

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[3] Cost of debt is referred to as "interest rates on debts" in the Regulation.
[4] Details on the technical aspects of the Fisher equation can be found here.

Such costs are often used to undertake new projects or investments by the company. Costs which cannot be considered as capitalised costs and are merely to be interpreted as operating expenses refer to the day-to-day running costs incurred in the normal course of business. According to International Financial Reporting Standards (IFRS) guidelines, the costs related to property, plant, and equipment as assets (IFRS IAS 16) which can be capitalised at initial recognition are:

- The purchase price, including import duties and non-refundable purchase taxes, after deducting trade discounts and rebates; and
- Any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management.

19 Expenditures for an intangible item are generally recognised as an expense, unless the item meets the definition of an intangible asset (IFRS IAS 38), and thus:

- It is probable that the future economic benefit associated with the item will flow to the entity; and
- The cost of the asset can be measured reliably.

20 While the above provides general guidance on how to interpret costs that may be capitalised and included in the ANSP's fixed asset base, it is not exhaustive. Whether costs can be considered as part of the fixed asset base for the calculation of the cost of capital, as prescribed by the Regulation, should be assessed on a case-by-case basis.

21 With regards to net current assets, these can be interpreted as net working capital which is the difference between a company's current assets and its current liabilities. It is a measure of a company's liquidity and its ability to meet short-term obligations using its most liquid assets. The current assets typically include accounts receivable, inventory, and prepaid expenses. The current liabilities typically include accounts payable and accrued liabilities. All items that can be considered as part of the net working capital should have a short-term character.

22 Where an ANSP has received or is expected to receive financial assistance from the Member State concerned, this may lead to a higher average value of the net current assets of the ANSP for a certain period of time. This will increase the size of the asset base and accordingly the cost of capital. NSAs should consider applying an adjustment to the regulatory asset base in respect of the net current assets to ensure that no cost of capital is charged on amounts received as financial assistance.

23 For further details on the definition of the asset base, please consult the 2024 supporting material on cost bases for charges and unit rates developed by the PRB to assist Member States.

2.3 Organisation and ownership of ANSPs

24 The estimated WACC of ANSPs should reflect their business and financial risk profiles. According to credit rating agencies, the business risk profile of ANSPs is generally low due to their monopoly position, public ownership, and strategic importance to Member States.[5] Notably, all ANSPs of the SES are 100% publicly owned, with the exception of ENAV which is 53.3% state-owned.[6]

25 Irrespective of organisational arrangements, all ANSPs are required to obtain a certificate issued by the NSAs in accordance with Article 7 of Regulation (EC) 550/2004 on the provision of air navigation services in the SES.[7] To achieve such certification an ANSP must demonstrate compliance with the common requirements laid out in Annex III of the Commission Implementing Regulation (EU) 2017/373, including the financial strength of the entity. In particular, Annex III stipulates that "*Air navigation services and air traffic flow management providers shall be able to meet their financial obligations, such as fixed and variable costs of operation or capital investment costs*".[8]

26 With respect to market power, most of the air navigation services in each Member State are provided under a statutory monopoly by a single supplier, facing limited market competition, except for terminal services in a few Member States. While airspace users are free to choose alternative routes, in practice the need to minimise flight costs (notably operating costs such as fuel and crew costs) limits such options. As a result, ANSPs with these characteristics may issue debt or receive equity injections at more favourable conditions than private companies facing competition.

27 The WACC applied is generally the same for both en route and terminal services, since the ANSPs are facing similar market risk and structure for the services. A factor contributing to WACC differences across charging zones may be the level of competition faced by terminal services compared to en route services within a Member State. If terminal services encountered greater competition, it might result in a different WACC for these services.

28 During RP3, six Member States had different levels of WACC between en route and terminal services implying different levels of risk for each service. Different WACC rates between en route and terminal services have repercussions on both the cost of capital and the allocation of costs between these services. The PRB highlights that NSAs must justify any differences in business or financial risks between en route and terminal services leading to distinct WACC rates in their performance plans. This requirement aims to prevent potential cross-subsidization between the services, as prohibited under Article 15(2) of Regulation (EC) 550/2004 on the provision of air navigation services in the SES.

2.4 Regulatory mechanisms that mitigate the risk of ANSPs

29 The demand for air navigation services is highly exposed to macro-economic cycles. However, the impact of demand variations on ANSP revenues due to typical cycles is significantly mitigated within reference periods through four mechanisms prescribed in the Regulation:

- Revision of performance targets during a reference period in case that at least one of the alert thresholds referred in Article 9(4) b) of the Regulation is reached. It limits ANSPs' exposure to traffic variations;
- Traffic risk sharing, limiting ANSPs' exposure to traffic variations (Article 27). ANSPs and airspace users share the revenue risk caused by deviations from the service unit forecast in the performance plans. According to the Regulation, a deviation by 2% or less is fully borne by the ANSPs, while a deviation by more than 10% is fully borne by the airspace users (AUs). In case of a deviation between 2% and 10%, 30% of the resulting change in revenue is borne by the ANSPs, while 70% is recovered

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[5] 20th January 2021, Moody's completed a periodic review of ratings for NATS (En Route) PLC. Details can be found here.
4th November 2022, Moody's affirmed Avinor's A1 ratings and changed the outlook to stable from negative. Details can be found here.
[6] The ownership structures of ANSPs are given in the ACE Benchmarking report from May 2023 and can be found here. No changes in ownership structure of ANSPs were observed compared to the 2021 PRB Study.
[7] Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky (the service provision Regulation), as amended.
[8] Commission Implementing Regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight.

from airspace users. Therefore, the resulting maximum risk exposure of ANSPs is limited to 2%*100% + (10%-2%)*30% = 4.4%. Figure 1 provides a visual representation of the mechanism;[9]

- Cost risk sharing, limiting ANSPs' exposure to cost variations by providing exemptions to the cost risk sharing mechanism (Article 28); and
- Inflation adjustment, covering the difference between determined and actual inflation indexes (Article 26).

30 These four mechanisms are designed to deal with deviations between determined and actual values within a reference period due to typical macro-economic cycles.

31 In order to respond to the extraordinary impact of the COVID-19 pandemic on aviation, the Commission adopted Implementing Regulation (EU) 2020/1627, which established exceptional measures for RP3. Among other changes, these measures entailed redefining the timeline for planning RP3, combining the calendar years 2020 and 2021 into a single regulatory year, and requiring Union-wide and local performance targets to be revised. The decision aimed at guaranteeing that ANSPs could recover the loss of revenue from airspace users, ensuring that ANSPs would get sufficient resources to continue to operate and to invest.

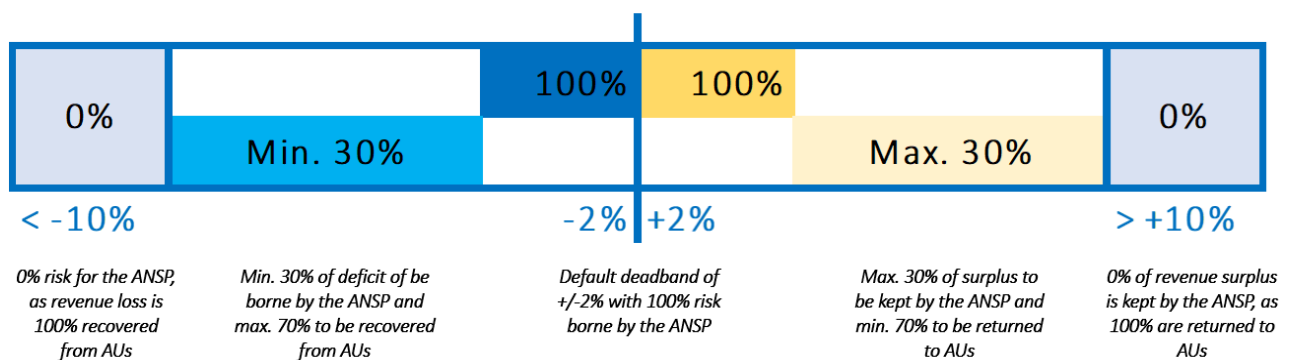*Figure 1 – Visual representation of the traffic risk sharing mechanism.*

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[9] Under Article 27(5) of the Regulation, the NSAs have the possibility to change the traffic risk sharing parameters after consultation with the airspace users and ANSPs.

2.5   PRB framework for RP4

32   The PRB framework for the calculation of the WACC has been revised for RP4. In Option 1, the cost of debt (CoD) calculation has been revised (details in the Annex).Additionally, the previous Option 4 (named as Maximum Exposure) has been removed from the PRB framework for RP4, and has been replaced by a sense check on the return on equity of Member States as explained further in this report. The revised PRB framework for RP4 is as follows:

- **Option 1 – Efficient WACC** should be used when the WACC of an ANSP is based on a genuine capital structure that is not aligned to the optimal capital structure.
- **Option 2 – Administered WACC** should be used if lower than Option 1 for an ANSP that is subject to a government-specified equity return.
- **Option 3 – Hybrid WACC** should be used if lower than Option 1 for an ANSP that has access to loan finance on favourable terms but is not subject to a government-specified equity return.

33   Irrespective of the Option applied, a sense check must be conducted on the ratio between the monetary value of the return on equity and the total cost base. Member States should verify that this ratio aligns with the risk incurred by the ANSP, which is expected to primarily stem from the maximum risk exposure to traffic, as explained in section 2.4. If ANSPs are exposed to additional risks, the NSAs should assess the factors contributing to these risks and provide an explanation in the Performance Plans to justify the proposed ratio.

34   This check allows the Member States and the PRB to evaluate if the embedded return on equity is proportionate to the total costs. Where such ratio is found to be disproportionate, a correction on the value of the return of equity should be applied.

35   Further insights into the underlying formulas and computations for all the Options are available within the reporting tool developed by the PRB and in the Annex of this report. The tool has been designed to assist Member States and NSAs to determine the WACC rate for RP4, and facilitates the reporting of the components for the draft performance plan of RP4.

36   Table 1 (next page) provides an overview of the PRB framework for RP4.

	1. Efficient WACC	2. Administered WACC	3. Hybrid WACC
Scope	The efficient WACC should be used when the WACC of an ANSP is based on a genuine capital structure that is not aligned to the optimal capital structure.	The administered WACC should be used if the WACC of an ANSP is subject to a government-specified equity return, and is lower than Option 1 WACC.	The hybrid WACC should be used when the WACC of an ANSP comprise loan finance on favourable terms but is not subject to a government-specified equity return. This WACC should be lower than Option 1 WACC.
Return on equity	Use CAPM.	Use rate specified by government.	Use CAPM.
Cost of Debt	Use the risk-free rate with a debt premium.	Use genuine Cost of Debt or government borrowing rate (whichever higher).[10]	Use genuine Cost of Debt or government borrowing rate (whichever higher).[10]
Capital structure	Use optimal capital structure calculated as the average gearing of similar corporate entities.	Use genuine capital structure.	Use genuine capital structure.
Transposition to reporting tables	Calculate RoE using the following inputs: 1) Efficient WACC (Option 1); 2) Genuine CoD; and 3) Genuine capital structure. Refer to section 4 for an example.	Calculate WACC using the following inputs: 1) Government-specified RoE; 2) Genuine CoD; and 3) Genuine capital structure.	Calculate WACC using the following inputs: 1) Efficient RoE (Option 1); 2) Genuine CoD; and 3) Genuine capital structure.

Table 1 – PRB framework for RP4.

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[10] Using either genuine Cost of Debt or government borrowing rate (whichever is higher) ensures financial risk is accurately reflected. ANSPs with a state guarantee or favourable borrowing rates may get lower rates compared to the market or even the government borrowing rate. In such cases, applying the government rate is more appropriate as it better represents the associate underlying risk with the activity.

3 IMPACT OF THE ECONOMIC ENVIRONMENT AND WACC ESTIMATE

3.1 Impact on the WACC

37 Since the revision of RP3 performance plans following the COVID-19 pandemic, financial markets have been impacted by external geopolitical tensions, specifically Russia's war of aggression against Ukraine. This conflict has led to a shock to the European economy, exacerbating already rising consumer and energy prices from mid-2021, which in turn has triggered higher inflation and interest rate increases. Disruptions to global supply chains and trade routes due to the conflicts could further worsen economic uncertainties.

38 In the European Union, annual inflation rates have risen sharply from 2.5% in July 2021 to a peak of 11.5% in October 2022.[11] In response to this increase, the European Central Bank (ECB) has adjusted its monetary strategy, progressively increasing the main refinancing operations interest rates from 0.5% in mid-2021 to the current rate of 4.5%, effective since September 2023.[12] At the end of 2023, inflation rates began to decrease and, by March 2024, inflation in the European Union had decreased to 2.6%, marking the first return to this level since July 2021.

39 These macroeconomic factors influence the cost of capital of ANSPs, through their impact on financial markets and the perceived business and financial risks:

- Lenders and investors now perceive a higher risk, potentially driving up both the cost of debt and equity in the short term. However, some ANSPs have the ability to secure finance through public loans and equity injections, which may mitigate increases in the cost of debt and equity;
- Both lenders and equity investors may adjust their required returns upward in response to inflation expectations, thus impacting the cost of debt and equity; and
- Higher interest rates as a result of monetary tightening by Central Banks increase the cost of debt and indirectly influence equity

valuation through higher required returns and possibly lower future cash flows due to slower economic growth.

3.2 WACC estimates (Option 1)

40 To inform the preparation of performance plans by Member States, the PRB estimated an efficient pre-tax nominal WACC per Member State which corresponds to Option 1 of the PRB framework for RP4. These estimates are incorporated in the reporting tool mentioned in the previous section.

41 Options 2, and 3 of the PRB framework may result in lower numbers than Option 1 if the ANSP is subject to a lower government-specified return on equity (Option 2), or if the ANSP obtains loan finance on more favourable terms (Option 3).

42 For Option 1, the average Union-wide WACC ranges from 6.1% in 2025 to 6.4% in 2029. By 2029, half of the Member States show a pre-tax WACC below 6.0%, with the majority being below 7.2%. Nonetheless, seven Member States maintain a pre-tax WACC higher than 7.2% for 2029.

43 The Annex to this report presents the data sources, data description, and methodology employed to estimate the RoE, gearing, and CoD.

44 The efficient WACC (Option 1 of the PRB framework) was estimated using the following data and assumptions:

- The 10-year average of the 10-year government bond yield of each Member State is applied as the risk-free rate. Exceptions are: Greece, where the PRB applied a 5-year average; Croatia, Cyprus, Estonia, Latvia, and Malta where the rate of German bonds is used due to insufficient data caused by market illiquidity;[13]
- The asset beta is estimated based on companies from two peer groups that have similarity in activities, risk profiles and sector compared to the ANSPs;
- The equity beta is calculated as the average of the 10-year average betas of both peer

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[11] Details on the annual inflation rates in the European Union can be found here.
[12] Details on the interest rates employed by the ECB can be found here.
[13] The 10 year period includes years in which the rates can be considered exceptional and therefore not comparable to the current financial and economic circumstances of Greece.

groups. This average has been applied for all ANSPs;

- The equity risk premium (ERP) considered for all Member States is the ERP of Germany, which is kept constant over the projected period as the inflation expectations are already captured in the risk-free rate component;

- The Cost of Debt is the sum of the applicable risk-free rate and the debt premium computed as the difference between the 10-year averages of the 10-year BBB EUR bond yield and the 10-year German government bond yield; and

- The inflation rate data used to adjust the risk-free rates is sourced from the IMF database.[14]

45 Table 2 (next page) and Table 3 (page 12) are providing the WACC and RoE values for each Member State.

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[14] Details on the IMF inflation rates of April 2024 can be found here.

Estimated pre-tax WACC for Option 1					
Member State	2025	2026	2027	2028	2029
Austria	5.0%	5.0%	5.1%	5.1%	5.1%
Belgium	5.2%	5.3%	5.3%	5.3%	5.3%
Bulgaria	5.4%	5.5%	5.5%	5.6%	5.6%
Croatia	6.8%	6.8%	6.9%	7.0%	7.0%
Cyprus	5.3%	5.3%	5.4%	5.4%	5.4%
Czech Republic	6.2%	6.2%	6.3%	6.3%	6.4%
Denmark	4.6%	4.6%	4.6%	4.6%	4.6%
Estonia	7.3%	7.4%	7.5%	7.6%	7.7%
Finland	4.8%	4.8%	4.9%	4.9%	4.9%
France	5.2%	5.2%	5.2%	5.2%	5.3%
Germany	4.9%	4.9%	4.9%	5.0%	5.0%
Greece	7.8%	7.9%	7.9%	8.0%	8.1%
Hungary	8.2%	8.4%	8.5%	8.7%	8.8%
Ireland	5.3%	5.3%	5.3%	5.4%	5.4%
Italy	6.8%	6.8%	6.9%	6.9%	7.0%
Latvia	7.3%	7.4%	7.5%	7.6%	7.7%
Lithuania	5.4%	5.5%	5.5%	5.6%	5.6%
Malta	6.1%	6.2%	6.2%	6.2%	6.3%
Netherlands	4.9%	5.0%	5.0%	5.0%	5.0%
Norway	6.3%	6.4%	6.4%	6.5%	6.5%
Poland	8.2%	8.3%	8.4%	8.6%	8.7%
Portugal	6.5%	6.5%	6.6%	6.6%	6.7%
Romania	9.7%	9.9%	10.1%	10.3%	10.5%
Slovakia	5.3%	5.3%	5.3%	5.4%	5.4%
Slovenia	8.2%	8.3%	8.4%	8.5%	8.6%
Spain	6.1%	6.1%	6.2%	6.2%	6.2%
Sweden	4.9%	4.9%	4.9%	5.0%	5.0%
Switzerland	3.8%	3.8%	3.8%	3.8%	3.8%
Union-wide (average)	6.1%	6.2%	6.2%	6.3%	6.4%

Table 2 – Estimated pre-tax WACC in national currency for Member States to be used as Option 1 (source: PRB elaboration of IMF April 2024, ECB, Capital IQ, Damodaran, EY Valuation Services).

Estimated pre-tax Return on Equity for Option 1					
Member State	2025	2026	2027	2028	2029
Austria	5.9%	5.9%	6.0%	6.0%	6.0%
Belgium	6.2%	6.2%	6.2%	6.3%	6.3%
Bulgaria	6.2%	6.2%	6.3%	6.3%	6.4%
Croatia	7.7%	7.8%	7.8%	7.9%	8.0%
Cyprus	6.1%	6.1%	6.1%	6.2%	6.2%
Czech Republic	7.1%	7.1%	7.2%	7.2%	7.3%
Denmark	5.4%	5.5%	5.5%	5.5%	5.5%
Estonia	8.3%	8.4%	8.5%	8.6%	8.7%
Finland	5.7%	5.7%	5.7%	5.7%	5.7%
France	6.1%	6.1%	6.2%	6.2%	6.2%
Germany	5.9%	5.9%	5.9%	5.9%	6.0%
Greece	8.8%	8.9%	9.0%	9.1%	9.2%
Hungary	9.0%	9.2%	9.3%	9.5%	9.6%
Ireland	6.0%	6.1%	6.1%	6.1%	6.2%
Italy	7.8%	7.8%	7.9%	8.0%	8.0%
Latvia	8.3%	8.4%	8.5%	8.6%	8.7%
Lithuania	6.3%	6.3%	6.3%	6.4%	6.4%
Malta	7.3%	7.3%	7.4%	7.4%	7.5%
Netherlands	5.9%	5.9%	5.9%	5.9%	6.0%
Norway	7.3%	7.3%	7.4%	7.4%	7.5%
Poland	9.2%	9.3%	9.5%	9.6%	9.7%
Portugal	7.4%	7.5%	7.6%	7.6%	7.7%
Romania	10.7%	10.9%	11.1%	11.3%	11.5%
Slovakia	6.2%	6.2%	6.2%	6.3%	6.3%
Slovenia	9.3%	9.4%	9.5%	9.6%	9.7%
Spain	7.1%	7.1%	7.2%	7.2%	7.3%
Sweden	5.8%	5.8%	5.8%	5.8%	5.9%
Switzerland	4.5%	4.6%	4.6%	4.6%	4.6%
Union-wide (average)	7.1%	7.1%	7.2%	7.2%	7.3%

Table 3 – Estimated pre-tax return on equity for Member States used in Option 1 (source: PRB elaboration of IMF April 2024, ECB, IQ Capital, Damodaran, Oxford Economics, EY Valuation Services).

4 REPORTING COST OF CAPITAL

46 When drafting the performance plan the Member States should:

- Report in tab 3.4.6. b) "Determined Costs assumption ANSP" of the performance plan the assumptions on the parameters (efficient parameters) applied to the calculation of the WACC for each ANSP; and
- Report in the determined parts of the reporting tables (i.e. annex A and B of the performance plan) (i) the planned interest rates on loans and the planned share of financing through equity of the ANSPs, (ii) the RoE as a result of the calculation from the real share of financing through equity, the planned interest rates on loans as reported in the performance plan, and the applied WACC. The WACC rate in item 3.5 is already calculated in the reporting table as the ratio between cost of capital and the total asset base. This WACC rate should be equal to the one reported in tab 3.4.6. b).

47 During the yearly monitoring process, in the reporting tables, Member States should:

- Report the RoE equal to the rate as in the determined cost base (per Articles 22(4) and 23 of the Regulation, the actual RoE for any given year should align with the determined RoE specified for that year in the performance plan);
- Report the values of the interest rates on loans effectively incurred during that year and the actual share of financing through equity; and
- Report the actual cost of capital in item 1.4, as the results of the RoE, actual interest rates on loans, and share of financing through equity as for the points above. The WACC rate in item 3.5 is automatically calculated as the ratio between cost of capital and the total asset base.

48 Table 4 shows an example of the comparison between the Efficient WACC parameters (Option 1) and the reported determined and actual parameters from the reporting tables. The reporting tool also provides the reporting template to include in the draft performance plan of RP4.

Efficient parameters (e.g. Option 1)		Relevant cost items from reporting tables	RP4 performance plan	Monitoring report year X
			Determined year X	Actual year X
WACC	4.80% (a)	3.5 Cost of capital pre tax rate	4.80%	5.00%
RoE	6.00%	3.6 Return on equity	5.45% (b)	5.45%
CoD	3.00%	3.7 Average interest on debts	4.00%	3.50%
Share of financing through equity	60%	3.8 Share of financing through equity	55%	77%

Table 4 – Example of reporting WACC.

(a) $$WACC = RoE * \frac{E}{E+D} * \frac{1}{(1-t)} + CoD * \frac{D}{E+D}.$$

The efficient WACC rate to be reported in the determined costs of the reporting tables under "3.5 Cost of capital pre tax rate" item (4.80% in the example).

(b) $3.6\ Return\ on\ equity =$

$$\frac{3.5\ Cost\ of\ capital\ pre\ tax\ rate - 3.7\ Average\ interest\ on\ debts * (1 - 3.8\ Share\ of\ financing\ through\ equity)}{3.8\ Share\ of\ financing\ through\ equity}$$

5 CONCLUSIONS AND RECOMMENDATIONS

49 **Conclusion 1**: The impact of the recent geopolitical and economic environment on the cost of capital is limited to the financial data used to estimate the WACC parameters. The methodology employed by the PRB to estimate the efficient pre-tax WACC and to assess the cost of capital in performance plans remains fit-for-purpose.

50 **Recommendation 1**: The PRB recommends to the European Commission to use the revised PRB framework to assess the WACC and the cost of capital as included in the draft performance plans.

51 **Conclusion 2**: The average Union-wide efficient pre-tax WACC, as defined in Option 1 of the PRB framework, ranges between 6.1% in 2025 and 6.4% in 2029.

52 **Recommendation 2**: The PRB recommends to the European Commission to assess performance plans using the sense check as defined in this study to verify if differences from the parameters of this study are justified.

53 **Conclusion 3**: Where an ANSP has received or is expected to receive financial assistance from the Member State concerned, this may lead for a certain period of time to a higher value of the regulated asset base and accordingly the cost of capital.

54 **Recommendation 3**: The PRB recommends that NSAs should consider applying an adjustment to the regulatory asset base to ensure that no cost of capital is charged on amounts received as financial assistance.

ANNEX – TECHNICAL DESCRIPTION

Pre-tax Weighted Cost of Capital ($WACC$)

55   The weighted average cost of capital (WACC) is the rate of return that bondholders (lenders) and shareholders require as compensation for their contribution of capital for the average-risk investment of a company.

56   The WACC is equal to the sum of the return on equity (RoE) multiplied by the proportion of equity ($\frac{E}{E+D}$), and the Cost of Debt (CoD) multiplied by the proportion of debt ($\frac{D}{E+D}$). The pre-tax WACC formula multiplies the return on equity by $\frac{1}{(1-t)}$ in order to provide ANSPs with sufficient revenue to meet their corporation tax liabilities.[15] The proportion of debt (D) and equity (E) compared to the total financing is the denominated capital structure. The formula can be expressed algebraically as follows:

$$WACC = RoE * \frac{E}{E+D} * \frac{1}{(1-t)} + CoD * \frac{D}{E+D}$$

57   The CoD is the Cost of Debt financing (interest rates) to a company when it issues a bond or takes out a bank loan. It is represented by the weighted rates of interest paid by the ANSP on the debt instruments. The genuine CoD reflects the periodic interest (or coupon) rate that the borrower is contractually obligated to pay to its bondholders (lenders). The genuine CoD may not be efficient when there is the possibility for the regulated companies to pass the cost of their economically inefficient decisions. Therefore, as a proxy for a competitive CoD the regulators may use a notional CoD observed from a market index, or similar entities.[16]

58   The RoE is an estimate of a reasonable rate of return on the shareholders' or owners' investment. The PRB suggests estimating the RoE using the Capital Asset Pricing Model (CAPM).

Capital Asset Pricing Model (CAPM)

59   The PRB recommends the use of the CAPM to estimate the return of equity component for Options 1 and 3, while for Option 2 the rate specified by the government should be applied. The CAPM states that the RoE is the sum of the risk-free rate, Rf, and a premium for bearing the stock's market risk. The RoE can be presented algebraically as follows:

$$RoE = R_f + \beta_e(R_m - R_f)$$

60   Where R_f is the risk-free rate and represents the return on an asset that has no default risk. A common proxy for the risk-free rate is the yield on a default-free government debt instrument.

61    $(R_m - R_f)$ is the equity risk premium (ERP), which is the difference between the return on the market (R_m) and the risk-free rate (R_f). The ERP represents the additional return that an investor expects to receive from investing in stocks over and above the risk-free rate of return.

62   β_e is the equity beta and represents the return sensitivity of a stock to changes in the market return (also referred to as the systematic or market risk).[17] Even though public companies have a different risk profile compared to private companies, the PRB recommends using market data to estimate the beta value for all ANSPs irrespective of their organisational arrangements. The reason behind this approach is that the market is assumed to always provide the most efficient way of financing with the optimal capital structure and risk profile associated.

63   To estimate the equity beta (β_e), first the Hamada's equation is used to estimate the asset beta (β_a) of an entity given its equity beta observed in the market. Second, the inverse of the Hamada's equation is used to estimate the equity beta of ANSPs.

64   The asset beta (β_a) of a company is a function of its business risks and its financial structure. It integrates the market sensitivity of equity and the presumed non-volatility of debt returns. It can be calculated as the weighted average of the betas of debt (β_d) and equity (β_e) after considering the tax-deductibility of interest. A company's debt beta can be assumed to be zero implying that the

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[15] Detail on the corporate tax rates for Member States can be found here.

[16] Note that the CoD is the market interest rate on new debt, not the coupon rate on the ANSP's existing debt.

[17] Since historical returns data is used, the estimation of the beta is sensitive to the length of time used and the frequency of the data. Furthermore, the estimate is affected by which index is chosen to represent the market return.

returns on debts do not vary with the returns on the markets. The Hamada's equation to solve for the asset beta can be expressed algebraically without debt beta as follows:

$$\beta_a = \beta_e \left[\frac{1}{1 + \left[(1-t)\frac{D}{E}\right]} \right]$$

65 Following the above, the market risk of a company's equity (equity beta) is affected by both the asset's market risk (β_a), and a factor representing the non-diversifiable portion of the company's financial risk, $\left[1 + \left((1-t)\frac{D}{E}\right)\right]$. The inverse of the Hamada's equation to solve for the equity beta can be expressed algebraically as follows:

$$\beta_e = \beta_a \left[1 + \left((1-t)\frac{D}{E}\right) \right]$$

Cost of Debt (CoD)

66 To determine the CoD component of the efficient WACC, a debt premium is added to the risk-free rate of the Member State.

67 The debt premium serves as a measure of the specific credit risk faced by the ANSP, represented by the additional yield or return investors demand for investing in bonds issued by entities with credit ratings lower than the highest quality (typically rated AAA or equivalent).

68 The CoD can be expressed algebraically as follows:

$$Cost\ of\ Debt\ (CoD)\ = R_f + debt\ premium$$

Data sources and estimations

69 To determine the components of the WACC, the PRB revisited the temporal aspect of its methodology to enhance accuracy and reliability. Therefore, the PRB recommends utilising 10-year averages for estimating key parameters such as risk-free rates, equity risk premiums, and other relevant factors for the following reasons:

- To mitigate the impact of short-term financial fluctuations, such as those in interest rates, especially given the heightened volatility in the current economic environment;
- To align with the nature of the regulatory asset base (RAB) and the useful life of assets, which often extend over several years, ensuring a consistent approach; and
- To mirror prevailing practices observed in analogous markets overseen by regulatory bodies.[18]

The next sections detail the data sources and methodology used to estimate each WACC parameter.

Risk-free rate (R_f)

70 The risk-free rate represents the return on an asset that has no default risk. A common proxy for the risk-free rate is the yield on a default-free government debt instrument. The risk-free rates of Member States are shown in Table 5 (page 18).

71 The methodology applied by the PRB derives the 10-year average rate from the 10-year government bond yield of the respective countries, as of valuation date.[19] The 10-year average risk-free rates are then adjusted for inflation, derived from IMF, for the subsequent years of RP4, by multiplying the risk-free rate by (1+inflation rate of the specific Member State).

$$Adjusted\ R_{fMS} = 10\ year\ average\ R_f * (1 + inflation_{MS})$$

72 Due to insufficient data caused by market illiquidity, an indirect approach to compute the risk-free rate was applied for the following Member States: Croatia, Cyprus, Estonia, Latvia, and Malta. This approach involves aggregating the 10-year average of the following components:

- The German 10-year government bond yield ($R_{f,DE}$);

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[18] For example, the Commission de Régulation de l'Énergie for the TURPE 6 regulatory framework regulates the rates for using the public electricity distribution and transport networks. The TURPE 6 came into effect on 1st August 2021, is set to last for four years. The details can be found here. Additionally, the Beschlusskammer 10 of the Bundesnetzagentur in Germany is responsible for the market regulatory decisions to be taken in relation to railway infrastructure undertakings (EIU) under the European Railway Regulation Act, i.e. in particular for decisions on granting access and regulating charges. The details can be found here.

[19] Regarding Greece, the PRB deviated from the standard 10-year period and instead utilised a 5-year average. This adjustment was deemed necessary because the 10-year period includes years marked by exceptional rates and therefore not comparable to the current financial and economic circumstances of Greece.

- The country risk premium (CRP) of the respective Member State, derived from the database of Damodaran and shown in Table 5 (next page), to factor in the individual country-related risks;[20] and
- The inflation differential between the respective Member State and Germany (Δ inf.) is shown in Table 5 (next page), ensuring that the resulting risk-free rates reflect the inflation trends of that Member State.

73 The calculation of the risk-free rate for these specific Member States is as follows (with each component being the 10-year average):

$$R_{f\,MS} = R_{f,DE} + CRP_{MS} + (Inflation_{MS} - Inflation_{DE})$$

74 An additional remark with regards to the estimation of the risk-free rates relates to current macro-economic events (e.g. Russia's war of aggression against Ukraine). No additional premium is added as it is assumed that such major macro-economic events are already reflected in the current risk-free rates which have been used as a basis for the risk-free rates. Current risk-free rates are higher compared to prior reference periods indicating that an additional risk factor is factored in.

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[20] January 1, 2024. Details on the specific CRP of Member States can be found here.

Member State	2025				2026				2027				2028				2029			
	$R_{f,DE}$	CRP	Δ inf.	R_f	$R_{f,DE}$	CRP	Δ inf.	R_f	$R_{f,DE}$	CRP	Δ inf.	R_f	$R_{f,DE}$	CRP	Δ inf.	R_f	$R_{f,DE}$	CRP	Δ inf.	R_f
Austria				0.9%				0.9%				0.9%				1.0%				1.0%
Belgium				1.0%				1.0%				1.0%				1.1%				1.1%
Bulgaria				1.8%				1.8%				1.9%				1.9%				1.9%
Croatia	0.5%	1.8%	0.2%	2.6%	0.6%	1.8%	0.2%	2.7%	0.6%	1.9%	0.2%	2.7%	0.6%	1.9%	0.2%	2.8%	0.6%	2.0%	0.3%	2.8%
Cyprus	0.5%	1.4%	-0.4%	1.5%	0.6%	1.5%	-0.4%	1.6%	0.6%	1.5%	-0.4%	1.6%	0.6%	1.5%	-0.4%	1.6%	0.6%	1.6%	-0.5%	1.7%
Czech Republic				2.0%				2.1%				2.1%				2.1%				2.2%
Denmark				0.6%				0.6%				0.6%				0.6%				0.6%
Estonia	0.5%	0.5%	1.9%	3.0%	0.6%	0.5%	2.0%	3.1%	0.6%	0.5%	2.0%	3.1%	0.6%	0.5%	2.1%	3.2%	0.6%	0.5%	2.1%	3.3%
Finland				0.8%				0.9%				0.9%				0.9%				0.9%
France				0.9%				1.0%				1.0%				1.0%				1.0%
Germany				0.5%				0.5%				0.6%				0.6%				0.6%
Greece				3.2%				3.3%				3.3%				3.4%				3.5%
Hungary				4.4%				4.5%				4.7%				4.8%				5.0%
Ireland				1.5%				1.6%				1.6%				1.6%				1.6%
Italy				2.3%				2.3%				2.4%				2.4%				2.5%
Latvia	0.5%	0.9%	1.6%	3.0%	0.6%	0.9%	1.6%	3.0%	0.6%	0.9%	1.6%	3.1%	0.6%	0.9%	1.7%	3.2%	0.6%	1.0%	1.7%	3.2%
Lithuania				1.6%				1.6%				1.6%				1.7%				1.7%
Malta	0.5%	0.7%	-0.1%	1.2%	0.6%	0.7%	-0.1%	1.2%	0.6%	0.7%	-0.1%	1.3%	0.6%	0.8%	-0.1%	1.3%	0.6%	0.8%	-0.1%	1.3%
Netherlands				0.7%				0.7%				0.8%				0.8%				0.8%
Norway				2.0%				2.0%				2.1%				2.1%				2.2%
Poland				3.7%				3.9%				4.0%				4.1%				4.2%
Portugal				2.2%				2.2%				2.3%				2.3%				2.4%
Romania				5.3%				5.4%				5.6%				5.8%				5.9%
Slovakia				1.2%				1.2%				1.2%				1.3%				1.3%
Slovenia				3.6%				3.7%				3.7%				3.8%				3.9%
Spain				1.7%				1.7%				1.7%				1.8%				1.8%
Sweden				0.9%				0.9%				0.9%				1.0%				1.0%
Switzerland				0.1%				0.1%				0.1%				0.1%				0.1%

Table 5 – Risk-free rates (including the relevant country risk premium) per Member State for RP4 (source: PRB elaboration).

Equity Risk Premium (ERP)

75 Similarly to CRP, the PRB based the ERP on the dataset of Damodaran, published on the 1st of January 2024.

76 In continuity with the 2021 Study, a single ERP rate is applied across all Member States. However, unlike the previous approach which utilised the S&P 500 index (4.7% in 2020), the ERP rate is now derived from Germany's ERP. This change aims to enhance consistency within the PRB framework by using a Union-wide benchmark, aligning more closely with the scope of this study.

77 Additionally, certain Member States in the 2021 study were subject to a country risk premium alongside the single ERP rate. As the national-level risk factors are already incorporated into the estimation of risk-free rates, an additional CRP is excluded from determining the ERP of each Member State to prevent double-estimation of country-specific risk.

78 In line with this approach, the ERP rate is set for all Member States at 5.3%. This rate was kept constant over the reference period, as the inflation expectations are already captured in the risk-free rate component.

Equity beta (β_e)

79 The PRB defined two peer groups based on their similarity in activities, risk profile and sector compared to the ANSPs to determine the asset betas (β_a):

- The first peer group, referred to as the airport peer group (Tier 1), is selected based on their engagement in airport operations similar to the activities of the ANSPs; and
- The second group (Tier 2) is defined by companies with a RAB mirroring the regulatory impact of being government-held and the reduced risk profile typically associated with ANSPs and their monopoly situation.

80 The medians of the asset betas of the two peer groups are shown in Table 6 and Table 7 (next page). The equity beta applicable for the WACCs of the ANSPs is estimated using the 10-year average asset betas of the two peer groups of publicly traded companies mentioned above. The final equity beta has been calculated as the average of the 10-year median of the betas of the two peer groups. This average has been applied for all ANSPs (0.55).

81 The PRB derived the equity beta (β_e) by using the components from Hamada's equation as described in the previous section:

- The asset betas (β_a) of the two peer groups;
- The tax rate (t) per Member State sourced from Capital IQ;[21] and
- The optimal gearing (D/E) calculated as the average of the median of the actual 10-year average gearing of the entities in the two peer groups shown in Table 6 and Table 7 (next page).

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[21] Details on the tax rates of Member States can be found here.

Tier 1		
Company	Member State	10-year average asset beta
Flughafen Wien Aktiengesellschaft	Austria	0.46
Københavns Lufthavne A/S	Denmark	0.43
Aeroports de Paris SA	France	0.65
Fraport AG	Germany	0.58
Aeroporto Guglielmo Marconi di Bologna S.p.A.	Italy	0.69
Toscana Aeroporti S.p.A.	Italy	0.45
Aena S.M.E., S.A.	Spain	0.58
Flughafen Zürich AG	Switzerland	0.71
Median		**0.59**

Table 6 – Tier 1 peer group of asset Betas (source: Capital IQ, EY valuation services).

Tier 2		
Company	Member State	10-year average asset beta
VERBUND AG	Austria	0.65
Elia Group SA/NV	Belgium	0.30
Fluxys Belgium SA	Belgium	0.18
Engie SA	France	0.77
Aeroports de Paris SA	France	0.65
Admie Holding S.A.	Greece	0.74
Public Power Corporation S.A.	Greece	0.29
E.ON SE	Germany	0.64
Enel SpA	Italy	0.57
Ascopiave S.p.A.	Italy	0.54
Terna S.p.A.	Italy	0.40
Snam S.p.A.	Italy	0.36
Litgrid AB	Lithuania	0.21
AB Ignitis grupe	Lithuania	0.32
Societa Energetica Electrica S.A.	Romania	0.48
S.N.T.G.N. Transgaz S.A.	Romania	0.54
CNTEE Transelectrica SA	Romania	0.54
Iberdrola, S.A.	Spain	0.49
Median		**0.52**

Table 7 – Tier 2 peer group of asset Betas (source: Capital IQ, EY valuation services).

Cost of Debt (CoD)

82   In Option 1 of the PRB methodology, the cost of debt of ANSPs should be estimated using the risk-free rate of each Member State and the debt premium defined as the difference in 10-year average yield between a benchmark bond with a credit rating of BBB and the 10-year German government bond.

83   Similar to the approach described for ERP, a uniform debt premium is applied for all Member States. This Union-wide approach, as opposed to a case-by-case assessment at Member State level, stems from the recognition that national-level debt premiums may lead to an overestimation of country-specific risk, as differences in risk are already captured by including the CRP in the risk-free rates and inflation figures. Moreover, considering that the activities of ANSPs involve a network market, their risk exposure is more closely tied to the overall risk and return dynamics of the area as a whole rather than those of individual Member States.

84   The debt premium is calculated as follows (with each component being the 10-year average):

Debt premium = 10-year Eurozone BBB bond yield – 10-year German government bond yield = 1.96% - 0.52% = 1.45%

85   The risk-free rates, the debt premium, and the corresponding CoD are shown in Table 8 (next page).

Member State	2025			2026			2027			2028			2029		
	R_f	pre-mium	CoD	R_f	pre-mium	CoD	R_f	pre-mium	CoD	R_f	pre-mium	CoD	R_f	pre-mium	CoD
Austria	0.9%	1.4%	2.3%	0.9%	1.4%	2.4%	0.9%	1.4%	2.4%	1.0%	1.4%	2.4%	1.0%	1.4%	2.4%
Belgium	1.0%	1.4%	2.4%	1.0%	1.4%	2.5%	1.0%	1.4%	2.5%	1.1%	1.4%	2.5%	1.1%	1.4%	2.5%
Bulgaria	1.8%	1.4%	3.2%	1.8%	1.4%	3.3%	1.9%	1.4%	3.3%	1.9%	1.4%	3.3%	1.9%	1.4%	3.4%
Croatia	2.6%	1.4%	4.0%	2.7%	1.4%	4.1%	2.7%	1.4%	4.2%	2.8%	1.4%	4.2%	2.8%	1.4%	4.3%
Cyprus	1.5%	1.4%	3.0%	1.6%	1.4%	3.0%	1.6%	1.4%	3.1%	1.6%	1.4%	3.1%	1.7%	1.4%	3.1%
Czech Republic	2.0%	1.4%	3.5%	2.1%	1.4%	3.5%	2.1%	1.4%	3.6%	2.1%	1.4%	3.6%	2.2%	1.4%	3.6%
Denmark	0.6%	1.4%	2.0%	0.6%	1.4%	2.0%	0.6%	1.4%	2.0%	0.6%	1.4%	2.1%	0.6%	1.4%	2.1%
Estonia	3.0%	1.4%	4.4%	3.1%	1.4%	4.5%	3.1%	1.4%	4.6%	3.2%	1.4%	4.7%	3.3%	1.4%	4.7%
Finland	0.8%	1.4%	2.3%	0.9%	1.4%	2.3%	0.9%	1.4%	2.3%	0.9%	1.4%	2.3%	0.9%	1.4%	2.4%
France	0.9%	1.4%	2.4%	1.0%	1.4%	2.4%	1.0%	1.4%	2.4%	1.0%	1.4%	2.4%	1.0%	1.4%	2.5%
Germany	0.5%	1.4%	2.0%	0.5%	1.4%	2.0%	0.6%	1.4%	2.0%	0.6%	1.4%	2.0%	0.6%	1.4%	2.0%
Greece	3.2%	1.4%	4.7%	3.3%	1.4%	4.7%	3.3%	1.4%	4.8%	3.4%	1.4%	4.9%	3.5%	1.4%	4.9%
Hungary	4.4%	1.4%	5.9%	4.5%	1.4%	6.0%	4.7%	1.4%	6.1%	4.8%	1.4%	6.3%	5.0%	1.4%	6.4%
Ireland	1.5%	1.4%	3.0%	1.6%	1.4%	3.0%	1.6%	1.4%	3.0%	1.6%	1.4%	3.1%	1.6%	1.4%	3.1%
Italy	2.3%	1.4%	3.7%	2.3%	1.4%	3.8%	2.4%	1.4%	3.8%	2.4%	1.4%	3.9%	2.5%	1.4%	3.9%
Latvia	3.0%	1.4%	4.4%	3.0%	1.4%	4.5%	3.1%	1.4%	4.6%	3.2%	1.4%	4.6%	3.2%	1.4%	4.7%
Lithuania	1.6%	1.4%	3.0%	1.6%	1.4%	3.1%	1.6%	1.4%	3.1%	1.7%	1.4%	3.1%	1.7%	1.4%	3.2%
Malta	1.2%	1.4%	2.7%	1.2%	1.4%	2.7%	1.3%	1.4%	2.7%	1.3%	1.4%	2.7%	1.3%	1.4%	2.8%
Netherlands	0.7%	1.4%	2.2%	0.7%	1.4%	2.2%	0.8%	1.4%	2.2%	0.8%	1.4%	2.2%	0.8%	1.4%	2.2%
Norway	2.0%	1.4%	3.5%	2.0%	1.4%	3.5%	2.1%	1.4%	3.5%	2.1%	1.4%	3.6%	2.2%	1.4%	3.6%
Poland	3.7%	1.4%	5.2%	3.9%	1.4%	5.3%	4.0%	1.4%	5.4%	4.1%	1.4%	5.5%	4.2%	1.4%	5.6%
Portugal	2.2%	1.4%	3.6%	2.2%	1.4%	3.7%	2.3%	1.4%	3.7%	2.3%	1.4%	3.8%	2.4%	1.4%	3.8%
Romania	5.3%	1.4%	6.7%	5.4%	1.4%	6.9%	5.6%	1.4%	7.0%	5.8%	1.4%	7.2%	5.9%	1.4%	7.4%
Slovakia	1.2%	1.4%	2.6%	1.2%	1.4%	2.7%	1.2%	1.4%	2.7%	1.3%	1.4%	2.7%	1.3%	1.4%	2.7%
Slovenia	3.6%	1.4%	5.0%	3.7%	1.4%	5.1%	3.7%	1.4%	5.2%	3.8%	1.4%	5.3%	3.9%	1.4%	5.3%
Spain	1.7%	1.4%	3.1%	1.7%	1.4%	3.2%	1.7%	1.4%	3.2%	1.8%	1.4%	3.2%	1.8%	1.4%	3.3%
Sweden	0.9%	1.4%	2.3%	0.9%	1.4%	2.4%	0.9%	1.4%	2.4%	1.0%	1.4%	2.4%	1.0%	1.4%	2.4%
Switzerland	0.1%	1.4%	1.5%	0.1%	1.4%	1.5%	0.1%	1.4%	1.5%	0.1%	1.4%	1.5%	0.1%	1.4%	1.5%

Table 8 – Cost of Debt for member states for Option 1 including the debt premium (source: EY valuation services)

Optimal Gearing (D/E)

86 According to Modigliani & Miller's theory, a business' value should not depend on its chosen financing method.[22] This implies that the enterprise value should not change whether the business is valued by equity, debt, or a combination of both. In a scenario where an ANSP is entirely financed by equity, charging a higher cost of capital simply due to a suboptimal gearing compared to the peer group might present challenges. As the ANSPs are reflecting their respective costs to airspace users through the cost of capital, the mechanism of using the actual financing/gearing ratio of the respective ANSP could result in an overvaluation of the costs. Consequently, the optimal capital structure should be used when calculating the efficient WACC.

87 The PRB defined two peer groups, whereby the first peer group (Tier 1) is constituted out of airports, and the second peer group (Tier 2) focuses on the RAB listed companies in aviation, energy, infrastructure, transport, telecommunications, and water sectors. The gearing of the peer group entities was calculated using total debt and total market capitalisation of the 2014-2023 period sourced from Capital IQ.

88 The optimal gearing (D/E) is calculated as the average of the median of the actual 10-year average gearing of the entities in the two peer groups (Table 9 and Table 10, next page), resulting in an average ratio of 34%.

89 For establishing the cost of capital within the performance plan and reporting tables, the weighting of factors is based on the proportion of financing through equity, expressed as $\frac{E}{E+D}$, or $\frac{1}{1+Gearing}$. Consequently, the share of financing through equity used to calculate the efficient WACC in Option 1 is 0.75, a rate uniformly applied to all Member States.

90 Compared to the previous report, the PRB has moved from a Member State level asset beta and gearing to a Union-wide tier group-level approach for the following reasons:

- Peer group companies selected for Tier 1 and Tier 2 exhibit similar operational characteristics and face comparable risks within their respective tiers, irrespective of their country of origin;

- ANSPs are predominantly influenced by operational risks inherent in Tier 1 and Tier 2 activities, such as cross-border operations and regulatory environments, rather than risks associated with their country of residence; and

- Less availability of data points, including publicly listed companies with accessible data for each Member State, which limits the ability to calculate the asset beta and gearing at the Member State level.

91 Given these factors, adopting a Union-wide peer group ensures a more representative assessment of ANSPs' volatility compared to the broader market. Additionally, for alternative WACC Options, Member States directly provide genuine RoE and gearing data.

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[22] Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. The American Economic Review, 48(3), 261-297.

Tier 1		
Company	Member State	10-year average D/E
Flughafen Wien Aktiengesellschaft	Austria	17%
Københavns Lufthavne A/S	Denmark	18%
Aeroports de Paris SA	France	39%
Fraport AG	Germany	90%
Aeroporto Guglielmo Marconi di Bologna S.p.A.	Italy	2%
Toscana Aeroporti S.p.A.	Italy	15%
Aena S.M.E., S.A.	Spain	38%
Flughafen Zürich AG	Switzerland	16%
Median		**18%**

Table 9 – Tier 1 peer group for optimal gearing and capital structure (source: Capital IQ, EY valuation services).

Tier 2		
Company	Member State	10-year average D/E
VERBUND AG	Austria	28%
Elia Group SA/NV	Belgium	94%
Fluxys Belgium SA	Belgium	70%
Engie SA	France	45%
Aeroports de Paris SA	France	39%
Admie Holding S.A.	Greece	-1%
Public Power Corporation S.A.	Greece	461%
E.ON SE	Germany	60%
Enel SpA	Italy	69%
Ascopiave S.p.A.	Italy	33%
Terna S.p.A.	Italy	82%
Snam S.p.A.	Italy	86%
Litgrid AB	Lithuania	30%
AB Ignitis grupe	Lithuania	55%
Societatea Energetica Electrica S.A.	Romania	-7%
S.N.T.G.N. Transgaz S.A.	Romania	5%
CNTEE Transelectrica SA	Romania	-6%
Iberdrola, S.A.	Spain	61%
Median		**50%**

Table 10 – Tier 2 peer group for optimal gearing and capital structure (source: Capital IQ, EY valuation services).

Currency conversion and inflation

92   The WACC figures presented in Table 2 (page 11) are estimated in national currency, in accordance with Article 22(3) of the Regulation, which requires that determined costs included and reported in the cost bases for ANS charges be calculated in national currency.[23] The conversion process of WACC from national currency to Euro is presented below:

$$\text{WACC}_{\text{euro}} = (1 + \text{WACC}_{\text{local}}) * \frac{(1 + local\ inflation)}{(1 + eurozone\ inflation)} - 1$$

93   The forecasted inflation rates are given in Table 11 (next page). Inflation forecasts of Member States that were lower than that of the Eurozone average have been matched to the Eurozone's level.

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[23] As reference, the conversion to Euro involves adjusting the WACC from the local currency to Euro. This adjustment is made by factoring in the difference between the local inflation rate and the inflation rate of the Eurozone. By accounting for these inflation differentials, the converted WACC reflects a standardized valuation in Euro, allowing for uniformity among Member States. The conversion formula is as follows:
$$WACC_{euro} = (1 + \text{WACC}_{\text{local}}) * \frac{(1 + local\ inflation)}{(1 + eurozone\ inflation)} - 1.$$

Inflation rates for RP4					
Member State	2025	2026	2027	2028	2029
Austria	2.8%	2.3%	2.0%	2.1%	2.1%
Belgium	2.1%	2.0%	1.9%	2.0%	2.0%
Bulgaria	2.7%	2.2%	2.0%	2.0%	2.0%
Croatia	2.2%	2.2%	2.2%	2.2%	2.2%
Cyprus	2.1%	2.0%	1.9%	1.9%	1.9%
Czech Republic	2.1%	2.0%	2.0%	2.0%	2.0%
Denmark	2.1%	2.0%	2.0%	2.0%	2.0%
Estonia	2.5%	2.5%	2.5%	2.5%	2.5%
Finland	2.1%	2.0%	2.0%	2.0%	2.0%
France	2.1%	2.0%	1.9%	1.9%	1.9%
Germany	2.1%	2.0%	2.0%	2.0%	2.0%
Greece	2.1%	2.0%	1.9%	1.9%	1.9%
Hungary	3.5%	2.9%	3.0%	3.0%	3.0%
Ireland	2.1%	2.0%	2.0%	2.0%	2.0%
Italy	2.1%	2.0%	2.0%	2.0%	2.0%
Latvia	3.6%	2.2%	2.3%	2.3%	2.3%
Lithuania	2.3%	2.2%	2.3%	2.3%	2.3%
Malta	2.1%	2.0%	2.0%	2.0%	2.0%
Netherlands	2.1%	2.0%	2.0%	2.0%	2.0%
Norway	2.6%	2.0%	2.0%	2.0%	2.0%
Poland	5.0%	3.6%	2.9%	2.5%	2.5%
Portugal	2.1%	2.0%	2.0%	2.0%	2.0%
Romania	4.0%	3.3%	3.0%	3.0%	3.0%
Slovakia	3.9%	2.5%	2.0%	2.0%	2.0%
Slovenia	2.1%	2.0%	2.0%	2.0%	2.0%
Spain	2.4%	2.0%	1.9%	1.9%	1.9%
Sweden	2.1%	2.0%	2.0%	2.0%	2.0%
Switzerland	2.1%	2.0%	1.9%	1.9%	1.9%
Union-wide (average)	2.5%	2.2%	2.1%	2.1%	2.1%

Table 11 – Inflation rates for Member States (source: IMF April 2024, EY Valuation Services).