

Performance Review Body: Study on cost of capital Methodology review and update

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1 ABOUT THE DOCUMENT

- 1 This study provides a methodological review of the estimation of the cost of capital of Air Navigation Service Providers (ANSPs), including the selection of parameters taking into account local circumstances. These parameters aim to assimilate the cost of capital of ANSPs with the cost that an efficient private company would pay to raise finance in similar market conditions.¹
- 2 This study is an update of the PRB “*Study on the cost of capital – Methodology review*” published in August 2019. The methodology outlined in the 2019 Study to assess the cost of capital in performance plans remains unchanged. However, the estimate of the efficient parameters predates the outbreak of the COVID-19 pandemic. The purpose of this study is to update such parameters after the outbreak of the pandemic in order to inform the preparation of performance plans by Member States and their assessment by the PRB and the European Commission. The third reference period (RP3) performance plans will be submitted in October 2021 due to the Exceptional Measures (Regulation 2020/1627).² The PRB will continue to monitor the evolution of financial market data and may update the parameters for assessing performance plans.
- 3 The study is structured as follows:
 - Section 2 explains the legal 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.³
 - Section 3 analyses the impact of the COVID-19 pandemic on financial markets as well as on the business and financial risks of ANSPs. It provides an estimate of the efficient weighted average cost of capital (WACC) per Member State using data up to April 2021.
 - Section 4 concludes the study.

¹ 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 Commission Implementing Regulation (EU) No 2020/1627 on exceptional measures for the third reference period (2020-2024) of the single European sky performance and charging scheme due to the COVID-19 pandemic.

³ Commission Implementing Regulation (EU) No 2019/317 laying down a performance and charging scheme in the single European sky and repealing Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013.

2 DEFINITION AND METHODOLOGY

2.1 Weighted average cost of capital definition

- 4 Implementing Regulation 2019/317 art. 22 (4) defines the cost of capital as the product of the total net asset base, excluding interest-bearing accounts, and the weighted average cost of capital (WACC). Art 22 (4) defines the WACC as the average of the return on equity and the interest rate on debt, weighted by the capital structure. Annex IV of the Implementing Regulation clarifies that the WACC relevant for the assessment of performance plans is the “cost of capital pre-tax rate”. The pre-tax WACC may be expressed as:

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

- 5 The return on equity (RoE) is the return expected by the shareholders of the ANSP. It should reflect the individual business and financial risks of the ANSP, and the fact that Member States are single shareholders of most ANSPs (see Table 1 page 6 compiled based on information published in May 2020).
- 6 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 ANSPs market risk has to be estimated within the CAPM approach using data from comparator companies with available data on market shares.
- 7 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 (t) liabilities.
- 8 The interest rate on debts or cost of debt (CoD) is the cost of financing for an ANSP when issuing a bond or taking out a loan.

- 9 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 ($\frac{E}{E+D}$). Generally, a certain level of debt contributes to an optimal capital structure because interest payment may generate tax benefits. 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 recent years the cost of debt has been lower than the return on equity, making it a more cost-efficient funding option as long as the default risk is kept under control.
- 10 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. This study also refers to gearing expressed as the ratio of debt to equity (D/E).

2.2 Organisation and ownership of ANSPs

- 11 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, public ownership and strategic importance to Member States.⁴ Similarly, the financial risk is generally low as ANSPs typically have stable cash flow generation from the provision of an essential service, moderate level of debt and high liquidity. ANSPs with these characteristics may issue debt or receive equity injections at more favourable conditions than private companies facing competition.
- 12 To date, 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) limit such options.
- 13 In most Member States, en route and terminal services face comparable levels of competition and bear similar levels of business and financial

⁴ 20 January 2021, [NATS \(En Route\) PLC -- Moody's announces completion of a periodic review of ratings of NATS \(En Route\) PLC \(yahoo.com\)](#). July 2012, DFS Deutsche Flugsicherung GmHH and NATS (En Route) Limited – Peer Comparison, Moody’s.

risk. During the second reference period (RP2), roughly half of the Member States applied the same determined WACC for en route and terminal services implying the same level of risk. However, some Member States had different levels of WACC implying different levels of risk for each service.

- 14 In some Member States, the WACC in RP2 have been different for en route and terminal services due to the possibility of excluding airports with fewer than 225,000 IFR movements per year from the traffic risk sharing mechanism (Implementing Regulation 391/2013 art. 13 (6)).⁵ However, in RP3 there is no longer an exception on the application of the traffic risk sharing mechanism for smaller airports (Implementing Regulation 2019/317 does not apply to airports with fewer than 80,000 IFR movements). The WACC may have also been different if terminal services faced more competition than en route services in a given Member State during RP2.
- 15 A different WACC for en route and terminal services will impact both the cost of capital and the cost allocation between en route and terminal services. The performance plans submitted by NSAs should justify any difference in the business or financial risks between en route and terminal services that results in a different WACC. This should rule out potential cross subsidisation between en route and terminal services.⁶ Cross subsidies between en route and terminal charging zones are not permitted under EU law (Regulation 550/2004 art. 15 (2)).⁷
- 16 All ANSPs of the SES are 100% publicly owned, with the exception of ENAV which is 53.3% state-owned (see ANPS organisation in Table 1, next page).⁸ The strategic importance of air navigation services as part of infrastructure of States explains their interest to exert partial or full control over the national ANSP.

⁵ Commission Implementing Regulation (EU) No 391/2013 laying down a common charging scheme for air navigation services.

⁶ For recommendations on cost allocation between en route and terminal charging zones see the 2021 PRB en route and terminal cost allocation methodology review.

⁷ Regulation (EC) No 550/2004 of the European Parliament and of the Council on the provision of air navigation services in the single European sky (the service provision Regulation), as amended.

⁸ No changes in ownership structure of ANSPs were observed compared to the 2019 PRB Study on Cost of Capital.

Member State	ANSP	Organisational & Corporate Arrangements
Austria	Austro Control	Limited liability company
Belgium	skeyes	State-owned enterprise
Bulgaria	BULATSA	State-owned enterprise
Croatia	Croatia Control	Joint-stock company
Cyprus	DCAC Cyprus	State body
Czech Republic	ANS CR	State-owned enterprise
Denmark	NAVIAIR	State-owned enterprise
Estonia	EANS	Joint-stock company
Finland	Finavia	State-owned enterprise
France	DSNA	State body (autonomous)
Germany	DFS	Limited liability company
Greece	HCAA	State body
Hungary	HungaroControl	State-owned enterprise
Ireland	IAA	Joint-stock company
Italy	ENAV	Joint-stock company since July 2016
Latvia	LGS	Joint-stock company
Lithuania	Oro Navigacija	State-owned enterprise
Malta	MATS	Joint-stock company
Netherlands	LVNL	Independent administrative body
Norway	Avinor	Joint-stock company
Poland	PANSA	State body
Portugal	NAV Portugal	State-owned enterprise
Romania	ROMATSA	State-owned enterprise
Slovakia	LPS	State-owned enterprise
Slovenia	Slovenia Control	State-owned enterprise
Spain	ENAIRE	State-owned enterprise
Sweden	LFV	State-owned enterprise
Switzerland	Skyguide	Joint-stock company (part-private)

Table 1 - ANSPs ownership structures (source: ACE 2018 Benchmarking Report with 2019-2023 outlook, May 2020).

2.3 Regulatory mechanisms that mitigate the risk of ANSPs

- 17 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 Implementing Regulation 2019/317:
- Revision of performance targets during a reference period in case that at least one of the alert thresholds referred in art. 9 (4) b) is reached (art. 18). It limits ANSPs' exposure to traffic variations. The alert thresholds are defined either as (i) deviations from the traffic forecast or (ii) variation of reference values as a result of seasonal updates of the Network Operations Plan.
 - Traffic risk sharing, limiting ANSPs' exposure to traffic variations (art. 27). ANSPs and airspace users share the revenue risk caused by deviations from the service unit forecast in the performance plans. The maximum exposure of ANSPs to traffic risk is +/- 4.4% of revenues.⁹
 - Cost risk sharing, limiting ANSPs' exposure to cost variations by sharing the risk of differences between determined and actual costs among airspace users and ANSPs (art. 28). The cost risk sharing mechanism defines some cost exemptions that are fully recovered from users, further limiting the risk.
 - Elimination of ANSPs' exposure to the inflation variation between determined and actual costs (art. 26).
- 18 These four mechanisms are designed to deal with deviations between determined and actual values within a reference period due to typical macro-economic cycles. In order to respond to the extraordinary impact of the COVID-19 pandemic on aviation, the EU adopted Exceptional Measures (Implementing Regulation 2020/1267) revising

targets and the draft performance plans submitted in 2019 (art. 5 (4)).

2.4 Methodological framework

- 19 The methodological framework recommended by the PRB to assess the cost of capital and its components remains unchanged from the previous report. The approach calculates efficient costs of capital and combines them with a check on the maximum exposure due to the traffic-risk sharing mechanism.
- 20 The PRB's methodological framework addresses two issues relevant for the assessment of the cost of capital. The first relates to the capital structure used to estimate the WACC, the second concerns the correct inclusion of the inflation rate in the cost of capital.
- 21 The optimal capital structure consists of both debt and equity. ANSPs should aim to reach the optimal capital structure and the corresponding efficient WACC to not pass through the cost of economically inefficient decisions to airspace users.
- 22 With respect to the inflation rate, Implementing Regulation 2019/317 art. 22 (4) 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.
- 23 In order to calculate the cost of capital of a regulated asset base valued at current cost, the nominal WACC shall be converted to real WACC using the Fisher equation¹⁰, defined in the following formula:

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

- 24 The methodological framework assesses the cost of capital according to four options shown in Table 2 (next page):
- Option 1 should be used when the WACC of an ANSP is based on an actual capital

⁹ 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. 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 from airspace users. The resulting maximum risk exposure of ANSPs is limited to $2\% * 100\% + (10\% - 2\%) * 30\% = 4.4\%$. Under article 27(5) of Commission Implementing Regulation No 2019/317, the NSAs have the possibility to change the traffic risk sharing parameters after consultation with the airspace users and ANSPs.

¹⁰ <https://www.sjsu.edu/faculty/watkins/fisher1.htm>.

structure that is not aligned to the optimal capital structure.

- Option 2 should be used if it is lower than Option 1 for an ANSP that is subject to a government-specified equity return.
- Option 3 should be used if it is 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.

- Option 4 is an additional sense check of the cost of capital (the WACC times the asset base) and the maximum risk exposure of the ANSP (4.4% of revenues).

Options	1. Efficient WACC	2. Administered WACC	3. Hybrid WACC	4. Maximum Exposure
Scope	The efficient WACC should be used when the WACC of an ANSP is based on an actual 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 the efficient 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 the efficient WACC.	The cost of capital calculated using Options 1, 2, or 3 is compared to the maximum exposure of ANSPs. If cost of capital using Options 1,2 or 3 is higher, retroactively calculate a WACC that meets the maximum exposure.
Return on equity	Use CAPM.	Use rate specified by government.	Use CAPM.	Retroactively calculate a WACC that meets the maximum exposure.
Cost of debt	Use average yields on corporate bonds from similar entities (domestic or other Member State adjusted).	Use actual cost of debt or government borrowing rate (whichever higher).	Use actual cost of debt or government borrowing rate (whichever higher).	Retroactively calculate a WACC that meets the maximum exposure.
Capital structure	Use optimal capital structure calculated as average gearing of similar corporate entities (domestic or other Member State adjusted).	Use actual capital structure.	Use actual capital structure.	Retroactively calculate a WACC that meets the maximum exposure.

Table 2 - Framework by the PRB to assess the cost of capital (source: PRB elaboration).

3 IMPACT OF THE COVID-19 PANDEMIC ON THE COST OF CAPITAL

3.1 Impact on the WACC and the asset base

- 25 The COVID-19 pandemic may have affected the cost of capital of ANSPs as a result of its impact on (i) financial markets, (ii) business and financial risks of ANSPs and (iii) the measures taken by ANSPs in response to the pandemic. As a result, the pandemic may have affected both the level of the WACC and the asset base.
- 26 The possible impacts on the WACC as a result of changes in the financial markets are twofold. On the one hand, a heightened perceived risk by lenders and investors could result in a higher cost of debt and equity in the short term. However, as mentioned in section 2.1 the ability of some ANSPs to obtain finance, including public loans and equity injections, may mitigate the increase in the cost of debt and equity. On the other hand, the cost of debt and equity may be lower because emergency monetary easing by Central Banks and fiscal stimulus by governments are driving benchmark interest rates close to zero. Evidence from market data until end of April 2021 shows that, in general, low interest rates have outweighed any higher perceived risk by lenders and investors. As a result, the average cost of debt and cost of equity are at or below the levels last seen in 2019 before the pandemic.
- 27 There might be an impact on the WACC as a result of changes in the business and financial risks of ANSPs due to the drop in traffic. During the pandemic, ANSPs continue to operate while having lower revenues. In March 2021, the PRB *“Monitoring Report on the Financial and Operational impact of COVID-19 on the SES”* showed that the drop in traffic in 2020 has put ANSPs under financial pressure affecting their cashflow. The inability to service debts represents a financial risk that can impact the future cost structure of ANSPs.
- 28 To date, ANSPs have taken measures to address the financial and operational impact of the COVID-19 pandemic on their activities. The aforementioned PRB monitoring report indicates that ANSPs managed the gap caused by the drop in revenues in different ways, by obtaining additional finances through loans or equity injections and/or reducing capital costs.
- 29 With respect to the additional finance, some ANSPs were able to raise public funds at more favourable rates than the market. The PRB report showed that Member States provided 62% of the loans at an estimated average interest rate of 0.4%, while private banks provided 35% of the loans at an average rate of 1%, the market rate.¹¹
- 30 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.
- 31 The PRB Monitoring report showed a reduction of - 1% in 2020 for the en route cost of capital compared to 2019. A total of 4.4M€₂₀₁₇ have been saved by the postponement or cancellation of en route investments. The PRB report highlighted that postponement of investments only transfers the costs from 2020 to later years without triggering structural changes in the cost base.
- 32 Annex II of Regulation 2019/317 requires that performance plans describe and justify *“the costs, nature and benefits of new and existing investments in fixed assets planned over the reference period.”* The assessment of investment costs by NSAs may conclude that the costs indicated for one or several fixed assets planned by the ANSP would not be justified following the outbreak of the COVID-19 pandemic. After consultation between the ANSP and airspace users, and detailed analysis of the underlying investments, the NSA may decide to adjust the asset base to exclude any unjustified amounts. Adjustments by the NSA to the asset

¹¹ The standard deviation (s) of the interest rates provided by the Member States equals 0.007 (based on nine interest rates provided by the Member States). The standard deviation (s) of the interest rates provided by private banks equals 0.01 (calculated based on 15 interest rates provided by the Member States).

base will impact the cost of capital and depreciation costs.

3.2 WACC estimates (Option 1) up to April 2021

- 33 To inform and ease 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 its methodological framework (Table 3 next page). The average Union-wide WACC ranges from 4.3% in 2020 to 4.9% in 2024. The return on equity values per Member State corresponding to the WACC in Option 1 are presented in Table 4 (page 12).
- 34 Options 2-4 of the methodological framework may result in **lower** numbers than Option 1 if the ANSP is subject to a lower government-specified return on equity (Option 2), if the ANSP obtains loan finance on more favourable terms (Option 3), or if the WACC implied by the maximum exposure of the ANSP is lower (Option 4).
- 35 Annex I – Technical description presents the data sources, data description and methodology employed to estimate the return on equity (RoE), gearing (D/E), and cost of debt (CoD).
- 36 The efficient WACC (Option 1 of the methodological framework) was estimated using the following data and assumptions:
- Risk free rate data (10-year government bonds) are available for ANSPs of 10 Member States: Denmark, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain, Sweden, and Switzerland. For Greece and Member States without available data, the rate of German bonds is used.
 - The equity beta of ANSPs is estimated based on the asset beta of similar entities listed in the stock market in each Member State. Similar entities are publicly listed companies in the aviation, energy, infrastructure, transport, telecommunications, and water sector. The asset betas of similar entities are calculated using the equity beta, tax rate, and gearing of each entity. The capital structure of each entity is calculated as total debt divided by total market capitalisation.
 - The asset beta and capital structure per Member State are weighted by their GDP to arrive to a Union-wide weighted average of asset beta and capital structure.
- The equity beta of ANSPs in each Member State is computed using the Union-wide weighted average asset beta, the tax level of each Member State, and the Union-wide weighted average capital structure.
 - The equity risk premium (ERP) includes country risk premia for 15 Member States: Bulgaria, Croatia, Cyprus, Czech Republic, Greece, Hungary, Ireland, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia. The remaining Member States do not have a country risk premium.
 - The cost of debt of ANSPs is the sum of the risk free rate and the average spread of corporate debt of entities with broadly similar credit ratings to the ANSP within the Member State. In Member States where there are no similar corporate bonds available, the spread of German bonds is used, adjusted by the specific country risk premium. A country risk premium was added to the same 15 Member States as for the equity risk premium.
 - The values of 2020 actual inflation and 2021-2024 forecasted inflation are the same as those to be used in the RP3 draft performance plans that will be submitted in October 2021. For States with negative actual inflation in 2020, a value equal zero is used instead of the actual value as required in Implementing Regulation 2019/317 art. 2 (12).

Estimated pre-tax WACC for Option 1					
Member State	2020	2021	2022	2023	2024
Austria	4.1%	4.0%	4.1%	4.2%	4.3%
Belgium	2.9%	4.2%	4.3%	4.1%	4.2%
Bulgaria	4.7%	4.1%	5.0%	4.9%	5.1%
Croatia	4.4%	4.8%	5.1%	5.9%	6.4%
Cyprus	4.7%	4.8%	5.0%	5.3%	5.7%
Czech Republic	6.6%	5.0%	4.6%	4.5%	4.6%
Denmark	2.9%	3.5%	3.7%	3.7%	4.0%
Estonia	2.3%	4.0%	4.7%	4.1%	4.0%
Finland	2.7%	3.5%	3.5%	3.6%	3.9%
France	3.2%	3.5%	3.5%	3.7%	4.0%
Germany	3.2%	5.2%	3.6%	4.0%	4.3%
Greece	5.6%	5.2%	5.9%	5.9%	6.8%
Hungary	7.3%	7.1%	6.9%	6.5%	6.4%
Ireland	2.9%	4.4%	4.6%	4.6%	4.7%
Italy	4.3%	4.8%	4.8%	5.0%	5.3%
Latvia	3.3%	5.3%	5.3%	4.8%	5.2%
Lithuania	4.4%	4.5%	4.7%	4.8%	5.0%
Malta	4.9%	4.7%	5.1%	5.1%	5.5%
Netherlands	2.8%	2.7%	2.8%	2.8%	2.9%
Norway	3.7%	4.5%	4.1%	4.1%	4.2%
Poland	7.2%	6.2%	5.3%	5.3%	5.3%
Portugal	5.6%	6.1%	6.3%	6.3%	6.6%
Romania	6.7%	6.7%	5.8%	6.3%	6.4%
Slovakia	5.5%	4.1%	4.8%	4.9%	5.0%
Slovenia	3.3%	3.8%	4.6%	4.6%	4.8%
Spain	3.7%	4.5%	4.7%	5.0%	5.1%
Sweden	3.4%	4.0%	3.6%	4.0%	4.3%
Switzerland	2.8%	2.5%	2.7%	3.2%	3.4%
Union-wide (average)	4.3%	4.6%	4.6%	4.7%	4.9%

Table 3 - Estimated pre-tax WACC for Member States to be used as Option 1 (source: PRB elaboration of IMF, ECB, IQ Capital, Damodaran, Oxford Economics, EY Valuation Services).

Estimated return of equity for Option 1					
Member State	2020	2021	2022	2023	2024
Austria	5.1%	5.1%	5.2%	5.2%	5.4%
Belgium	3.9%	5.3%	5.5%	5.2%	5.4%
Bulgaria	5.5%	4.9%	5.8%	5.7%	5.9%
Croatia	5.3%	5.6%	6.0%	6.7%	7.3%
Cyprus	5.5%	5.5%	5.7%	5.9%	6.4%
Czech Republic	7.7%	6.0%	5.6%	5.4%	5.6%
Denmark	3.9%	4.5%	4.7%	4.7%	5.1%
Estonia	3.1%	5.0%	5.7%	5.1%	5.0%
Finland	3.6%	4.5%	4.5%	4.5%	4.9%
France	4.2%	4.6%	4.6%	4.7%	5.1%
Germany	4.3%	6.5%	4.7%	5.1%	5.5%
Greece	6.5%	6.0%	6.7%	6.7%	7.7%
Hungary	8.1%	7.9%	7.6%	7.2%	7.1%
Ireland	3.6%	5.1%	5.3%	5.3%	5.5%
Italy	5.4%	6.0%	6.0%	6.1%	6.5%
Latvia	4.2%	6.3%	6.2%	5.7%	6.2%
Lithuania	5.3%	5.4%	5.6%	5.6%	5.9%
Malta	6.1%	6.0%	6.4%	6.3%	6.8%
Netherlands	3.8%	3.7%	3.7%	3.8%	3.9%
Norway	4.7%	5.6%	5.2%	5.1%	5.2%
Poland	8.3%	7.3%	6.3%	6.2%	6.3%
Portugal	6.5%	7.1%	7.3%	7.2%	7.6%
Romania	7.6%	7.6%	6.7%	7.1%	7.3%
Slovakia	6.5%	5.1%	5.8%	5.8%	6.1%
Slovenia	4.2%	4.7%	5.5%	5.4%	5.8%
Spain	4.7%	5.7%	5.9%	6.1%	6.3%
Sweden	4.5%	5.1%	4.7%	5.0%	5.4%
Switzerland	3.7%	3.5%	3.6%	4.1%	4.3%
Union-wide (average)	5.2%	5.6%	5.6%	5.6%	5.9%

Table 4 – Estimated return on equity for Member States used in Option 1 (source: PRB elaboration of IMF, ECB, IQ Capital, Damodaran, Oxford Economics, EY Valuation Services).

4 CONCLUSIONS AND RECOMMENDATIONS

- 37 **Conclusion 1:** The impact of the COVID-19 pandemic 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.
- 38 **Recommendation 1:** The PRB recommends to the European Commission to continue using the current methodological framework to assess the WACC and the cost of capital, as defined in the previous report and employed in the assessment of performance plans in January 2020.
- 39 **Conclusion 2:** The average Union-wide efficient pre-tax WACC, as defined in Option 1 of the PRB methodological framework, should range between 4.3% in 2020 and 4.9% in 2024.
- 40 **Recommendation 2:** The PRB recommends to the European Commission to assess performance plans using the WACC parameters estimated by the PRB in this study.
- 41 **Conclusion 3:** The determined WACC of en route and terminal services may differ if terminal services face more competition than en route services in a given Member State.
- 42 **Recommendation 3:** The PRB recommends to the European Commission to assess whether national performance plans justify any difference in the WACC between en route and terminal services by demonstrating a different business or financial risk. The objective of assessing the justification is to prevent cross subsidisation between en route and terminal services which is not permitted under EU Law (Regulation 550/2004 art. 15 (2)).
- 43 **Conclusion 4:** 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.
- 44 **Recommendation 4:** 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 I – TECHNICAL DESCRIPTION

Pre-tax Weighted Average Cost of Capital (WACC)

- 45 The weighted average cost of capital (WACC) is the rate of return that bondholders and shareholders require as compensation for their contribution of capital for the average-risk investment of a company.
- 46 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.¹² 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:

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

- 47 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 actual cost of debt reflects the periodic interest (or coupon) rate that the company is contractually obligated to pay to its bondholders (lenders). The actual cost of debt 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 cost of debt the regulators may use a notional cost of debt observed from a market index, or similar entities.¹³
- 48 The RoE is an estimate of a reasonable rate of return on the shareholders' or owners' investment. The PRB recommends estimating the RoE using the Capital Asset Pricing Model (CAPM).

Capital Asset Pricing Model

- 49 The capital asset pricing model (CAPM) states that the return on equity (RoE) is the sum of the risk free rate, R_f , and a premium for bearing the stock's market risk. The RoE can be presented algebraically as follows:

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

- 50 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. β_e , the equity beta, is the return sensitivity of a stock to changes in the market return (also referred to as the systematic or market risk).¹⁴ $(R_m - R_f)$ 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).
- 51 The equity beta (β_e) of ANSPs is estimated using data of asset betas of similar entities. Similar entities are companies that have comparable business risk and, thus, similar asset betas as ANSPs. First, the Hamada's equation is used to estimate the asset beta 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 using the asset beta (β_a) of similar companies.
- 52 The asset beta (β_a) of a company is a function of its business risks and its financial structure. 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 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:

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

- 53 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

¹² Corporate tax for Member States are sourced from <https://tradingeconomics.com/>

¹³ Note that the CoD is the market interest rate on new debt, not the coupon rate on the firm's existing debt.

¹⁴ 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.

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

- 54 As per Option 1 of the PRB methodology, the cost of debt of ANSPs may be estimated using the average of corporate debt of other entities in the same Member State with broadly similar credit ratings to the ANSP.
- 55 In the event of no sufficiently liquid domestic bond market in the relevant Member State, the cost of debt should be estimated based on similar entities in another Member State. In this case, to correct for country specific factors, the debt risk premium should be calculated as the difference between the cost of debt and the country's risk free rate. The resulting debt risk premium is then added to the domestic risk free rate and country risk premium (CRP) to obtain an estimate of the ANSPs market cost of debt.
- 56 The cost of debt can be expressed algebraically as follows:

$$\begin{aligned} \text{Cost of debt (CoD)} &= R_f + \text{debt premium} \\ &= R_f + \text{CRP} + \left(\text{CoD}_{\text{similar entities}} - R_f_{\text{relevant country}} \right) \end{aligned}$$

Data sources and Estimation

- 57 The data sources and methodology used to estimate each WACC parameter are summarised below. Where applicable, a description focusing on the impact of the COVID-19 pandemic on the relevant parameter is provided.

Nominal risk free rate (Rf)

- 58 At the start of the COVID-19 pandemic in March 2020, government bond rates, notably those of Greece and Italy, showed a sharp but temporary increase to the level last seen in April 2019. However, compared to March 2020, government bond rates have since decreased.

- 59 In the coming years, a similar level to the current nominal rates may be foreseen since the European Central Bank (ECB) expects no change in the current negative real interest rate on debts in the short and long term.¹⁵

- 60 The nominal risk free rate in 2020 is particularly low due to the dip in inflation recorded as a result of the COVID-19 pandemic. The variability of the risk free rate is the highest in 2020 because actual inflation (as defined in Regulation 2019/317) has a wider range (0% to 4%) compared to 2024 (1% to 3%). The range of the forecast inflation in 2021-2024 is progressively lower since the IMF expects a return to long term inflation values over the period.

- 61 For Member States with available data except Greece (Italy, Portugal, Spain, Sweden, Denmark, France, Germany, the Netherlands and Switzerland), the risk free rate values for 2021-2024 were converted to nominal using the IMF forecast inflation as per the Fischer equation (page 7).

- 62 For Greece and Member States without Government bond data, the German risk free rate was converted to nominal using each Member State's national inflation.

- 63 For Member States with negative actual inflation in 2020 (Cyprus, Estonia, Greece, Ireland, Italy, Portugal, Slovenia, Spain and Switzerland), a value of zero was used instead as per Implementing Regulation 2019/317 art. 2 (12).

- 64 The calculation of the risk free rate presented in Table 5 (page 17) and Table 9 (page 27) is based on data collected from the following sources:

- 10-year nominal government bond yields for 2020 (Capital IQ).
- Actual inflation for 2020 from Eurostat and inflation forecasts for 2021-2024 at Member State level from the World Economic Outlook published by the International Monetary Fund (IMF) in April 2021. For Member States with negative actual inflation in 2020, a value of zero was used instead of the actual value as required in Implementing Regulation 2019/317 art. 2 (12).

¹⁵ According to the European Central Bank, "with more savings chasing fewer investments, low and stable inflation today is consistent with real short and long-term interest rates that are much lower than even a decade ago. Available estimates of this "equilibrium" rate of interest suggest that nowadays stable inflation is likely to require a negative real short-term interest rate".

<https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210226~ff6ad267d4.en.html>

Equity risk premium (ERP)

- 65 The equity risk premium (ERP in Table 5), $R_m - R_f$, per Member State is calculated using the database of Damodaran.¹⁶
- 66 The 2020 value of the ERP per Member State is the actual estimated by Damodaran. It is the sum of i) the country risk premium compared to the US government bonds (CRP in Table 5), and ii) the ERP of the mature market (US) estimated using the S&P 500 index (4.7% in 2020).
- 67 The PRB assumes a constant ERP for the mature market from 2020 to 2021 of 4.7%. The ERP includes country risk premia for 15 Member States as shown in Table 5.

¹⁶ http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html.

Member State	2020				2021				2022				2023				2024			
	R_f	R_m	CRP	ERP	R_f	R_m	CRP	ERP	R_f	R_m	CRP	ERP	R_f	R_m	CRP	ERP	R_f	R_m	CRP	ERP
Austria	0.4%	5.1%		4.7%	0.6%	5.4%		4.7%	0.8%	5.5%		4.7%	1.0%	5.7%		4.7%	1.0%	5.7%		4.7%
Belgium	-0.6%	4.1%		4.7%	0.7%	5.4%		4.7%	0.9%	5.6%		4.7%	0.8%	5.5%		4.7%	0.8%	5.5%		4.7%
Bulgaria	0.2%	6.5%	1.5%	6.3%	0.0%	6.3%	1.5%	6.3%	0.9%	7.2%	1.5%	6.3%	1.0%	7.3%	1.5%	6.3%	1.0%	7.3%	1.5%	6.3%
Croatia	-1.0%	6.1%	2.4%	7.1%	-0.3%	6.9%	2.4%	7.1%	0.1%	7.3%	2.4%	7.1%	0.9%	8.0%	2.4%	7.1%	1.2%	8.3%	2.4%	7.1%
Cyprus	-1.0%	6.6%	2.9%	7.6%	-0.5%	7.1%	2.9%	7.6%	-0.2%	7.4%	2.9%	7.6%	0.2%	7.8%	2.9%	7.6%	0.4%	8.0%	2.9%	7.6%
Czech Republic	2.3%	7.6%	0.6%	5.3%	1.3%	6.6%	0.6%	5.3%	1.0%	6.3%	0.6%	5.3%	1.0%	6.3%	0.6%	5.3%	1.0%	6.3%	0.6%	5.3%
Denmark	-0.4%	4.3%		4.7%	0.3%	5.1%		4.7%	0.6%	5.3%		4.7%	0.7%	5.4%		4.7%	0.8%	5.6%		4.7%
Estonia	-1.0%	3.7%		4.7%	0.8%	5.5%		4.7%	1.5%	6.2%		4.7%	1.1%	5.8%		4.7%	0.9%	5.6%		4.7%
Finland	-0.6%	4.1%		4.7%	0.4%	5.1%		4.7%	0.5%	5.2%		4.7%	0.6%	5.3%		4.7%	0.7%	5.5%		4.7%
France	-0.3%	4.4%		4.7%	0.3%	5.0%		4.7%	0.3%	5.1%		4.7%	0.5%	5.2%		4.7%	0.6%	5.3%		4.7%
Germany	-0.6%	4.1%		4.7%	1.2%	6.0%		4.7%	0.1%	4.8%		4.7%	0.5%	5.2%		4.7%	0.6%	5.4%		4.7%
Greece	-1.0%	7.2%	3.5%	8.2%	-0.8%	7.4%	3.5%	8.2%	-0.2%	8.0%	3.5%	8.2%	0.0%	8.2%	3.5%	8.2%	0.6%	8.8%	3.5%	8.2%
Hungary	2.4%	9.2%	2.1%	6.9%	2.6%	9.5%	2.1%	6.9%	2.5%	9.3%	2.1%	6.9%	2.2%	9.1%	2.1%	6.9%	2.0%	8.9%	2.1%	6.9%
Ireland	-1.0%	4.5%	0.8%	5.5%	0.6%	6.1%	0.8%	5.5%	0.9%	6.4%	0.8%	5.5%	1.0%	6.5%	0.8%	5.5%	1.0%	6.5%	0.8%	5.5%
Italy	0.5%	5.2%		4.7%	1.3%	6.0%		4.7%	1.4%	6.1%		4.7%	1.6%	6.3%		4.7%	1.7%	6.5%		4.7%
Latvia	-0.9%	5.0%	1.2%	5.9%	1.1%	7.0%	1.2%	5.9%	1.2%	7.0%	1.2%	5.9%	0.9%	6.8%	1.2%	5.9%	1.1%	7.0%	1.2%	5.9%
Lithuania	0.1%	6.0%	1.2%	5.9%	0.5%	6.4%	1.2%	5.9%	0.8%	6.7%	1.2%	5.9%	1.0%	6.9%	1.2%	5.9%	1.1%	7.0%	1.2%	5.9%
Malta	-0.2%	5.3%	0.8%	5.5%	0.1%	5.6%	0.8%	5.5%	0.4%	6.0%	0.8%	5.5%	0.5%	6.1%	0.8%	5.5%	0.7%	6.2%	0.8%	5.5%
Netherlands	-0.5%	4.2%		4.7%	-0.3%	4.4%		4.7%	-0.2%	4.5%		4.7%	-0.1%	4.7%		4.7%	-0.1%	4.7%		4.7%
Norway	0.2%	4.9%		4.7%	1.2%	5.9%		4.7%	1.0%	5.7%		4.7%	1.0%	5.7%		4.7%	1.0%	5.7%		4.7%
Poland	2.7%	8.2%	0.8%	5.5%	2.2%	7.7%	0.8%	5.5%	1.5%	7.0%	0.8%	5.5%	1.5%	7.1%	0.8%	5.5%	1.5%	7.0%	0.8%	5.5%
Portugal	0.0%	6.9%	2.1%	6.9%	0.9%	7.8%	2.1%	6.9%	1.2%	8.1%	2.1%	6.9%	1.3%	8.2%	2.1%	6.9%	1.4%	8.3%	2.1%	6.9%
Romania	1.3%	8.1%	2.1%	6.9%	1.7%	8.6%	2.1%	6.9%	1.1%	7.9%	2.1%	6.9%	1.6%	8.4%	2.1%	6.9%	1.6%	8.4%	2.1%	6.9%
Slovakia	1.0%	6.5%	0.8%	5.5%	0.2%	5.8%	0.8%	5.5%	0.9%	6.4%	0.8%	5.5%	1.0%	6.6%	0.8%	5.5%	1.1%	6.6%	0.8%	5.5%
Slovenia	-1.0%	4.9%	1.2%	5.9%	-0.2%	5.7%	1.2%	5.9%	0.5%	6.4%	1.2%	5.9%	0.6%	6.5%	1.2%	5.9%	0.8%	6.6%	1.2%	5.9%
Spain	0.1%	4.8%		4.7%	1.1%	5.8%		4.7%	1.3%	6.1%		4.7%	1.6%	6.3%		4.7%	1.7%	6.4%		4.7%
Sweden	0.0%	4.7%		4.7%	0.8%	5.5%		4.7%	0.5%	5.3%		4.7%	0.9%	5.6%		4.7%	1.1%	5.8%		4.7%
Switzerland	-0.5%	4.2%		4.7%	-0.4%	4.3%		4.7%	-0.2%	4.5%		4.7%	0.3%	5.0%		4.7%	0.4%	5.1%		4.7%

Table 5 - Equity risk premium (including the relevant country risk premium) per Member State for RP3 (source: PRB elaboration).

Asset beta of similar companies

- 68 The asset beta of similar entities, as presented in Table 6 (next page) is calculated according to the Hamada's equation using the equity beta, tax rate, and gearing (Table 7, page 25) of each similar entity.¹⁷ The gearing of each company is calculated as total debt divided by total market capitalisation.
- 69 The similar entities were further shortlisted according to the degree of correlation between the equity beta of each similar entity and the national market index. The degree of correlation is measured with R-squared (R^2) which is a statistical indicator representing the proportion of the variance in stock return of each similar entity with respect to the market returns. It is common practice in the valuation field to select entities with an R^2 greater than 10%. All entities selected have an R^2 of more than 10% for the period 2015-2020.
- 70 The asset beta values for 2021-2024 are forecasted using the rolling average asset beta for the preceding four years for each similar entity.
- 71 In order to calculate the Union-wide weighted average, the median of the asset beta values per Member State have been weighted by the GDP of each Member State. GDP forecasts for 2021-2024 were sourced from Oxford Economics. The GDP of Member States with different currencies was converted to Euro using annual average exchange rates from 2017-2020. For 2021, average rates between 1st January and 27th April were used. Between 2022 and 2024, exchange rates were assumed constant at the level on 27th April 2021.
- 72 The asset beta was estimated using from 2017-2020 of publicly listed companies in aviation, energy, infrastructure, transport, telecommunications, and water sectors. The following is the data collected:
- one year weekly equity beta and R-squared (Capital IQ);
 - annual total debt (Capital IQ);
 - annual total market capitalization (Capital IQ).
- 73 In addition to company data, the following data was obtained for each Member State:
- 2017-2020 tax rate (Capital IQ);
- 2017-2020 actual GDP and 2021-2024 forecast GDP (Oxford Economics);
 - For Member States not in the Euro area, average exchange rates between 1st January and 31st December were used for 2017-2020, and from 1st January to 27th April for 2021 (Capital IQ).

¹⁷ Slovakia did not have comparable publicly listed entities.

Asset beta of similar companies						
Member State	Company name	2020	2021	2022	2023	2024
Austria	Telekom Austria	0.49	0.47	0.45	0.44	0.45
	EVN	0.65	0.61	0.61	0.59	0.60
	Flughafen Wien Aktiengesellschaft	1.00	0.85	0.79	0.78	0.81
	Median	0.65	0.61	0.61	0.59	0.60
Belgium	Proximus	0.56	0.53	0.53	0.51	0.52
	Orange Belgium .	0.66	0.57	0.54	0.54	0.56
	Elia Group	0.38	0.34	0.31	0.30	0.32
	Median	0.56	0.53	0.53	0.51	0.52
Bulgaria	CEZ Distribution Bulgaria	-	-	-	-	-
	Oil and Gas Exploration and Production	-	-	-	-	-
	CEZ Electro Bulgaria	-	-	-	-	-
	Port Flot-Burgas	-	-	-	-	-
	Capman Green Energy Fund	-	-	-	-	-
	Median	-	-	-	-	-
Croatia	Hrvatski Telekom	0.61	0.61	0.61	0.61	0.61
	Croatia Airlines	-	-	-	-	-
	Median	0.61	0.61	0.61	0.61	0.61
Czech Republic	CEZ	0.56	0.53	0.52	0.51	0.52
Denmark	Ørsted	0.96	0.85	0.80	0.81	0.83
Estonia	AS Tallinna Vesi	0.38	0.38	0.37	0.36	0.37
Finland	Fortum	0.77	0.76	0.74	0.73	0.74
France	Électricite de Strasbourg Société Anonyme	0.54	0.55	0.57	0.56	0.56
	iliad	0.35	0.42	0.39	0.36	0.37
	MINT Société anonyme	0.91	0.91	0.94	0.92	0.92
	Orange	-	-	-	-	-
	Aéroports de Paris	0.73	0.72	0.73	0.73	0.73
	Voltaia	0.62	0.49	0.46	0.46	0.49
	Electricité de France	-	-	-	-	-
	Néocom Multimédia	0.55	0.31	0.29	0.28	0.32
	Compagnie des Eaux de Royan	0.48	0.46	0.44	0.42	0.44
	Energie Europe Service	-1.21	-0.79	-0.57	-0.53	-0.65
	ENGIE	0.57	0.58	0.57	0.56	0.56
	VINCI	0.77	0.75	0.73	0.72	0.73
	Median	0.56	0.52	0.52	0.51	0.52
Germany	United Internet	0.72	0.74	0.75	0.72	0.73
	EnBW Energie Baden-Württemberg	0.47	0.38	0.36	0.36	0.38
	Fraport	-	-	-	-	-
	freenet	0.54	0.55	0.56	0.55	0.55
	ecotel communication	0.61	0.57	0.53	0.53	0.55
	Telefónica Deutschland Holding	0.50	0.57	0.59	0.58	0.57
	1&1 Drillisch	0.96	0.93	0.97	0.94	0.95
	Uniper	0.69	0.65	0.61	0.60	0.62
	Lechwerke	0.49	0.50	0.48	0.46	0.47
	Deutsche Lufthansa	-	-	-	-	-
	TELES Aktiengesellschaft	0.15	-0.02	-0.09	-0.14	-0.08
	StarDSL	0.33	0.30	0.26	0.20	0.24

Asset beta of similar companies						
Member State	Company name	2020	2021	2022	2023	2024
	RWE Aktiengesellschaft	0.80	0.74	0.72	0.68	0.71
	Median	0.54	0.57	0.56	0.55	0.55
Greece	Athens Water Supply and Sewerage Company	0.66	0.68	0.68	0.69	0.69
	Thessaloniki Port Authority Societe Anonyme	0.64	0.58	0.56	0.57	0.58
	Hellenic Telecommunications Organization	0.59	0.61	0.62	0.61	0.61
	Thessaloniki Water Supply & Sewerage Co	0.70	0.67	0.65	0.65	0.66
	Admie Holding	0.86	0.86	0.85	0.85	0.85
	Aegean Airlines	-	-	-	-	-
	Terna Energy Societe Anonyme Commercial Technical	0.55	0.47	0.44	0.45	0.46
	Public Power Corporation	-	-	-	-	-
	Elliniki Technodomiki Anemos	-	-	-	-	-
	Median	0.65	0.64	0.64	0.63	0.63
Hungary	Nordtelekom Távközlési Szolgáltató	1.39	1.08	0.97	0.94	1.02
	ALTEO Energiaszolgáltató	0.36	0.33	0.29	0.28	0.30
	MOL Magyar Olaj- és Gázipari	0.54	0.63	0.65	0.63	0.62
	Magyar Telekom Távközlési	0.30	0.29	0.29	0.28	0.29
	PannErgy	0.41	0.35	0.33	0.33	0.34
	Median	0.41	0.35	0.33	0.33	0.34
Ireland	EQTEC	1.71	1.26	1.09	1.04	1.16
	Ryanair Holdings	1.11	1.09	1.09	1.12	1.11
	Median	1.41	1.18	1.09	1.08	1.13
Italy	ERG	0.56	0.46	0.45	0.44	0.46
	Telecom Italia	-	-	-	-	-
	Unidata	0.44	0.44	0.44	0.44	0.44
	Intred	0.49	0.38	0.34	0.33	0.36
	Infrastrutture Wireless Italiane	0.41	0.47	0.48	0.43	0.44
	Enel	0.64	0.52	0.46	0.46	0.49
	Edison	0.50	0.46	0.45	0.45	0.46
	Saipem	-	-	-	-	-
	Elettra Investimenti	0.43	0.47	0.45	0.43	0.44
	Retelit	0.46	0.65	0.74	0.73	0.68
	Iren	-	-	-	-	-
	Ascopiave S	0.65	0.60	0.58	0.57	0.58
Median	0.49	0.47	0.45	0.44	0.46	
Latvia	AS Latvijas Gaze	0.43	0.45	0.45	0.43	0.43
	AS Baltic Technology Ventures	0.04	-0.06	0.17	0.24	0.17
	Median	0.24	0.19	0.31	0.33	0.30
Lithuania	Litgrid	0.32	0.35	0.35	0.35	0.35
	Inter RAO Lietuva	0.80	0.73	0.73	0.73	0.74
	Kauno Energija	0.22	0.36	0.39	0.42	0.38
	Ignitis grupe	0.31	0.31	0.31	0.31	0.31
	Telia Lietuva	0.47	0.42	0.42	0.43	0.44
	Lesto	-	-	-	-	-
	Median	0.32	0.36	0.39	0.42	0.38
Malta	GO	0.24	0.26	0.26	0.26	0.26
Netherlands	New Sources Energy	0.21	0.24	0.28	0.33	0.30
Norway	Magnora	0.91	0.78	0.79	0.75	0.78

Asset beta of similar companies						
Member State	Company name	2020	2021	2022	2023	2024
	Ice Group	-	-	-	-	-
	EAM Solar	1.18	0.79	0.68	0.61	0.71
	Median	1.04	0.78	0.73	0.68	0.75
Poland	ENEA	-	-	-	-	-
	Wodkan Przedsiębiorstwo Wodociągów	0.41	0.36	0.38	0.41	0.40
	Netia	0.44	0.41	0.40	0.41	0.41
	Polenergia	0.60	0.55	0.52	0.52	0.54
	Orange Polska	0.55	0.50	0.49	0.50	0.50
	PGE Polska Grupa Energetyczna	0.82	0.75	0.72	0.73	0.74
	Lubelski Węgiel Bogdanka	0.90	0.88	0.86	0.85	0.86
	MDI Energia	0.52	0.48	0.50	0.50	0.50
	Energa	-	-	-	-	-
	Korbank	0.51	0.45	0.42	0.43	0.44
	G-Energy	1.64	1.20	1.06	1.06	1.15
	easyCALL.pl	1.33	0.95	0.69	0.69	0.80
	SferaNet	0.52	0.49	0.47	0.49	0.49
	Internet Union	0.25	0.21	0.14	0.12	0.15
	Enter Air	1.70	1.21	1.10	1.06	1.16
	TELGAM S.A.	0.79	0.64	0.59	0.58	0.62
	TAURON Polska Energia	-	-	-	-	-
	Grupa LOTOS	0.63	0.77	0.77	0.77	0.75
	Polskie Górnictwo Naftowe i Gazownictwo	0.95	0.91	0.90	0.90	0.91
	Telestrada	0.39	0.39	0.38	0.38	0.38
Fiten	0.81	0.81	0.81	0.81	0.81	
Median	0.62	0.59	0.56	0.55	0.58	
Portugal	Galp Energia, SGPS	0.90	0.85	0.86	0.86	0.86
	NOS, S.G.P.S.	0.47	0.53	0.56	0.54	0.53
	Median	0.69	0.69	0.71	0.70	0.70
Romania	Societatea Energetica Electrica	0.62	0.68	0.69	0.68	0.67
	S.N. Nuclearelectrica	0.99	0.93	0.93	0.95	0.95
	S.N.T.G.N. Transgaz	0.64	0.72	0.68	0.65	0.66
	CNTEE Transelectrica	0.71	0.71	0.70	0.71	0.71
	Median	0.68	0.71	0.69	0.69	0.69
Slovenia	Telekom Slovenije	0.42	0.49	0.52	0.52	0.50
	Elektro Gorenjska	-	-	-	-	-
	Elektro Ljubljana	0.40	0.06	0.13	0.13	0.15
	Elektro Maribor	0.46	0.32	0.27	0.25	0.29
	Median	0.42	0.32	0.27	0.25	0.29
Spain	Aena	0.80	0.73	0.71	0.71	0.72
	Endesa	0.68	0.65	0.62	0.60	0.62
	International Consolidated Airlines Group	-	-	-	-	-
	Holaluz-Clidom	0.69	-1.66	-2.44	-2.74	-2.14
	Greenalia	0.57	0.52	0.41	0.41	0.45
	Cellnex Telecom	0.39	0.40	0.40	0.36	0.37
	Solaria Energía y Medio Ambiente	0.74	0.66	0.66	0.62	0.64
	Audax Energia	-	-	-	-	-
	Eurona Wireless Telecom	0.53	0.51	0.56	0.58	0.56

Asset beta of similar companies						
Member State	Company name	2020	2021	2022	2023	2024
	Median	0.68	0.52	0.56	0.58	0.56
Sweden	SAS	-	-	-	-	-
	Telia Company	0.52	0.50	0.49	0.48	0.49
	Arise	0.86	0.71	0.66	0.64	0.68
	Tele2	0.61	0.58	0.56	0.53	0.55
	Transtema Group	0.50	0.47	0.47	0.45	0.46
	Bredband2 i Skandinavien	0.71	0.66	0.65	0.64	0.65
	Cortus Energy	0.99	0.70	0.53	0.56	0.63
	Bahnhof	0.55	0.56	0.57	0.55	0.56
	Median	0.61	0.58	0.56	0.55	0.56
Switzerland	Swisscom	0.63	0.61	0.60	0.58	0.59
	Flughafen Zürich	0.87	0.84	0.84	0.84	0.84
	Romande Energie Holding	0.50	0.38	0.35	0.35	0.38
	BKW	0.62	0.56	0.53	0.53	0.55
	Energiedienst Holding	0.53	0.47	0.46	0.46	0.47
Median	0.62	0.56	0.53	0.53	0.55	
Union-wide average asset beta (weighted by GDP)		0.58	0.52	0.50	0.48	0.50

Table 6 - Asset beta of similar entities per Member state for RP3 (source: PRB elaboration).

Optimal gearing (D/E)

74 The optimal gearing (D/E) is calculated as the Union-wide weighted average of the actual gearing of entities listed in the stock market with broadly similar operating characteristics to ANSPs. Actual gearing was calculated using total debt and total market capitalisation from 2017-2020 (Capital IQ). The data belongs to publicly listed companies in: aviation, energy, infrastructure, transport, telecommunications, and water sectors.

75 Similar to the asset beta, gearing values for 2021-2024 are forecast using the rolling average gearing for the preceding four years for each company. The weighted average of gearing across Member States was also calculated by weighting the gearing per Member State by the corresponding GDP.

76 The Union-wide weighted average gearing for 2020-2024 ranges from 34% to 41%, resulting in a capital structure composed of around 30% debt and 70% equity.

Gearing						
Member State	Company name	2020	2021	2022	2023	2024
Austria	Telekom Austria	81%	80%	79%	80%	80%
	EVN	39%	41%	38%	39%	40%
	Flughafen Wien Aktiengesellschaft	0%	8%	6%	5%	6%
	Median	39%	41%	38%	39%	40%
Belgium	Proximus	57%	42%	44%	48%	45%
	Orange Belgium	39%	37%	40%	39%	39%
	Elia Group	120%	120%	120%	120%	120%
	Median	57%	42%	44%	48%	45%
Bulgaria	CEZ Distribution Bulgaria	33%	37%	37%	36%	37%
	Oil and Gas Exploration and Production	0%	4%	3%	2%	3%
	CEZ Electro Bulgaria	3%	2%	3%	3%	3%
	Port Flot-Burgas	1%	1%	1%	1%	1%
	Capman Green Energy Fund	0%	0%	0%	0%	0%
	Median	1%	2%	3%	2%	3%
Croatia	Hrvatski Telekom	6%	5%	6%	5%	5%
	Croatia Airlines	-	55%	72%	63%	63%
	Median	6%	30%	39%	34%	34%
Czech Republic	CEZ	55%	58%	59%	57%	58%

Gearing						
Member State	Company name	2020	2021	2022	2023	2024
Denmark	Ørsted	8%	12%	12%	11%	12%
Estonia	AS Tallinna Vesi	34%	41%	38%	38%	39%
Finland	Fortum	63%	45%	47%	52%	48%
France	Électricité de Strasbourg Société Anonyme	0%	1%	1%	1%	1%
	iliad	121%	99%	112%	111%	107%
	MINT Société anonyme	0%	2%	1%	1%	1%
	Orange	-	110%	119%	115%	115%
	Aéroports de Paris	105%	64%	71%	80%	71%
	Voltaia	35%	70%	53%	53%	59%
	Électricité de France	-	143%	143%	143%	143%
	Néocom Multimédia	0%	0%	0%	0%	0%
	Compagnie des Eaux de Royan	0%	0%	0%	0%	0%
	Energie Europe Service	0%	0%	0%	0%	0%
	ENGIE	127%	116%	118%	120%	118%
	VINCI	73%	65%	66%	68%	66%
	Median	18%	64%	60%	60%	62%
Germany	United Internet	30%	31%	33%	31%	32%
	EnBW Energie Baden-Württemberg	69%	74%	69%	71%	72%
	Fraport	-	82%	82%	82%	82%
	freenet	69%	82%	79%	77%	79%
	ecotel communication	37%	43%	49%	43%	45%
	Telefónica Deutschland Holding	77%	54%	65%	65%	62%
	1&1 Drillisch	3%	1%	2%	2%	2%
	Uniper	17%	23%	19%	20%	21%
	Lechwerke	0%	0%	0%	0%	0%
	Deutsche Lufthansa	-	100%	114%	107%	107%
	TELES Aktiengesellschaft Informationstechnologien	0%	12%	14%	9%	12%
	StarDSL	0%	0%	0%	0%	0%
	RWE Aktiengesellschaft	22%	27%	28%	26%	27%
		Median	22%	31%	33%	31%
Greece	Athens Water Supply and Sewerage Company	0%	0%	0%	0%	0%
	Thessaloniki Port Authority Societe Anonyme	19%	18%	18%	18%	18%
	Hellenic Telecommunications Organization	26%	32%	30%	29%	31%
	Thessaloniki Water Supply & Sewerage Co	0%	0%	0%	0%	0%
	Admie Holding	0%	0%	0%	0%	0%
	Aegean Airlines	-	48%	70%	59%	59%
	Terna Energy Societe Anonyme Commercial Technical Company	63%	104%	95%	87%	96%
	Public Power Corporation	-	-	-	-	-
	Elliniki Technodomiki Anemos Production of Electrical Energy	-	-	-	-	-
	Median	10%	18%	18%	18%	18%
Hungary	Nordtelekom Távközlési Szolgáltató	0%	0%	0%	0%	0%
	ALTEO Energiaszolgáltató	145%	125%	136%	135%	132%
	MOL Magyar Olaj- és Gázipari	82%	56%	62%	67%	61%
	Magyar Telekom Távközlési	121%	88%	97%	102%	96%
	PannErgy	88%	78%	81%	82%	81%
		Median	88%	78%	81%	82%
Ireland	EQTEC	1%	34%	34%	23%	30%
	Ryanair Holdings	23%	26%	24%	24%	25%
		Median	12%	30%	29%	24%
Italy	ERG	65%	78%	74%	72%	74%
	Telecom Italia	-	-	-	-	-
	Unidata	17%	17%	17%	17%	17%
	Intred	4%	4%	3%	4%	4%

Gearing						
Member State	Company name	2020	2021	2022	2023	2024
	Infrastrutture Wireless Italiane	40%	20%	25%	28%	25%
	Enel	71%	90%	83%	81%	84%
	Edison	15%	15%	16%	15%	15%
	Saipem	-	88%	87%	87%	87%
	Elettra Investimenti	126%	96%	105%	109%	103%
	Retelit	52%	25%	29%	35%	30%
	Iren	-	114%	107%	111%	111%
	Ascopiave S	45%	35%	38%	39%	38%
	Median	45%	35%	38%	39%	38%
Latvia	AS Latvijas Gaze	6%	8%	7%	7%	7%
	AS Baltic Technology Ventures	0%	0%	0%	0%	0%
	Median	3%	4%	4%	4%	4%
Lithuania	Litgrid	29%	34%	32%	31%	32%
	Inter RAO Lietuva	0%	2%	1%	1%	1%
	Kauno Energija	79%	64%	66%	70%	67%
	Ignitis grupe	84%	84%	84%	84%	84%
	Telia Lietuva	17%	23%	22%	21%	22%
	Lesto	-	-	-	-	-
	Median	29%	34%	32%	31%	32%
Malta	GO	41%	29%	33%	34%	32%
Netherlands	New Sources Energy	0%	2%	1%	1%	1%
Norway	Magnora	0%	0%	0%	0%	0%
	Ice Group	-	-	-	-	-
	EAM Solar	4%	5%	5%	5%	5%
	Median	2%	3%	3%	2%	3%
Poland	ENEA	-	-	-	-	-
	Wodkan Przedsiębiorstwo Wodociągów i Kanalizacji	22%	25%	24%	24%	24%
	Netia	35%	30%	34%	33%	32%
	Polenergia	45%	72%	63%	60%	65%
	Orange Polska	102%	107%	102%	104%	104%
	PGE Polska Grupa Energetyczna	94%	78%	85%	86%	83%
	Lubelski Wegiel Bogdanka	6%	3%	4%	4%	4%
	MDI Energia	29%	26%	28%	28%	27%
	Energa	-	-	-	-	-
	Korbank	36%	37%	34%	35%	35%
	G-Energy	0%	2%	1%	1%	1%
	easyCALL.pl	0%	0%	0%	0%	0%
	SferaNet	0%	19%	11%	10%	13%
	Internet Union	15%	22%	22%	19%	21%
	Enter Air	0%	72%	72%	48%	64%
	TELGAM S.A.	4%	5%	6%	5%	5%
	TAURON Polska Energia	-	-	-	-	-
	Grupa LOTOS	53%	35%	39%	43%	39%
	Polskie Górnictwo Naftowe i Gazownictwo	13%	16%	19%	16%	17%
	Telestrada	1%	3%	3%	2%	2%
Fiten	0%	0%	0%	0%	0%	
Median	14%	24%	23%	22%	23%	
Portugal	Galp Energia, SGPS	67%	43%	48%	52%	48%
	NOS, S.G.P.S.	105%	69%	76%	83%	76%
	Median	86%	56%	62%	68%	62%
Romania	Societatea Energetica Electrica	23%	20%	22%	21%	21%
	S.N. Nuclearelectrica	0%	18%	11%	10%	13%
	S.N.T.G.N. Transgaz	51%	24%	31%	35%	30%
	CNTEE Transelectrica	9%	12%	11%	10%	11%
	Median	16%	19%	17%	16%	17%
	Telekom Slovenije	136%	116%	124%	125%	122%

Gearing						
Member State	Company name	2020	2021	2022	2023	2024
Slovenia	Elektro Gorenjska	-	-	-	-	-
	Elektro Ljubljana	0%	53%	45%	33%	44%
	Elektro Maribor	0%	32%	27%	20%	26%
	Median	0%	53%	45%	33%	44%
Spain	Aena	39%	34%	34%	36%	35%
	Endesa	31%	28%	29%	29%	29%
	International Consolidated Airlines Group	-	88%	102%	95%	95%
	Holaluz-Clidom	14%	11%	11%	12%	11%
	Greenalia	79%	85%	89%	84%	86%
	Cellnex Telecom	47%	53%	48%	49%	50%
	Solaria Energía y Medio Ambiente	14%	32%	29%	25%	29%
	Audax Energía	-	0%	0%	0%	0%
	Eurona Wireless Telecom	0%	0%	0%	0%	0%
	Median	31%	32%	29%	29%	29%
Sweden	SAS	-	127%	127%	127%	127%
	Telia Company	78%	68%	73%	73%	71%
	Arise	43%	70%	70%	61%	67%
	Tele2	41%	37%	37%	38%	37%
	Transtema Group	47%	95%	96%	79%	90%
	Bredband2 i Skandinavien	10%	3%	5%	6%	5%
	Cortus Energy	19%	11%	11%	14%	12%
	Bahnhof	0%	0%	0%	0%	0%
	Median	41%	53%	53%	49%	52%
Switzerland	Swisscom	37%	35%	36%	36%	36%
	Flughafen Zürich	40%	28%	30%	33%	30%
	Romande Energie Holding	0%	6%	5%	4%	5%
	BKW	29%	37%	35%	34%	35%
	Energiedienst Holding	8%	8%	8%	8%	8%
	Median	29%	28%	30%	33%	30%
Union-wide average gearing (weighted by GDP share)		34%	40%	41%	41%	41%

Table 7 - Gearing (D/E) of similar entities per Member States for RP3 (source: PRB elaboration).

Equity beta of ANSPs per Member State

77 The equity beta (β_e) of ANSPs in each Member State is presented in Table 8 and computed by using the Hamada's equation. The inputs of the equation are:

- the Union-wide weighted average of asset beta of similar companies and optimal gearing explained above.
- the tax rate per Member State obtained from Capital IQ.

Member State	Equity beta				
	2020	2021	2022	2023	2024
Austria	0.73	0.67	0.65	0.63	0.65
Belgium	0.71	0.65	0.64	0.62	0.65
Bulgaria	0.76	0.70	0.68	0.66	0.68
Croatia	0.74	0.68	0.66	0.64	0.67
Cyprus	0.76	0.70	0.68	0.65	0.68
Czech Republic	0.74	0.68	0.66	0.64	0.67
Denmark	0.74	0.68	0.66	0.64	0.66
Estonia	0.74	0.68	0.66	0.64	0.66
Finland	0.74	0.68	0.66	0.64	0.66
France	0.72	0.65	0.63	0.62	0.65
Germany	0.76	0.70	0.68	0.66	0.69
Greece	0.72	0.66	0.64	0.62	0.64
Hungary	0.72	0.66	0.64	0.62	0.66
Ireland	0.74	0.70	0.68	0.66	0.69
Italy	0.76	0.70	0.68	0.65	0.68
Latvia	0.72	0.67	0.65	0.63	0.66
Lithuania	0.75	0.69	0.66	0.64	0.66
Malta	0.75	0.69	0.67	0.65	0.67
Netherlands	0.71	0.65	0.63	0.61	0.63
Norway	0.73	0.67	0.65	0.63	0.65
Poland	0.73	0.67	0.65	0.64	0.66
Portugal	0.74	0.68	0.66	0.64	0.67
Romania	0.74	0.68	0.66	0.64	0.66
Slovakia	0.75	0.69	0.67	0.65	0.67
Slovenia	0.75	0.68	0.68	0.64	0.67
Spain	0.73	0.67	0.65	0.63	0.65
Sweden	0.74	0.68	0.66	0.64	0.66
Switzerland	0.75	0.69	0.66	0.64	0.67

Table 8 - Equity beta per Member State estimated using national tax rates and Union-wide weighted averages of the asset beta and gearing (source: PRB elaboration).

Cost of debt

78 The methodology to estimate the cost of debt of ANSPs adds the risk free rate in the Member State and the average spread of corporate debt of entities in the same Member State with broadly similar credit ratings to the ANSP, as presented in Table 9 (next page). In Member States where there are no corporate bonds available, an indirect approach uses the spread of German bonds adjusted by specific country risk premium obtained from the database of Damodaran. The PRB adds a country risk premium for 15 Member States as shown in Table 9.

- 79 Yield to worst data was obtained for 10-year corporate bonds with rating between A- & BBB+, available for each Member State (Capital IQ). The yield to worst is the lowest yield an investor can expect when investing in a callable bond.
- 80 Similarly to the risk free rate, at the start of the COVID-19 pandemic in March 2020, there was a sharp but temporary rise in the yield of BBB- and A-rated corporate Euro bonds with ten-year maturity. By October 2020, corporate yields had returned to similar levels seen in 2019 at around 1%.

Member State	2020				2021				2022				2023				2024			
	R_f	Spread	CRP	CoD	R_f	Spread	CRP	CoD	R_f	Spread	CRP	CoD	R_f	Spread	CRP	CoD	R_f	Spread	CRP	CoD
Austria	0.4%	0.6%		1.0%	0.6%	0.6%		1.3%	0.8%	0.6%		1.4%	1.0%	0.6%		1.6%	1.0%	0.6%		1.6%
Belgium	-0.6%	0.6%		0.0%	0.7%	0.6%		1.3%	0.9%	0.6%		1.5%	0.8%	0.6%		1.3%	0.8%	0.6%		1.3%
Bulgaria	0.2%	0.6%	1.5%	2.4%	0.0%	0.6%	1.5%	2.2%	0.9%	0.6%	1.5%	3.1%	1.0%	0.6%	1.5%	3.2%	1.0%	0.6%	1.5%	3.2%
Croatia	-1.0%	0.6%	2.4%	2.0%	-0.3%	0.6%	2.4%	2.8%	0.1%	0.6%	2.4%	3.2%	0.9%	0.6%	2.4%	3.9%	1.2%	0.6%	2.4%	4.2%
Cyprus	-1.0%	0.6%	2.9%	2.5%	-0.5%	0.7%	2.9%	3.1%	-0.2%	0.7%	2.9%	3.4%	0.2%	0.7%	2.9%	3.8%	0.4%	0.7%	2.9%	4.0%
Czech Republic	2.3%	0.6%	0.6%	3.5%	1.3%	0.6%	0.6%	2.5%	1.0%	0.6%	0.6%	2.2%	1.0%	0.6%	0.6%	2.2%	1.0%	0.6%	0.6%	2.2%
Denmark	-0.4%	0.6%		0.2%	0.3%	0.6%		1.0%	0.6%	0.6%		1.2%	0.7%	0.6%		1.3%	0.8%	0.6%		1.5%
Estonia	-1.0%	0.7%		-0.3%	0.8%	0.7%		1.4%	1.5%	0.7%		2.1%	1.1%	0.7%		1.7%	0.9%	0.7%		1.5%
Finland	-0.6%	0.7%		0.1%	0.4%	0.7%		1.1%	0.5%	0.7%		1.2%	0.6%	0.7%		1.3%	0.7%	0.7%		1.4%
France	-0.3%	0.6%		0.3%	0.3%	0.6%		0.9%	0.3%	0.6%		0.9%	0.5%	0.6%		1.1%	0.6%	0.6%		1.2%
Germany	-0.6%	0.7%		0.1%	1.2%	0.7%		1.9%	0.1%	0.7%		0.7%	0.5%	0.7%		1.1%	0.6%	0.7%		1.3%
Greece	-1.0%	0.6%	3.5%	3.1%	-0.8%	0.6%	3.5%	3.3%	-0.2%	0.6%	3.5%	3.9%	0.0%	0.6%	3.5%	4.1%	0.6%	0.6%	3.5%	4.7%
Hungary	2.4%	0.6%	2.1%	5.1%	2.6%	0.6%	2.1%	5.4%	2.5%	0.6%	2.1%	5.2%	2.2%	0.6%	2.1%	5.0%	2.0%	0.6%	2.1%	4.8%
Ireland	-1.0%	1.1%	0.8%	0.9%	0.6%	1.1%	0.8%	2.5%	0.9%	1.1%	0.8%	2.8%	1.0%	1.1%	0.8%	2.9%	1.0%	1.1%	0.8%	2.9%
Italy	0.5%	0.6%		1.1%	1.3%	0.6%		1.8%	1.4%	0.6%		2.0%	1.6%	0.6%		2.1%	1.7%	0.6%		2.3%
Latvia	-0.9%	0.6%	1.2%	0.9%	1.1%	0.6%	1.2%	2.9%	1.2%	0.6%	1.2%	2.9%	0.9%	0.6%	1.2%	2.7%	1.1%	0.6%	1.2%	2.9%
Lithuania	0.1%	0.6%	1.2%	1.9%	0.5%	0.6%	1.2%	2.3%	0.8%	0.6%	1.2%	2.6%	1.0%	0.6%	1.2%	2.8%	1.1%	0.6%	1.2%	2.9%
Malta	-0.2%	0.6%	0.8%	1.2%	0.1%	0.6%	0.8%	1.5%	0.4%	0.6%	0.8%	1.9%	0.5%	0.6%	0.8%	2.0%	0.7%	0.6%	0.8%	2.1%
Netherlands	-0.5%	0.6%		0.0%	-0.3%	0.6%		0.3%	-0.2%	0.6%		0.4%	-0.1%	0.6%		0.5%	-0.1%	0.6%		0.5%
Norway	0.2%	0.6%		0.8%	1.2%	0.6%		1.8%	1.0%	0.6%		1.6%	1.0%	0.6%		1.6%	1.0%	0.6%		1.6%
Poland	2.7%	0.6%	0.8%	4.1%	2.2%	0.6%	0.8%	3.6%	1.5%	0.6%	0.8%	2.9%	1.5%	0.6%	0.8%	3.0%	1.5%	0.6%	0.8%	2.9%
Portugal	0.0%	0.6%	2.1%	2.8%	0.9%	0.6%	2.1%	3.7%	1.2%	0.6%	2.1%	4.0%	1.3%	0.6%	2.1%	4.1%	1.4%	0.6%	2.1%	4.2%
Romania	1.3%	0.6%	2.1%	4.0%	1.7%	0.6%	2.1%	4.5%	1.1%	0.6%	2.1%	3.8%	1.6%	0.6%	2.1%	4.3%	1.6%	0.6%	2.1%	4.3%
Slovakia	1.0%	0.6%	0.8%	2.4%	0.2%	0.6%	0.8%	1.7%	0.9%	0.6%	0.8%	2.3%	1.0%	0.6%	0.8%	2.5%	1.1%	0.6%	0.8%	2.5%
Slovenia	-1.0%	0.6%	1.2%	0.8%	-0.2%	0.6%	1.2%	1.6%	0.5%	0.6%	1.2%	2.3%	0.6%	0.6%	1.2%	2.4%	0.8%	0.6%	1.2%	2.5%
Spain	0.1%	0.7%		0.7%	1.1%	0.7%		1.7%	1.3%	0.7%		2.0%	1.6%	0.7%		2.2%	1.7%	0.7%		2.3%
Sweden	0.0%	0.5%		0.5%	0.8%	0.5%		1.3%	0.5%	0.5%		1.0%	0.9%	0.5%		1.4%	1.1%	0.5%		1.6%
Switzerland	-0.5%	0.7%		0.2%	-0.4%	0.7%		0.3%	-0.2%	0.7%		0.5%	0.3%	0.7%		1.0%	0.4%	0.7%		1.1%

Table 9 - Cost of debt per Member State for RP3 (source: PRB elaboration).