PRB | Performance review body of the single european sky

Study on Cost of Capital
Methodology review

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Glossary

ANSP	Air Navigation Service Provider
CAPM	Capital Asset Pricing Model
CoD	Cost of Debt
CRP	Country Risk Premium
DMS	Dimson-Marsh-Staunton
ERP	Equity Risk Premium
PP	Performance Plans
RAB	Regulated Asset Base
R_m	Risk Market
RoE	Return on equity
RP2	Second Reference Period
RP3	Third Reference Period
R_f	Risk Free Rate
SDG	Steer Davies Gleave
SES	Single European Sky
SU	Service Units
WACC	Weighted Average Cost of Capital

1. Introduction

1.1 This document

1 This study provides a methodological review for the computation and the estimation of the cost of capital of Air Navigation Service Providers (ANSPs). It includes a methodology for selecting parameters taking into account local circumstances. The purpose is to inform the preparation and assessment of RP3 performance plans (PP).[1]

2 The determined parameters aim to assimilate the cost of capital of ANSPs with the cost that an efficient private company or undertaking would pay to raise finance in similar market conditions.[2]

1.2 The nature of air navigation service provision

3 In the Member States of the Single European Sky, air navigation services are provided under statutory monopolies, primarily by national state-owned service providers facing limited market competition (more details in section 1.4). Except for a few cases for terminal services, airspace users/airlines cannot chose which air navigation service provider supplies the air traffic management services for their routes; they can only chose alternative routes. However, these options are constrained by the additional costs that longer routes imply.

4 The monopolies of air traffic management are subject to economic regulation similar to other industries such as, inter alia, water and energy utilities and rail networks. The regulatory framework ensures that charges include a remuneration on the costs of capital reflecting the one of companies operating in a competitive environment.[3]

5 Despite the similar nature, air navigation services differ significantly from other network industries. These peculiarities must be considered in the regulatory framework, specifically in the risk remuneration embedded in cost of capital:

- En route air navigation services are subject to little or no competition, in contrast to (although not all) other regulated industries.
- Air navigation service have a high proportion of staff costs as compared with the other industries which, tend to be relatively capital intensive and have high fixed costs.
- The demand for air navigation services is highly exposed to the macro-economic climate (although the impact of demand variations on ANSPs is partially mitigated through the traffic risk sharing mechanism).

[1] For this purpose, the methodology has been first tested for RP2 cost of capital values and the results are presented in Annex 1.

[2] An efficient company can be defined as an entity with a capital structure that minimises the weighted average cost of capital (WACC) while maximising the company market value.

[3] Economic regulation is supplementary to other types of regulation, for example safety and environmental regulation which are frequently applied to competitive industries (e.g. the airline industry). In the remainder of this report, the term 'regulation' is generally used to identify economic regulation.

1.3 Market risk

6 Given the exposure of the industry to macro-economic events, four mechanisms are described in the Implementing Regulation 2019/317 to limit ANSPs' exposure to traffic, costs (i.e. pensions, interest rates on loans, taxation law, new cost item required by law and international agreements) and inflation variations.

7 The first mechanism, described in Article 18, limits ANSPs' exposure to traffic variations. This article allows the revision of performance targets during a reference period in case that at least one of the alert thresholds referred to in point (b) of Article 9(4) is reached. Those alert thresholds are based on i) the deviation of the actual traffic from the traffic forecast over a given calendar year and expressed as a percentage of IFR movements and service units and ii) the variation of the reference values as a result of the seasonal updates of the Network Operations.

8 The second mechanism, described in Article 27, further limits ANSPs' exposure to traffic variations.[4] The charging scheme provision shares the risk of revenue fluctuations (i.e. due to deviations from the service unit determined in the performance plans) between airspace users and the ANSPs. The traffic risk sharing mechanism limits to a maximum of ±4.4% the ANSPs' revenue changes, due to a variation of the service unit forecast, as determined in the performance plan. As shown in Figure 1, the maximum risk can be computed as 2% x 100% + (10% - 2%) x 30% = 4.4%.[5]

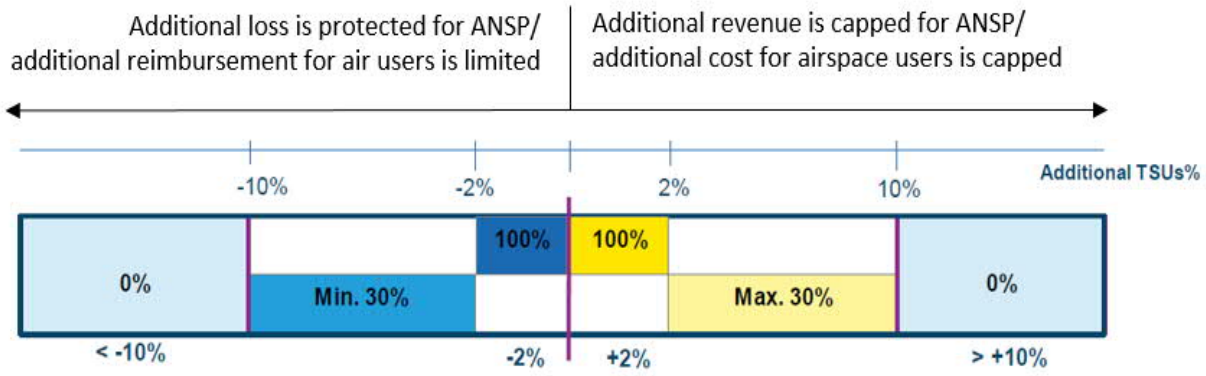


Figure 1 - Graphical explanation of Article 27 of Implementing Regulation (EU) 2019/317 on traffic risk sharing mechanism

9 The third mechanism, described in Article 28, limits ANSPs' exposure to cost variations. The charging scheme provision puts the risk of differences between determined costs included in the performance plan and actual costs on the ANSPs. However, the cost risk sharing mechanism defines some cost exemptions where differences may be recovered from users, limiting the risk. These exemptions are: unforeseen and significant changes in pension costs (on the condition that such changes are outside the control of the ANSPs),

[4] Former Article 13 of the Implementing Regulation 391/2013.
[5] Safety and operational risks are not included in the computation.

unforeseeable changes in interest rates on loans that finance costs arising from the provision of air navigation services (on the condition that such changes are outside the control of the ANSPs), and unforeseeable changes in national taxation law or other unforeseeable new cost items not covered in the performance plan but required by law.

10 The fourth mechanism, described in Article 26, limits ANSPs' exposure to inflation variation. In particular, for each year of the reference period, the determined costs included in the cost bases for en route and terminal charges of year n expressed in nominal terms shall be adjusted on the basis of the difference in percentage between the actual inflation index and the forecast inflation index for that year n and included as an adjustment for the calculation of the unit rate for year n+2.

11 In summary, despite the fact that demand for air navigation services is more exposed to the macro-economic climate than some other regulated industries, the mitigation provided by these mechanisms substantially reduces the revenue risk faced by ANSPs. This view is confirmed by Moody's report on DFS and NATS.[6] The report concludes that due to their monopolistic nature, their ownership structure and their strategic importance (from a national security perspective), both DFS and NATS have a low business risk pro-file. The report provides a useful independent assessment of the risk faced by ANSPs and information on the calculations of the cost of capital.

1.4 Ownership of European ANSPs

12 Ownership requirements are typical in aviation, ensuring a certain degree of control of a state over what most countries consider typical infrastructure. Most countries and the EU require a certain percentage of ownership.

13 The ownership of the ANSPs may influence on the capital structure, by impacting the ratio between debt and the equity. A State may exert strong influence or full control over the national ANSP, for example in terms of resourcing for operations and funding of investment. This can be achieved by retaining the ANSP in public ownership, and/or providing debt or equity on more favorable terms than the market would offer. Furthermore, the State may require a specified level of return on equity from the ANSP.

14 Table 1 shows the range of ANSP ownership structures across States participating in the Single European Sky (SES) initiative. The majority of the ANSPs are linked to, or wholly owned by the respective State. Even if they are a corporatized entity, the ANSPs may benefit to some extent from an implicit State guarantee. While this guarantee may differ in magnitude and type across the States, it is nevertheless important to examine the ownership arrangements in tandem with the charging arrangements for the provision of a consistent cost of capital in line with the risk.

15 Some examples of ANSPs listed in the stock market are NATS (which has a 51% private shareholding since 2001), Skyguide, or ENAV (listed in Milano stock exchange since July 2016).

[6] "DFS Deutsche Flugsicherung GmbH and NATS (En Route) Limited – Peer Comparison", Moody's. July 2012.

Country	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 (state-owned)
Cyprus	DCAC Cyprus	State body
Czech Republic	ANS CR	Republic State-owned enterprise
Denmark	NAVIAIR	State-owned enterprise
Estonia	EANS	Joint-stock company (state-owned)
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 (state-owned)
Italy	ENAV	Joint-stock company (state-owned) since July 2016
Latvia	LGS	Joint-stock company (state-owned)
Lithuania	Oro Navigacija	State-owned enterprise
Malta	MATS	Joint-stock company (state-owned)
Netherlands	LVNL	Independent administrative body
Norway	Avinor	Joint-stock company (state-owned)
Poland	PANSA	State body (acting a legal entity with an autonomous budget)
Portugal	NAV Portugal	State-owned enterprise
Romania	ROMATSA	State-owned enterprise
Slovak Republic	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)
United Kingdom	NATS	Joint-stock company (part-private)

Table 1 - List of ANSPs ownership structures. Source: ACE 2017 Benchmarking Report with 2018-2022 outlook, May 2019

2. Methodology described in RP3 Regulation[7]

2.1 Description of the calculations

16 Article 22 (4) of the Implementing Regulation 2019/317 establishes that the cost of capital shall be equal to the product of:

- the total assets base excluding interest-bearing accounts;[8]
- the weighted average of the interest rate on debts (or cost of debt – CoD) and of the return on equity (RoE). This is commonly known as the weighted average cost of capital ($WACC$).

17 The above-mentioned can be expressed algebraically as follows:

$$Cost\ of\ capital = total\ asset\ base\ x\ WACC$$

Where,

$$WACC = \frac{E}{E+D} RoE + \frac{D}{E+D} CoD$$

18 The weighted average cost of capital ($WACC$) is equal to the sum of the return on equity (RoE) multiplied by the proportion of equity ($\frac{E}{E+D}$), and to the cost of debt (CoD) multiplied by the proportion of debt ($\frac{D}{E+D}$). The proportion of debt (D) and equity (E) compared to the total financing is the denominated capital structure.

19 The return on equity (RoE) or cost of common equity is an estimate of a reasonable rate of return on the shareholders' or owners' investment. It is normally estimated by using a market driven model called the Capital Asset Pricing Model (CAPM), which attempts to measure the relationship between the risk of a share (or stock) and its return, given the level of risk of the activity. In the case of air navigation service providers, the market for shares is either not existing or very limited. Therefore, the ANSPs market risk has to be estimated either within the CAPM approach, or using another methodology proposed by the ANSP based on its own assumptions.

20 The interest rate on debts or cost of debt (CoD) is represented by the weighted rates of interest paid by the ANSP on the debt instruments.

2.2 Potential issues in the implementation of the method

21 The PRB has detected three potential issues when implementing the methodology as described in the previous section. The first issue is related to the capital structure of ANSPs, the second concerns the computation of inflation, and the third relates to the maximum risk borne by the ANSPs.

[7] This methodology is also described and valid for RP2.
[8] In regulated environments, as the one of the ANSPs, the total asset base is commonly named regulated asset base (RAB).

Capital structure

22 **ANSPs' return on equity may fail to take into account the optimal level of gearing hence increasing the WACC.[9]**

23 Generally, corporates are financed with both debt and equity in order to support investments. The use of debt can be a cost-efficient financing approach, since interest rates are typically significantly lower than the cost of equity. The use of debt is justified as well by tax benefits, given that corporate tax is levied on earnings after interest. However, an excessive amount of debt increases interest payments, the volatility of earnings, and the risk of bankruptcy. Moreover, the related increase in financial risk requires a higher compensation to shareholders, which in turn, increases the WACC.

24 As a result, there is a theoretical optimal level of gearing (i.e. the ratio between debt and equity), where the effect of the lower cost of debt outweighs the increasing cost of equity. Figure 2 shows the effect of the relation between debt (K_d) and equity (K_e) on WACC and cost of capital. An increase of the gearing reduces the WACC and the related cost of capital, until an optimal level (point X of the figure). A further increase of the gearing above the optimal level has the effect of raising the related WACC and cost of capital.

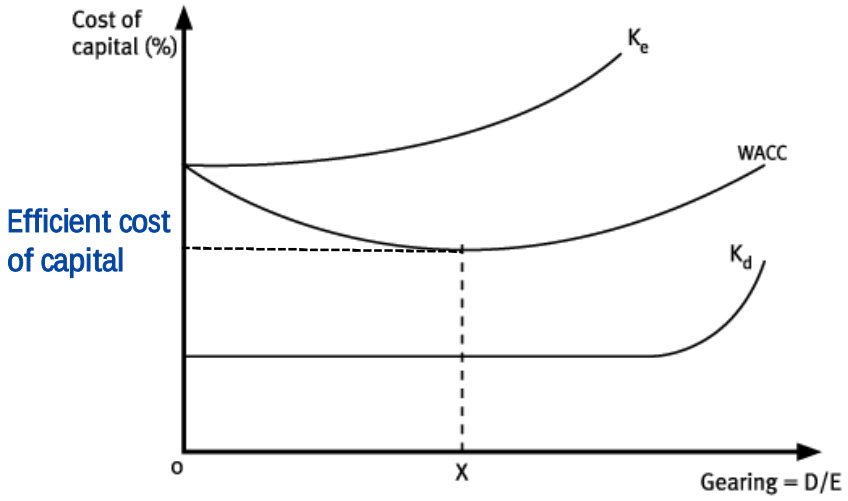


Figure 2 - Optimal gearing. Source: Adaptation from Kaplan Financial Knowledge bank

25 Corporates in competitive markets seek to reach the optimal gearing (i.e. the optimal capital structure), which minimises the cost of capital while maximising the market. The cost of capital at the optimal gearing level is the so-called "efficient cost of capital" and the WACC associated is denominated as "efficient WACC".

26 In the context of air navigation services, ANSPs should aim for a capital structure reaching the "efficient WACC" or, at least, the "efficient WACC" should be taken into account when

[9] Gearing refers to the level of a company's debt related to its equity capital (D/E), usually expressed in percentage form. It is a measure of a company's financial leverage and shows the extent to which its operations are funded by lenders versus shareholders.

applying the CAPM model (or another approach). It should be noted that, under the current regulatory framework, ANSPs are requested to report the parameters of an "efficient WACC" along with the actual parameters.

27 Notwithstanding that ANSPs have reported in RP2 Performance Plan a capital structure for an "efficient WACC" to be around 60% debt and 40% equity, the actual capital structure for some ANSPs is still far from the optimal. Some of their actual capital structures do not minimise the cost of capital, while several ANSPs are almost entirely financed with equity. This implies a higher than the efficient cost of capital, with ANSPs indirectly passing on the cost of their economically inefficient decisions to airspace users through the cost of capital.

Inflation

28 **Cost of capital is computed by multiplying the regulated asset base (RAB)– which was quantified using current cost accounting – by a nominal WACC rather than a real WACC.**

29 The relationship between the cost of capital and inflation should be considered in the context of conversions between real and nominal costs of capital, which is the case of ANSPs.

30 Concerning the real or nominal choice, two valid approaches exist regarding the influence of inflation:

- **Real WACC:** WACC has been adjusted by inflation such that changes in WACC exclude the effect of inflation. Inflation is considered by annual indexation of the regulated asset base.
- **Nominal WACC:** Expectations of inflation are wrapped within the nominal WACC calculation. In this case, the regulated asset base is not adjusted for inflation.

31 Article 22 (4) of Implementing Regulation 2019/317 specifies the link between the asset base accounting method and the cost of capital calculation. More precisely, nominal WACC should be multiplied by nominal regulated asset base, obtained from historical cost accounting. Real WACC should be multiplied by real regulated asset base, resulting from current cost accounting. By following this approach, inflation is not double counted.

Maximum risk borne by ANSPs

32 **Some ANSPs' cost of capital is higher than the maximum risk borne by the ANSPs.**

33 The maximum risk borne by ANSPs determines the maximum loss that they can incur (or the maximum revenues that they can earn). Since the cost and revenue risk faced by ANSPs is low and broadly similar to the one faced by some other regulated industries, it is appropriate to set the maximum threshold for the cost of capital at the level of the maximum risk borne under the traffic risk sharing mechanisms.[10] The cost generated by the capital needed for the provision of air navigation services should not be higher than the maximum risk borne by the ANSPs.

34 In some cases, even if the ANSPs' cost of capital is in line with the competitive market practices, it is still higher than the maximum risk borne by ANSPs. The solution for these

[10] This can be considered as a good and measurable approximation of the risks faced by the ANSPs. In reality ANSPs are facing other risks which are mitigated by the mechanisms in place to reduce the market exposure (described in section 1.4).

cases is to cap ANSPs' cost of capital to the maximum risk. However, for the majority of ANSPs the cost of capital is higher that the risk because the values are not in line with competitive market practices thus implying a problem in the capital structure and/or in the computation of inflation. The solution for these cases is to address first the issue of capital structure and/or inflation for a correct calculation of the cost of capital.

3. Steer Davies Gleave report

35 The Steer Davies-Gleave (SDG) report "Study on Cost of Capital, Return on Equity and Pension Costs of Air Navigation Service Providers" focuses on the definition and calculation of the regulatory asset base and on the definition and calculation of WACC.

36 In the context of air navigation providers, SDG recommends a framework for calculating the appropriate WACC depending on market conditions:

- Option 1 – efficient cost of capital: this approach should apply to ANSPs operating as an independent commercial entity, regardless of the ownership.
  - Debt: average yields on corporate bonds from similar entities of the country. If no domestic comparators exist, the cost of debt should be calculated based on yields on bonds in other countries issued by similar entities, corrected for country specific differences.
  - Equity: full application of the CAPM approach.
  - Capital structure: optimal capital structure calculated as the average of the actual gearing of corporates across the EU with broadly similar operating characteristics to ANSPs.
- Option 2 – administered cost of capital: this approach should apply to ANSPs whose government specifies the return on equity.
  - Debt: actual values for the cost of debt (i.e. the rate paid when borrowing from government or benefitting from favourable terms due to State guarantees) or government borrowing rate (whichever higher).
  - Equity: the required equity return where the government specifies it or government borrowing rate (whichever higher). The calculation involves the application of the WACC using actual gearing.
  - Capital structure: actual capital structure.
- Option 3 – hybrid: this approach should apply to ANSPs able to secure loan finance on favourable terms, while not being subject to a government specified equity return.
  - Debt: as for Option 2.
  - Equity: as for Option 1.
  - Capital structure: as for Option 2.

37 In applying Options 2 and 3, the resulting cost of capital should not exceed an efficient value calculated through Option 1. This limitation can be observed in Figure 3, that represents graphically the three options.

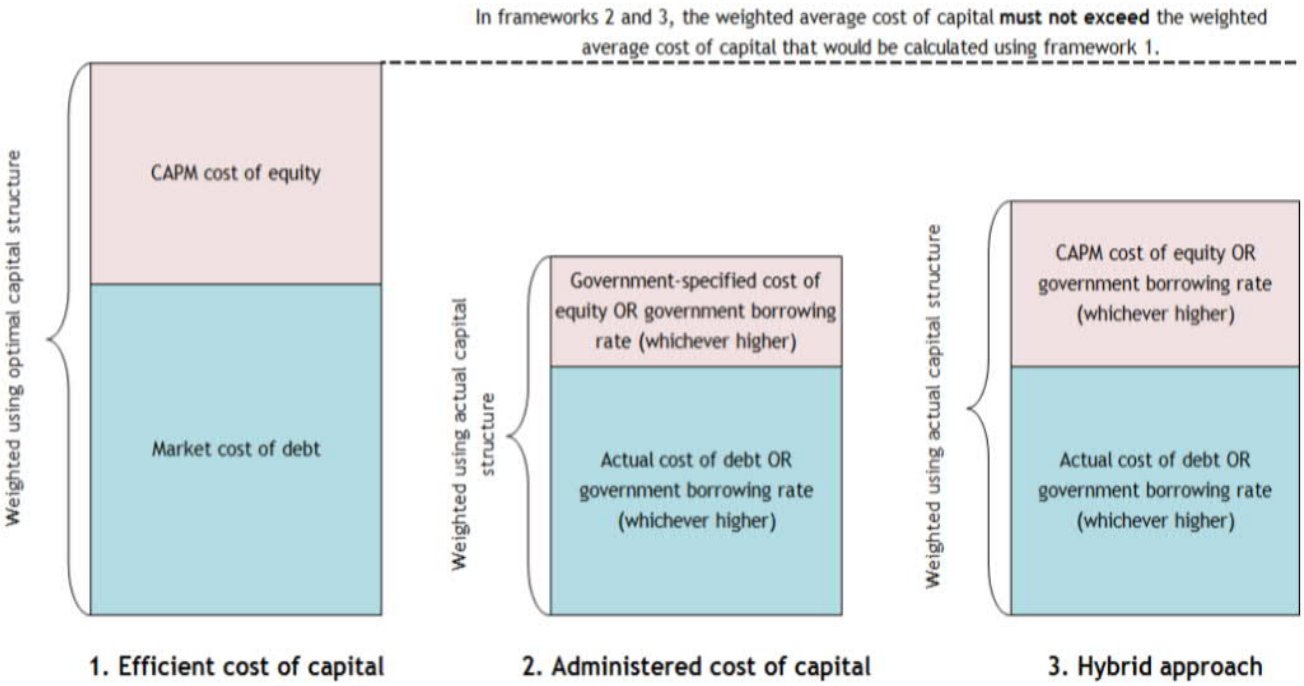


Figure 3 - Framework proposed by SDG for the WACC calculation. Source: SDG report

4. Preferred approach

38 The PRB recommends a methodological framework for classifying ANSPs by capital structure. This framework uses the calculation of an efficient cost of capital and combines the traffic-risk sharing mechanism, as described in section 1.3, and the framework recommended by SDG, as presented in section 3. More specifically, in the cases where the cost of capital calculated through Options 1, 2, or 3 is higher than the maximum risk borne by the ANSPs, the PRB deems appropriate to cap the cost of capital to the monetary maximum risk computed through the traffic share mechanism.

39 The framework proposed by the PRB adapting SDG recommendations is summarised in Table 2:

Options	1- Efficient	2-Administered	3-Hybrid	4-Capped
Scope	ANSPs with actual capital structure is aligned with competitive market practices (i.e. not aligned to the optimal capital structure)	ANSPs subject to a government-specified equity return	ANSPs securing loan finance on favourable terms but not subject to a government-specified equity return	Cost of capital calculated through option 1, 2, or 3 is higher than the maximum risk borne by ANSPs

Return on equity	CAPM	Specified by government	CAPM	CAPM
Cost of debt	Average yields on corporate bonds from similar entities (domestic or other countries adjusted)	Actual cost of debt or government borrowing rate (whichever higher)	Actual cost of debt or government borrowing rate (whichever higher)	Actual cost of debt, corporate debt or government borrowing rate (whichever higher)
Capital structure	Optimal capital structure calculated as average gearing of similar corporate entities (domestic or other countries adjusted)	Actual capital structure	Actual capital structure	Case by case, to meet the capped cost of capital

Table 2 - Framework proposed by the PRB for WACC calculation

40 The cost of capital computed with Options 2 and 3 should not exceed the values obtained with Option 1 (the closest option to competitive and efficient market conditions). Likewise, Options 1, 2, and 3 should not exceed Option 4, which is setting the cap for the cost of capital.

41 Options 1 and 3 differ in the cost of debt and in the capital structure. Concerning the cost of debt, the market cost of debt (Option 1) is theoretically higher than the actual cost of debt (government linked entities benefit from better borrowing conditions than the market). This is the case, for example, for ANSPs fully financed with equity.

42 Figure 4 summarises the above-described framework to calculate ANSPs cost of capital:

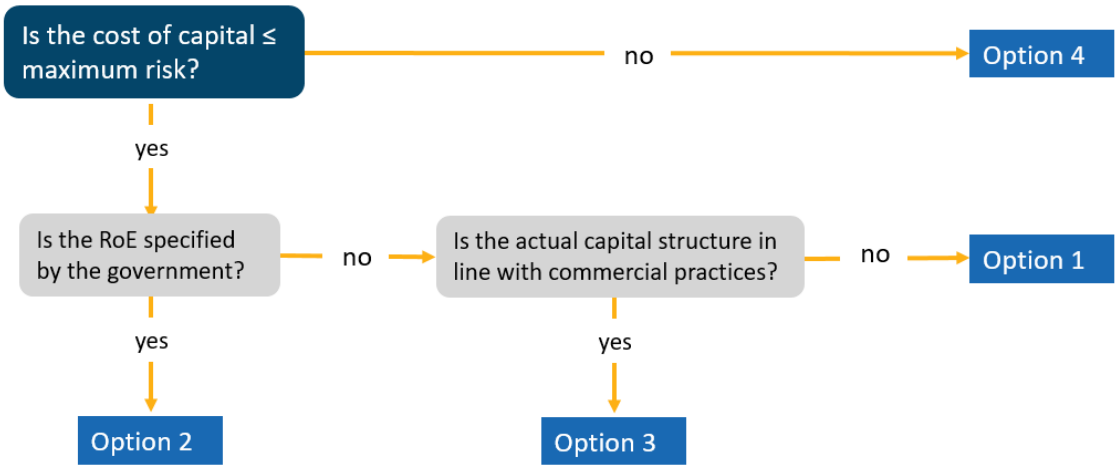


Figure 4 - Decision tree representing the PRB framework

4.1 Definition of the parameters within the framework

43 To provide a complete overview, this section describes in detail the parameters to be used within the above-mentioned framework.

Return on equity

44 The CAPM formula states that an organisation's cost of capital is equal to the risk-free rate of return (typically the yield on a ten-year treasury bond), plus a premium to reflect the extra risk of the investment.

45 The formula could be expressed algebraically as follows:

$$Return\ on\ equity\ (RoE) = R_f + \beta_e(R_m - R_f)$$

Where R_f represents the risk-free rate, R_m the market rate and Equity β_e measures the excess systemic risk of an investment.

46 The risk-free rate (R_f) resamples the return that investors could reasonably expect from capital invested in a risk-free investment with guaranteed returns and no possibility of default. Although an entirely risk-free instrument does not exist, government bond rates in stable and developed countries are often considered as reasonable proxies for the risk-free rate. The difference between the market rate and the risk free rate ($R_m - R_f$) is known as equity risk premium, and represents the excess return over the risk-free rate that investors require to compensate the risks associated with the variability of the market portfolio. Finally, the Equity β_e measures the additional risk of a specific asset, compared to a similar investment in the market. The Equity β_e is a function of the business risk and the financial risk of using debt in addition to equity finance.

47 Equity β_e needs to be calculated using the asset β_a as an input in the Hamada's equation. The asset β_a (or unlevered beta) is a widely used approach that provides an indication of the risk which is independent from the entity capital structure. The asset β_a, the tax rate t, and the gearing D/E are known parameters in the Hamada's equation:

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

48 Table 3 summarizes the parameters of the CAPM methodology to be used in Options 1 and 3 of the framework.

Risk free rate (R_f)	Financial stability: domestic government bond rates with a 10-year yield spread.
	Financial instability or lack of domestic government bond: risk free rate on German bonds yields, with an adjustment to take account of the difference between domestic and German inflation forecasts.
Equity risk premium ($R_m - R_f$)	Average of the estimates of Dimson-Marsh-Staunton (DMS), Damodaran and Fernandez-IESE Business School. This value is then adjusted by the equity β_e.

Equity beta (β_e)	Computed from the Hamada's equation using as inputs the unleveraged asset beta (β_a), the tax and the gearing .
Asset beta (β_a)	Average of β_a of the aviation sector and other regulated entities across the EU.
Gearing	Optimal gearing calculated as the average of the actual gearing of corporates across the EU with broadly similar operating characteristics to ANSPs.

Table 3 - Parameters proposed by PRB for CAPM in the calculation of RoE for Options 1 and 3

49 For Option 2, the return on equity is specified by the government.

50 For Option 4, the rationale of CAPM is the same as Options 1 and 3, but two parameters might change to optimise the capped cost of capital. The β_a can vary in a range between 0.3 to 0.5 (as suggested by SDG), while the gearing is adjusted to obtain the capped cost of capital.

Cost of debt

51 The cost of debt for Option 1 is the average of corporate debt of other entities in the same country with broadly similar credit ratings to the ANSP. In the event of no sufficiently liquid domestic bond market in the relevant State, the cost of debt should be estimated based on one of the similar entities in other but similar countries. 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, to obtain an estimate of the ANSP's market cost of debt.

52 The formula could be expressed algebraically as follows:

$$Cost\ of\ debt = R_f + debt\ premium = R_f + \left(CoD\ similar\ entities - R_f\ similar\ countries\right)$$

53 For Options 2, 3, and 4, the cost of debt is equal to the domestic government bond rate with a 10-year yield spread (the risk-free rate).

4.2 Correction of identified issues

Capital structure

54 Options 1, 2, and 3 prevent the issue of not taking into account an optimal level of gearing.

55 As stated in section 2.2, corporates require both debt and equity finance in order to support investments. If the actual capital structure of a specific ANSP is in line with competitive market practices regardless the ownership, Option 3 (or Option 2 if administered WACC) calculates the WACC retaining the actual capital structure.

56 In the case where actual capital structure shows major deviations from competitive market practices (e.g. ANSPs financed 100% equity or similar), Option 1 provides a solution for a capital structure aligned to the efficient one.

Inflation

57 As explained in section 2.2, the inflation impacts the calculation of the cost of capital, both in the regulated asset base and in the WACC. Some ANSPs use historical cost accounting (nominal terms), whereas others use current cost accounting (real terms) when calculating the regulatory asset base. In order to ensure that inflation is not double counted when ANSPs compute the WACC, the methodology needs to be applied consistently:

- **Nominal:** CAPM parameters are expressed in nominal terms, as is the cost of debt. Nominal WACC is then calculated and reported according to the Regulation, along with the cost of capital (the product of nominal WACC and nominal regulated asset base). For the purpose of reporting, both RAB and WACC are in nominal terms according to the implementing Regulation.
- **Real:** ANSPs calculating their regulated asset base in real terms need to compute the WACC in real terms to follow a consistent approach when providing the cost of capital.

58 The formula that connects nominal and real terms is the Fisher relationship:

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

Maximum risk borne by ANSPs

59 Despite Options 1, 2, and 3 being in line with competitive market practices, the cost of capital may be higher than the maximum risk borne by the ANSPs (i.e. depending as well on the magnitude of the asset base). In this scenario, the WACC should be capped to the monetary value of the maximum revenue risk faced by the ANSPs.

60 Option 4 provides a solution for this scenario, calculating a WACC as a result of a capped cost of capital and proposing a suggestion on the level of debt necessary to achieve that WACC. To reach that capped cost of capital, the parameters of the CAPM are aligned to competitive market practices, as in Options 1 and 3, and fixed, with the exception of the β_a and gearing. β_a can vary within a range of 0.3 to 0.5, as suggested by SDG, to provide more flexibility in the calculation of this WACC. The gearing is the incognita that needs to be solved in order to obtain this WACC. Therefore, it will be calculated by trial and error and case by case to obtain the closest result to the maximum risk.

61 To enable the comparison of the cost of capital with the maximum risk borne by ANSPs, both values have to be compared in real terms. For this purpose, where the WACC calculated by ANSPs is in nominal terms, it needs to be converted into real terms by using the Fisher relationship set out above.

5. Implementation of the methodology per ANSP in RP2

62 It is important to note that the establishment of the cost base for charges is not the same for both RP2 and RP3. In RP2, the costs included in the cost base (i.e. staff costs, operating costs other than staff costs, depreciation costs, cost of capital and exceptional costs) are set in real terms and specified for each calendar year. Differently, in RP3 depreciation costs and cost of capital are set in nominal terms where historical cost accounting is applied. This change has an impact on the comparison of cost of capital with the maximum risk exposure (calculated as a percentage of the determined costs). This change has to be considered when implementing the methodology for RP3.

5.1 WACC parameters

63 This section provides the description and result of the calculations of WACC parameters for RP2.

Risk free rate (R_f)

64 For States benefiting of financial stability, the domestic government bond rates with a 10-year yield spread, are the best proxy for the risk-free rate. In the cases of States lacking domestic government bond or suffering from a financial instability, the German government bond should be used as risk-free rate, adjusted by the German inflation and the specific State inflation.

65 Table 4 shows the 10-year domestic bond rates and their respective spread, from 2015 to 2019. The risk-free rate of the countries marked with an asterisk (*) has been adjusted according to the rationale explained above. Bulgaria, Estonia, Lithuania and Malta do not have a domestic government bonds and Greece's government bonds are still quite high as a consequence of the financial crisis in 2007.

	2015	2016	2017	2018	2019
Austria	0.75%	0.37%	0.59%	0.67%	0.45%
Belgium	0.85%	0.48%	0.73%	0.80%	0.60%
Bulgaria*	0.12%	0.32%	-0.22%	-0.04%	-0.17%
Croatia	4.16%	3.63%	2.86%	2.27%	1.93%
Cyprus	3.93%	3.77%	3.33%	2.37%	0.43%
Czech Republic	0.70%	0.44%	1.05%	2.03%	2.00%
Denmark	0.72%	0.34%	0.54%	0.46%	0.17%
Estonia*	2.18%	1.63%	1.68%	1.76%	1.43%
Finland	0.67%	0.36%	0.49%	0.64%	0.41%
France	0.86%	0.47%	0.81%	0.78%	0.50%
Germany	0.54%	0.13%	0.38%	0.46%	0.13%
Greece*	-0.47%	-0.41%	-0.08%	0.01%	0.01%
Hungary	3.49%	3.17%	2.99%	3.08%	3.47%
Ireland	1.19%	0.74%	0.82%	0.96%	0.70%
Italy	1.71%	1.46%	2.08%	2.61%	2.84%
Latvia	0.92%	0.88%	0.91%	1.06%	0.87%
Lithuania*	0.85%	0.77%	1.22%	1.00%	0.66%
Malta*	0.88%	0.33%	0.38%	0.46%	0.13%

	2015	2016	2017	2018	2019
Netherlands	0.70%	0.29%	0.55%	0.58%	0.27%
Norway	1.54%	1.31%	1.61%	1.85%	1.78%
Poland	2.70%	3.05%	3.44%	3.22%	3.13%
Portugal	2.43%	3.21%	3.06%	1.85%	1.37%
Romania	3.56%	3.36%	3.96%	4.83%	5.22%
Slovakia	0.87%	0.58%	1.00%	0.91%	0.68%
Slovenia	1.67%	1.15%	1.14%	1.09%	0.43%
Spain	1.75%	1.37%	1.57%	1.44%	1.20%
Sweden	0.72%	0.42%	0.69%	0.66%	0.40%
Switzerland	-0.07%	-0.35%	-0.09%	0.00%	-0.24%
United Kingdom	1.82%	1.22%	1.21%	1.41%	1.33%

Table 4 - Domestic government bond rates with a 10-year yield spread for RP2. Source: Bloomberg

Equity risk premium $(R_m - R_f)$

66 The equity risk premium for mature market equity risk premium (S&P 500) is calculated by using Professor Aswath Damodaran's database.[11] For 2019, equity risk premium is calculated based on forecasted values of R_f and Risk Market (R_m) adjusting the 2018 values by the GDP growth rate.

67 Table 5 shows the values for equity risk premium. A more detailed explanation of the computation is provided in Table 10 of Annex 3.

	2015	2016	2017	2018	2019
Austria	6.0%	6.3%	5.5%	6.5%	6.8%
Belgium	6.9%	6.5%	5.8%	6.8%	7.1%
Bulgaria	8.8%	8.4%	7.3%	8.6%	9.1%
Croatia	9.7%	10.0%	8.5%	10.1%	10.8%
Cyprus	12.7%	12.1%	9.2%	10.1%	12.5%
Czech Republic	7.0%	6.7%	5.9%	6.9%	7.2%
Denmark	6.0%	5.7%	5.1%	6.0%	6.4%
Estonia	7.0%	6.7%	5.9%	6.9%	7.5%
Finland	6.0%	6.3%	5.5%	6.5%	6.9%
France	6.7%	6.4%	5.7%	6.6%	7.0%
Germany	6.0%	5.7%	5.1%	6.0%	6.4%
Greece	20.9%	19.9%	15.5%	15.0%	15.3%
Hungary	9.7%	8.8%	7.6%	9.0%	9.1%
Ireland	8.4%	7.4%	6.1%	7.1%	7.6%
Italy	8.8%	8.4%	7.3%	9.0%	8.8%
Latvia	7.8%	7.4%	6.5%	7.6%	8.1%
Lithuania	7.8%	7.4%	6.5%	7.6%	8.2%
Malta	7.8%	7.4%	6.5%	7.6%	8.4%
Netherlands	6.0%	5.7%	5.1%	6.0%	6.4%
Norway	6.0%	5.7%	5.1%	6.0%	6.2%
Poland	7.3%	6.9%	6.1%	7.1%	7.6%

[11] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

	2015	2016	2017	2018	2019
Portugal	9.7%	9.2%	8.0%	9.0%	9.7%
Romania	9.3%	8.8%	7.6%	9.0%	9.0%
Slovakia	7.3%	6.9%	6.1%	7.1%	7.7%
Slovenia	9.3%	8.8%	6.9%	8.2%	9.2%
Spain	8.8%	8.4%	7.3%	8.2%	8.6%
Sweden	6.0%	5.7%	5.1%	6.0%	6.3%
Switzerland	6.0%	5.7%	5.1%	6.0%	6.3%
United Kingdom	1.82%	1.22%	5.7%	6.6%	6.8%

Table 5 - Equity risk premium for RP2. Source: Damodaran

Asset beta (β_a)

68 The β_a, or unlevered adjusted beta, takes into account the risk of the sector. To calculate a β_a that reflects the risk faced by ANSPs, the best proxy is a weighted average of β_a of the aviation sector and other regulated entities - i.e. transport, energy and telecom per country.

69 The rationale behind the shortlist of the entities is the degree of correlation between the β_a and the β_e. The degree of correlation is measured with the statistical indicator R-squared (R^2) representing the proportion of the variance in stock return of comparable companies vis a vis market returns. It is common practice in the valuation field to select companies with an R^2 greater than 10%. All companies selected have an R^2 of more than 10% for the entire period (2015-2018), with the only exception of Bulgaria and Latvia where no other comparable public company were found. In order to calculate the weighted average of β_a across Europe, the β_a values per country have been weighted by the GDP of each country.[12]

70 Table 6 shows the weighted average of β_a per country. The average at European level varies between 0.59 and 0.70, slightly higher than the range of values suggested by SDG (0.3 to 0.5). A more detailed explanation of the computation is provided in Table 11 of Annex 3.

	2015	2016	2017	2018	2019
Austria	0.51	0.56	0.67	0.69	0.64
Belgium	0.58	0.55	0.38	0.50	0.50
Bulgaria	0.50	0.10	0.49	0.56	0.44
Croatia	1.00	1.11	0.58	0.53	0.71
Cyprus	0.47	0.61	0.42	0.37	0.43
Czech Republic	0.66	0.67	0.38	0.65	0.61
Denmark	0.64	0.67	0.72	0.42	0.55
Estonia	0.39	0.33	0.46	0.41	0.38
Finland	0.81	0.86	0.44	1.33	1.00
France	0.59	0.60	0.59	0.67	0.63
Germany	0.59	0.60	0.59	0.67	0.63
Greece	0.63	0.62	0.58	0.71	0.65
Hungary	0.68	0.95	0.64	0.86	0.78
Ireland	1.05	1.06	0.96	1.12	1.07

[12] Source of the GDP data: Oxford Economics.

	2015	2016	2017	2018	2019
Italy	0.47	0.63	0.43	0.62	0.56
Latvia	0.32	0.21	0.37	0.64	0.47
Lithuania	0.11	0.33	0.35	0.41	0.34
Malta	0.47	0.14	0.25	0.51	0.40
Netherlands	0.58	0.62	0.54	0.66	0.62
Norway	1.06	0.84	1.09	1.22	1.10
Poland	0.69	0.60	0.61	0.59	0.61
Portugal	0.91	0.85	0.63	0.95	0.87
Romania	1.05	1.28	1.02	1.05	1.08
Slovakia	0.93	1.27	1.45	0.90	1.06
Slovenia	1.10	0.47	0.65	0.56	0.65
Spain	0.57	0.56	0.56	0.67	0.62
Sweden	0.57	0.64	0.83	0.66	0.67
Switzerland	0.51	0.55	0.63	0.70	0.63
United Kingdom	0.54	0.51	0.57	0.68	0.61
Weighted Average of asset beta	**0.60**	**0.62**	**0.59**	**0.70**	**0.65**

Table 6 - Asset beta for ANSPs for RP2. Source: Capital IQ data base

Gearing (D/E)

71 The optimal gearing is calculated as the weighted average of the actual gearings of entities listed in the stock market with broadly similar operating characteristics to ANSPs. In order to calculate the weighted average of gearing across Europe, the gearing per country has been weighted by the GDP of each country.[13] The shortlisted companies are the same as the ones presented in Table 11 of Annex 3. The values provided in Table 7 show an average gearing ranging from 41% to 48%, resulting in a capital structure composed of around 30% debt and 70% equity. A more detailed explanation of the computation is provided in Table 12 of Annex 3.

	2015	2016	2017	2018	2019
Austria	62.2%	48.4%	33.4%	32.4%	38.1%
Belgium	63.5%	56.3%	62.0%	78.5%	65.6%
Bulgaria	12.1%	27.4%	43.2%	-8.8%	35.0%
Croatia	-14.7%	-9.0%	-6.7%	-5.2%	-7.0%
Cyprus	63.1%	78.8%	72.5%	64.2%	71.9%
Czech Republic	54.6%	58.8%	51.3%	52.3%	54.1%
Denmark	18.2%	11.9%	13.6%	16.5%	14.0%
Estonia	52.6%	51.5%	41.1%	37.6%	40.2%
Finland	19.8%	-2.2%	-5.3%	-20.9%	-9.5%
France	60.4%	49.9%	39.8%	35.7%	41.8%
Germany	60.4%	49.9%	39.8%	35.7%	41.8%
Greece	60.1%	57.6%	54.5%	56.5%	57.3%
Hungary	40.9%	-13.6%	32.4%	24.8%	28.6%

[13] Source of the GDP data: Oxford Economics.

	2015	2016	2017	2018	2019
Ireland	21.8%	13.0%	13.7%	11.4%	12.7%
Italy	67.4%	72.1%	52.2%	36.5%	59.5%
Latvia	-19.0%	-46.8%	4.2%	6.7%	-12.0%
Lithuania	56.8%	46.2%	42.7%	38.0%	42.3%
Malta	4.0%	2.6%	-0.1%	-2.1%	0.2%
Netherlands	53.3%	64.9%	48.3%	65.3%	59.5%
Norway	37.5%	39.2%	33.7%	21.8%	31.6%
Poland	39.5%	61.3%	59.0%	71.8%	64.0%
Portugal	29.3%	18.1%	16.8%	15.8%	16.9%
Romania	-36.8%	-36.3%	-18.9%	-8.5%	-21.2%
Slovakia	4.5%	5.7%	-7.0%	-0.8%	-0.7%
Slovenia	60.7%	55.9%	54.8%	96.0%	68.9%
Spain	51.9%	51.8%	43.4%	42.1%	45.7%
Sweden	29.0%	36.0%	19.0%	27.7%	27.5%
Switzerland	36.6%	33.4%	21.7%	24.5%	26.6%
United Kingdom	29.7%	36.8%	38.7%	44.5%	40.0%
Weighted Average of asset beta	**48.3%**	**47.7%**	**41.6%**	**42.0%**	**44.8%**

Table 7 - Gearing for ANSPs for RP2. Source: Capital IQ data base

Equity beta (β_e)

72 The β_e is the adjustment of the unleveraged β_a (shown in Table 6) by the tax level and the gearing (shown in Table 7). It is computed by using the inverse of the Hamada's equation. The results are shown in Table 8.

	2015	2016	2017	2018	2019
Austria	0.82	0.83	0.77	0.91	0.86
Belgium	0.89	0.91	0.83	0.99	0.93
Bulgaria	0.86	0.88	0.81	0.96	0.91
Croatia	0.83	0.85	0.78	0.93	0.88
Cyprus	0.89	0.91	0.83	0.99	0.93
Czech Republic	0.83	0.85	0.78	0.93	0.88
Denmark	0.82	0.84	0.78	0.92	0.87
Estonia	0.83	0.85	0.78	0.93	0.88
Finland	0.83	0.85	0.78	0.93	0.88
France	0.89	0.91	0.83	0.99	0.93
Germany	0.80	0.82	0.76	0.90	0.85
Greece	0.89	0.91	0.83	0.99	0.93
Hungary	0.85	0.86	0.79	0.95	0.89
Ireland	0.85	0.87	0.80	0.95	0.90
Italy	0.81	0.83	0.76	0.91	0.85
Latvia	0.84	0.86	0.79	0.94	0.89
Lithuania	0.89	0.91	0.83	0.99	0.93
Malta	0.79	0.80	0.74	0.89	0.83
Netherlands	0.83	0.85	0.78	0.93	0.88

	2015	2016	2017	2018	2019
Norway	0.81	0.83	0.76	0.91	0.86
Poland	0.83	0.85	0.78	0.93	0.88
Portugal	0.82	0.84	0.77	0.92	0.87
Romania	0.84	0.86	0.79	0.94	0.89
Slovakia	0.82	0.84	0.77	0.92	0.87
Slovenia	0.84	0.86	0.79	0.94	0.88
Spain	0.80	0.82	0.76	0.90	0.85
Sweden	0.82	0.84	0.78	0.92	0.87
Switzerland	0.89	0.91	0.83	0.99	0.93
United Kingdom	0.78	0.80	0.74	0.88	0.83

Table 8 - Equity beta for ANSPs for RP2. Source: EY valuation services

Cost of debt

73 The cost of debt is the average of corporate debt of other entities in the same country, with broadly similar credit ratings to the ANSP. In countries where there are no corporate bonds available, an indirect approach has been followed considering the spread of German bonds adjusted by specific country risk premium (data obtained from Damodaran database).

74 For countries having no rating companies, a standard rating between BBB+ and BBB- for corporate bonds has been considered. However, it has been observed that the average rating of peers for most of countries lies within the standard range. Table 9 illustrates the results of cost of debt. A detailed explanation of the computation is provided in Table 13 of Annex 3.

	2015	2016	2017	2018	2019
Austria	1.7%	1.1%	1.3%	2.0%	1.8%
Belgium	1.7%	1.1%	1.4%	1.9%	1.7%
Bulgaria	0.0%	0.0%	0.0%	0.0%	0.0%
Croatia	10.1%	9.5%	7.6%	8.4%	8.1%
Cyprus	5.1%	4.8%	4.1%	3.9%	0.0%
Czech Republic	4.0%	3.0%	3.2%	5.0%	5.0%
Denmark	2.9%	1.9%	1.9%	2.5%	2.2%
Estonia	0.0%	0.0%	0.0%	0.0%	0.0%
Finland	1.8%	1.4%	1.3%	2.1%	1.9%
France	1.8%	1.1%	1.4%	2.0%	1.7%
Germany	1.7%	1.2%	1.2%	2.1%	1.7%
Greece	14.2%	12.0%	9.4%	8.6%	8.1%
Hungary	9.4%	7.9%	6.8%	8.1%	8.5%
Ireland	2.2%	1.5%	1.5%	2.3%	2.0%
Italy	2.8%	2.5%	2.9%	4.2%	4.4%
Latvia	4.9%	4.2%	3.6%	4.7%	4.5%
Lithuania	0.0%	0.0%	0.0%	0.0%	0.0%
Malta	0.0%	0.0%	0.0%	0.0%	0.0%
Netherlands	1.8%	1.3%	1.3%	2.2%	1.9%

	2015	2016	2017	2018	2019
Norway	3.4%	2.7%	2.7%	3.6%	3.5%
Poland	6.2%	5.9%	5.7%	6.4%	6.3%
Portugal	3.6%	4.3%	3.8%	3.4%	3.0%
Romania	9.1%	8.1%	7.8%	9.9%	10.3%
Slovakia	2.0%	1.6%	1.8%	2.5%	2.3%
Slovenia	2.8%	2.2%	1.9%	2.7%	0.0%
Spain	2.9%	2.5%	2.5%	3.3%	3.1%
Sweden	3.4%	2.2%	2.2%	2.8%	2.5%
Switzerland	0.2%	-0.1%	0.0%	0.2%	0.0%
United Kingdom	3.5%	2.5%	2.5%	0.88	3.0%

Table 9 - Cost of debt per country for RP2. Source: Damodaran, Bloomberg and EY valuation services

5.2 Cost of Capital analysis

75 Annex 1 provides an overview of the cost of capital computations by ANSP. Each analysis details the specific calculation of the cost of capital, the relationship with the maximum risk level and the comparator group benchmark.[14]

76 In addition, a graphical comparison of the suggested and reported WACC for RP2 for all the ANSPs is provided in Annex 2.

[14] The calculation of comparators group is required as per Article 9 of the Regulation "Together with the adoption of the Union-wide performance targets, the Commission shall establish the comparator groups of air navigation service providers with a similar operational and economic environment, for the purposes of assessing performance targets in the key performance area of cost-efficiency."

Annex 1 – Cost of Capital by ANSP

Austria – Austro Control

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.06%	4.05%	3.90%	4.28%	4.22%
Reported RAB (M€)	115.98	117.03	117.80	118.03	118.05
Computed Cost of capital (M€)	4.71	4.74	4.59	5.05	4.98

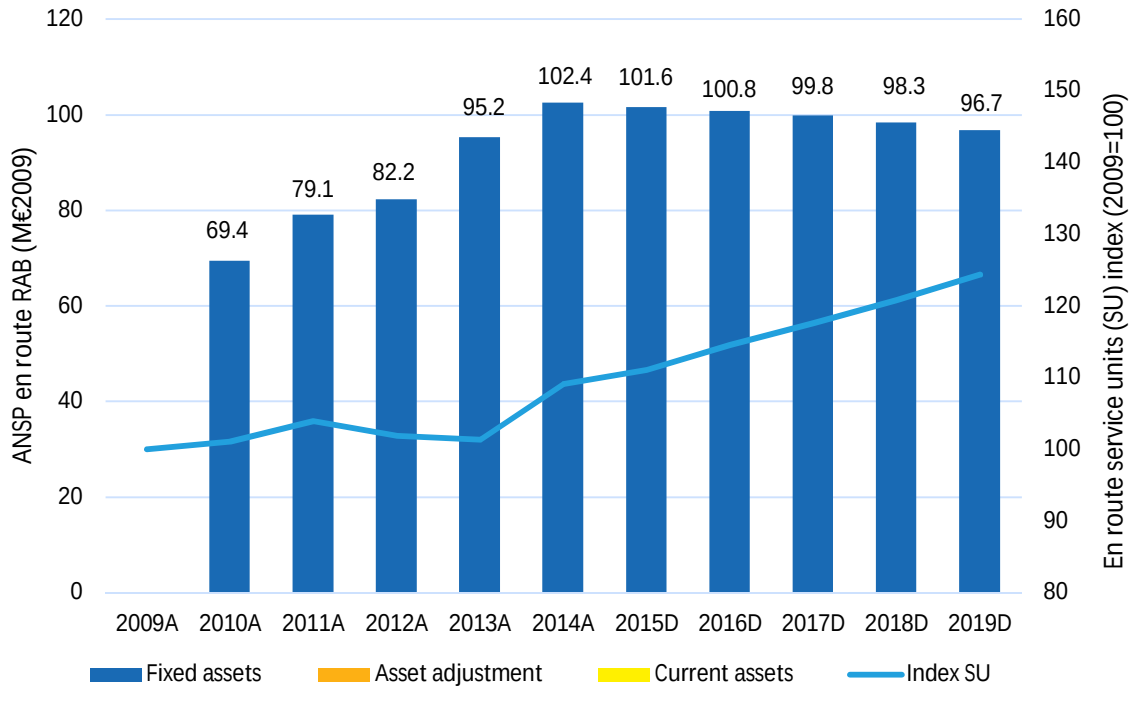
WACC

Option 3	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	7.55%	7.46%	6.50%	8.87%	8.51%
Computed Cost of debt	3.40%	3.40%	3.40%	3.40%	3.40%
Reported Capital structure (% debt)	84%	84%	84%	84%	84%
Computed WACC	4.06%	4.05%	3.90%	4.28%	4.22%
Reported WACC	4.00%	4.00%	4.00%	4.00%	4.00%

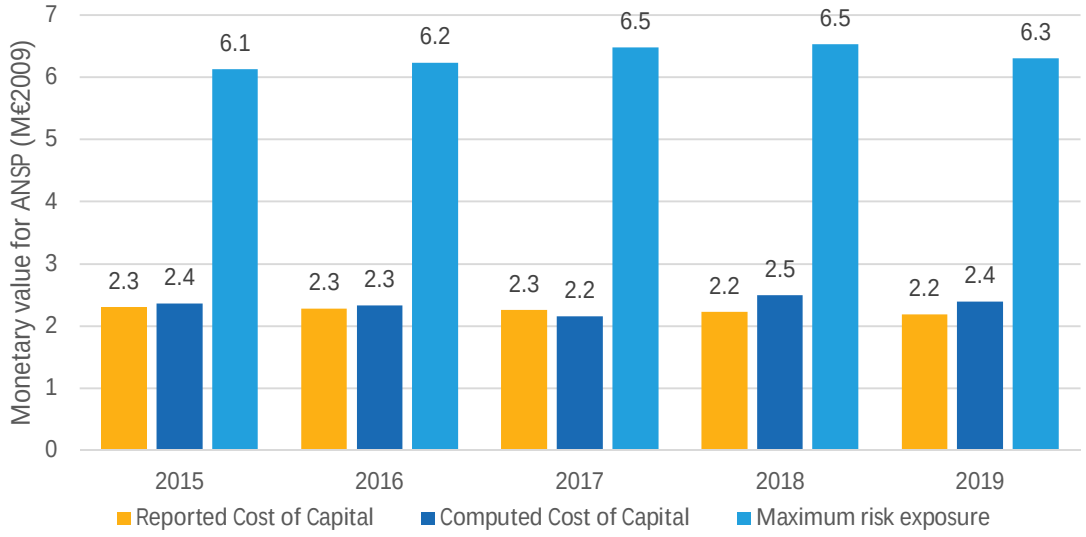
Comments

The WACC computed by the PRB ranges from 3.90% to 4.28%, in line with competitive market practices (Option 3). The WACC reported by Austro Control is close in value to the PRB WACC. The capital structure is mainly composed by debt, enabling a low value for the WACC.

Regulated Asset Base



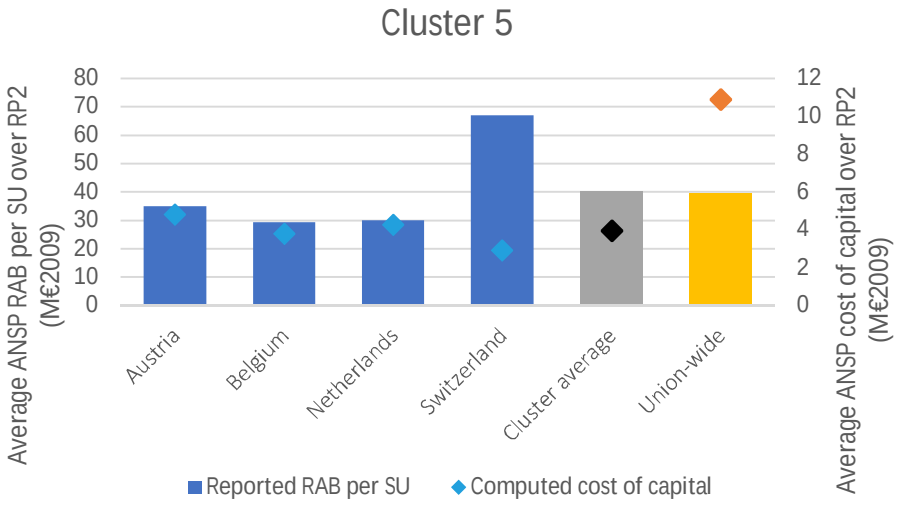
Cost of capital and Maximum risk exposure



Comments

Austro Control's cost of capital falls well below its maximum risk exposure and close to the one reported. This indicates that the sum that Austro Control pays to raise finance is comparable to the one of an efficient private entity in a similar market condition.

Cost of capital and Comparator groups



Comments

Austro Control's RAB per service units is 15% lower than the cluster 5 average and 13% lower than the Union-wide average. Austro Control's cost of capital is 18% higher than the cluster 5 average but lower than the Union-wide average. This is due to Austro Control's RAB in value lower than the Union-wide average coupled with its WACC towards the lower bound of values across Europe.

Belgium – Skeyes

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.44%	3.90%	3.82%	5.17%	4.77%
Reported RAB (M€)	87.95	87.91	83.51	84.38	86.38
Computed Cost of capital (M€)	3.90	3.43	3.19	4.36	4.12

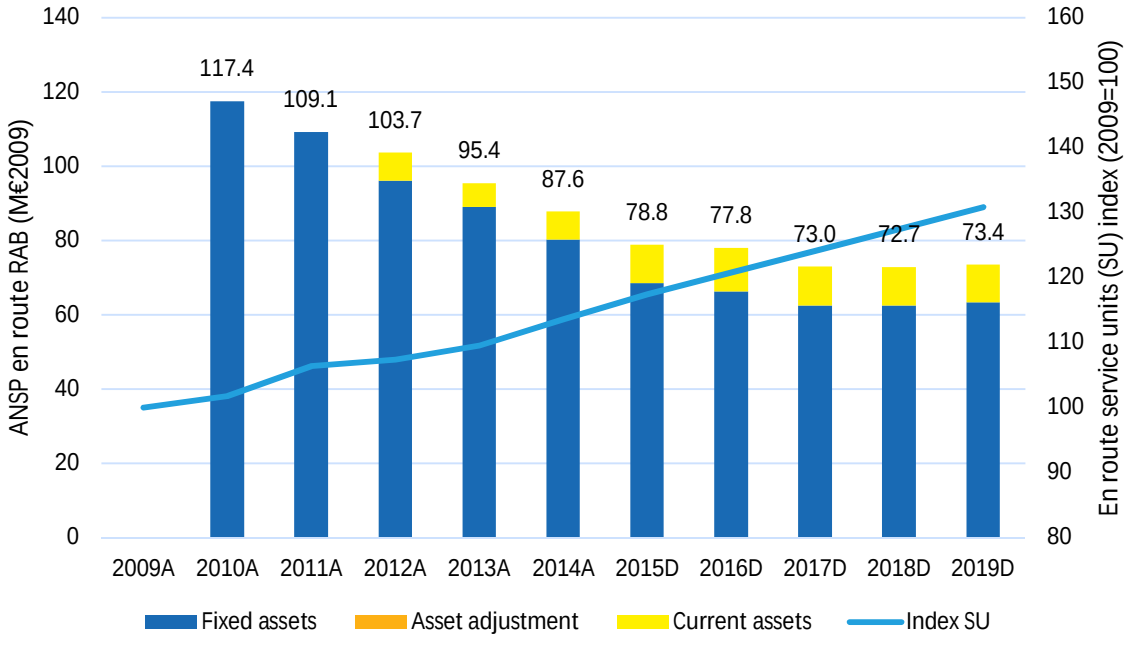
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	7.01%	6.44%	5.56%	7.55%	7.27%
Computed Cost of debt	1.68%	1.13%	1.39%	1.90%	1.69%
Computed Capital structure (% debt)	33%	32%	29%	30%	31%
Computed WACC	4.44%	3.90%	3.82%	5.17%	4.77%
Reported WACC	3.57%	3.87%	4.17%	4.47%	4.47%

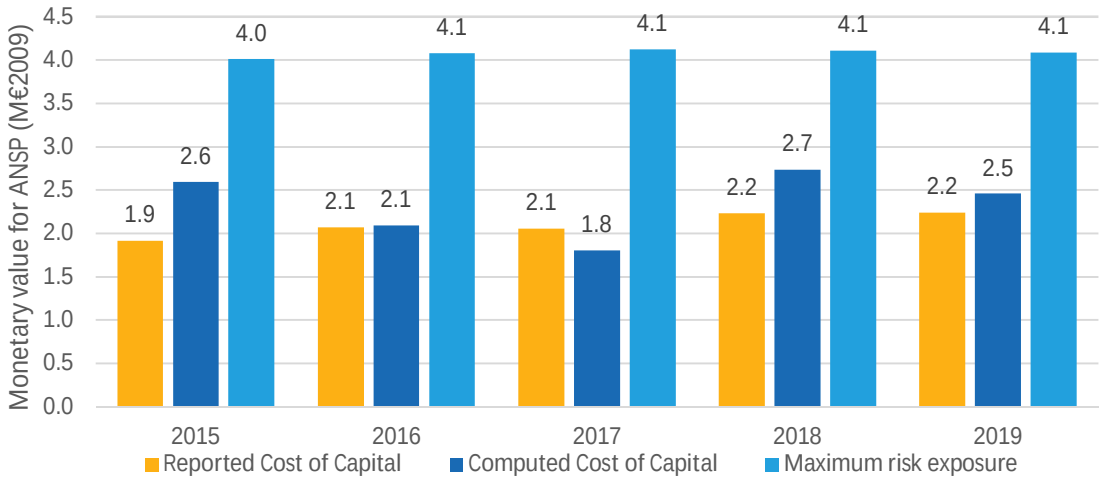
Comments

The WACC computed by the PRB ranges from 3.82% to 5.17%, in line with competitive market practices (Option 1). Skeyes reported a WACC close in value to the PRB WACC with a capital structure of 100% equity. Generally, it is unusual to obtain an efficient WACC with such a capital structure.

Regulated Asset Base



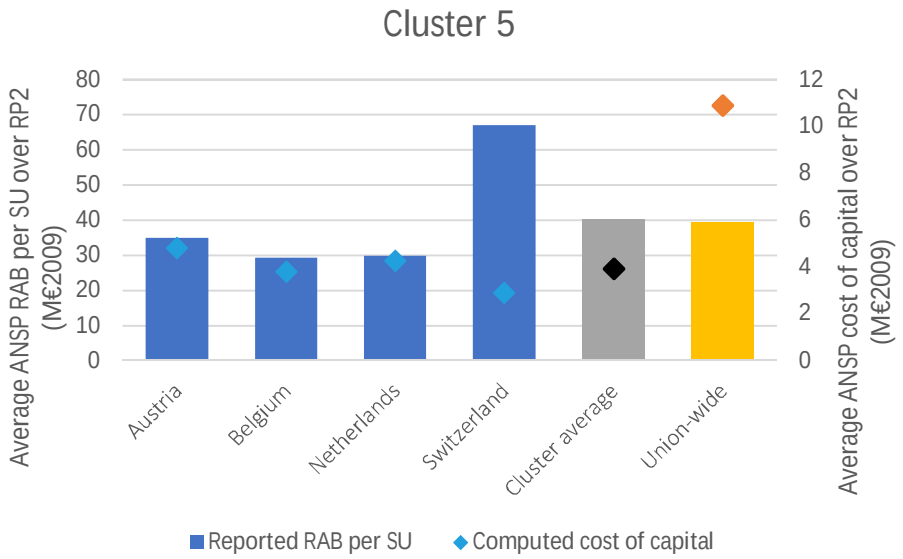
Cost of capital and Maximum risk exposure



Comments

Skeyes's cost of capital falls well below its maximum risk exposure and close to the one reported by Skeyes. However, it is unusual to obtain an efficient cost of capital with the capital structure reported by Skeyes.

Cost of capital and Comparator groups



Comments

Skeyes's RAB per service units is the lowest of cluster 5 compared to the cluster average (38%) and 35% lower than the Union-wide average. Skeyes's cost of capital is 4% lower than the cluster 5 average and it is also lower than the Union-wide average. This is due to Skeyes's RAB in value lower than the Union-wide average coupled with its WACC towards the lower bound of values across Europe.

Bulgaria – BULATSA

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	3.66%	4.48%	4.27%	4.52%	4.82%
Reported RAB (M€)	129.92	137.36	148.69	148.09	146.90
Computed Cost of capital (M€)	4.75	6.15	6.35	6.69	7.09

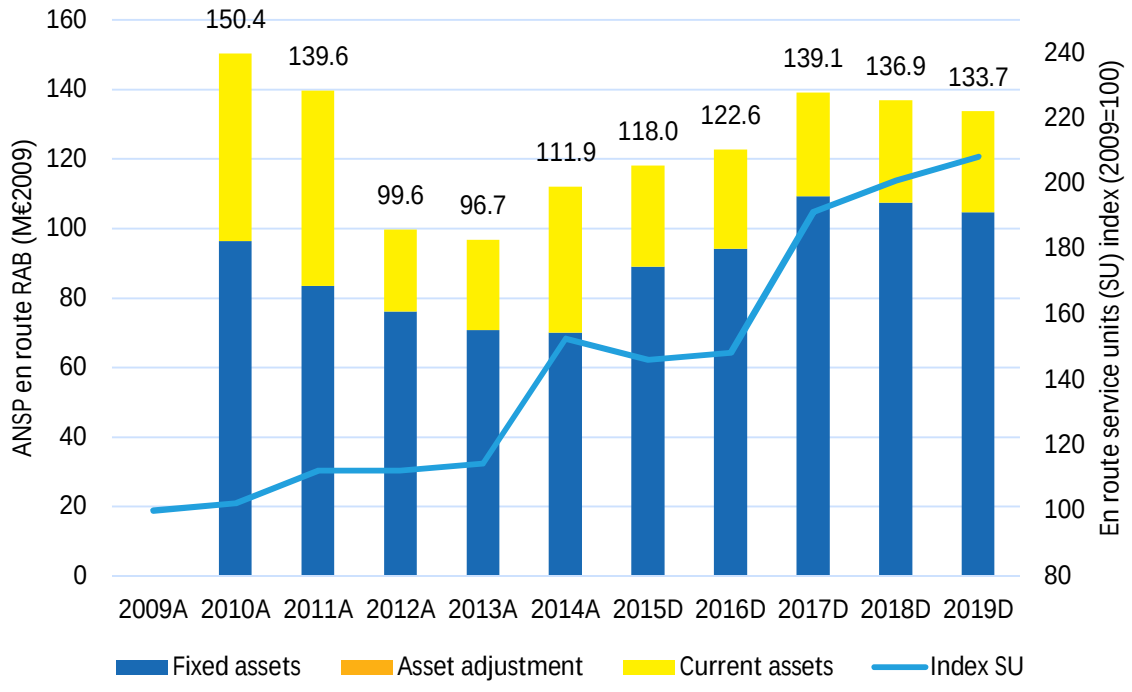
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	10.51%	8.41%	4.92%	8.12%	5.17%
Computed Cost of debt	5.17%	4.63%	3.28%	4.60%	4.46%
Computed Capital structure (% debt)	60%	51%	32%	50%	17%
Computed WACC	3.66%	4.48%	4.27%	4.52%	4.82%
Reported WACC	8.86%	8.86%	8.86%	8.86%	8.86%

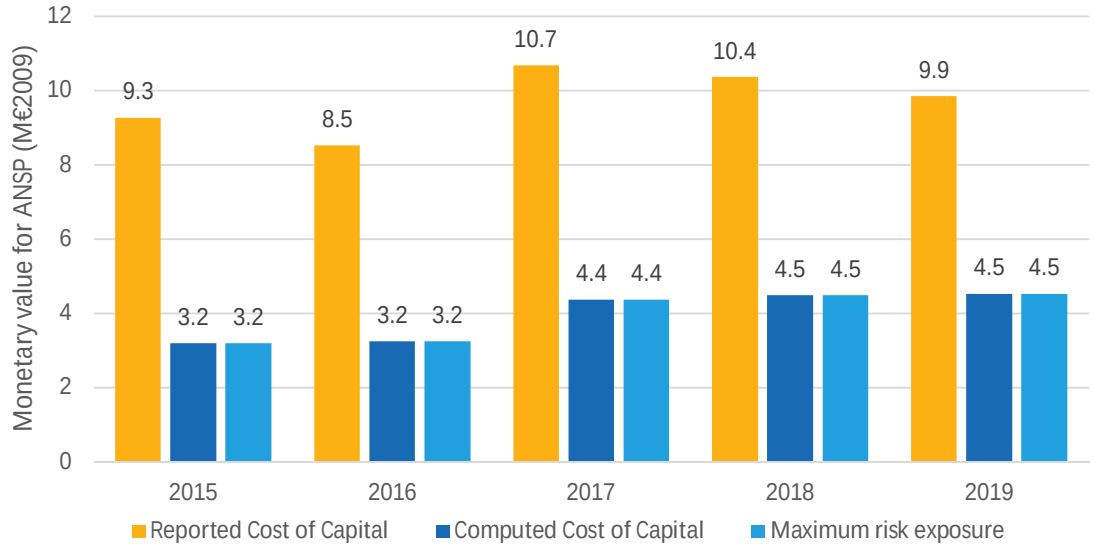
Comments

The WACC computed by the PRB ranges from 3.66% to 4.82%, after re-calculating the parameters of the RoE to align with the maximum risk borne (Option 4). BULATSA reported a WACC exceeding competitive market practices with a capital structure of 100% equity.

Regulated Asset Base



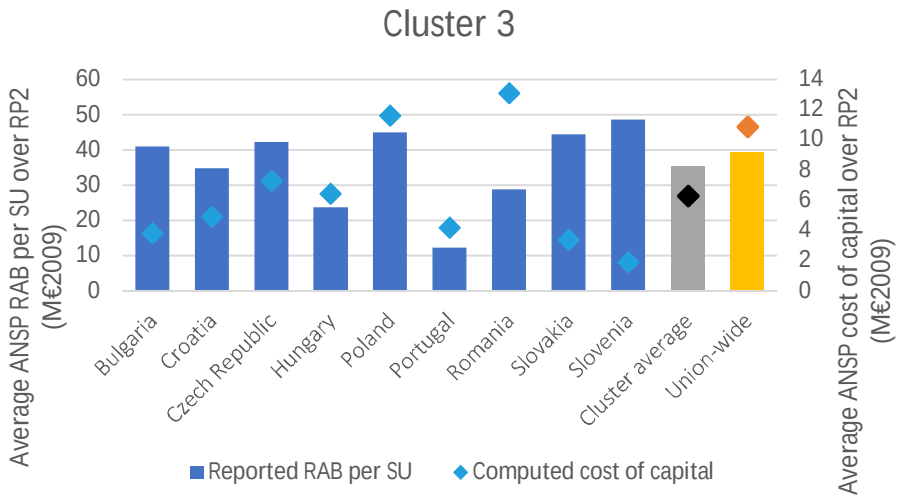
Cost of capital and Maximum risk exposure



Comments

BULATSA's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by BULATSA is almost three times higher than its maximum risk exposure.

Cost of capital and Comparator groups



Comments

BULATSA's RAB per service units is 13% higher than the cluster 3 average and 4% higher than the Union-wide average. BULATSA's cost of capital is 68% lower than the cluster 3 average and it is also lower than the Union-wide average. This is due both to BULATSA's RAB which is lower than the Union-wide average and a low WACC (close to the lower bound of values across Europe).

Croatia – Croatia Control

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.83%	6.05%	6.92%	8.42%	8.85%
Reported RAB (M€)	80.52	77.10	71.96	65.98	60.11
Computed Cost of capital (M€)	3.89	4.67	4.98	5.56	5.32

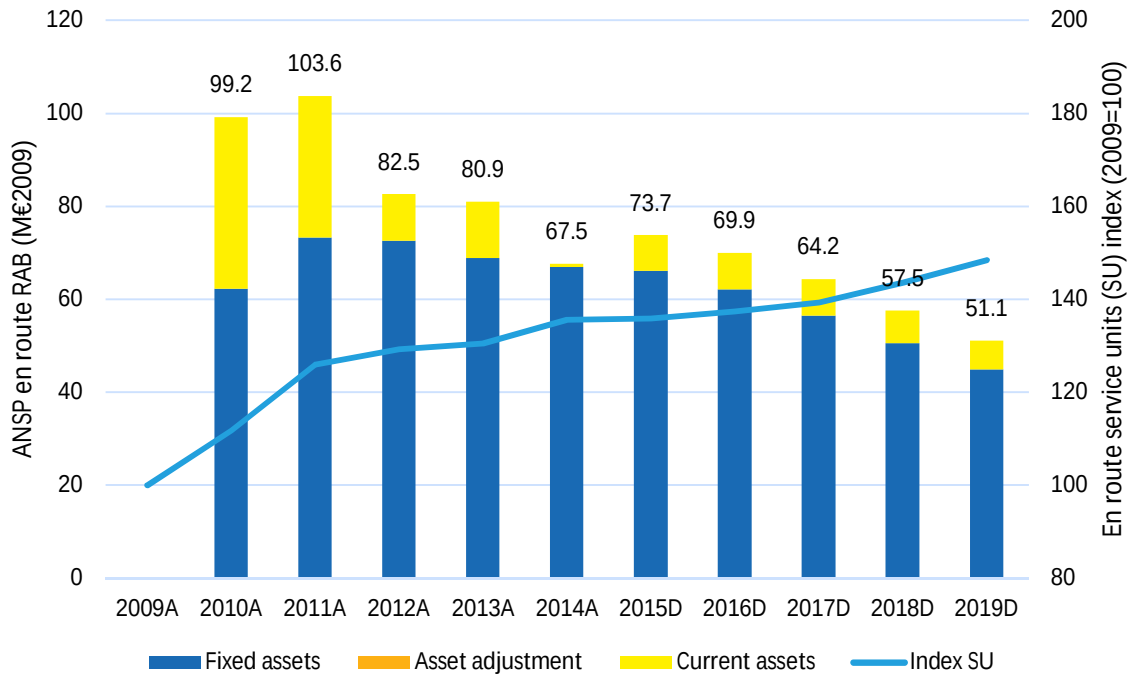
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	17.96%	16.78%	12.74%	13.07%	8.89%
Computed Cost of debt	10.11%	9.50%	7.63%	8.43%	8.09%
Computed Capital structure (% debt)	62%	60%	53%	50%	16%
Computed WACC	4.83%	6.05%	6.92%	8.42%	8.85%
Reported WACC	8.69%	9.00%	9.32%	9.62%	9.95%

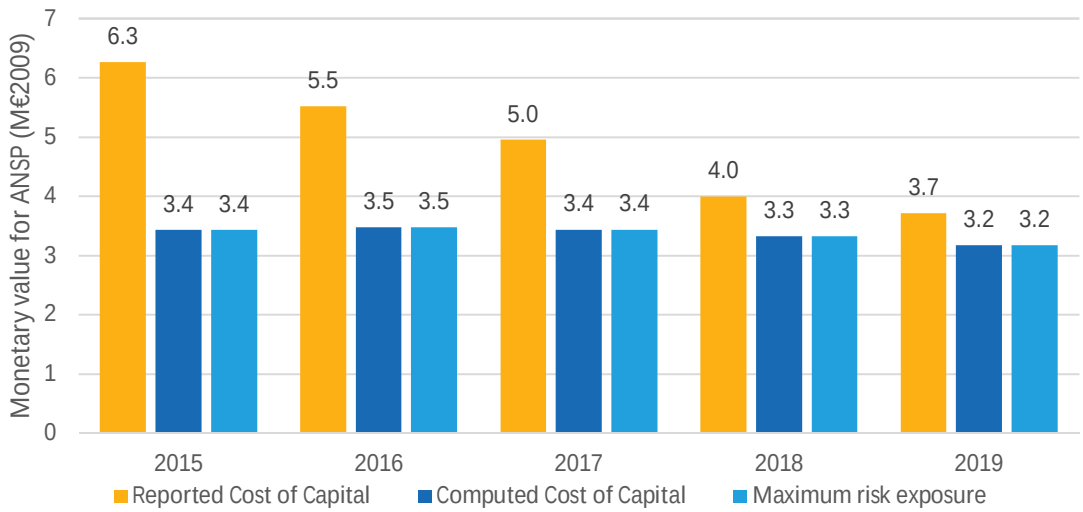
Comments

The WACC computed by the PRB ranges from 4.83% to 8.85%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). Croatia Control reported a WACC in line with competitive market practices but exceeding its maximum risk exposure.

Regulated Asset Base



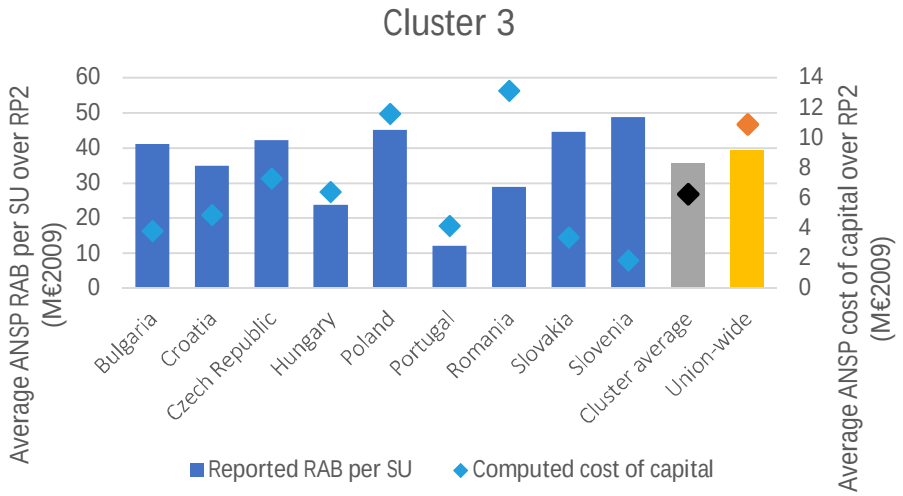
Cost of capital and Maximum risk exposure



Comments

Croatia Control's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by Croatia Control is almost twice the maximum risk exposure in 2015 (2.9 M€$_{2009}$), 2M€$_{2009}$ in 2016, 1.6 M€$_{2009}$ in 2017, 0.7 M€$_{2009}$ in 2018 and 0.5 M€$_{2009}$ in 2019.

Cost of capital and Comparator groups



Comments

Croatia Control's RAB per service units is 2% lower than the cluster 3 average and 13% lower than the Union-wide average. Croatia Control's cost of capital is 29% lower than the cluster 3 average and it is also lower than the Union-wide average. This is due to Croatia Control's RAB below the Union-wide average whilst the WACC remains in the middle bound of values across Europe.

Cyprus – DCAC

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	6.22%	6.32%	6.32%	6.42%	6.63%
Reported RAB (M€)	36.40	37.03	38.80	39.94	41.12
Computed Cost of capital (M€)	2.26	2.34	2.45	2.57	2.73

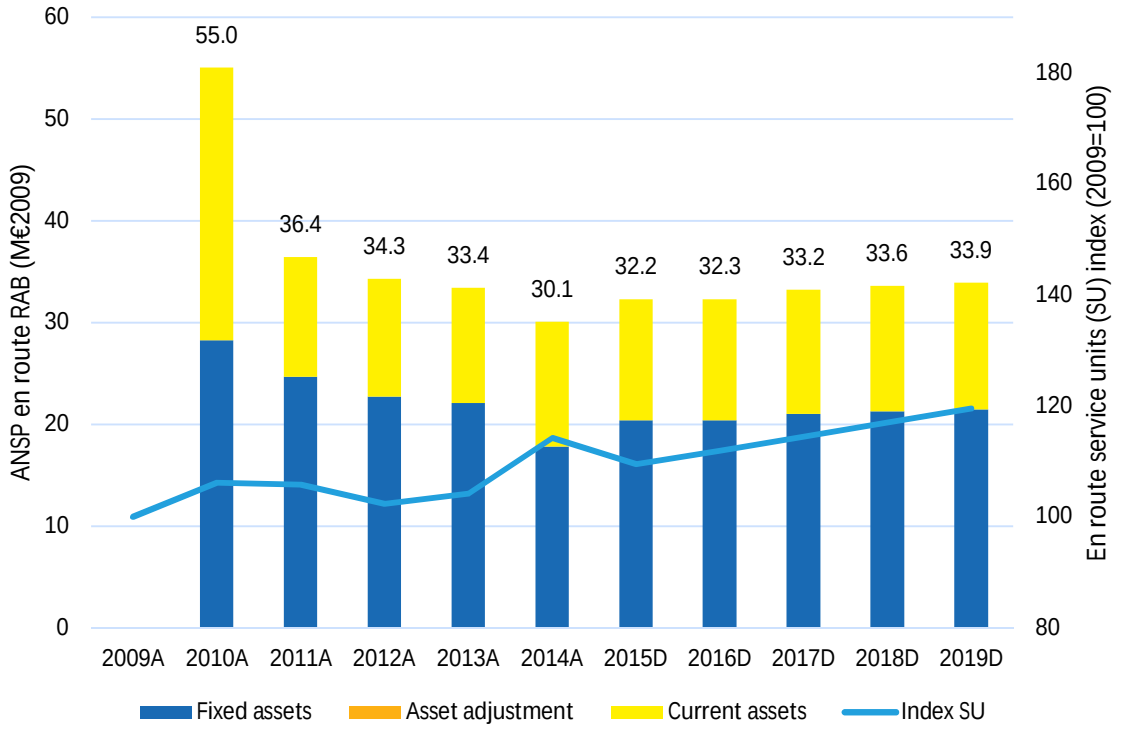
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	14.71%	13.77%	10.11%	9.38%	7.27%
Computed Cost of debt	5.06%	4.82%	4.12%	3.88%	1.94%
Computed Capital structure (% debt)	47%	46%	39%	35%	18%
Computed WACC	6.22%	6.32%	6.32%	6.42%	6.63%
Reported WACC	13.50%	13.50%	13.50%	13.50%	13.50%

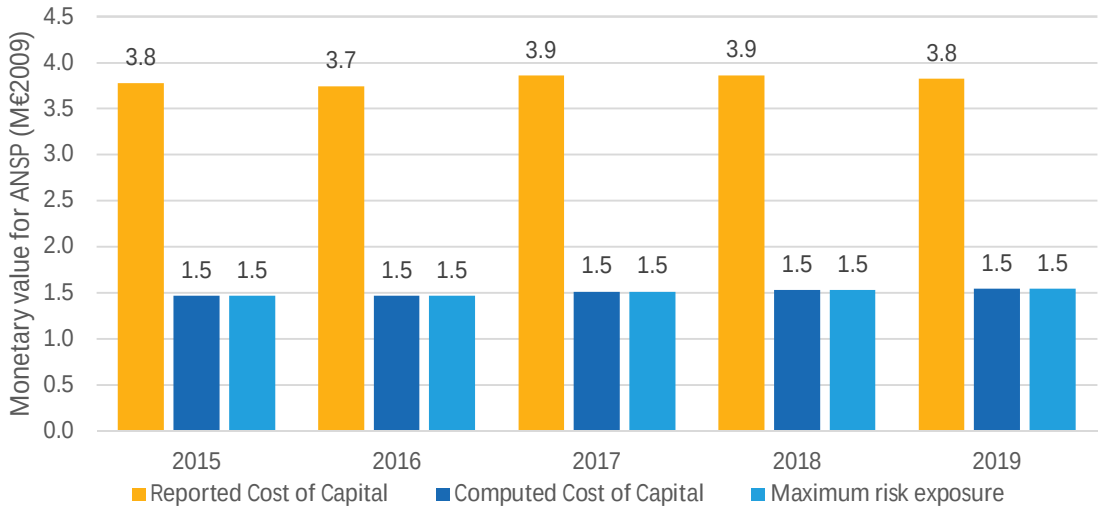
Comments

The WACC computed by the PRB ranges from 6.22% to 6.63%, after re-calculating the RoE to align it with the maximum risk borne (Option 4). DCAC's reported WACC exceeds the competitive market practices due to a capital structure based on 100% equity.

Regulated Asset Base



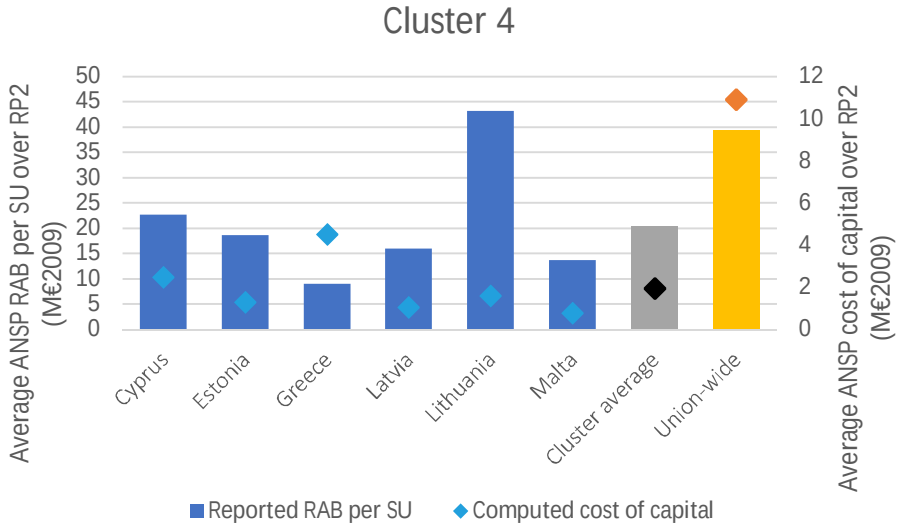
Cost of capital and Maximum risk exposure



Comments

DCAC cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by DCAC is more than the double of its maximum risk exposure.

Cost of capital and Comparator groups



Comments

DCAC's RAB per service units is 10% higher than the cluster 4 average and 74% lower than the Union-wide average. DCAC's cost of capital is 21% higher than the cluster 4 average and it is lower than the Union-wide average. This is due to DCAC's RAB in value well below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

Czech Republic – ANS Czech Republic

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	5.50%	5.46%	5.45%	5.54%	5.54%
Reported RAB (M€)	126.59	134.54	136.49	134.05	131.25
Computed Cost of capital (M€)	6.96	7.35	7.44	7.42	7.28

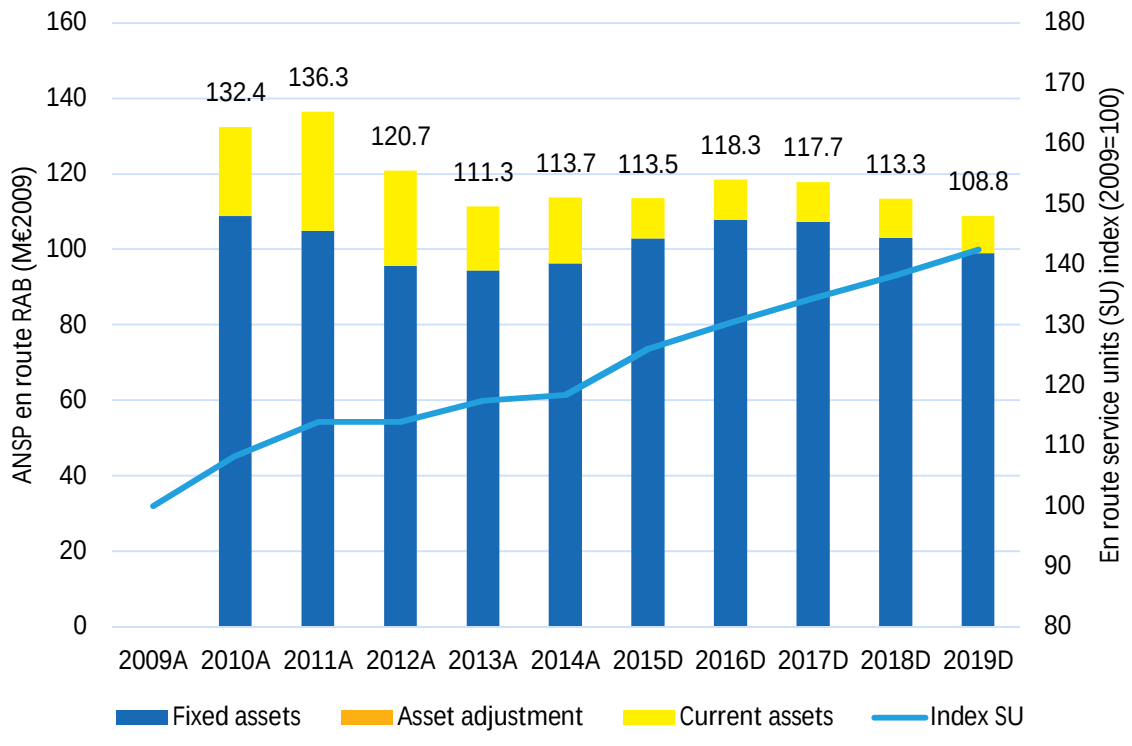
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	6.14%	5.02%	5.20%	9.14%	8.00%
Computed Cost of debt	3.97%	3.04%	3.17%	4.99%	4.96%
Computed Capital structure (% debt)	30%	20%	19%	47%	35%
Computed WACC	5.50%	5.46%	5.45%	5.54%	5.54%
Reported WACC	6.50%	6.50%	6.50%	6.50%	6.50%

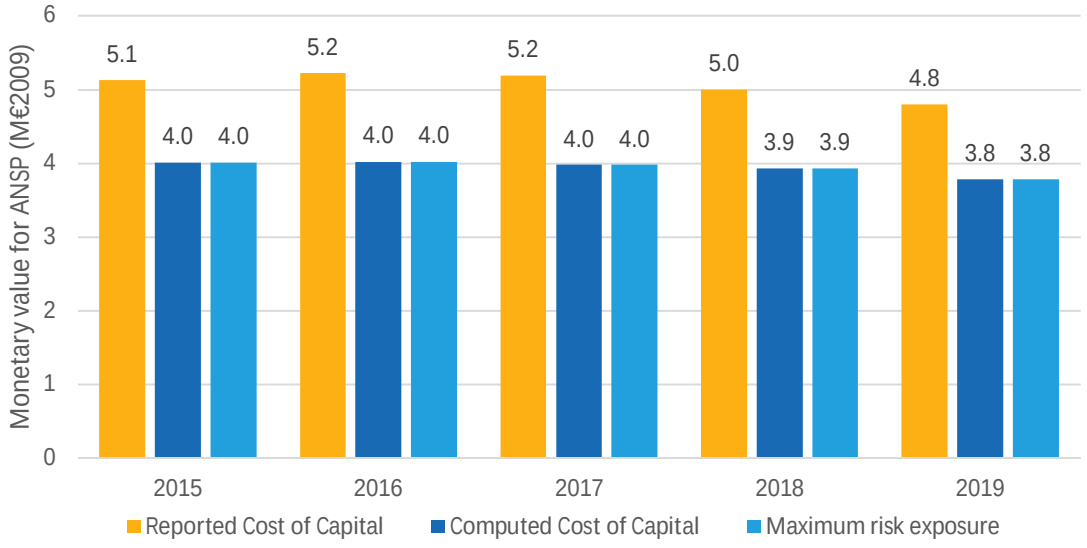
Comments

The WACC computed by the PRB ranges from 5.45% to 5.54%, after re-calculating the RoE to align it with the maximum risk borne (Option 4). ANS Czech Republic reported a WACC exceeding competitive market practices, with a capital structure of 100% equity.

Regulated Asset Base



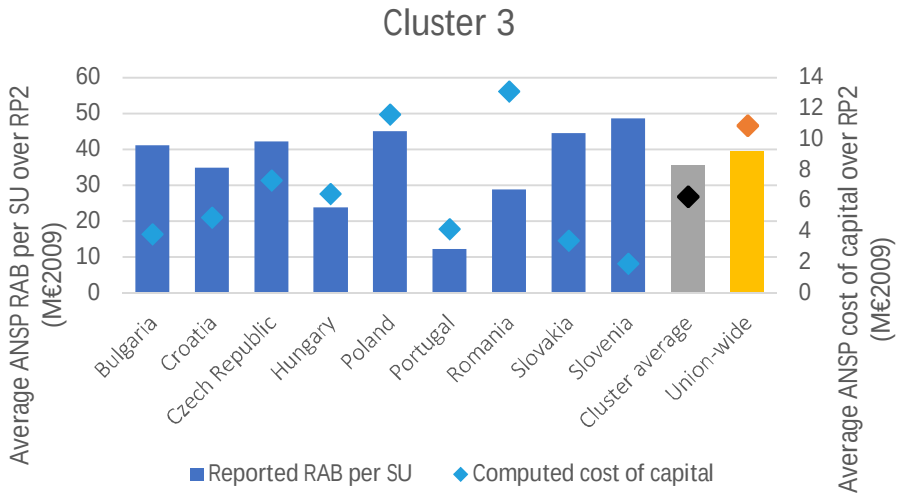
Cost of capital and Maximum risk exposure



Comments

ANS Czech Republic's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by ANS Czech Republic exceeds the maximum risk exposure by around 1 M€$_{2009}$ for each year of RP2.

Cost of capital and Comparator groups



Comments

ANS Czech Republic's RAB per service units is 16% higher than the cluster 3 average and 7% higher than the Union-wide average. ANS Check Republic's cost of capital is 14% higher than the cluster 3 average but lower than the Union-wide average. This is due to ANS Czech Republic's RAB in value below the Union-wide average whilst the WACC remains in the middle bound of values across Europe.

Denmark – Naviair

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	3.80%	4.17%	4.17%	4.16%	4.12%
Reported RAB (M€)	181.26	183.53	186.52	191.22	195.80
Computed Cost of capital (M€)	6.88	7.65	7.78	7.96	8.06

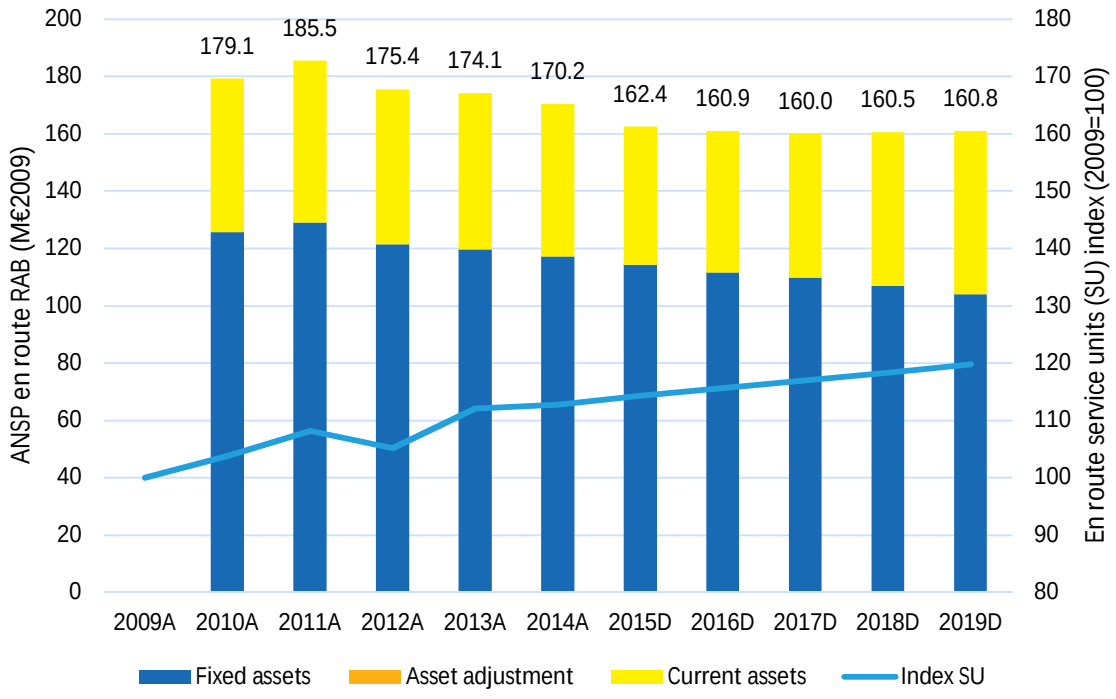
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Return on equity	7.49%	5.42%	4.75%	5.67%	4.62%
Computed Cost of debt	4.30%	3.50%	3.40%	3.10%	2.90%
Computed Capital structure (% debt)	53%	40%	33%	38%	27%
Computed WACC	3.80%	4.17%	4.17%	4.16%	4.12%
Reported WACC	4.54%	4.04%	3.92%	3.74%	3.57%

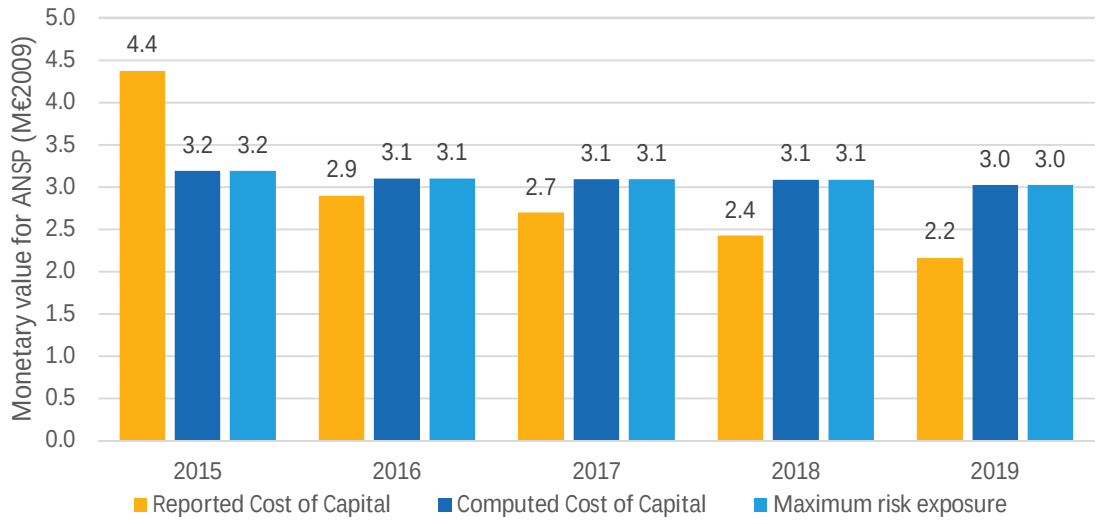
Comments

The WACC computed by the PRB ranges from 3.80% to 4.17%, after re-calculating the RoE to align it with the maximum risk borne (Option 4). Naviair reported a WACC exceeding the competitive market practices with a capital structure of 100% equity.

Regulated Asset Base



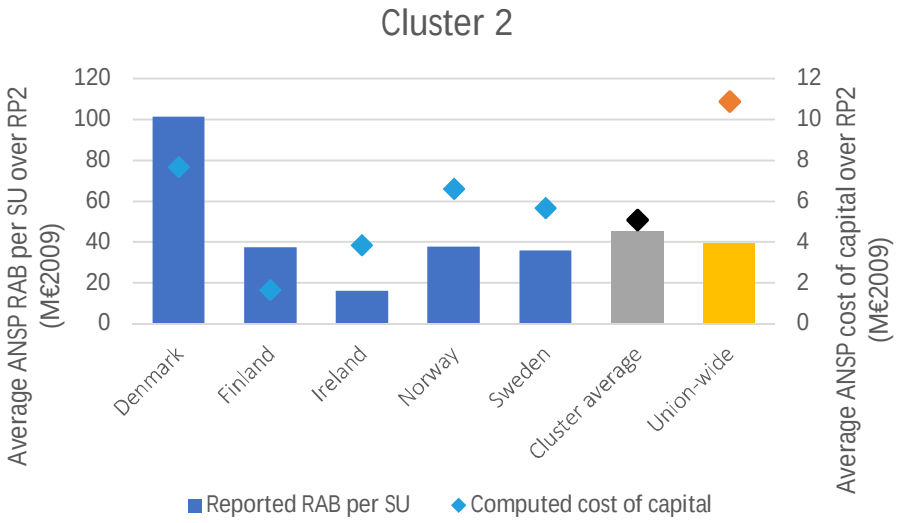
Cost of capital and Maximum risk exposure



Comments

Naviair's cost of capital is equal to the maximum risk, after being recalculated by the PRB methodology. The cost of capital reported by Naviair exceeds the maximum risk exposure by 1.2 M€$_{2009}$ in 2015.

Cost of capital and Comparator groups



Comments

Naviair's RAB per service units is 55% higher than the cluster 2 average and 61% higher than the Union-wide average. Naviair's cost of capital is 21% higher than the cluster 2 average but it is lower than the Union-wide average. This is due to Naviair's RAB in value lower than the Union-wide average coupled with its WACC towards the lower bound of values across Europe.

Estonia – EANS

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	6.81%	6.07%	5.63%	7.35%	6.89%
Reported RAB (M€)	20.87	21.71	20.40	19.05	17.72
Computed Cost of capital (M€)	1.42	1.32	1.15	1.40	1.22

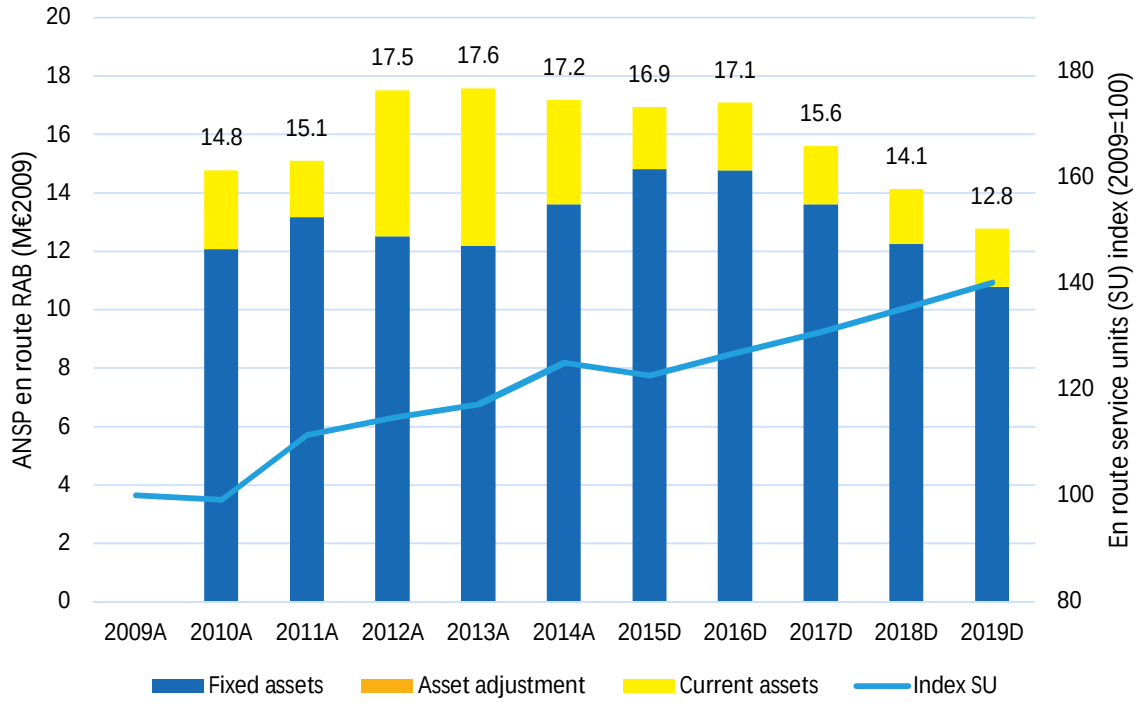
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	10.08%	9.16%	7.89%	10.30%	10.08%
Computed Cost of debt	3.31%	2.68%	2.46%	3.27%	3.31%
Computed Capital structure (% debt)	33%	32%	29%	30%	33%
Computed WACC	6.81%	6.07%	5.63%	7.35%	6.81%
Reported WACC	8.05%	7.91%	8.16%	8.07%	8.05%

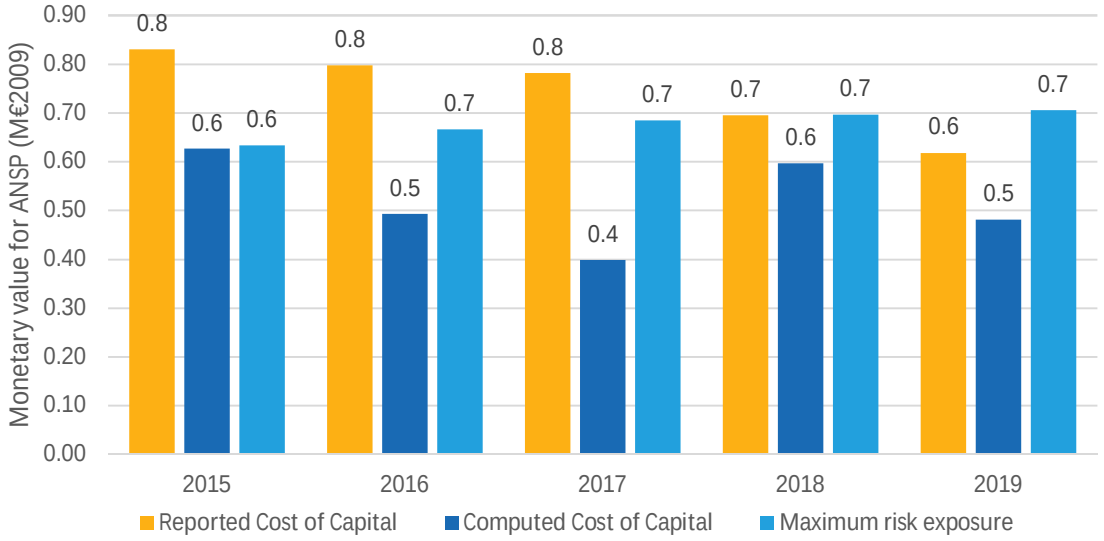
Comments

The WACC computed by the PRB ranges from 5.63% to 7.35%, in line with competitive market practices (Option 1). EANS reported a WACC higher in value to the PRB WACC with a capital structure of 83% equity. Generally, it is unusual to obtain an efficient WACC with such a capital structure.

Regulated Asset Base



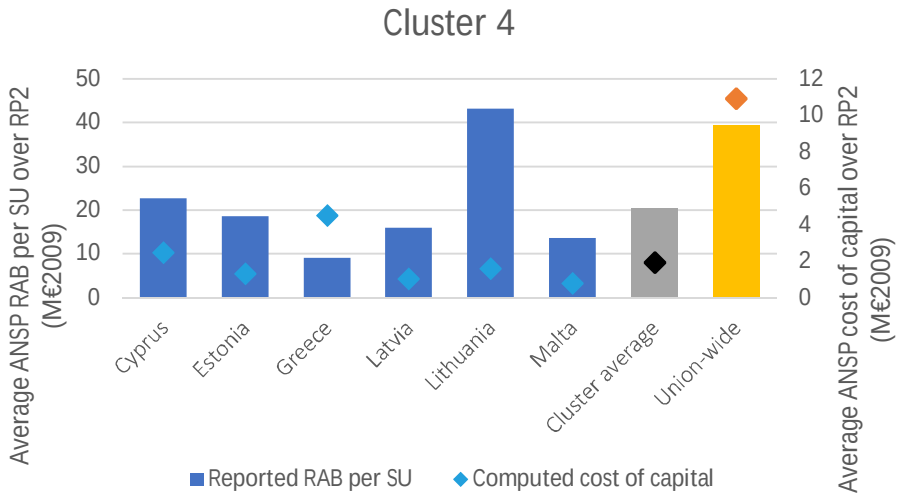
Cost of capital and Maximum risk exposure



Comments

EANS' cost of capital falls below its maximum risk and well below the one reported by EANS. The cost of capital reported by EANS exceeds its maximum risk exposure by 0.2 $M€_{2009}$ in 2015, 0.1 $M€_{2009}$ in 2016 and 2017.

Cost of capital and Comparator groups



Comments

EANS' RAB per service units is 10% lower than the cluster 4 average and 112% lower than the Union-wide average. EANS' cost of capital is 50% lower than the cluster 4 average and it is significantly lower than the Union-wide average. This is due to EANS' RAB in value well below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

Finland – ANS Finland

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.40%	4.40%	3.98%	4.92%	4.79%
Reported RAB (M€)	35.97	36.80	37.38	36.59	36.47
Computed Cost of capital (M€)	1.58	1.62	1.49	1.80	1.75

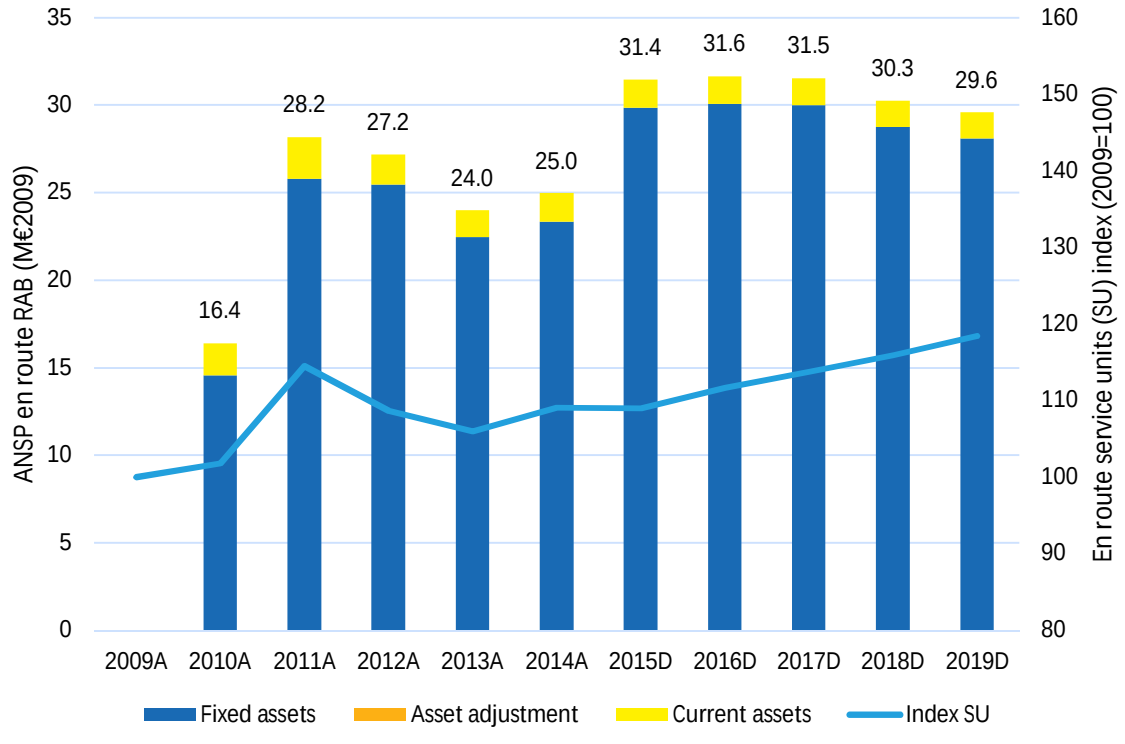
WACC

Option 3	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	7.10%	7.10%	6.05%	8.39%	8.07%
Computed Cost of debt	2.60%	2.60%	2.60%	2.60%	2.60%
Reported Capital structure (% debt)	60%	60%	60%	60%	60%
Computed WACC	4.40%	4.40%	3.98%	4.92%	4.79%
Reported WACC	5.01%	5.01%	5.01%	5.01%	5.01%

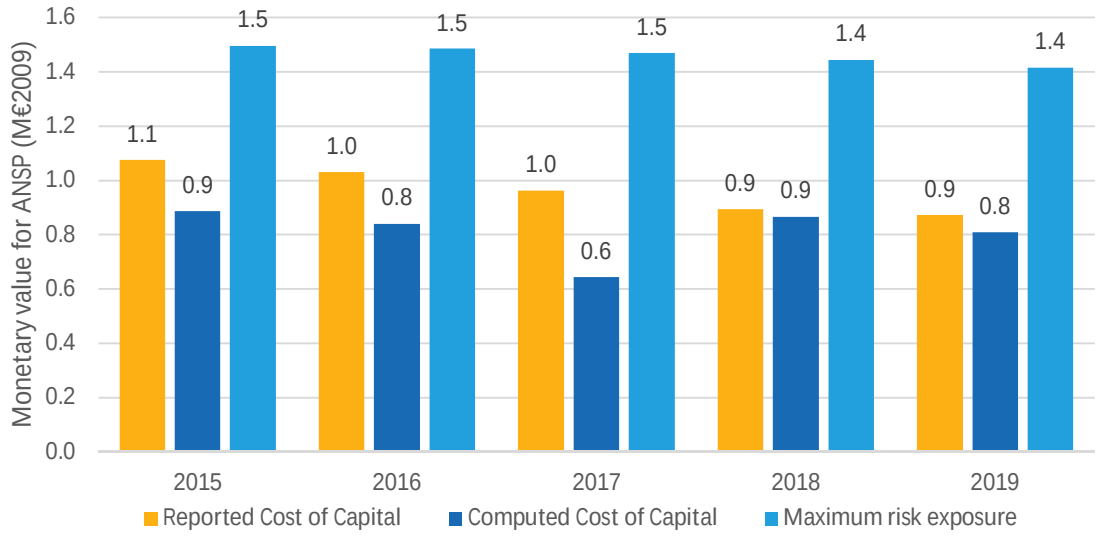
Comments

The WACC computed by the PRB ranges from 3.98% to 4.92%, in line with competitive market practices (Option 3). The WACC reported by Finland is close in value to the PRB WACC. The capital structure is mainly composed by debt, enabling a low value for the WACC.

Regulated Asset Base



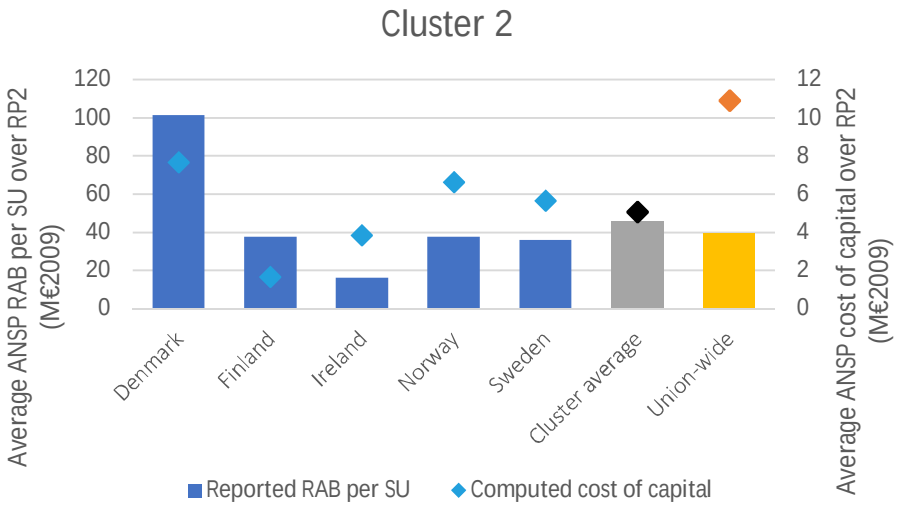
Cost of capital and Maximum risk exposure



Comments

ANS Finland's cost of capital falls well below its maximum risk and below the one reported by ANS Finland. This indicates that the sum that ANS Finland pays to raise finance is comparable to that of an efficient private entity in similar market conditions.

Cost of capital and Comparator groups



Comments

ANS Finland's RAB per service units is 22% lower than the cluster 2 average and 6% lower than the Union-wide average. ANS Finland's cost of capital is 209% lower than the cluster 2 average and it is also well below the Union-wide average. This is due to ANS Finland's WACC towards the lower bound of values across the Union coupled with its RAB in value well below than the Union-wide average.

France – DSNA

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.16%	3.96%	3.69%	3.62%	3.53%
Reported RAB (M€)	786.27	811.29	829.85	834.31	814.35
Computed Cost of capital (M€)	32.72	32.10	30.63	30.22	28.75

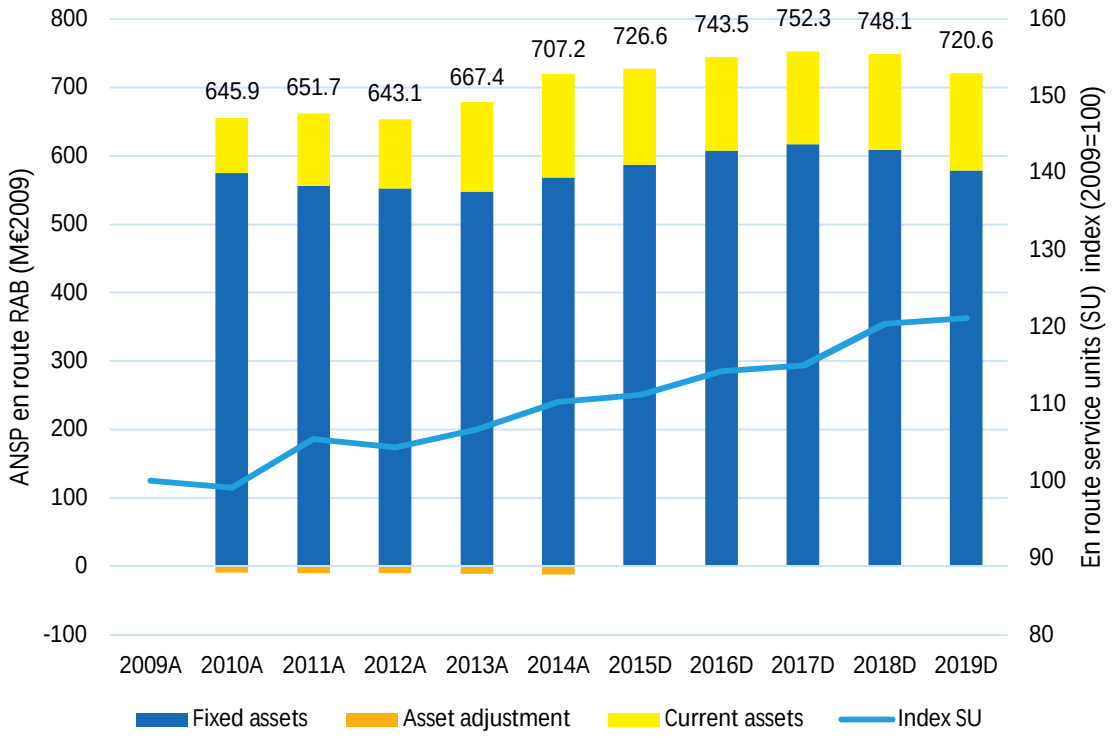
WACC

Option 3	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	6.88%	6.29%	5.53%	7.38%	7.11%
Computed Cost of debt	2.70%	2.70%	2.70%	1.60%	1.60%
Reported Capital structure (% debt)	65%	65%	65%	65%	65%
Computed WACC	4.16%	3.96%	3.69%	3.62%	3.53%
Reported WACC	4.76%	4.76%	4.76%	4.04%	4.04%

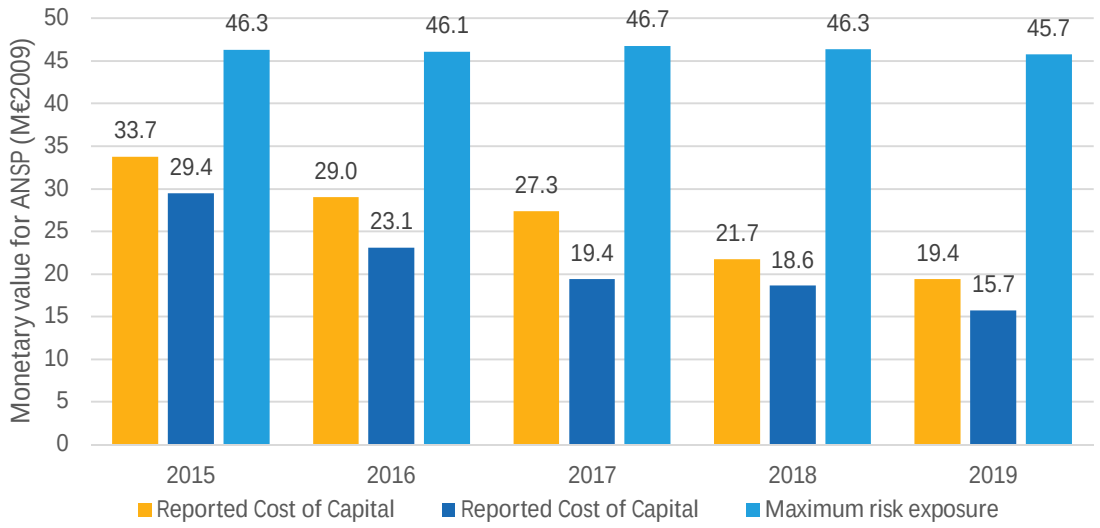
Comments

The WACC computed by the PRB ranges from 3.62% to 4.16%, in line with competitive market practices (Option 3). The WACC reported by DSNA is close in value to the PRB WACC. The capital structure is mainly composed by debt, enabling a low value for the WACC.

Regulated Asset Base



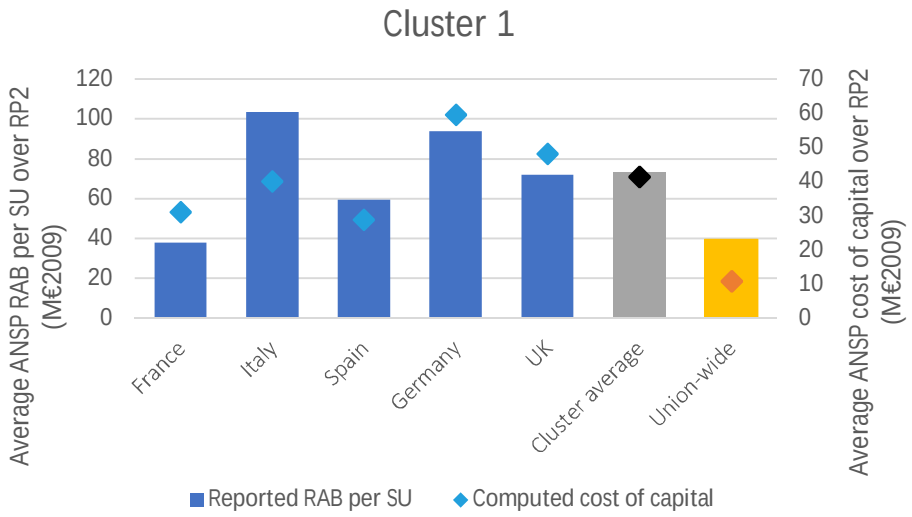
Cost of capital and Maximum risk exposure



Comments

DSNA's cost of capital falls well below its maximum risk and below the one reported by DSNA. This indicates that the sum that DSNA pays to raise finance is comparable to that of an efficient private entity in similar market conditions.

Cost of capital and Comparator groups



Comments

DSNA's RAB per service units is the lowest of cluster 1 compared to the cluster average (93%) and it is 4% lower than the Union-wide average. DSNA's cost of capital is 34% lower than the cluster 1 average and it is 65% higher than the Union-wide average. This is due to DSNA's RAB in value well above the Union-wide average whilst its WACC remains in the lower bound of values across the Union.

Germany – DFS

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.03%	4.22%	4.29%	4.35%	4.43%
Reported RAB (M€)	1491.44	1439.89	1394.81	1346.91	1297.67
Computed Cost of capital (M€)	60.08	60.78	59.77	58.62	57.44

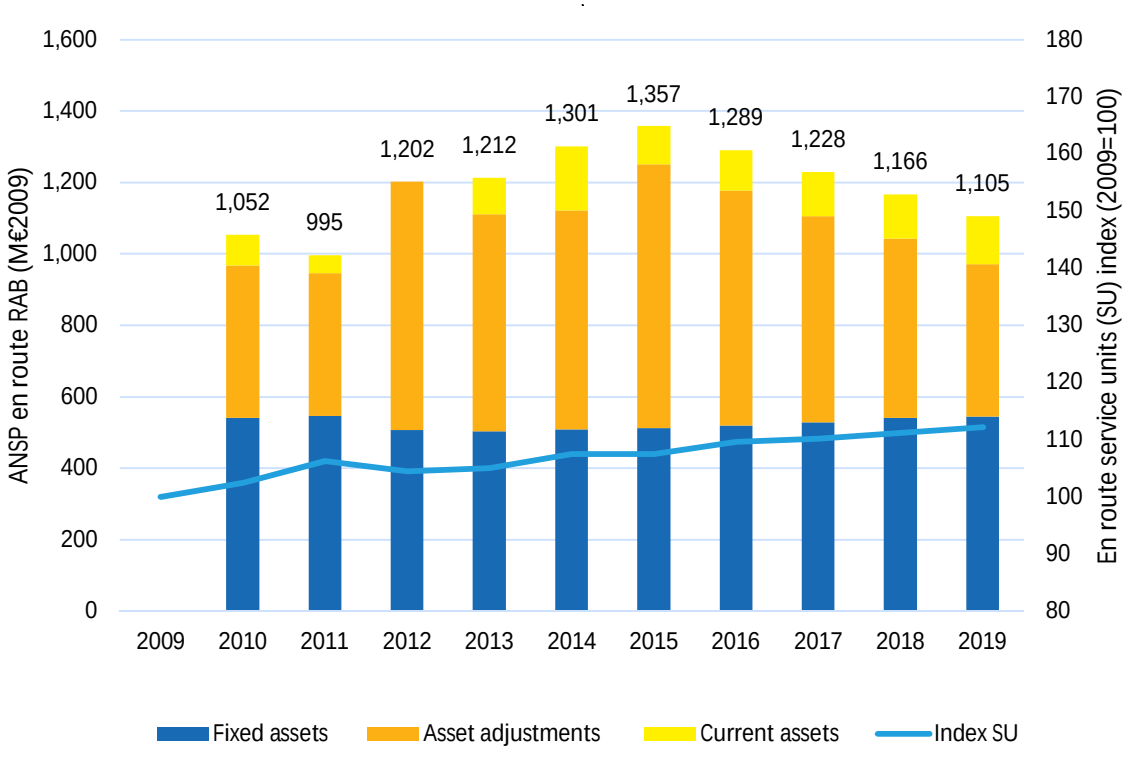
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	6.91%	5.37%	4.68%	6.14%	4.97%
Computed Cost of debt	3.40%	3.40%	3.30%	3.30%	3.30%
Computed Capital structure (% debt)	46%	37%	28%	38%	26%
Computed WACC	4.03%	4.22%	4.29%	4.35%	4.43%
Reported WACC	5.48%	5.48%	5.42%	5.42%	5.42%

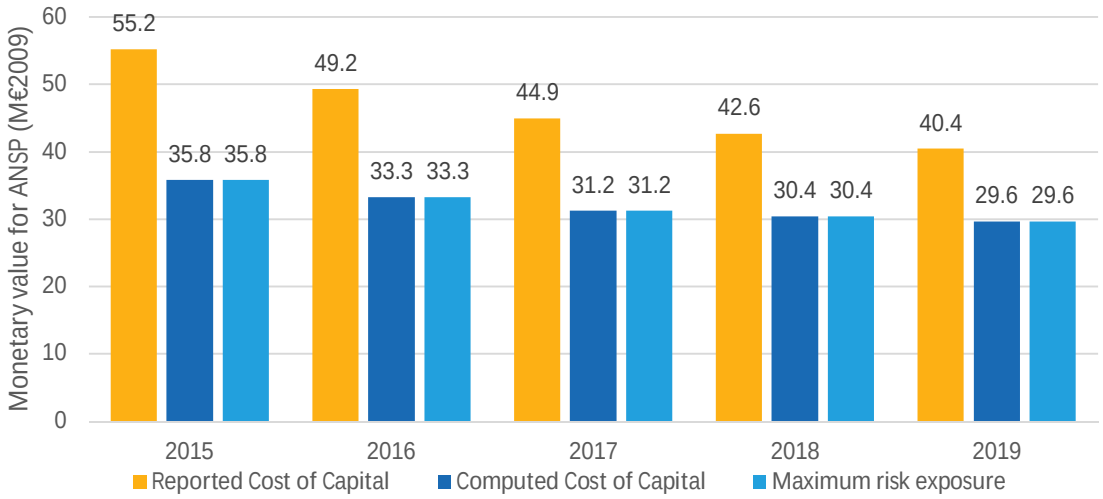
Comments

The WACC computed by the PRB ranges from 4.03% to 4.43%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). DFS reported a WACC in line with competitive market practices but exceeding its maximum risk exposure.

Regulated Asset Base



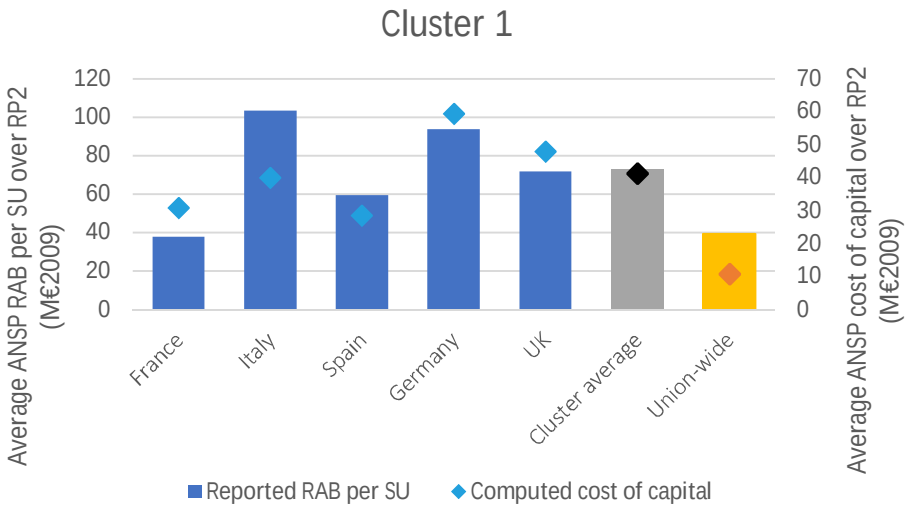
Cost of capital and Maximum risk exposure



Comments

DFS' cost of capital is equal to the maximum risk, after being recalculated by the PRB methodology. The cost of capital reported by DFS exceeds its maximum risk exposure by 19.4 M€$_{2009}$ in 2015, 15.9 M€$_{2009}$ in 2016, 13.7 M€$_{2009}$ in 2017, 12.2 M€$_{2009}$ in 2018 and 10.8 M€$_{2009}$ in 2019.

Cost of capital and Comparator groups



Comments

DFS' RAB per service units is 22% higher than the cluster 1 average and it is 58% higher than the Union-wide average. DFS' cost of capital is 30% lower than the cluster 1 average and it is 85% higher than the Union-wide average. This is due to DFS' RAB in value well above the Union-wide average whilst its WACC remains in the lower bound of values across the Union.

Greece – HCAA

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	11.16%	10.80%	8.86%	10.49%	9.91%
Reported RAB (M€)	17.15	40.29	48.30	47.74	69.98
Computed Cost of capital (M€)	1.91	4.35	4.28	5.01	6.94

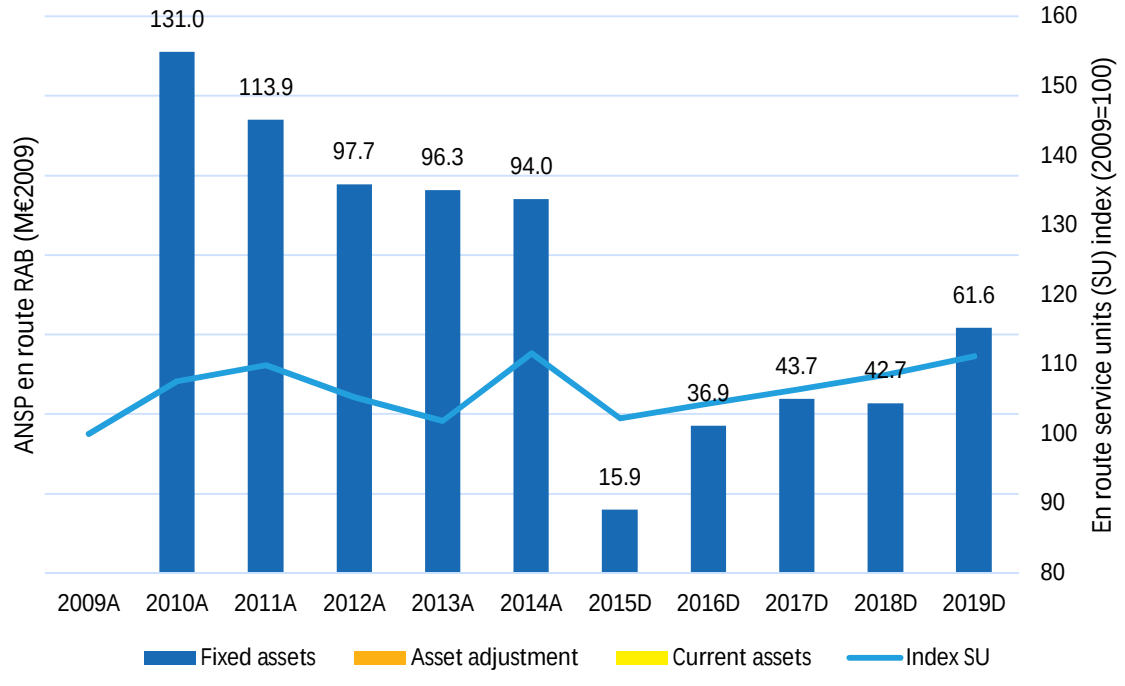
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	18.19%	17.70%	12.84%	14.88%	14.37%
Computed Cost of debt	3.65%	3.24%	3.30%	4.44%	4.43%
Computed Capital structure (% debt)	33%	32%	29%	30%	31%
Computed WACC	11.16%	10.80%	8.86%	10.49%	9.91%
Reported WACC	8.89%	8.89%	8.89%	8.89%	8.89%

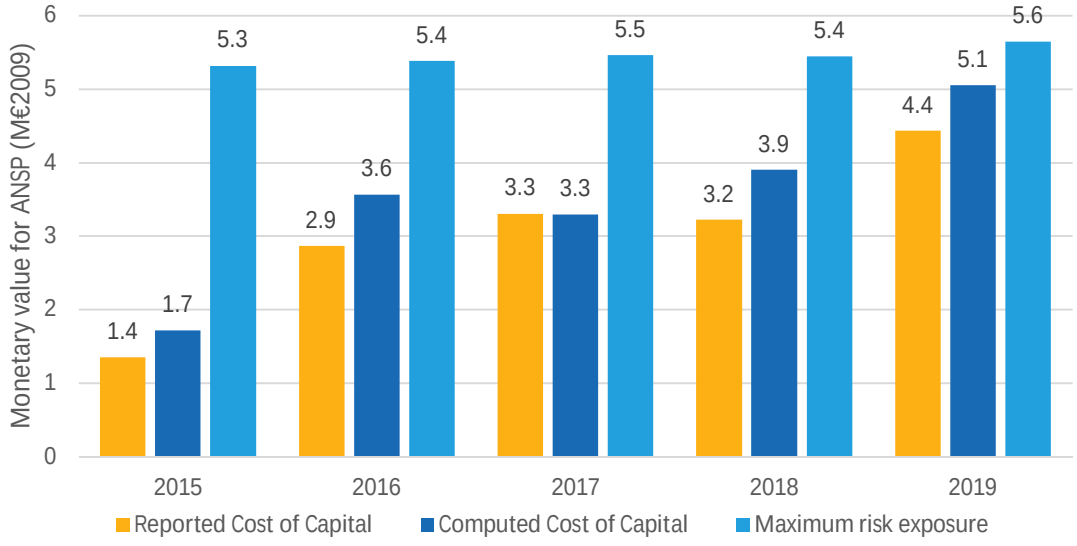
Comments

The WACC computed by the PRB ranges from 8.86% to 11.16%, in line with competitive market practices (Option 1). HCAA reported a WACC below the PRB WACC with a capital structure of 100% equity. Generally, it is unusual to obtain an efficient WACC with such a capital structure.

Regulated Asset Base



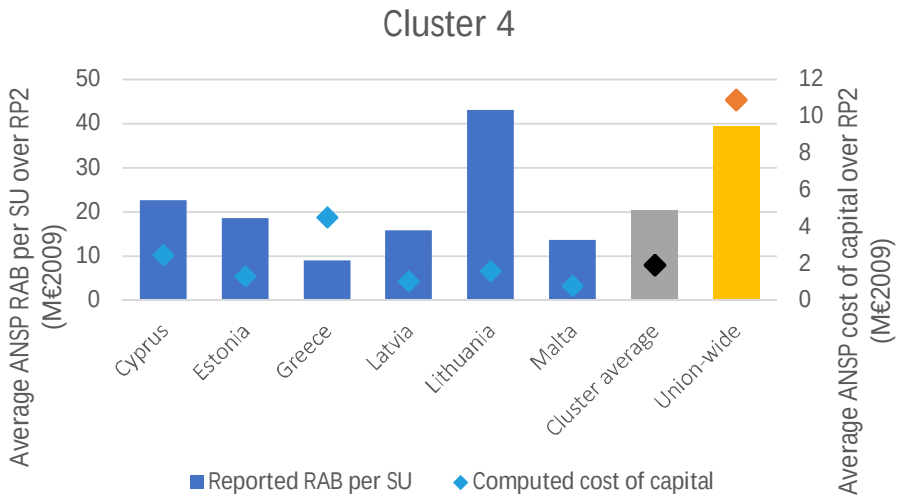
Cost of capital and Maximum risk exposure



Comments

HCAA's cost of capital falls well below its maximum risk and close to the one reported by HCAA. However, it is unusual to obtain an efficient cost of capital with the capital structure reported by HCAA.

Cost of capital and Comparator groups



Comments

HCAA's RAB per service units is 127% lower than the cluster 4 average and 337% lower than the Union-wide average. HCAA's cost of capital is 57% higher than the cluster 4 average and it is lower than the Union-wide average. This is due to HCAA's RAB in value well below the Union-wide average whilst its WACC remains in the upper bound of values across Europe.

Hungary – HungaroControl

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	7.32%	8.75%	9.13%	9.28%	9.63%
Reported RAB (M€)	74.88	75.30	71.80	71.95	70.32
Computed Cost of capital (M€)	5.48	6.59	6.56	6.68	6.77

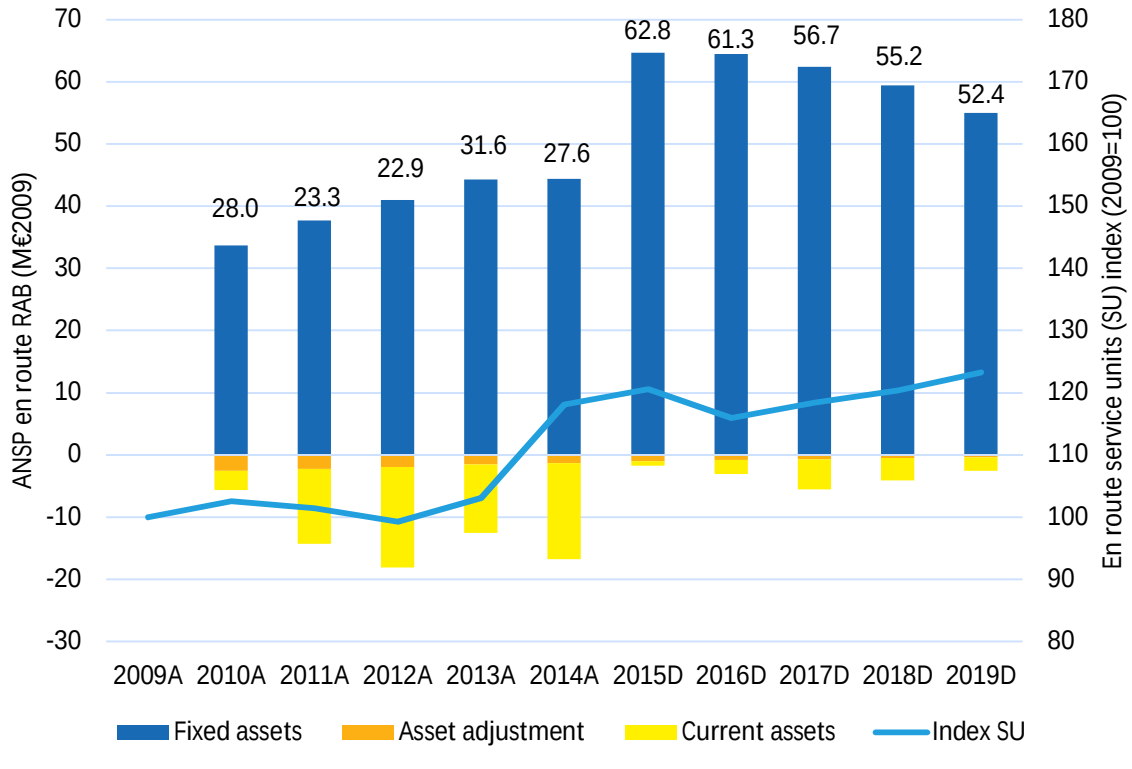
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	15.16%	11.38%	8.97%	10.79%	10.25%
Computed Cost of debt	9.44%	7.90%	6.84%	8.12%	8.52%
Computed Capital structure (% debt)	58%	43%	30%	38%	26%
Computed WACC	7.32%	8.75%	9.13%	9.28%	9.63%
Reported WACC	7.91%	7.91%	7.91%	7.91%	7.91%

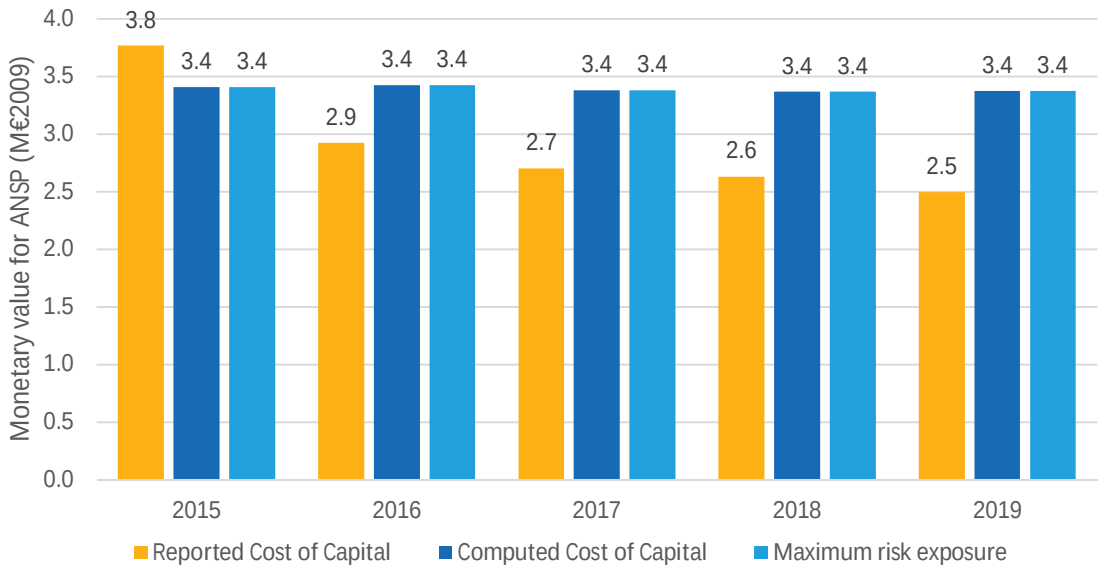
Comments

The WACC computed by the PRB ranges from 7.32% to 9.63%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). HungaroControl reported a WACC exceeding competitive market practices with a capital structure of 100% equity.

Regulated Asset Base



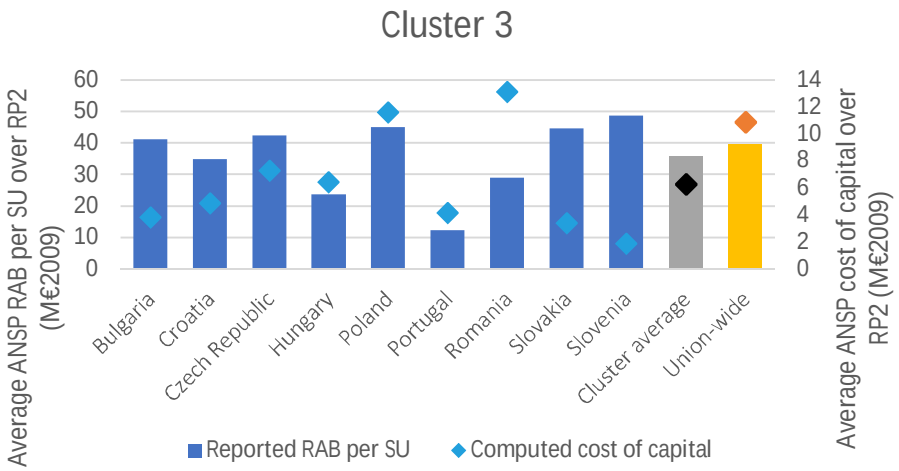
Cost of capital and Maximum risk exposure



Comments

HungaroControl's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by HungaroControl exceeds its maximum risk exposure by 0.4 $M€_{2009}$ in 2015.

Cost of capital and Comparator groups



Comments

HungaroControl's RAB per service units is 51% lower than the cluster 3 average and 67% lower than the Union-wide average. HungaroControl's cost of capital is 2% higher than the cluster 3 average but lower than the Union-wide average. This is due to HungaroControl's RAB in value below the Union-wide average whilst its WACC remains in the upper bound of values across Europe.

Ireland – IAA

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	5.98%	5.00%	4.43%	6.11%	5.68%
Reported RAB (M€)	65.62	67.36	67.12	75.34	76.68
Computed Cost of capital (M€)	3.92	3.37	2.97	4.60	4.36

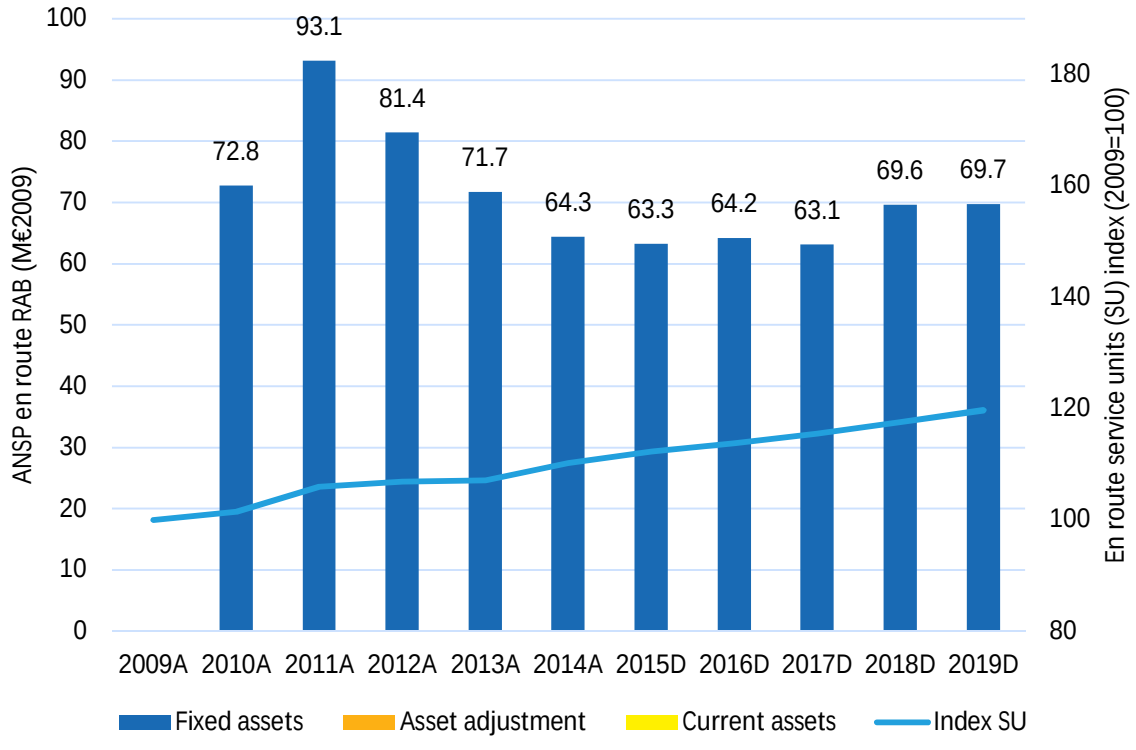
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	9.56%	8.22%	6.51%	8.89%	8.66%
Computed Cost of debt	2.16%	1.48%	1.53%	2.28%	2.02%
Computed Capital structure (% debt)	33%	32%	29%	30%	31%
Computed WACC	5.98%	5.00%	4.43%	6.11%	5.68%
Reported WACC	7.09%	7.20%	7.41%	7.74%	7.74%

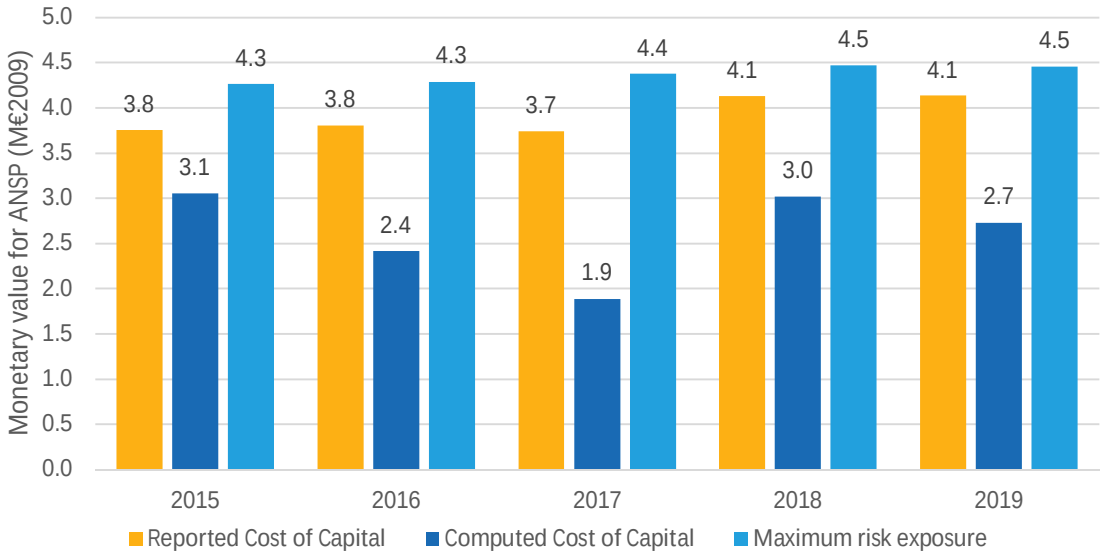
Comments

The WACC computed by the PRB ranges from 4.43% to 6.11%, in line with competitive market practices (Option 1). IAA reported a higher WACC that the PRB WACC.

Regulated Asset Base



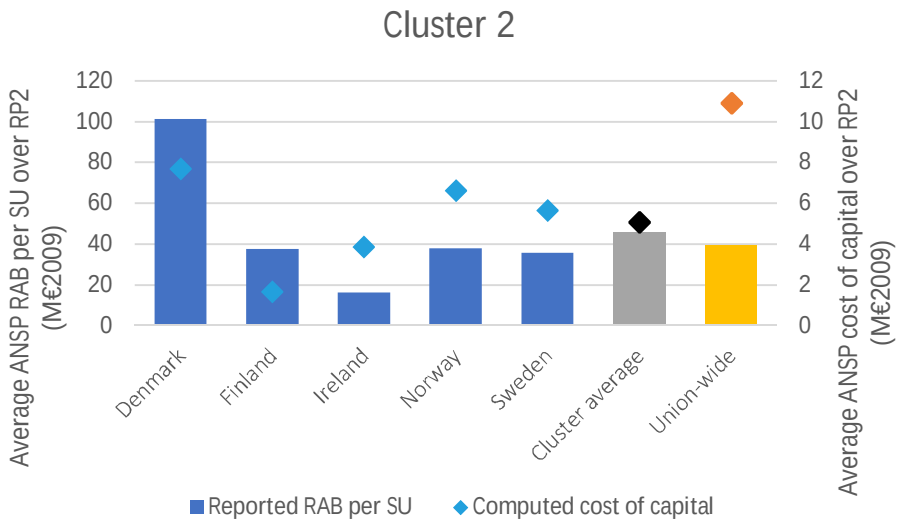
Cost of capital and Maximum risk exposure



Comments

IAA's cost of capital falls well below its maximum risk exposure and also below the one reported by Ireland. This indicates that the sum that the IAA pays to raise finance is comparable to that of an efficient private entity in similar market conditions.

Cost of capital and Comparator groups



Comments

IAAs RAB per service units is 185% lower than the cluster 2 average and 147% lower than the Union-wide average. IAA's cost of capital is 32% lower than the cluster 2 average and it is also below the Union-wide average. This is due to IAA's RAB in value below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

Italy – ENAV

Computed Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	3.36%	3.49%	3.75%	3.94%	4.02%
Reported RAB (M€)	1.08	1.08	1.08	1.08	1.08
Computed Cost of capital (M€)	36,19	37.60	40,48	42,48	43.30

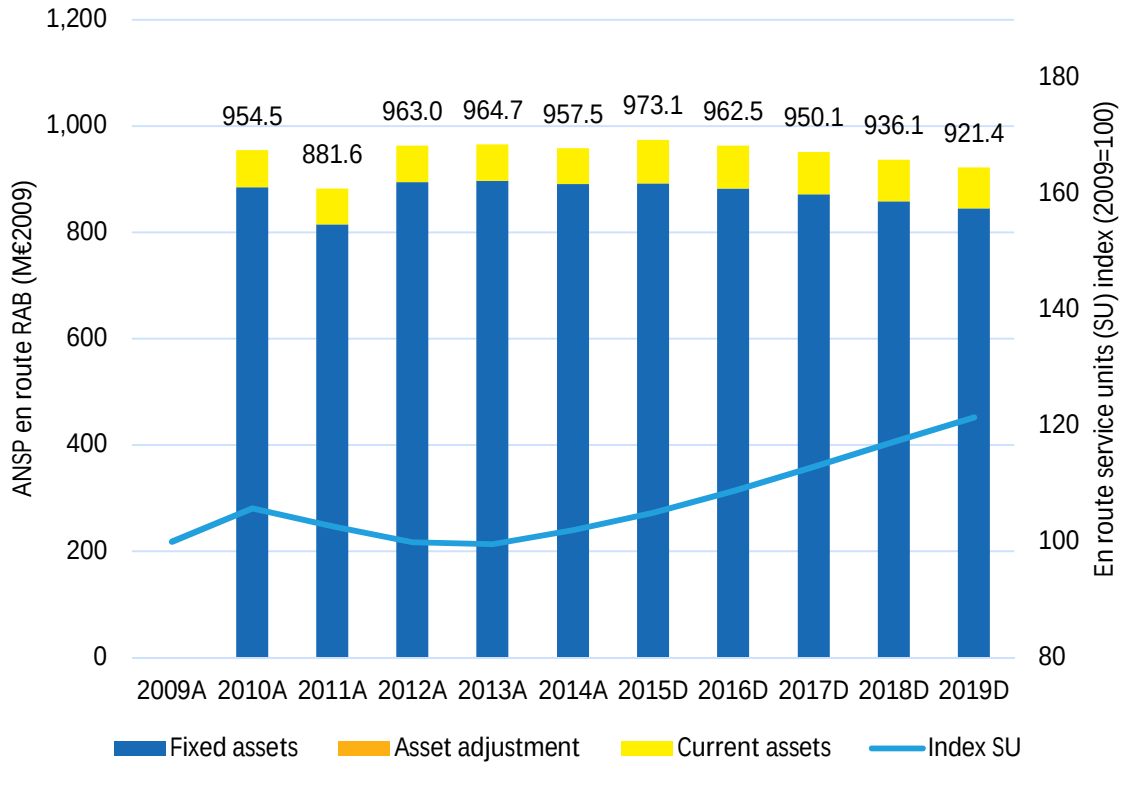
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	12.06%	11.12%	10.54%	13.42%	13.80%
Computed Cost of debt	3.65%	3.65%	3.65%	4.20%	4.43%
Computed Capital structure (% debt)	51%	51%	49%	51%	51%
Computed WACC	3.36%	3.49%	3.75%	3.94%	4.02%
Reported WACC	5.12%	5.12%	5.62%	5.62%	5.62%

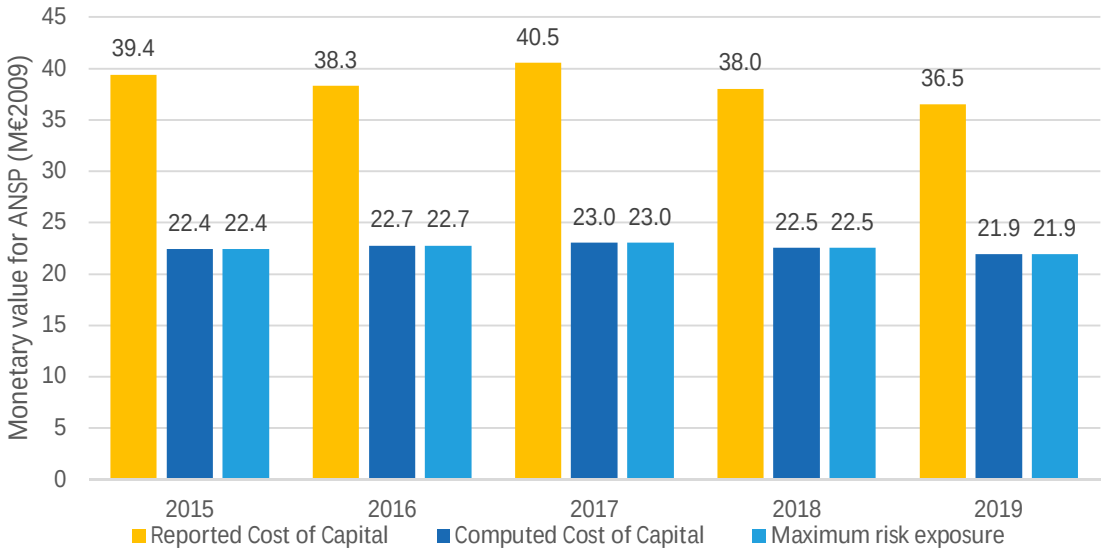
Comments

The WACC computed by the PRB ranges from 3.36% to 4.02%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). ENAV reported a WACC in line with competitive market practices but exceeding its maximum risk exposure.

Regulated Asset Base



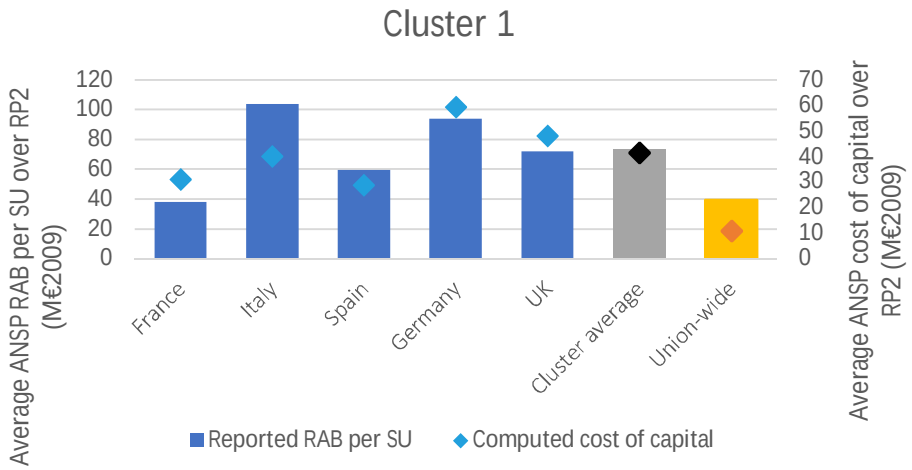
Cost of capital and Maximum risk exposure



Comments

ENAV's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by ENAV exceeds the maximum risk exposure by 17 M€$_{2009}$ every year from 2015 to 2019.

Cost of capital and Comparator groups



Comments

ENAV's RAB per service units is 29% higher than the cluster 1 average and it is 62% higher than the Union-wide average. ENAV's cost of capital is 3% lower than the cluster 1 average but it is 73% higher than the Union-wide average. This is due to ENAV's RAB in value well above the Union-wide average whilst its WACC remains in the lower bound of values across Europe.

Latvia – LGS

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	6.96%	6.48%	5.67%	7.63%	7.32%
Reported RAB (M€)	16.46	16.04	15.29	14.48	14.30
Computed Cost of capital (M€)	1.14	1.04	0.87	1.11	1.05

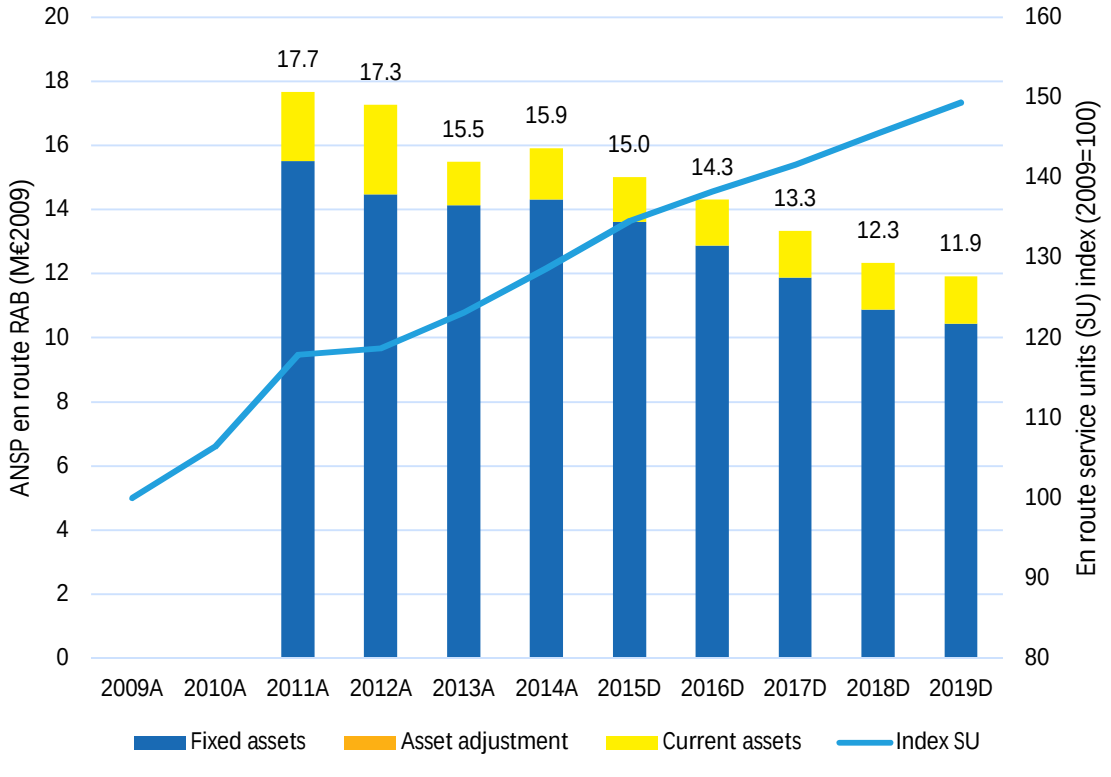
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	8.86%	8.57%	7.15%	9.74%	9.59%
Computed Cost of debt	4.92%	4.18%	3.61%	4.71%	4.52%
Computed Capital structure (% debt)	33%	32%	29%	30%	31%
Computed WACC	6.96%	6.48%	5.67%	7.63%	7.32%
Reported WACC	6.64%	6.60%	6.55%	6.49%	6.60%

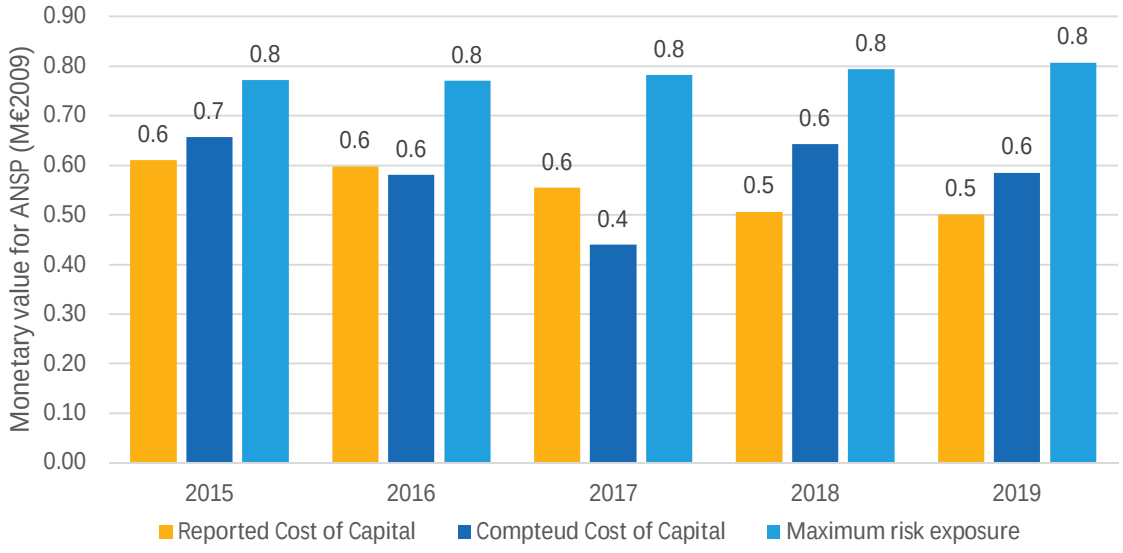
Comments

The WACC computed by the PRB ranges from 5.67% to 7.63%, in line with competitive market practices (Option 1). LGS reported a WACC close in value to the PRB WACC.

Regulated Asset Base



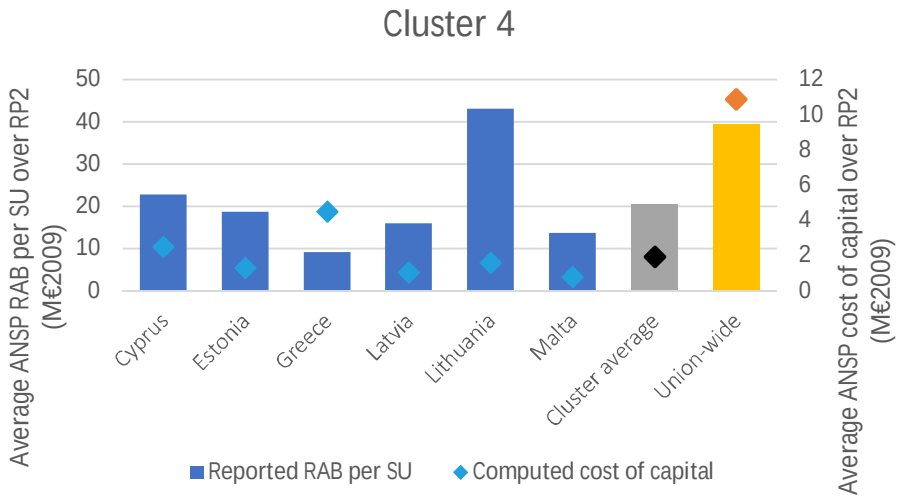
Cost of capital and Maximum risk exposure



Comments

LGS's cost of capital falls below its maximum risk exposure and close to the one reported by LGS. This indicates that the sum that LGS pays to raise finance is comparable to that of an efficient private entity in similar market conditions.

Cost of capital and Comparator groups



Comments

LGS's RAB per service units is 29% lower than the cluster 4 average and 148% lower than the Union-wide average. LGS's cost of capital is 87% lower than the cluster 4 average and it is significantly lower than the Union-wide average. This is due to LGS's RAB in value well below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

Lithuania – Oro Navigacija

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	5.73%	6.10%	5.97%	5.67%	6.07%
Reported RAB (M€)	23.35	24.58	28.86	29.76	27.37
Computed Cost of capital (M€)	1.34	1.50	1.72	1.69	1.66

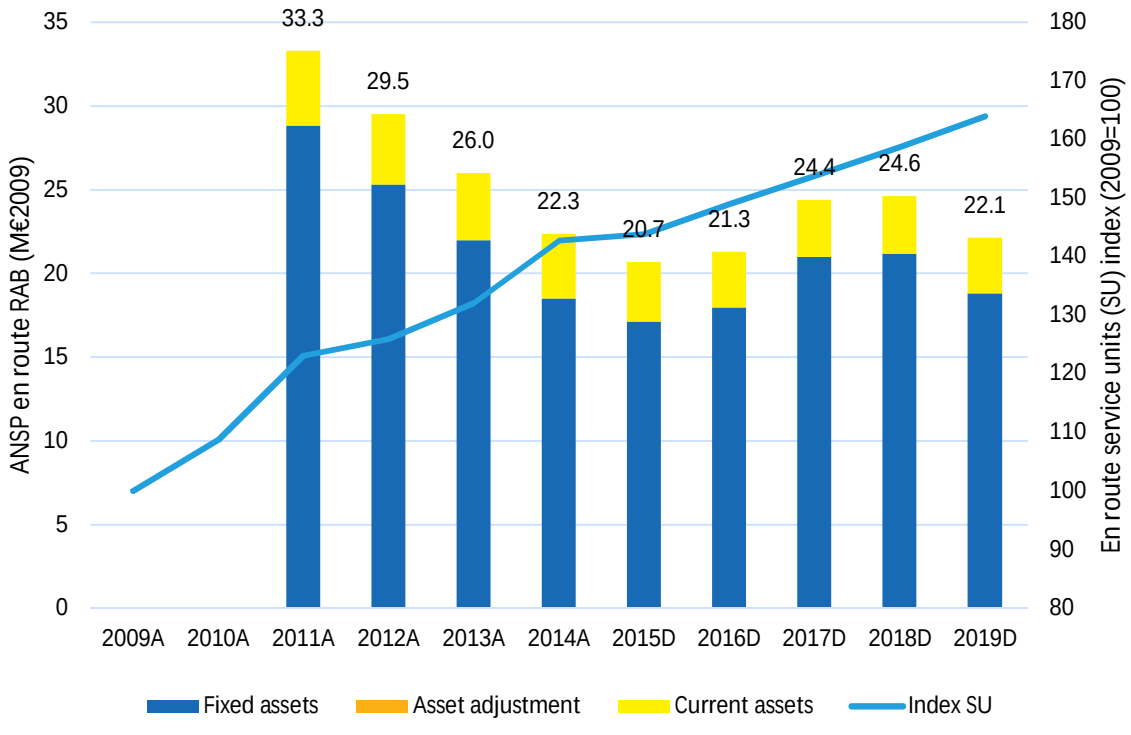
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	5.85%	5.70%	5.47%	5.90%	5.56%
Computed Cost of debt	4.86%	4.07%	3.92%	4.65%	4.32%
Computed Capital structure (% debt)	30%	32%	31%	30%	30%
Computed WACC	5.73%	6.10%	5.97%	5.67%	6.07%
Reported WACC	3.00%	3.00%	3.00%	3.00%	3.00%

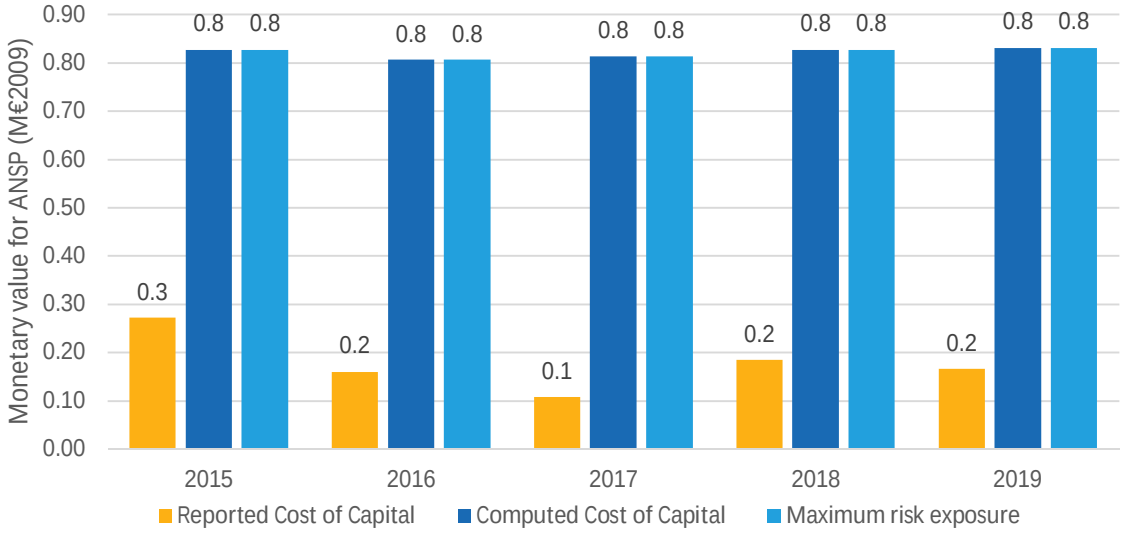
Comments

The WACC computed by the PRB ranges from 5.67% to 6.10%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). Oro Navigacija reported a WACC exceeding competitive market practices with a capital structure of 100% equity.

Regulated Asset Base



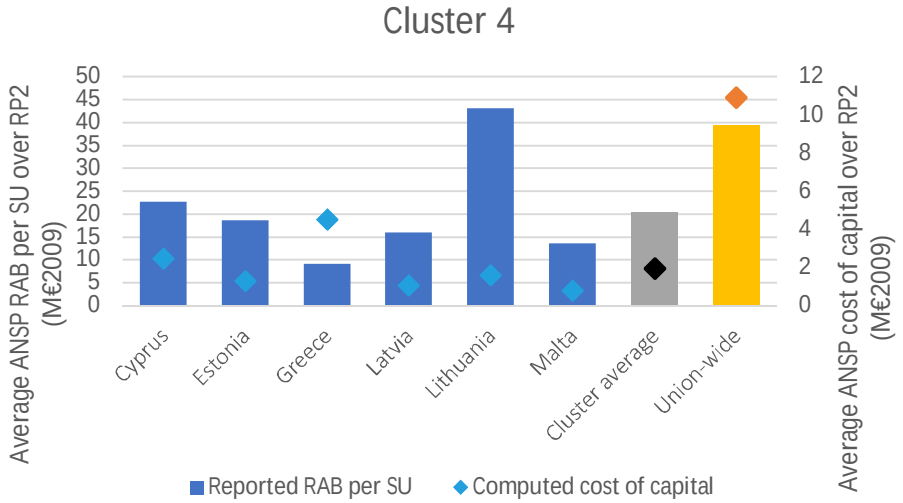
Cost of capital and Maximum risk exposure



Comments

Oro Navigacija's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported is lower than its maximum risk exposure. However, it is generally unusual to obtain an efficient cost capital with 100% equity.

Cost of capital and Comparator groups



Comments

Oro Navigacija's RAB per service units is 52% higher than the cluster 4 average and 8% higher than the Union-wide average. Oro Navigacija's cost of capital is 23% lower than the cluster 4 average and it is significantly lower than the Union-wide average. This is due to Oro Navigacija's RAB in value well below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

Malta – MATS

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	6.57%	5.73%	5.17%	7.32%	6.87%
Reported RAB (M€)	10.12	12.22	13.28	13.45	12.66
Computed Cost of capital (M€)	0.66	0.70	0.69	0.99	0.87

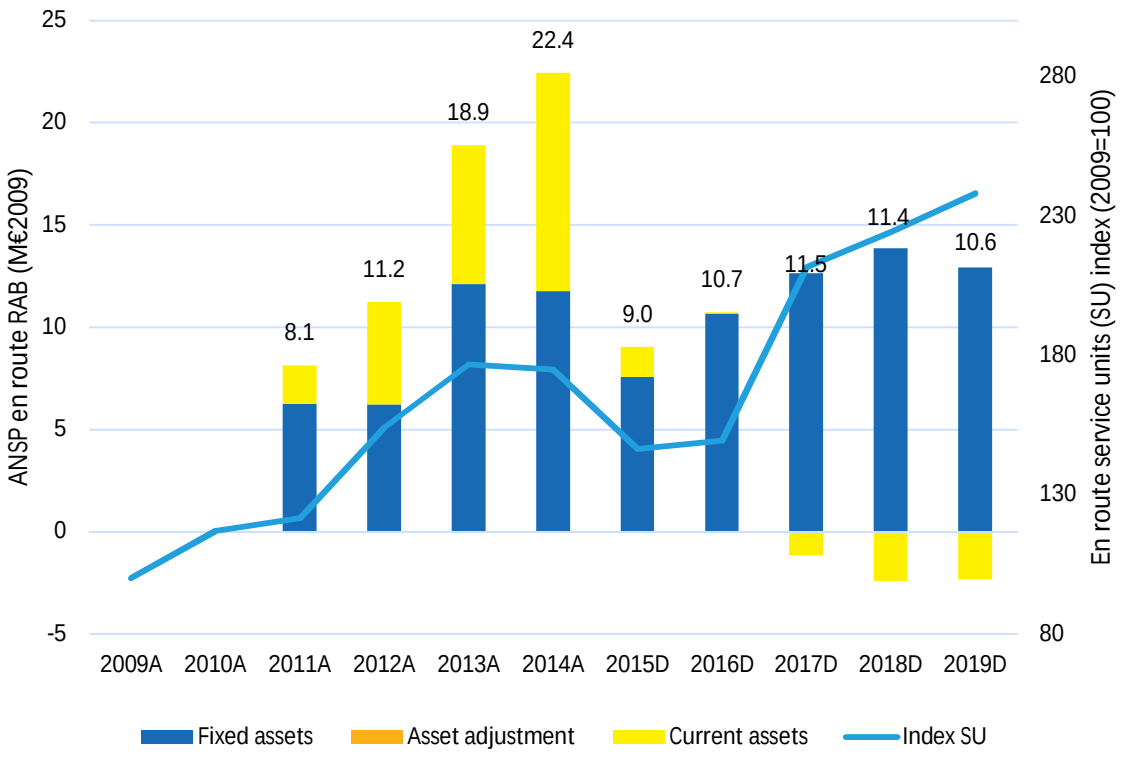
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Return on equity	10.83%	9.70%	8.03%	11.14%	11.06%
Cost of debt	2.01%	1.38%	1.16%	2.05%	1.72%
Capital structure (% debt)	33%	32%	29%	30%	31%
Computed WACC	6.57%	5.73%	5.17%	7.32%	6.87%
Reported WACC	5.83%	6.16%	6.31%	6.38%	6.36%

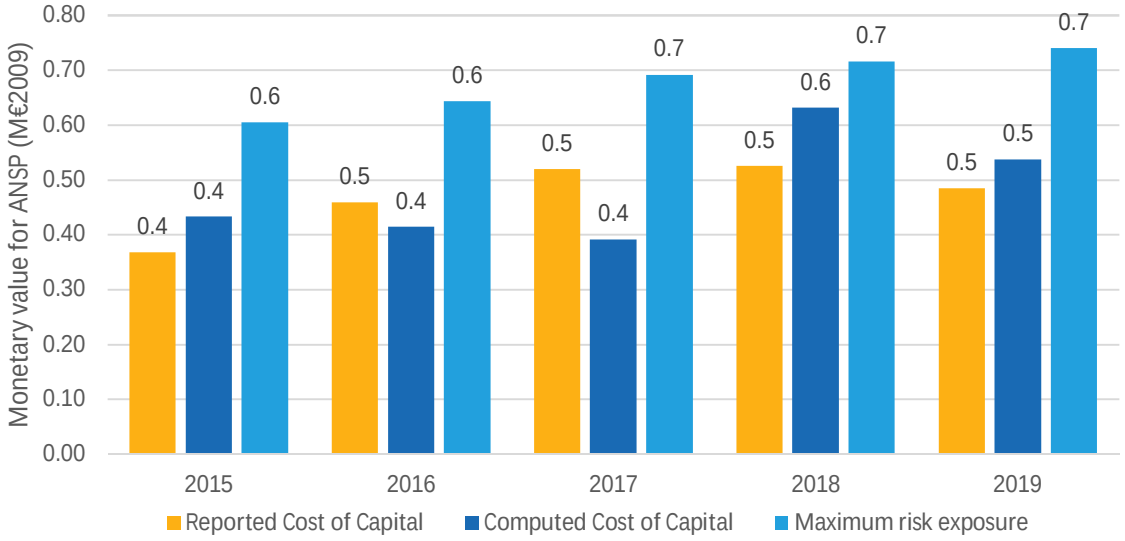
Comments

The WACC computed by the PRB ranges from 5.17% to 7.32%, in line with competitive market practices (Option 1). MATS reported a WACC close to the PRB WACC.

Regulated Asset Base



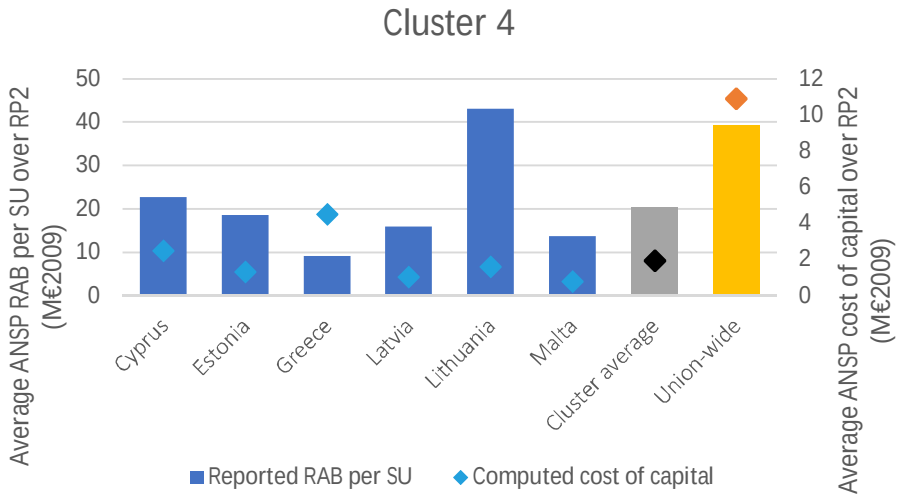
Cost of capital and Maximum risk exposure



Comments

MATS' cost of capital falls below its maximum risk exposure and close to the one reported by MATS. This indicates that the sum that MATS pays to raise finance is comparable to that of an efficient private entity in similar market conditions.

Cost of capital and Comparator groups



Comments

MATS' RAB per service units is 51% lower than the cluster 4 average and 190% lower than the Union-wide average. MATS cost of capital is 149% lower than the cluster 4 average and it is significantly lower than the Union-wide average. This is due to MATS' RAB well below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

The Netherlands – LVNL

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.41%	4.13%	3.83%	4.63%	4.51%
Reported RAB (M€)	91.91	93.87	97.81	109.29	101.91
Computed Cost of capital (M€)	4.05	3.87	3.75	5.06	4.59

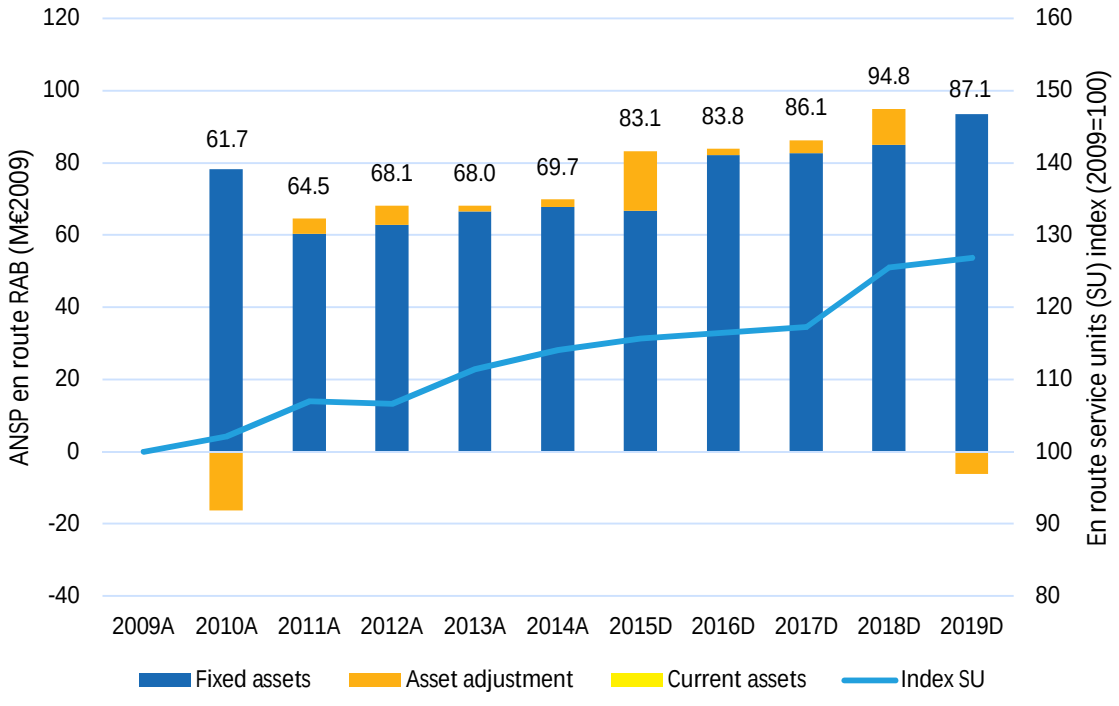
WACC

Option 3	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	7.13%	6.42%	5.68%	7.68%	7.37%
Computed Cost of debt	2.60%	2.60%	2.60%	2.60%	2.60%
Reported Capital structure (% debt)	60%	60%	60%	60%	60%
Computed WACC	4.41%	4.13%	3.83%	4.63%	4.51%
Reported WACC	5.01%	5.01%	5.01%	5.01%	5.01%

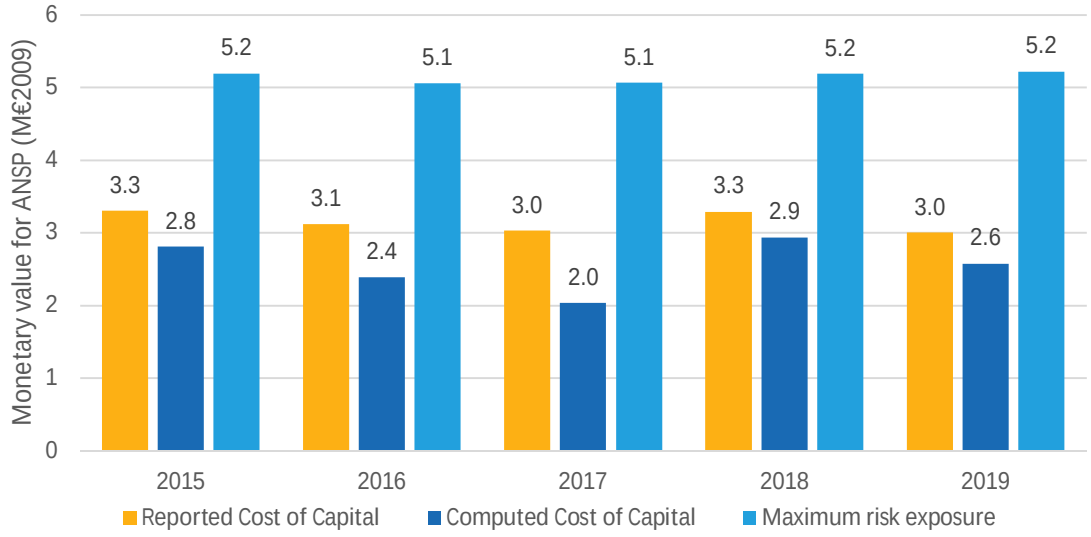
Comments

The WACC computed by the PRB ranges from 3.83% to 4.63%, in line with competitive market practices (Option 3). The WACC reported by LVNL is close in value to the PRB WACC. The capital structure is mainly composed by debt, enabling a low value for the WACC.

Regulated Asset Base



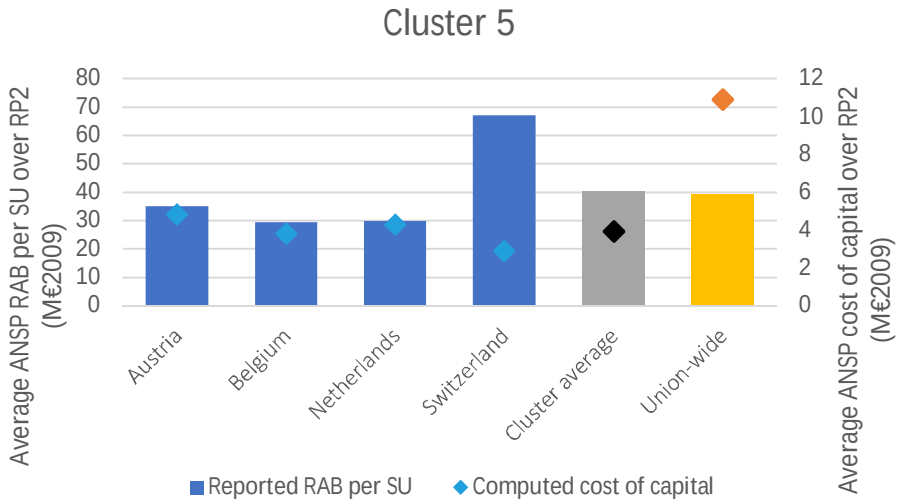
Cost of capital and Maximum risk exposure



Comments

LVNL's cost of capital falls well below its maximum risk exposure and also below the one reported by LVNL. This indicates that the sum that LVNL pays to raise finance is comparable to that of an efficient private entity in similar market conditions.

Cost of capital and Comparator groups



Comments

LVNL's RAB per service units is 35% lower than the cluster 5 average and 32% lower than the Union-wide average. LVNL's cost of capital is 8% higher than the cluster 5 average but lower than the Union-wide average. This is due to LVNL's RAB in value lower than the Union-wide average coupled with its WACC towards the lower bound of values across Europe.

Norway – Avinor

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	6.19%	5.61%	5.55%	7.30%	6.96%
Reported RAB (M€)	95.69	103.30	107.15	108.61	107.28
Computed Cost of capital (M€)	5.92	5.80	5.95	7.92	7.47

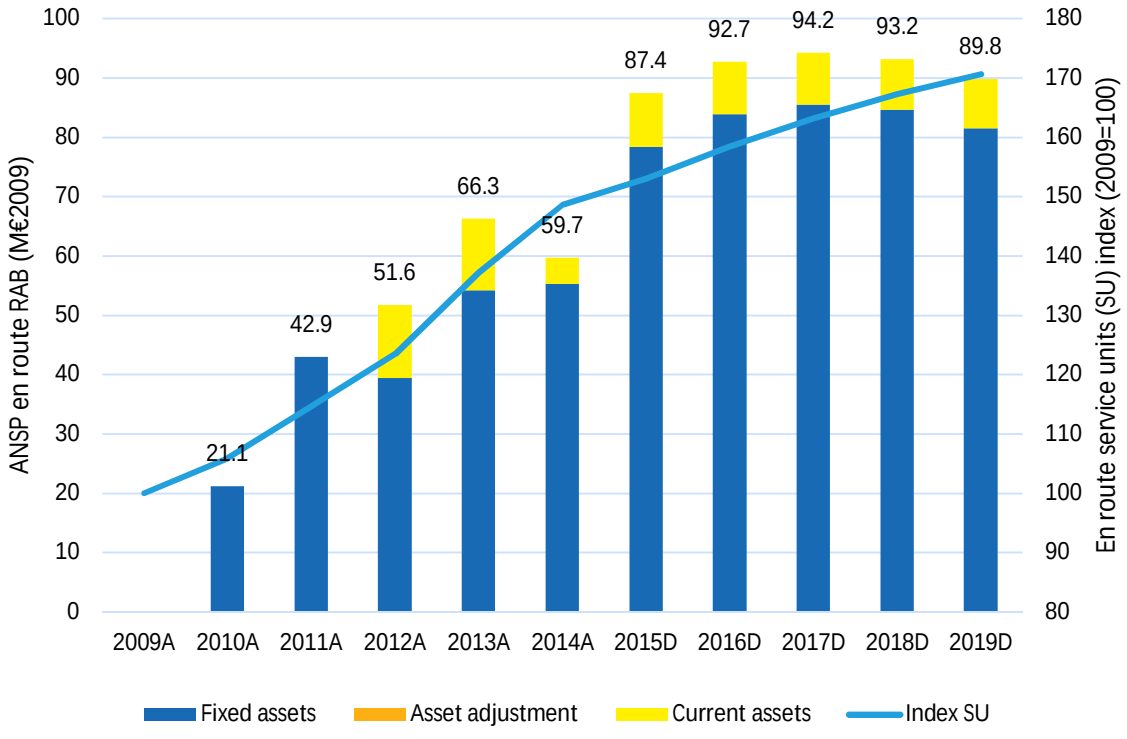
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	8.80%	8.27%	7.56%	9.99%	9.77%
Computed Cost of debt	3.39%	2.70%	2.74%	3.58%	3.51%
Computed Capital structure (% debt)	33%	32%	29%	30%	31%
Computed WACC	6.19%	5.61%	5.55%	7.30%	6.96%
Reported WACC	7.58%	7.58%	7.58%	7.58%	7.58%

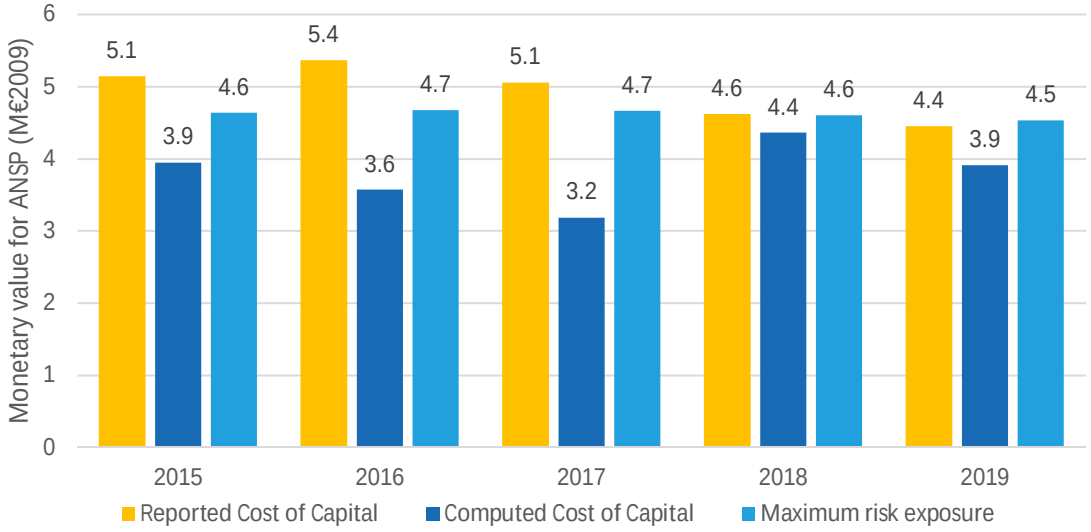
Comments

The WACC computed by the PRB ranges from 5.55% to 7.30%, in line with competitive market practices (Option 1). Avinor reported a higher WACC than the PRB WACC.

Regulated Asset Base



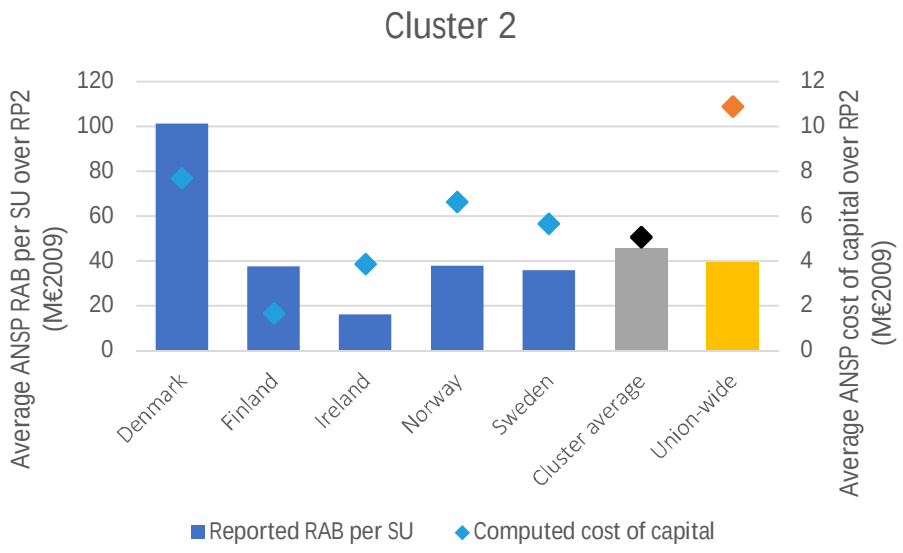
Cost of capital and Maximum risk exposure



Comments

Avinor's cost of capital falls below its maximum risk exposure and also below the one reported by Avinor. The cost of capital reported by Avinor exceeds its maximum risk exposure by 0.5 M€$_{2009}$ in 2015 and 0.4 M€$_{2009}$ in 2016 and in 2017.

Cost of capital and Comparator groups



Comments

Avinor's RAB per service units is 21% lower than the cluster 2 average and 5% lower than the Union-wide average. Avinor's cost of capital is 23% higher than the cluster 2 average but it is below the Union-wide average. This is due to Avinor's RAB in value below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

Poland – PANSA

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	6.14%	6.14%	4.19%	4.74%	4.86%
Reported RAB (M€)	162.27	175.10	239.11	273.41	295.40
Computed Cost of capital (M€)	9.96	10.75	10.02	12.97	14.36

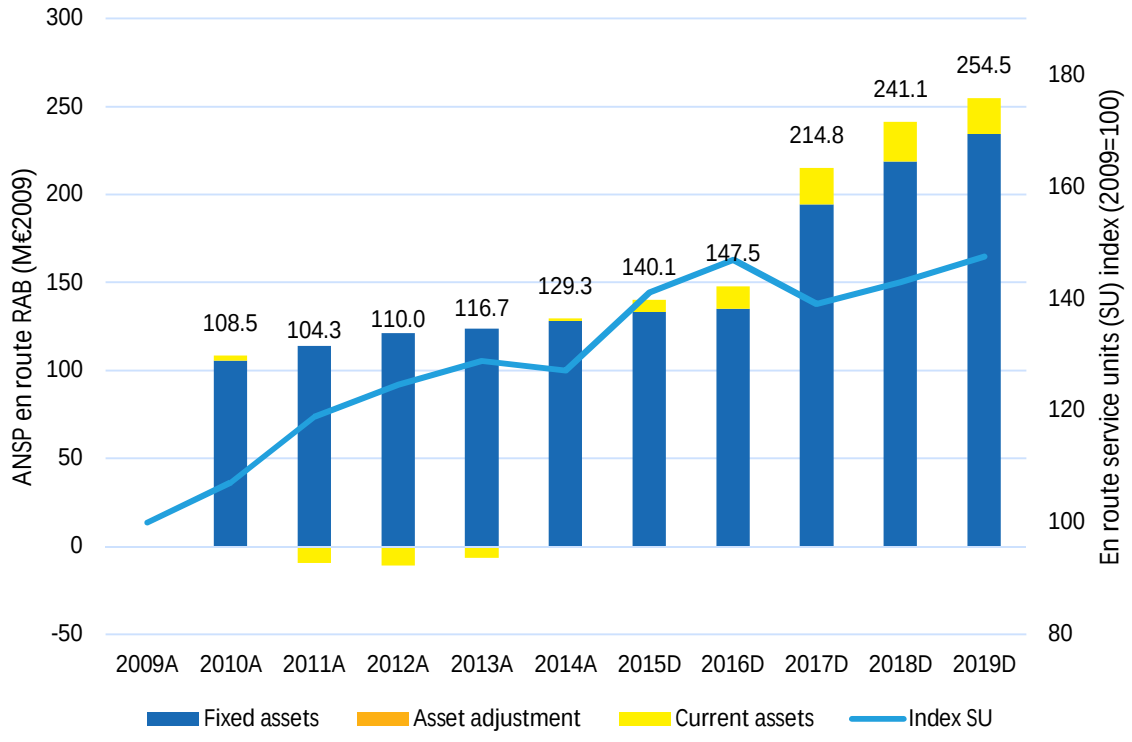
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	10.62%	10.63%	11.23%	12.07%	11.86%
Computed Cost of debt	6.19%	5.95%	5.95%	6.39%	6.30%
Computed Capital structure (% debt)	50%	49%	57%	56%	56%
Computed WACC	6.14%	6.14%	4.19%	4.74%	4.86%
Reported WACC	7.35%	7.35%	7.35%	7.35%	7.35%

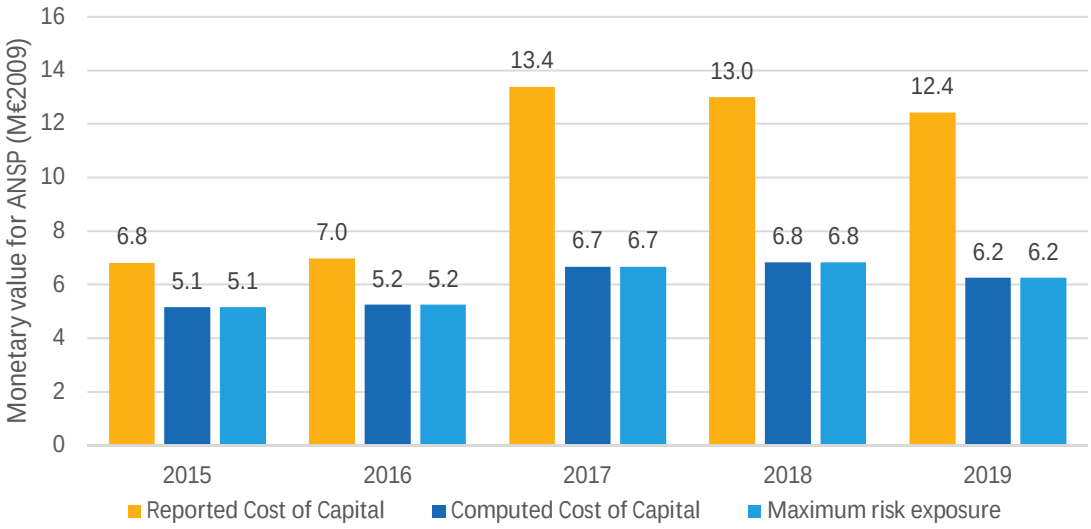
Comments

The WACC computed by the PRB ranges from 4.19% to 6.14%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). PANSA reported a WACC exceeding competitive market practices with a capital structure of 100% equity.

Regulated Asset Base



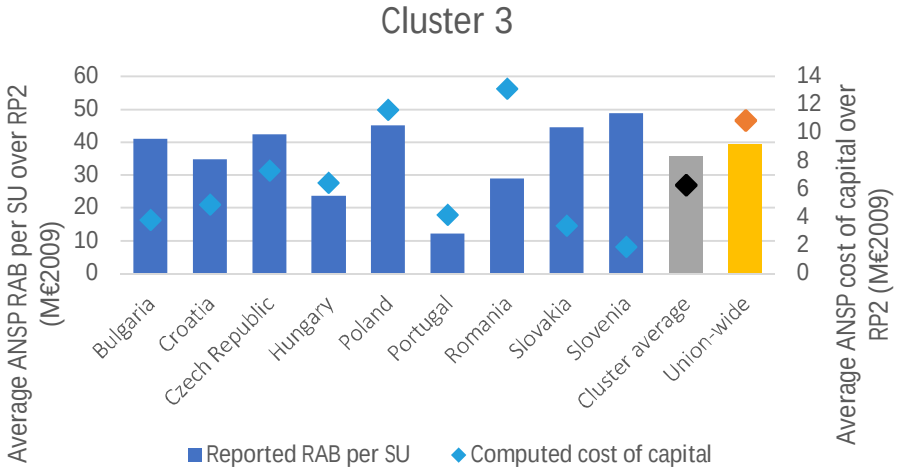
Cost of capital and Maximum risk exposure



Comments

PANSA's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by PANSA exceeds its maximum risk exposure in almost 1 M€$_{2009}$ in 2015 and 2016 and in 6 M€$_{2009}$ in 2017, 2018 and 2019.

Cost of capital and Comparator groups



Comments

PANSA's RAB per service units is 21% higher than the cluster 3 average and 12% higher than the Union-wide average. PANSA'S cost of capital is 46% higher than the cluster 3 average and 6% higher than the Union-wide average. This is due to PANSA's RAB in value close to the Union-wide average whilst its WACC remains in the upper bound of values across Europe.

Portugal – Nav Portugal

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	8.74%	9.50%	8.62%	9.11%	8.36%
Reported RAB (M€)	39.68	48.69	48.29	47.56	50.20
Computed Cost of capital (M€)	3.47	4.62	4.16	4.33	4.19

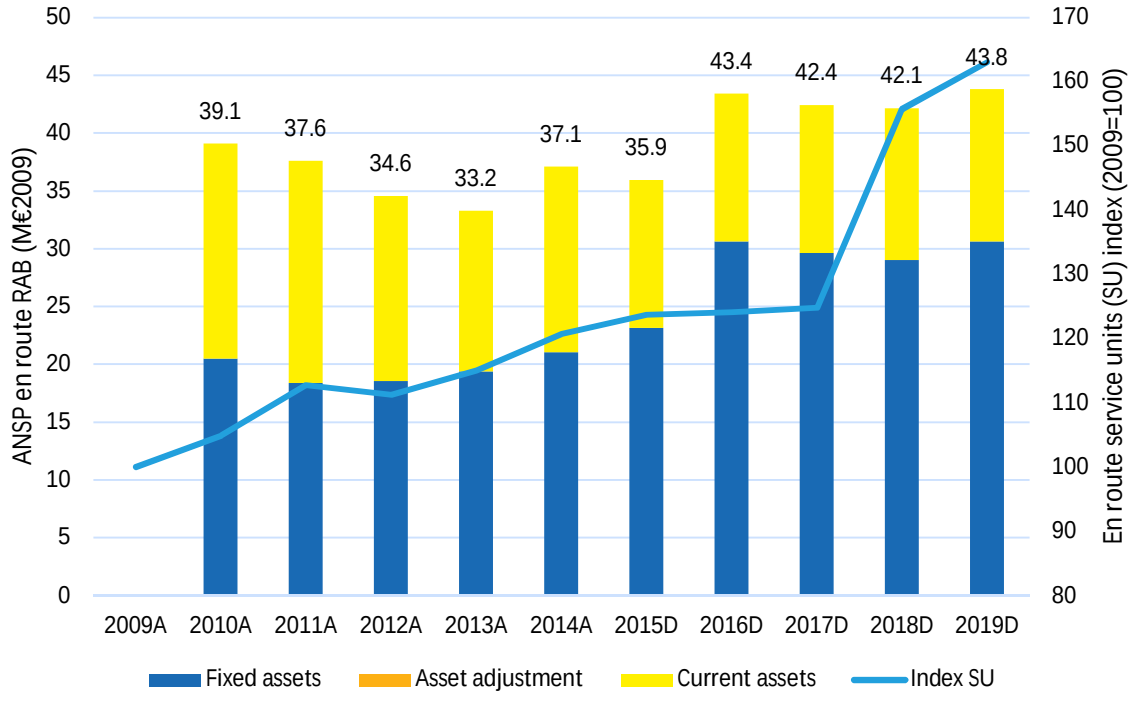
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	13.59%	14.28%	12.03%	13.22%	12.74%
Computed Cost of debt	3.56%	4.26%	3.85%	3.44%	2.96%
Computed Capital structure (% debt)	33%	32%	29%	30%	31%
Computed WACC	8.74%	9.50%	8.62%	9.11%	8.36%
Reported WACC	6.33%	6.33%	6.33%	6.33%	6.33%

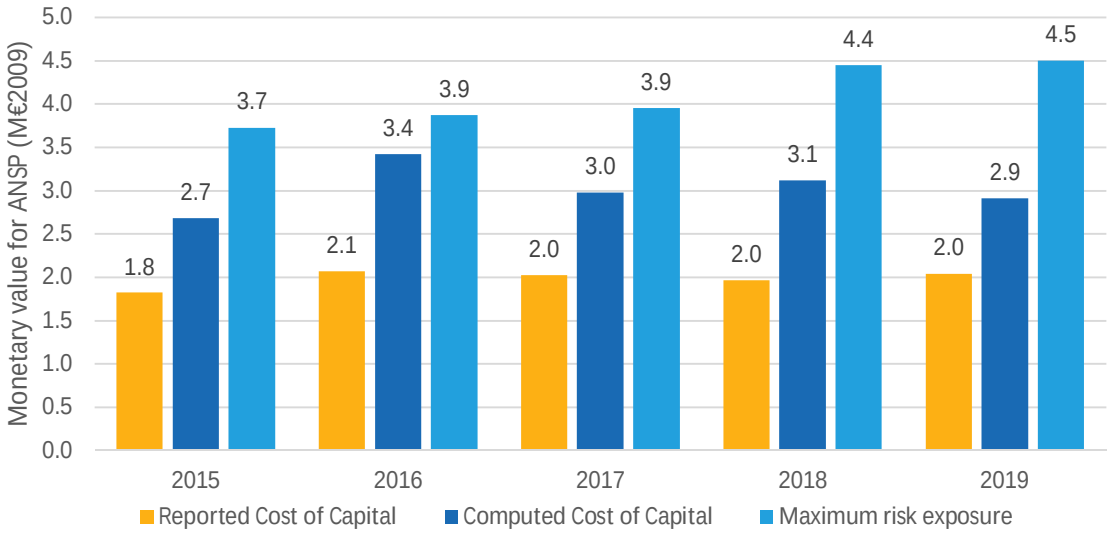
Comments

The WACC computed by the PRB ranges from 8.36% to 9.50%, in line with competitive market practices (Option 1). Nav Portugal reported a WACC close lower to the PRB WACC with a capital structure of 98.30% equity. Generally, it is unusual to obtain an efficient WACC with such a capital structure.

Regulated Asset Base



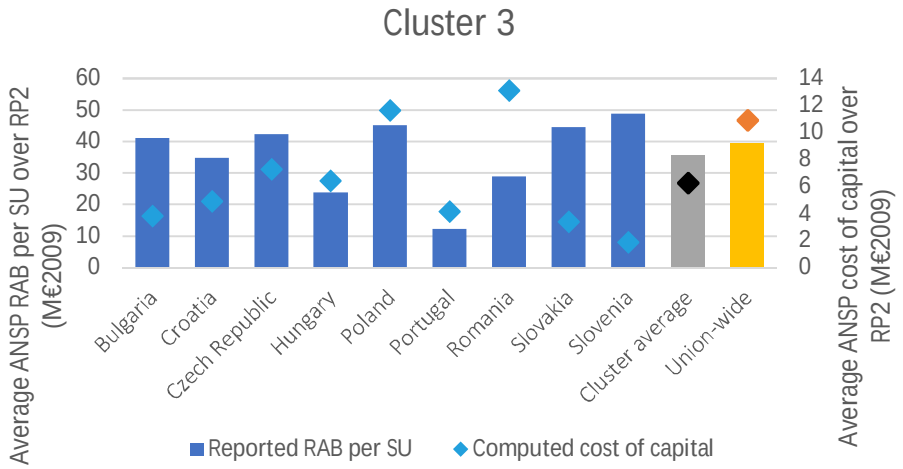
Cost of capital and Maximum risk exposure



Comments

Nav Portugal's cost of capital falls below its maximum risk and close to the one reported by Nav Portugal. However, it is unusual to obtain an efficient cost of capital with the capital structure reported by Nav Portugal.

Cost of capital and Comparator groups



Comments

Nav Portugal's RAB per service units is 193% lower than the cluster 3 average and 225% lower than the Union-wide average. Nav Portugal's cost of capital is 51% lower than the cluster 3 average and lower than the Union-wide average. This is due to Nav Portugal's RAB in value below the Union-wide average whilst its WACC remains in the upper bound of values across Europe.

Romania – ROMATSA

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	7.07%	6.90%	6.75%	10.55%	8.95%
Reported RAB (M€)	173.52	180.35	180.70	147.11	147.11
Computed Cost of capital (M€)	12.26	12.44	12.21	15.51	13.16

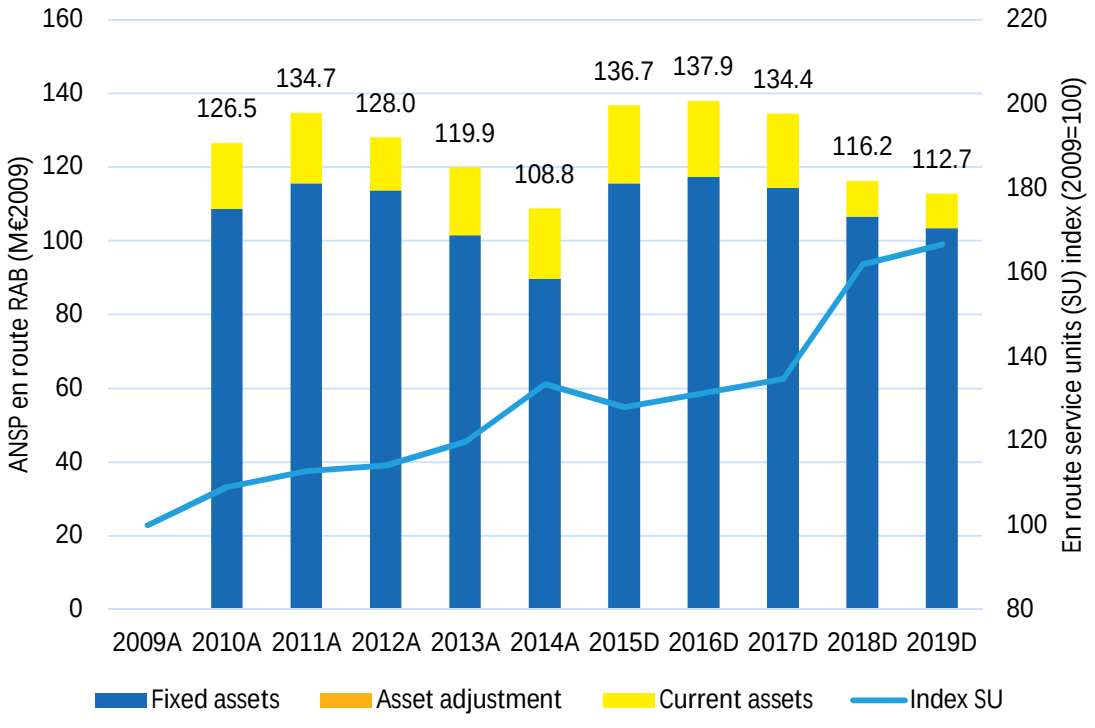
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	14.82%	13.54%	12.98%	14.63%	16.03%
Computed Cost of debt	9.06%	8.09%	7.81%	9.87%	10.26%
Computed Capital structure (% debt)	57%	55%	55%	50%	55%
Computed WACC	7.07%	6.90%	6.75%	10.55%	8.95%
Reported WACC	8.62%	8.62%	8.62%	7.43%	7.43%

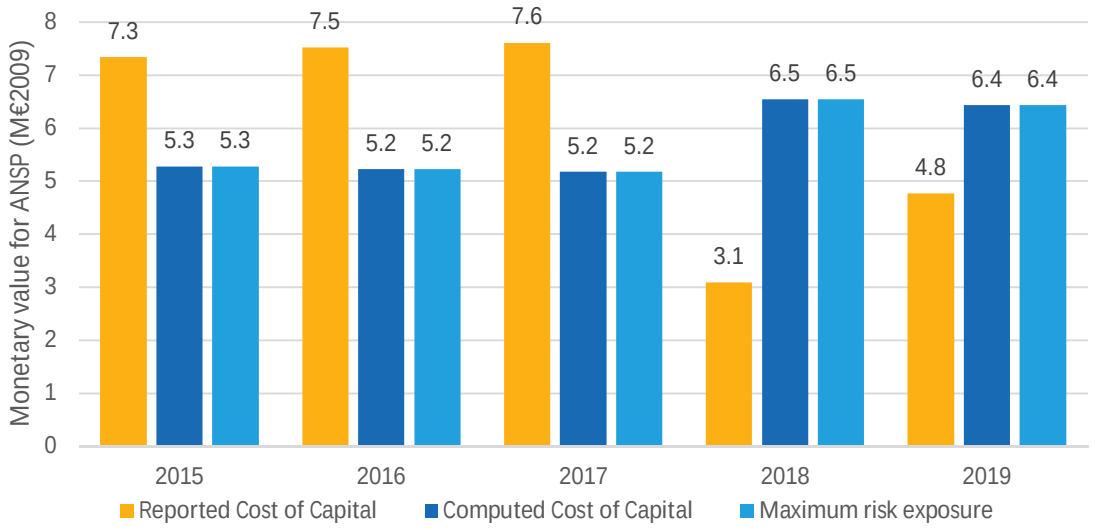
Comments

The WACC computed by the PRB ranges from 6.75% to 10.55%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). ROMATSA reported a WACC in line with competitive market practices but exceeding its maximum risk exposure.

Regulated Asset Base



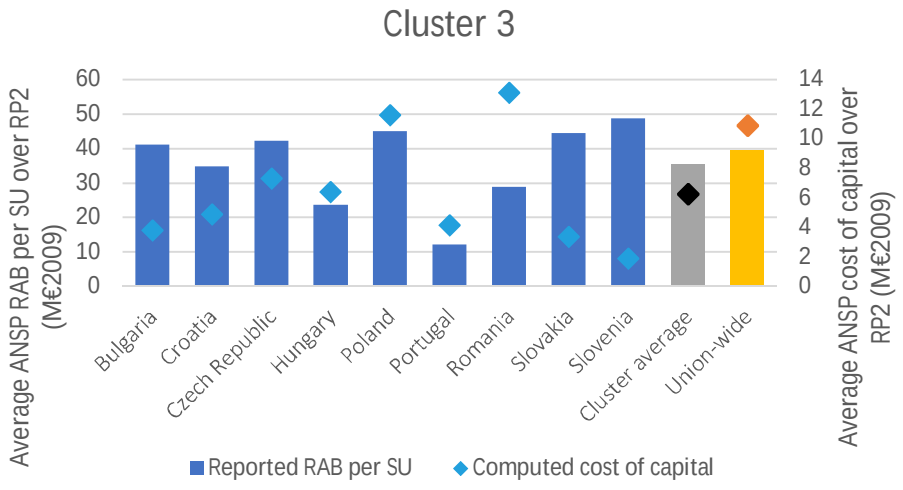
Cost of capital and Maximum risk exposure



Comments

Romania's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by ROMATSA exceeds the maximum risk exposure by around 2 M€$_{2009}$ in 2015, 2016 and 2017.

Cost of capital and Comparator groups



Comments

ROMATSA's RAB per service units is 24% lower than the cluster 3 average and 37% lower than the Union-wide average. ROMATSA's cost of capital is 52% higher than the cluster 3 average and 17 higher than the Union-wide average. This is due to ROMATSA's RAB in value close to the Union-wide average whilst its WACC remains in the upper bound of values across Europe.

Slovakia – LPS

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.18%	5.81%	5.90%	5.86%	6.07%
Reported RAB (M€)	55.62	55.81	59.14	64.65	66.21
Computed Cost of capital (M€)	2.32	3.24	3.49	3.79	4.02

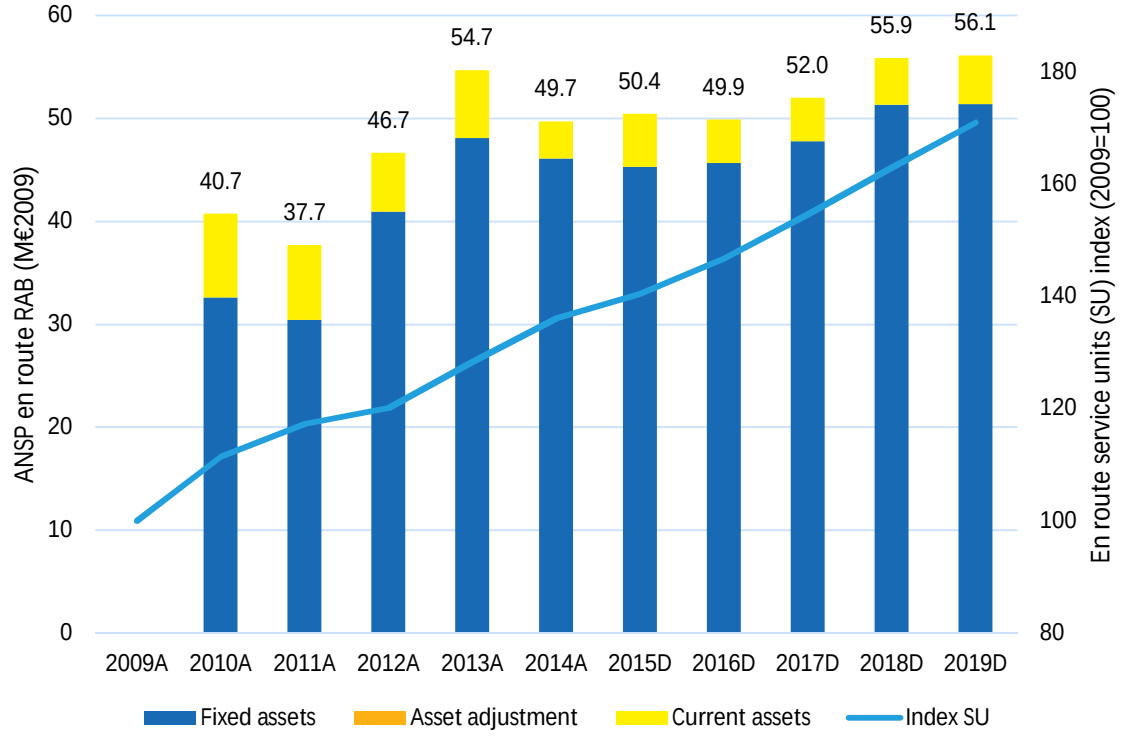
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	7.49%	5.12%	4.99%	5.52%	5.22%
Computed Cost of debt	2.30%	2.35%	2.40%	2.50%	2.50%
Computed Capital structure (% debt)	39%	10%	5%	5%	5%
Computed WACC	4.18%	5.81%	5.90%	5.86%	6.07%
Reported WACC	5.59%	5.68%	5.76%	5.49%	5.19%

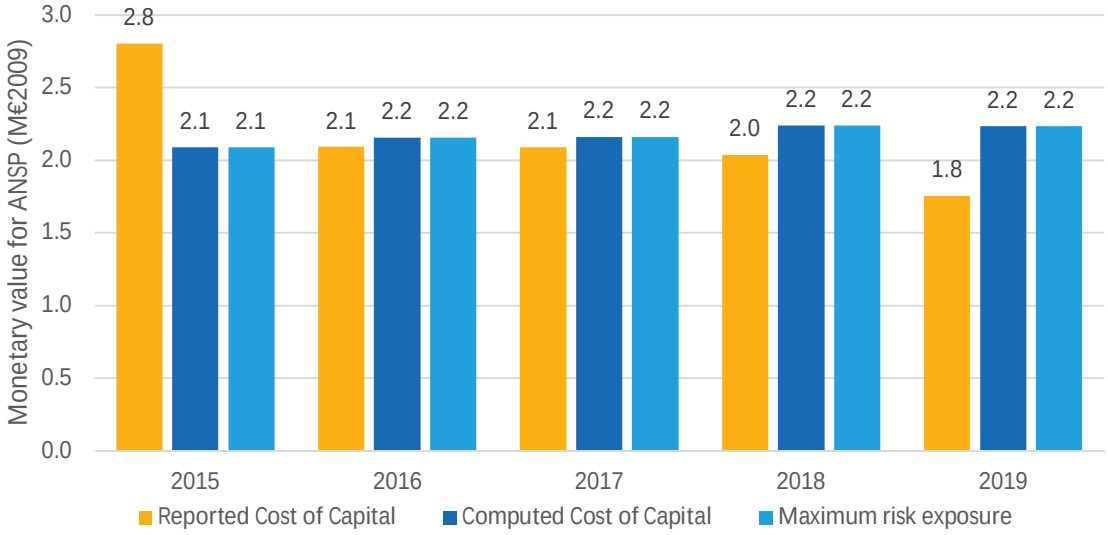
Comments

The WACC computed by the PRB ranges from 4.18% to 6.07%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). LPS reported a WACC exceeding competitive market practices with a capital structure of 85.10% equity.

Regulated Asset Base



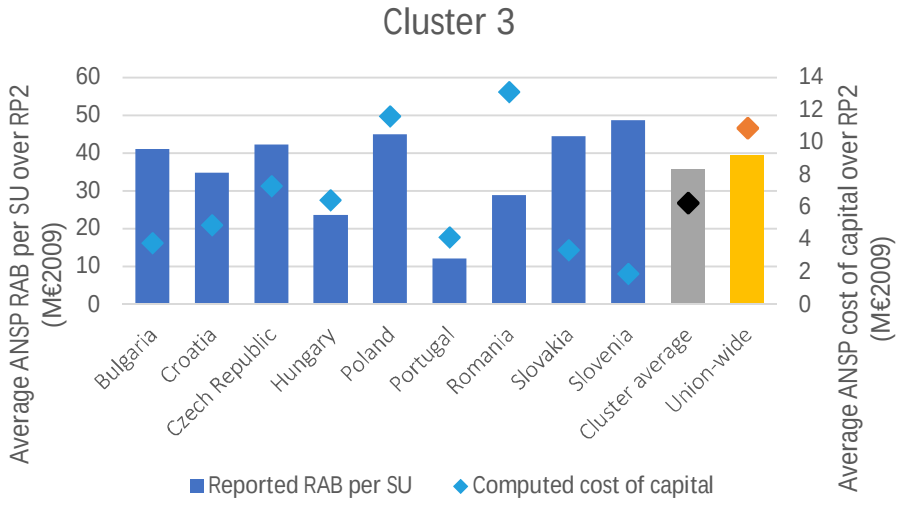
Cost of capital and Maximum risk exposure



Comments

LPS's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by LPS exceeds the maximum risk exposure by circa 0.7 M€$_{2009}$ in 2015.

Cost of capital and Comparator groups



Comments

LPS's RAB per service units is 20% higher than the cluster 3 average and 11% higher than the Union-wide average. LPS's cost of capital is 86% lower than the cluster 3 average and lower than the Union-wide average. This is due to LPS's RAB in value below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

Slovenia – Slovenia Control

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	5.59%	6.45%	6.52%	6.95%	7.31%
Reported RAB (M€)	31.99	30.38	28.81	27.34	25.91
Computed Cost of capital (M€)	1.79	1.96	1.88	1.90	1.89

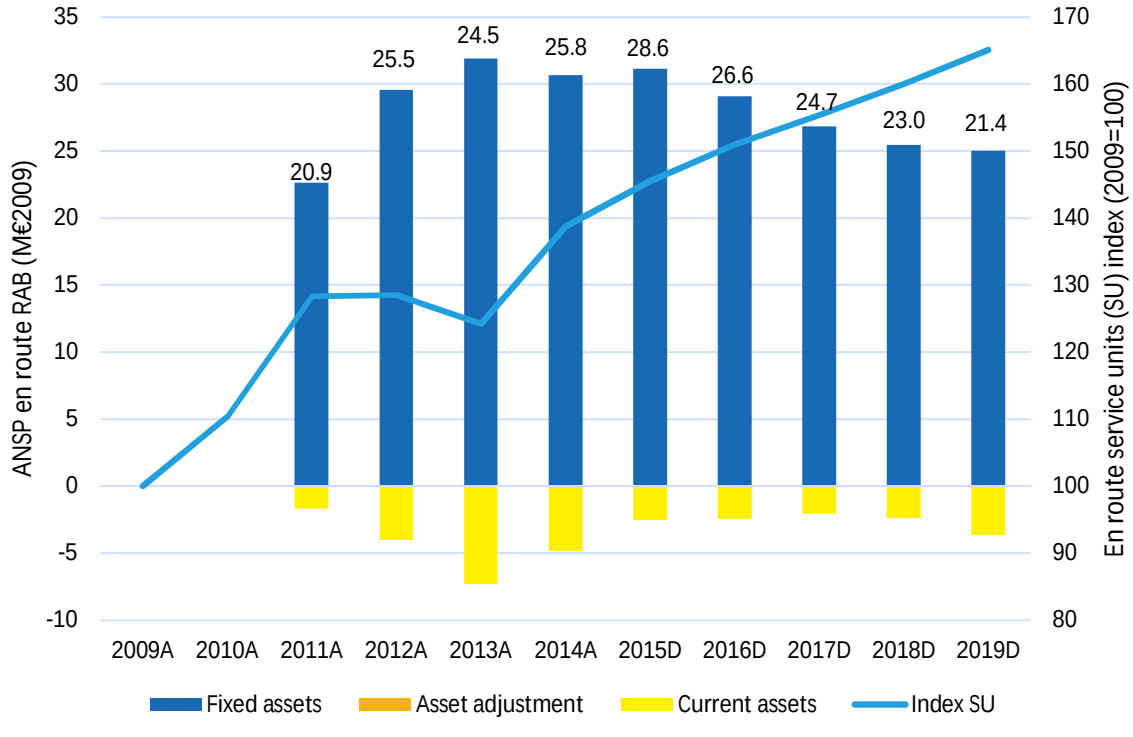
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	9.14%	6.74%	5.29%	6.15%	5.60%
Computed Cost of debt	3.98%	3.98%	3.98%	3.98%	3.98%
Computed Capital structure (% debt)	33%	13%	5%	10%	15%
Computed WACC	5.59%	6.45%	6.52%	6.95%	7.31%
Reported WACC	6.04%	6.04%	6.04%	6.04%	6.04%

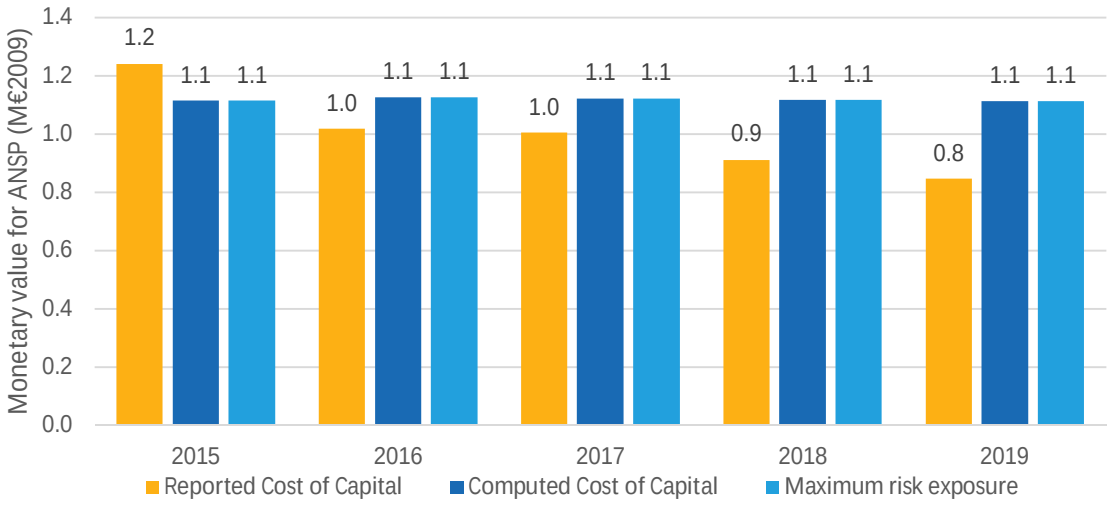
Comments

The WACC computed by the PRB ranges from 5.59% to 7.31%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). Slovenia Control reported a WACC in line with competitive market practices but exceeding its maximum risk exposure.

Regulated Asset Base



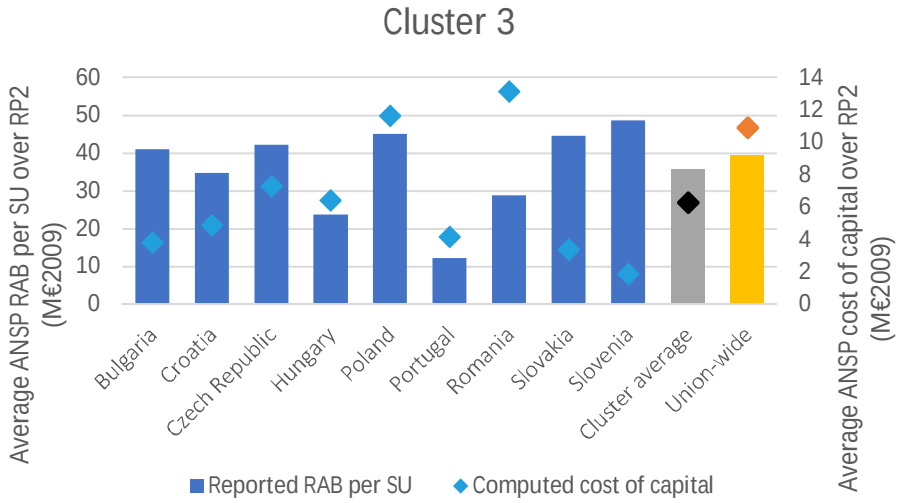
Cost of capital and Maximum risk exposure



Comments

Slovenia Control's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by Slovenia Control exceeds the maximum risk exposure by around 0.1 M€$_{2009}$ in 2015.

Cost of capital and Comparator groups



Comments

Slovenia Control's RAB per service units is 27% higher than the cluster 3 average and 19% higher than the Union-wide average. Slovenia Control's cost of capital is 233% lower than the cluster 3 average and significantly lower than the Union-wide average. This is due to Slovenia Control's RAB in value well below the Union-wide average whilst its WACC remains in the middle bound of values across Europe.

Spain – ENAIRE

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.54%	4.62%	4.81%	4.84%	4.92%
Reported RAB (M€)	614.13	610.58	603.90	597.36	590.84
Computed Cost of capital (M€)	27.88	28.23	29.03	28.91	29.07

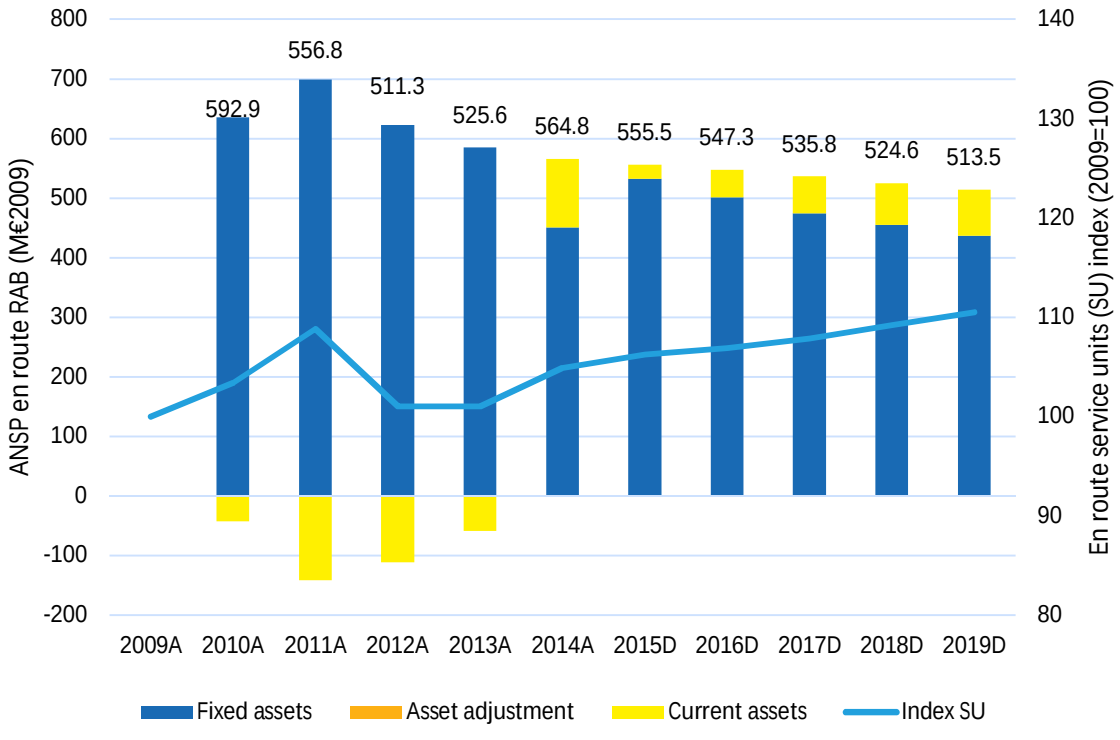
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	11.36%	10.07%	9.04%	10.21%	9.60%
Computed Cost of debt	2.86%	2.49%	2.46%	3.35%	3.11%
Computed Capital structure (% debt)	44%	42%	39%	44%	42%
Computed WACC	4.54%	4.62%	4.81%	4.84%	4.92%
Reported WACC	5.69%	5.70%	5.77%	5.84%	5.86%

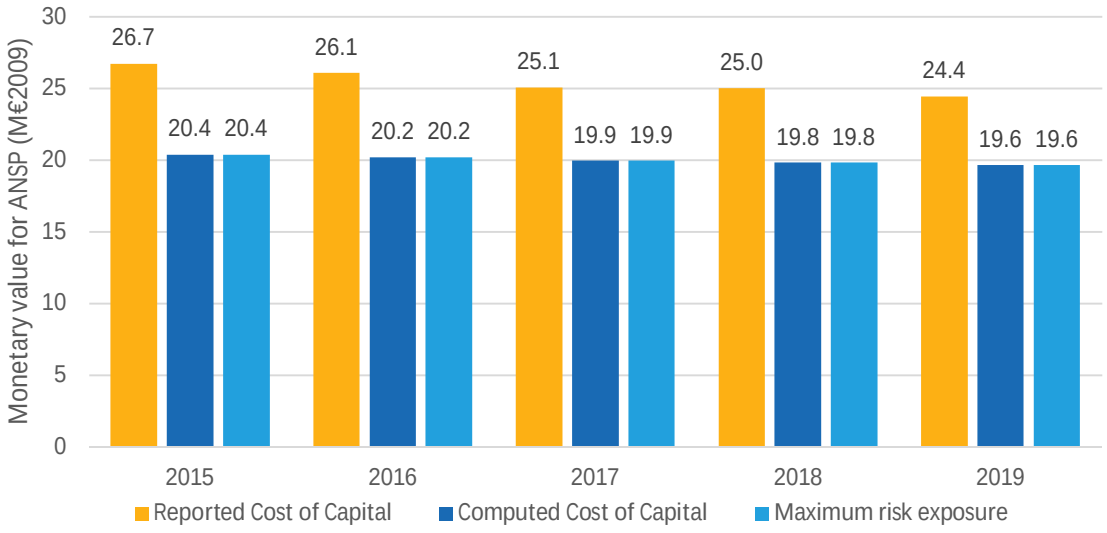
Comments

The WACC computed by the PRB ranges from 4.54% to 4.92%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). ENAIRE reported a WACC exceeding competitive market practices with a capital structure of 76.10% equity.

Regulated Asset Base



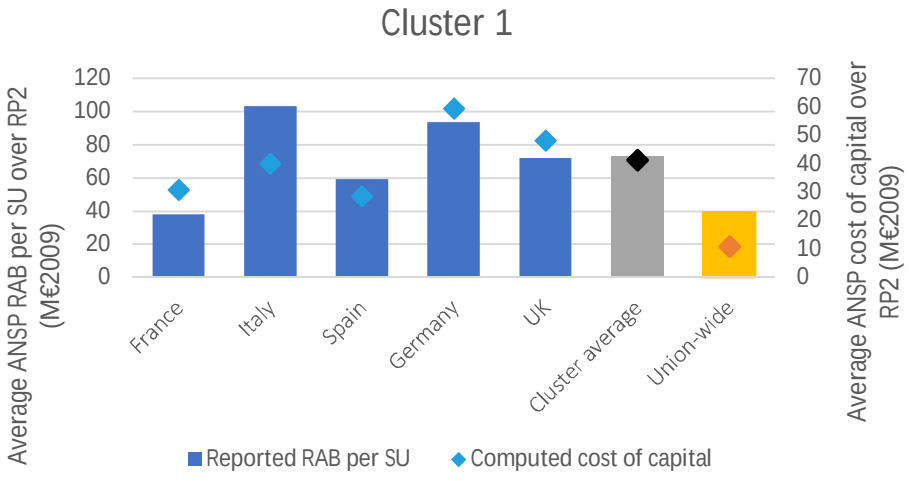
Cost of capital and Maximum risk exposure



Comments

ENAIRE's cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by ENAIRE exceeds the maximum risk exposure by 6 M€$_{2009}$ on average per year during RP2.

Cost of capital and Comparator groups



Comments

ENAIRE's RAB per service units is 23% lower than the cluster 1 average and it is 33% higher than the Union-wide average. ENAIRE's cost of capital is 45% lower than the cluster 1 average but it is 62% higher than the Union-wide average. This is due to ENAIRE's RAB well in value above the Union-wide average whilst its WACC remains in the lower bound of values across Europe.

Sweden – LFV

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	3.48%	4.14%	4.46%	4.68%	4.96%
Reported RAB (M€)	152.40	138.57	128.63	118.88	118.66
Computed Cost of capital (M€)	5.31	5,73	5.74	5.56	5.89

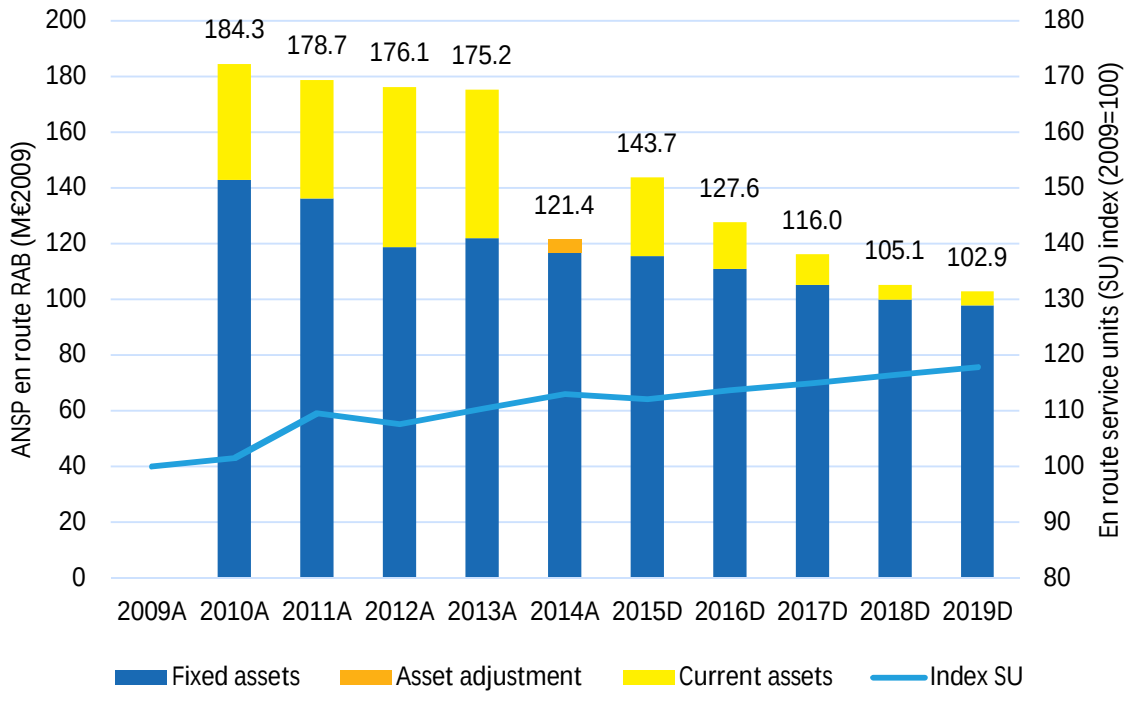
WACC

Option 2	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	5.00%	5.00%	5.00%	5.00%	5.00%
Computed Cost of debt	1.70%	2.60%	3.00%	3.00%	3.00%
Reported Capital structure (% debt)	46%	36%	27%	16%	2%
Computed WACC	3.48%	4.14%	4.46%	4.68%	4.96%
Reported WACC	3.48%	4.14%	4.46%	4.68%	4.96%

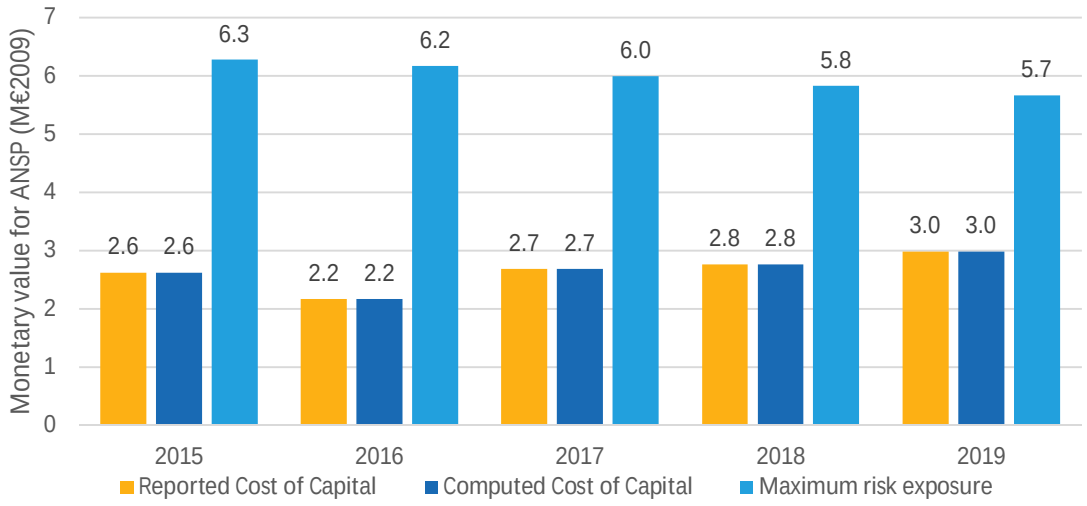
Comments

The WACC computed by the PRB ranges from 3.48% to 4.96%, in line with competitive market practices. LFV reported that has not used the CAPM methodology to calculate its RoE, but rather applied the Government of Sweden's required RoE of 4.00% post tax (5.13% pre-tax) with a variable capital structure.

Regulated Asset Base



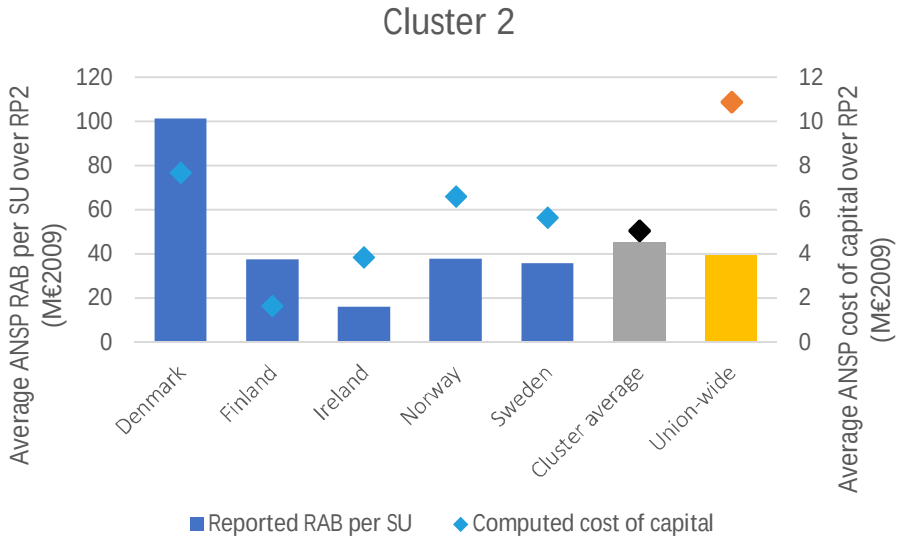
Cost of capital and Maximum risk exposure



Comments

LFV's cost of capital falls well below its maximum risk exposure and equals the one reported by LFV. This is due to the application of a RoE required by the Swedish Government in the computation of the cost of capital.

Cost of capital and Comparator groups



Comments

LFV's RAB per service units is 28% lower than the cluster 2 average and 10% lower than the Union-wide average. LFV's cost of capital is 10% higher than the cluster 2 average but it is lower than the Union-wide average. This is due to LFV's RAB in value below the Union-wide average coupled with its WACC towards the lower bound of values across Europe.

Switzerland – Skyguide

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	2.83%	2.47%	2.41%	3.53%	3.11%
Reported RAB (M€)	95.15	96.05	98.72	103.11	109.12
Computed Cost of capital (M€)	2.70	2.37	2.38	3.64	3.40

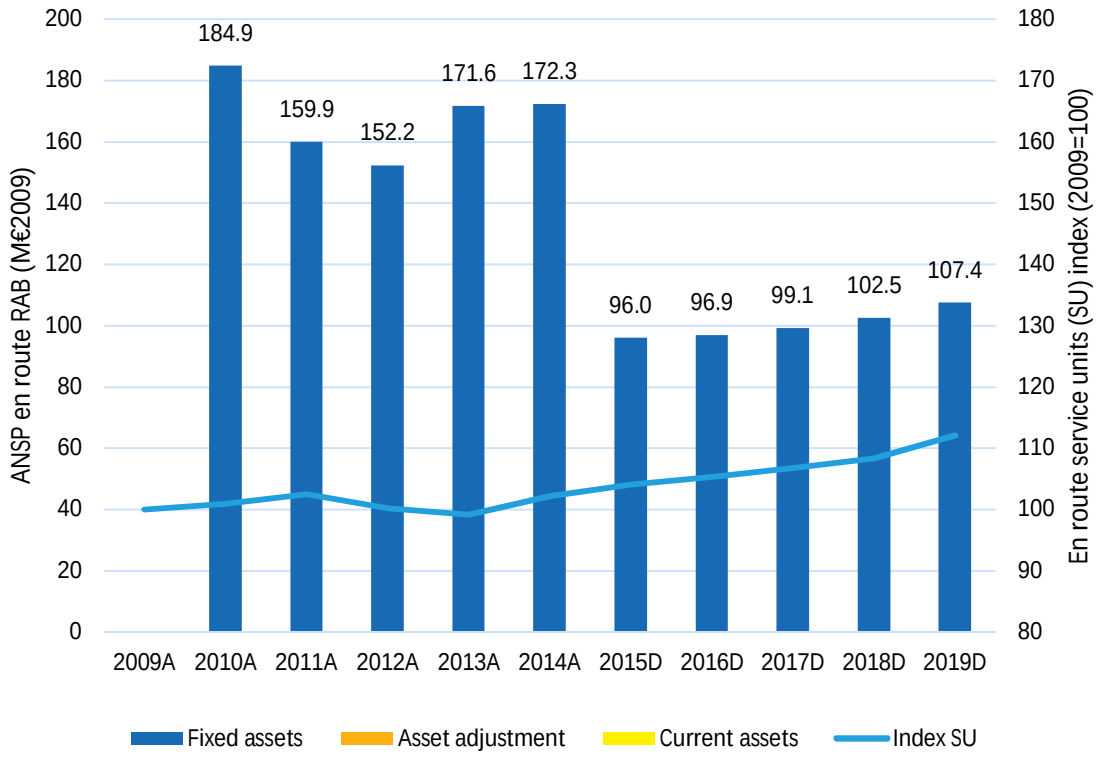
WACC

Option 1	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	5.29%	4.83%	4.15%	5.91%	5.65%
Computed Cost of debt	0.21%	-0.12%	-0.03%	0.24%	0.00%
Computed Capital structure (% debt)	33%	32%	29%	30%	31%
Computed WACC	2.83%	2.47%	2.41%	3.53%	3.11%
Reported WACC	3.40%	4.12%	4.44%	4.77%	4.77%

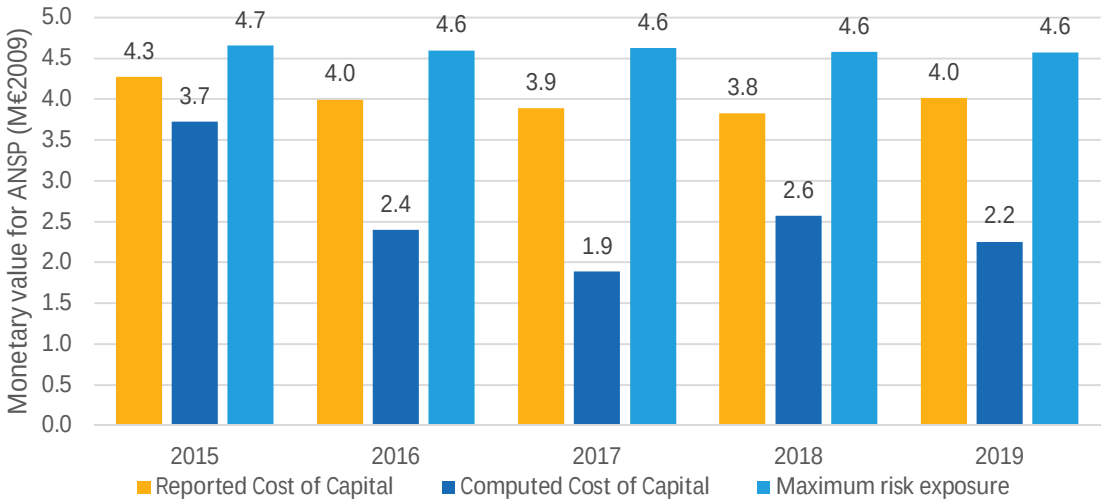
Comments

The WACC computed by the PRB ranges from 2.41% to 3.53%, in line with competitive market practices (Option 1). Skyguide reported a WACC higher in value to the PRB WACC.

Regulated Asset Base



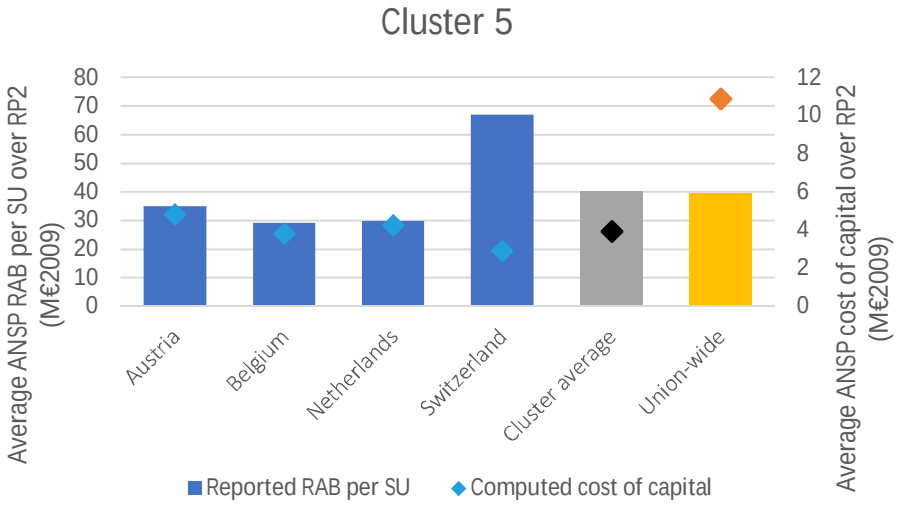
Cost of capital and Maximum risk exposure



Comments

Skyguide's cost of capital falls well below its maximum risk exposure and also below the one reported by Skyguide. This indicates that the sum that Skyguide pays to raise finance is comparable to that of an efficient private entity in similar market conditions.

Cost of capital and Comparator groups



Comments

Skyguide' RAB per service units is 40% higher than the cluster 5 average and 41% higher than the Union-wide average. Skyguide's cost of capital is 36% lower than the cluster 5 average and lower than the Union-wide average. This is due to Skygyuide's RAB in value lower than the Union-wide average coupled with its WACC towards the lower bound of values across Europe.

The United Kingdom – NATS

Cost of Capital

Nominal terms	2015D	2016D	2017D	2018D	2019D
Computed WACC (%)	4.78%	4.97%	5.27%	5.40%	5.58%
Reported RAB (M€)	1.047	980.64	923.63	874.16	815.55
Computed Cost of capital (M€)	50.02	48.71	48.64	47.20	45.49

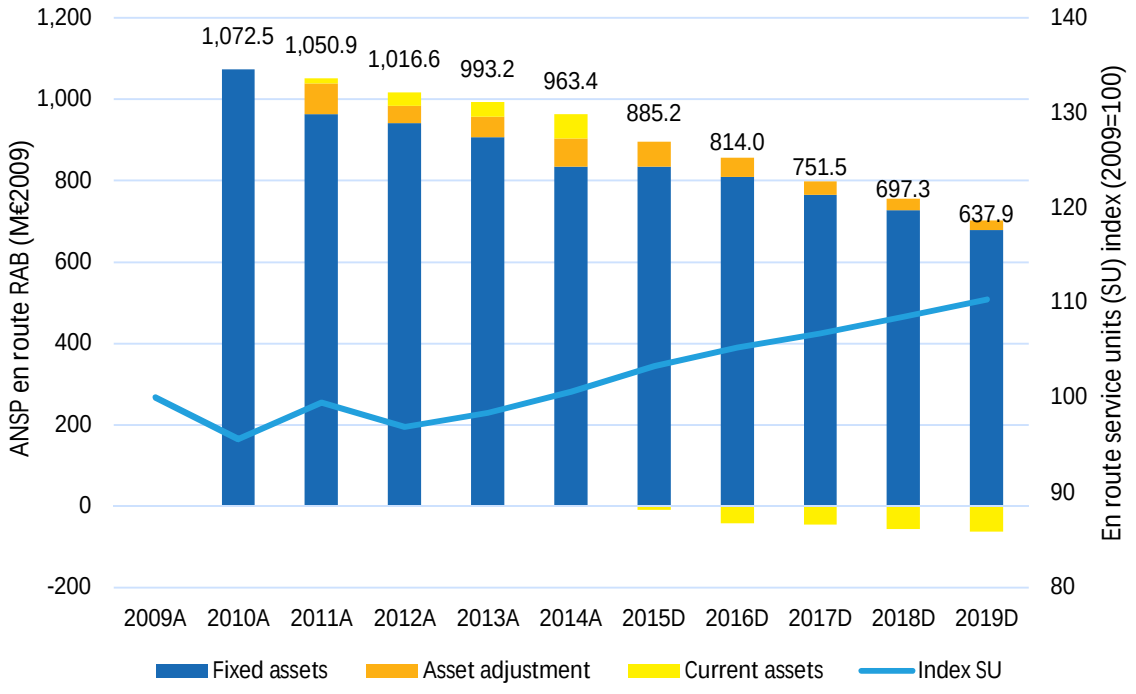
WACC

Option 4	2015D	2016D	2017D	2018D	2019D
Computed Return on equity	9.92%	7.92%	6.91%	8.78%	8.43%
Computed Cost of debt	3.45%	2.52%	2.50%	3.10%	3.02%
Computed Capital structure (% debt)	44%	35%	27%	37%	34%
Computed WACC	4.78%	4.97%	5.27%	5.40%	5.58%
Reported WACC	5.85%	5.85%	5.85%	5.85%	5.85%

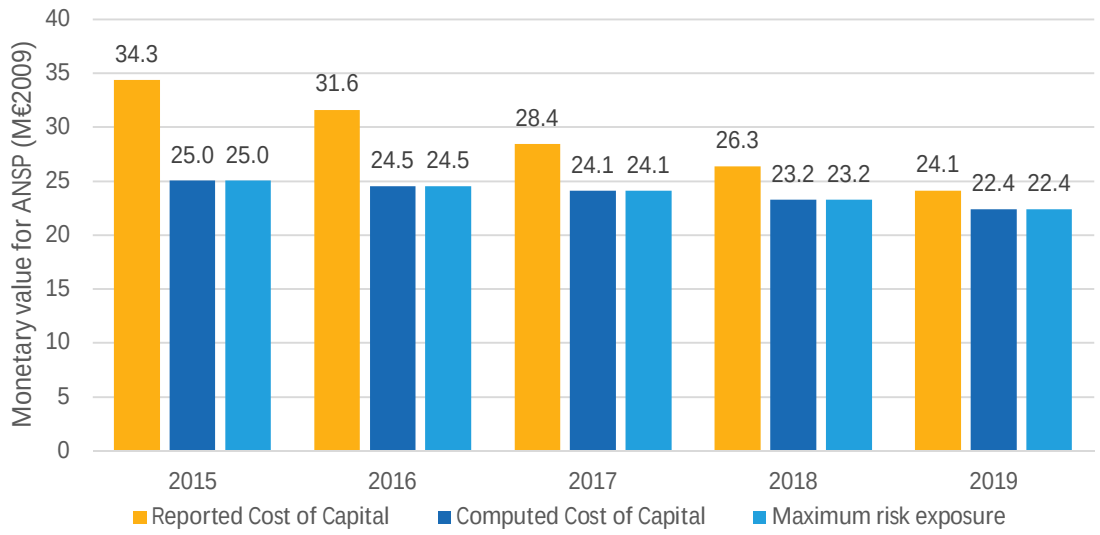
Comments

The WACC computed by the PRB ranges from 4.78% to 5.58%, after re-calculating the parameters of RoE to align with the maximum risk borne (Option 4). NATS reported a WACC in line with competitive market practices but exceeding its maximum risk exposure.

Regulated Asset Base



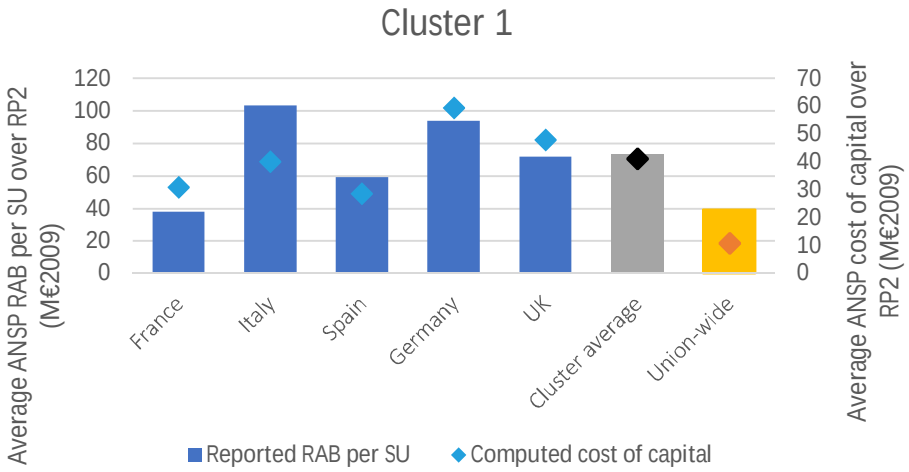
Cost of capital and Maximum risk exposure



Comments

NATS' cost of capital equals the maximum risk, after being recalculated following the PRB approach. The cost of capital reported by NATS exceeds its maximum risk exposure in 9 M€$_{2009}$ in 2015, 7 M€$_{2009}$ in 2016, 4 M€$_{2009}$ in 2017, 3 M€$_{2009}$ in 2018 and 1.7 M€$_{2009}$ in2019.

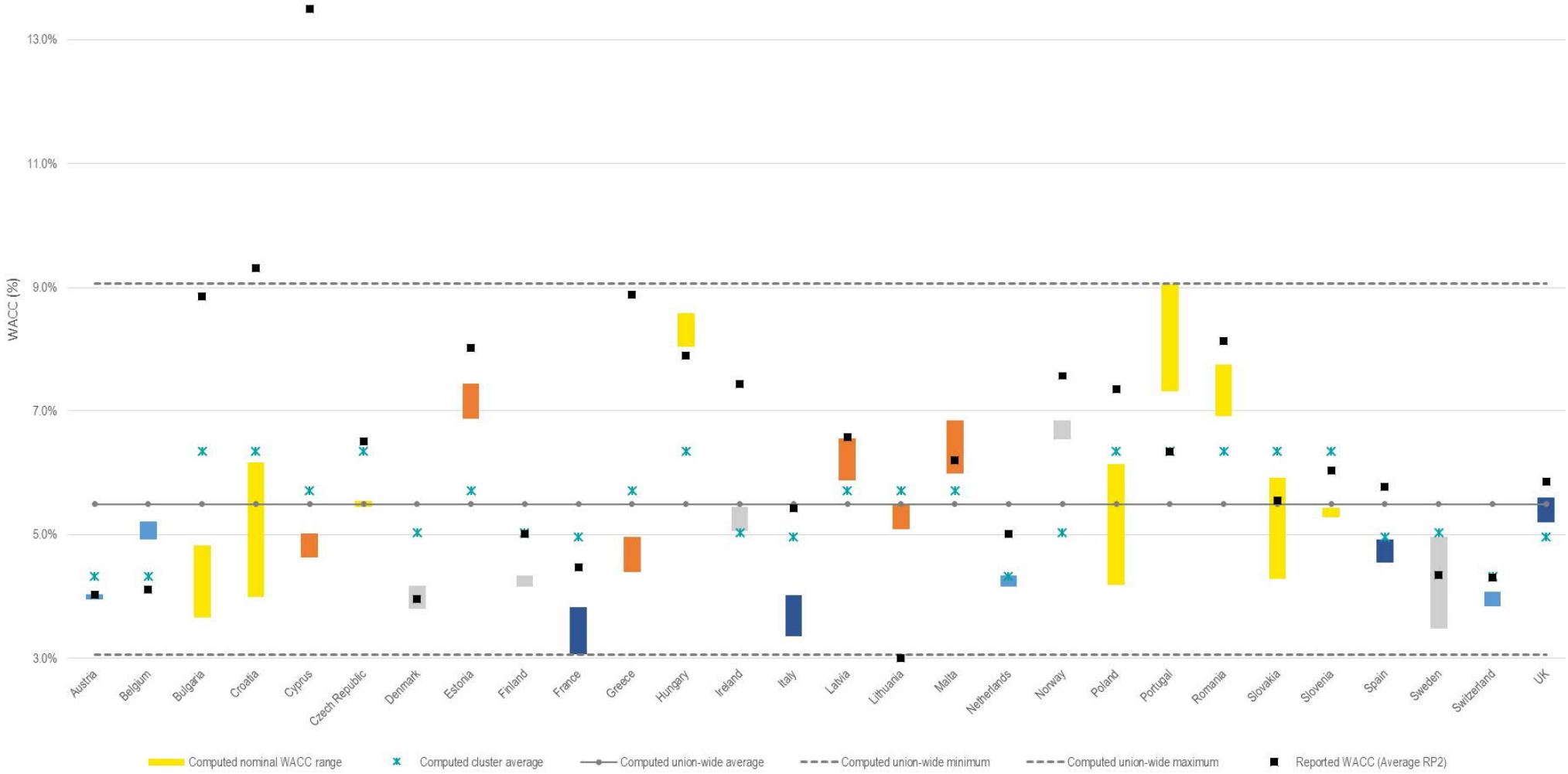
Cost of capital and Comparator groups



Comments

NATS' RAB per service units is 2% lower than the cluster 1 average and it is 45% higher than the Union-wide average. NATS' cost of capital is 14% higher than the cluster 1 average and it is 77% higher than the Union-wide average. This is due to NATS' RAB in value well above the Union-wide average whilst its WACC remains in the lower bound of values across Europe.

Annex 2 – Comparison computed and reported WACC EU-wide


13.0%
11.0%
9.0%
7.0%
5.0%
3.0%
WACC (%)
Austria
Belgium
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Malta
Netherlands
Norway
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
Switzerland
UK
Computed nominal WACC range
Computed cluster average
Computed union-wide average
Computed union-wide minimum
Computed union-wide maximum
Reported WACC (Average RP2)

Annex 3 – Additional information on WACC parameters

Equity risk premium ERP ($R_m - R_f$)

Country	2015				2016				2017				2018				2019			
	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	0.7%	6.7%	0.0%	6.0%	0.4%	6.6%	0.6%	6.3%	0.6%	6.1%	0.5%	5.5%	0.7%	7.2%	0.6%	6.5%	0.5%	7.3%	0.6%	6.8%
Belgium	0.9%	7.8%	0.9%	6.9%	0.5%	7.0%	0.9%	6.5%	0.7%	6.5%	0.7%	5.8%	0.8%	7.6%	0.8%	6.8%	0.6%	7.7%	0.8%	7.1%
Bulgaria	0.1%	9.0%	2.8%	8.8%	0.3%	8.7%	2.7%	8.4%	-0.2%	7.1%	2.2%	7.3%	0.0%	8.6%	2.6%	8.6%	-0.2%	8.9%	2.6%	9.1%
Croatia	4.2%	13.9%	3.7%	9.7%	3.6%	13.6%	4.3%	10.0%	2.9%	11.4%	3.5%	8.5%	2.3%	12.4%	4.2%	10.1%	1.9%	12.7%	4.2%	10.8%
Cyprus	3.9%	16.6%	6.7%	12.7%	3.8%	15.9%	6.4%	12.1%	3.3%	12.6%	4.1%	9.2%	2.4%	12.5%	4.2%	10.1%	0.4%	12.9%	4.2%	12.5%
Czech Republic	0.7%	7.7%	1.0%	7.0%	0.4%	7.1%	1.0%	6.7%	1.1%	6.9%	0.8%	5.9%	2.0%	9.0%	1.0%	6.9%	2.0%	9.2%	1.0%	7.2%
Denmark	0.7%	6.7%	0.0%	6.0%	0.3%	6.0%	0.0%	5.7%	0.5%	5.6%	0.0%	5.1%	0.5%	6.4%	0.0%	6.0%	0.2%	6.5%	0.0%	6.4%
Estonia	2.2%	9.2%	1.0%	7.0%	1.6%	8.3%	1.0%	6.7%	1.7%	7.6%	0.8%	5.9%	1.8%	8.7%	1.0%	6.9%	1.4%	9.0%	1.0%	7.5%
Finland	0.7%	6.7%	0.0%	6.0%	0.4%	6.6%	0.6%	6.3%	0.5%	6.0%	0.5%	5.5%	0.6%	7.1%	0.6%	6.5%	0.4%	7.3%	0.6%	6.9%
France	0.9%	7.6%	0.7%	6.7%	0.5%	6.9%	0.7%	6.4%	0.8%	6.5%	0.6%	5.7%	0.8%	7.4%	0.7%	6.6%	0.5%	7.5%	0.7%	7.0%
Germany	0.5%	6.5%	0.0%	6.0%	0.1%	5.8%	0.0%	5.7%	0.4%	5.5%	0.0%	5.1%	0.5%	6.4%	0.0%	6.0%	0.1%	6.5%	0.0%	6.4%
Greece	-0.5%	20.4%	14.9%	20.9%	-0.4%	19.5%	14.2%	19.9%	-0.1%	15.4%	10.4%	15.5%	0.0%	15.0%	9.0%	15.0%	0.0%	15.3%	9.0%	15.3%
Hungary	3.5%	13.2%	3.7%	9.7%	3.2%	12.0%	3.1%	8.8%	3.0%	10.6%	2.5%	7.6%	3.1%	12.1%	3.1%	9.0%	3.5%	12.6%	3.1%	9.1%
Ireland	1.2%	9.6%	2.4%	8.4%	0.7%	8.1%	1.7%	7.4%	0.8%	6.9%	1.0%	6.1%	1.0%	8.1%	1.2%	7.1%	0.7%	8.3%	1.2%	7.6%
Italy	1.7%	10.5%	2.8%	8.8%	1.5%	9.9%	2.7%	8.4%	2.1%	9.4%	2.2%	7.3%	2.6%	11.6%	3.1%	9.0%	2.8%	11.6%	3.1%	8.8%
Latvia	0.9%	8.7%	1.8%	7.8%	0.9%	8.3%	1.7%	7.4%	0.9%	7.4%	1.4%	6.5%	1.1%	8.7%	1.7%	7.6%	0.9%	9.0%	1.7%	8.1%
Lithuania	0.8%	8.6%	1.8%	7.8%	0.8%	8.2%	1.7%	7.4%	1.2%	7.7%	1.4%	6.5%	1.0%	8.6%	1.7%	7.6%	0.7%	8.9%	1.7%	8.2%
Malta	0.9%	8.7%	1.8%	7.8%	0.3%	7.7%	1.7%	7.4%	0.4%	6.8%	1.4%	6.5%	0.5%	8.1%	1.7%	7.6%	0.1%	8.6%	1.7%	8.4%
Netherlands	0.7%	6.7%	0.0%	6.0%	0.3%	6.0%	0.0%	5.7%	0.5%	5.6%	0.0%	5.1%	0.6%	6.5%	0.0%	6.0%	0.3%	6.6%	0.0%	6.4%
Norway	1.5%	7.5%	0.0%	6.0%	1.3%	7.0%	0.0%	5.7%	1.6%	6.7%	0.0%	5.1%	1.9%	7.8%	0.0%	6.0%	1.8%	8.0%	0.0%	6.2%
Poland	2.7%	10.0%	1.3%	7.3%	3.0%	9.9%	1.2%	6.9%	3.4%	9.5%	1.0%	6.1%	3.2%	10.4%	1.2%	7.1%	3.1%	10.7%	1.2%	7.6%
Portugal	2.4%	12.2%	3.7%	9.7%	3.2%	12.4%	3.6%	9.2%	3.1%	11.0%	2.9%	8.0%	1.9%	10.9%	3.1%	9.0%	1.4%	11.0%	3.1%	9.7%
Romania	3.6%	12.8%	3.3%	9.3%	3.4%	12.2%	3.1%	8.8%	4.0%	11.6%	2.5%	7.6%	4.8%	13.8%	3.1%	9.0%	5.2%	14.3%	3.1%	9.0%
Slovakia	0.9%	8.1%	1.3%	7.3%	0.6%	7.5%	1.2%	6.9%	1.0%	7.1%	1.0%	6.1%	0.9%	8.0%	1.2%	7.1%	0.7%	8.3%	1.2%	7.7%
Slovenia	1.7%	11.0%	3.3%	9.3%	1.2%	10.0%	3.1%	8.8%	1.1%	8.1%	1.8%	6.9%	1.1%	9.3%	2.2%	8.2%	0.4%	9.6%	2.2%	9.2%
Spain	1.7%	10.6%	2.8%	8.8%	1.4%	9.8%	2.7%	8.4%	1.6%	8.8%	2.2%	7.3%	1.4%	9.6%	2.2%	8.2%	1.2%	9.8%	2.2%	8.6%
Sweden	0.7%	6.7%	0.0%	6.0%	0.4%	6.1%	0.0%	5.7%	0.7%	5.8%	0.0%	5.1%	0.7%	6.6%	0.0%	6.0%	0.4%	6.7%	0.0%	6.3%
Switzerland	-0.1%	5.9%	0.0%	6.0%	-0.3%	5.3%	0.0%	5.7%	-0.1%	5.0%	0.0%	5.1%	0.0%	6.0%	0.0%	6.0%	-0.2%	6.0%	0.0%	6.3%
United King-dom	1.8%	8.4%	0.6%	6.6%	1.2%	7.5%	0.6%	6.3%	1.2%	6.9%	0.6%	5.7%	1.4%	8.1%	0.7%	6.6%	1.3%	8.2%	0.7%	6.8%

Table 10 - Extended calculations for equity risk premium for RP2. Source: Damodaran

Asset beta (β_a)

Country	Company Name	2015	2016	2017	2018	2019
Austria	Flughafen Wien Aktiengesellschaft (WBAG:FLU)	0.36	0.65	0.82	0.60	0.61
	VERBUND AG (WBAG:VER)	0.64	0.59	0.62	0.94	0.78
	Telekom Austria Aktiengesellschaft (WBAG:TKA)	0.53	0.43	0.59	0.54	0.53
	Average	**0.51**	**0.56**	**0.67**	**0.69**	**0.64**
Belgium	Proximus PLC (ENXTBR:PROX)	0.82	0.75	0.39	0.66	0.66
	Elia System Operator SA (ENXTBR:ELI)	0.34	0.36	0.38	0.34	0.35
	Average	**0.58**	**0.55**	**0.38**	**0.50**	**0.50**
Bulgaria	Oil and Gas Exploration and Production AD (BUL:4O1)	0.81	-0.28	0.43	0.76	0.54
	EBIOSS Energy, SE (BME:EBI)	0.37	0.23	0.71	NA	NA
	Capman Green Energy Fund AD (BUL:C4P)	0.31	0.35	0.32	0.35	0.34
	Average	**0.50**	**0.10**	**0.49**	**0.56**	**0.44**
Croatia	INA-Industrija nafte, d.d. (ZGSE:INA)	0.75	1.29	0.24	0.08	0.42
	Hrvatski Telekom d.d. (ZGSE:HT)	1.22	0.91	0.70	0.82	0.88
	Luka Rijeka d.d. (ZGSE:LKRI)	1.04	1.13	0.78	0.69	0.84
	Average	**1.00**	**1.11**	**0.58**	**0.53**	**0.71**
Cyprus	Petrolina (Holdings) Public Ltd (CSE:PHL)	0.47	0.61	0.42	0.37	0.43
	Average	**0.47**	**0.61**	**0.42**	**0.37**	**0.43**
Czech Republic	CEZ, a. s. (SEP:CEZ)	0.66	0.67	0.38	0.65	0.61
	Average	**0.66**	**0.67**	**0.38**	**0.65**	**0.61**
Denmark	Københavns Lufthavne A/S (CPSE:KBHL)	0.64	0.67	0.72	0.42	0.55
	Average	**0.64**	**0.67**	**0.72**	**0.42**	**0.55**
Estonia	AS Tallinna Sadam (TLSE:TSM1T)	NA	NA	NA	0.50	NA
	AS Tallink Grupp (TLSE:TAL1T)	0.32	0.25	0.32	0.29	0.30
	AS Tallinna Vesi (TLSE:TVEAT)	0.45	0.41	0.61	0.44	0.46
	Average	**0.39**	**0.33**	**0.46**	**0.41**	**0.38**
Finland	Finnair Oyj (HLSE:FIA1S)	NA	0.89	0.43	1.69	1.17
	Neste Oyj (HLSE:NESTE)	0.81	0.82	0.45	0.97	0.83
	Average	**0.81**	**0.86**	**0.44**	**1.33**	**1.00**
France	Air France-KLM SA (ENXTPA:AF)	NA	NA	NA	NA	NA
	Aéroports de Paris SA (ENXTPA:ADP)	0.68	0.55	0.68	0.76	0.70
	Iliad SA (ENXTPA:ILD)	0.70	0.64	0.89	0.58	0.66
	Electricité de France S.A. (ENXTPA:EDF)	NA	NA	0.75	0.64	0.70
	Orange S.A. (ENXTPA:ORA)	0.75	0.61	0.56	0.56	0.60

Country	Company Name	2015	2016	2017	2018	2019
	ENGIE SA (ENXTPA:ENGI)	0.78	0.69	0.83	0.82	0.80
	Suez SA (ENXTPA:SEV)	0.61	0.54	0.55	0.46	0.51
	Average	**0.70**	**0.61**	**0.71**	**0.64**	**0.66**
Hungary	MOL Magyar Olaj- es Gazipari Nyilvano-san Mukodo Reszvenytarsasag (BUSE:MOL)	0.82	0.78	0.88	1.00	0.91
	Magyar Telekom Telecommunications Public Limited Company (BUSE:MTELE-KOM)	0.37	0.42	0.30	0.34	0.35
	Average	**0.59**	**0.60**	**0.59**	**0.67**	**0.63**
Germany	Deutsche Lufthansa AG (DB:LHA)	0.36	NA	0.68	0.48	0.50
	Fraport AG (XTRA:FRA)	0.50	0.58	0.40	0.63	0.56
	Deutsche Telekom AG (DB:DTE)	0.71	0.62	0.49	0.54	0.58
	Telefónica Deutschland Holding AG (DB:O2D)	0.78	0.84	0.79	0.71	0.76
	RWE Aktiengesellschaft (DB:RWE)	NA	0.44	0.63	1.21	0.88
	freenet AG (DB:FNTN)	0.79	0.59	0.46	0.69	0.65
	Average	**0.63**	**0.62**	**0.58**	**0.71**	**0.65**
Greece	Aegean Airlines S.A. (ATSE:AEGN)	0.85	1.10	0.88	1.32	1.13
	Hellenic Telecommunications Organiza-tion S.A. (ATSE:HTO)	0.70	0.80	0.69	0.89	0.81
	Terna Energy Societe Anonyme Com-mercial Technical Company (ATSE:TEN-ERGY)	0.49	NA	0.36	0.36	0.39
	Average	**0.68**	**0.95**	**0.64**	**0.86**	**0.78**
Ireland	Ryanair Holdings plc (ISE:RY4C)	0.93	1.13	1.18	1.00	1.04
	Lansdowne Oil & Gas plc (AIM:LOGP)	1.18	0.99	0.74	1.24	1.10
	Average	**1.05**	**1.06**	**0.96**	**1.12**	**1.07**
Italy	Aeroporto Guglielmo Marconi di Bo-logna S.p.A. (BIT:ADB)	0.57	0.66	0.78	0.86	0.77
	Tiscali Spa (BIT:TIS)	NA	0.76	0.53	NA	NA
	Ascopiave S.p.A. (BIT:ASC)	0.55	0.55	0.47	0.74	0.63
	ERG S.p.A. (BIT:ERG)	0.41	0.41	0.25	0.51	0.43
	Edison S.p.A. (BIT:EDNR)	0.49	0.93	0.39	0.56	0.58
	Telecom Italia S.p.A. (BIT:TIT)	0.41	NA	NA	NA	NA
	Iren SpA (BIT:IRE)	0.42	0.48	0.17	0.43	0.39
	Average	**0.47**	**0.63**	**0.43**	**0.62**	**0.56**
Latvia	AS Latvijas Gaze (RISE:GZE1R)	0.32	0.21	0.37	0.64	0.47
	Average	**0.32**	**0.21**	**0.37**	**0.64**	**0.47**
Lithuania	LITGRID AB (NSEL:LGD1L)	0.11	0.33	0.35	0.41	0.34
	Average	**0.11**	**0.33**	**0.35**	**0.41**	**0.34**

Country	Company Name	2015	2016	2017	2018	2019
Malta	Malta International Airport p.l.c. (MTSE:MIA)	0.47	0.14	0.25	0.51	0.40
	Average	**0.47**	**0.14**	**0.25**	**0.51**	**0.40**
Netherlands	Koninklijke KPN N.V. (ENXTAM:KPN)	0.58	0.62	0.54	0.66	0.62
	Average	**0.58**	**0.62**	**0.54**	**0.66**	**0.62**
Norway	Equinor ASA (OB:EQNR)	1.06	0.91	0.98	0.98	0.98
	Aker BP ASA (OB:AKERBP)	NA	0.77	1.20	1.45	1.22
	Average	**1.06**	**0.84**	**1.09**	**1.22**	**1.10**
Poland	PGE Polska Grupa Energetyczna S.A. (WSE:PGE)	0.76	0.72	0.69	0.59	0.66
	ENEA S.A. (WSE:ENA)	0.53	0.54	0.60	0.42	0.49
	TAURON Polska Energia S.A. (WSE:TPE)	NA	NA	NA	NA	NA
	Polskie Górnictwo Naftowe i Gazownictwo S.A. (WSE:PGN)	0.94	0.79	0.81	0.90	0.87
	Orange Polska S.A. (WSE:OPL)	0.66	0.35	0.42	0.43	0.45
	PKP Cargo S.A. (WSE:PKP)	0.55	0.61	0.55	0.61	0.59
	Average	**0.69**	**0.60**	**0.61**	**0.59**	**0.61**
Portugal	Galp Energia, SGPS, S.A. (ENXTLS:GALP)	0.91	0.85	0.63	0.95	0.87
	REN - Redes Energéticas Nacionais, SGPS, S.A. (ENXTLS:RENE)	NA	NA	NA	NA	NA
	Average	**0.91**	**0.85**	**0.63**	**0.95**	**0.87**
Romania	Societatea Energetica Electrica S.A. (BVB:EL)	1.06	1.02	1.15	0.89	0.98
	S.N.G.N. RomGaz S.A. (BVB:SNG)	1.04	1.54	0.90	1.20	1.18
	Average	**1.05**	**1.28**	**1.02**	**1.05**	**1.08**
Slovakia	SLOVNAFT, a.s. (BSSE:1SLN01AE)	0.93	1.27	1.45	0.90	1.06
	Average	**0.93**	**1.27**	**1.45**	**0.90**	**1.06**
Slovenia	Telekom Slovenije, d.d. (LJSE:TLSG)	1.10	0.47	0.65	0.56	0.65
	Average	**1.10**	**0.47**	**0.65**	**0.56**	**0.65**
Spain	International Consolidated Airlines Group, S.A. (LSE:IAG)	0.68	0.57	0.83	0.95	0.82
	Aena S.M.E., S.A. (BME:AENA)	0.47	0.53	0.60	0.71	0.62
	Red Eléctrica Corporación, S.A. (BME:REE)	0.56	0.54	0.48	0.59	0.56
	Endesa, S.A. (BME:ELE)	0.54	0.64	0.76	0.70	0.68
	Repsol, S.A. (BME:REP)	0.74	0.74	0.62	0.73	0.71
	Cellnex Telecom, S.A. (BME:CLNX)	0.43	0.61	0.51	0.70	0.61
	Enagás, S.A. (BME:ENG)	0.50	0.40	0.42	0.56	0.50
	EDP Renováveis, S.A. (ENXTLS:EDPR)	0.62	0.49	0.29	0.46	0.46
	Average	**0.57**	**0.56**	**0.56**	**0.67**	**0.62**

Country	Company Name	2015	2016	2017	2018	2019
Sweden	SAS AB (publ) (OM:SAS)	0.39	0.61	1.38	0.76	0.77
	Telia Company AB (publ) (OM:TELIA)	0.60	0.67	0.46	0.60	0.59
	Tele2 AB (publ) (OM:TEL2 B)	0.72	0.66	0.64	0.63	0.65
	Average	**0.57**	**0.64**	**0.83**	**0.66**	**0.67**
Switzerland	Flughafen Zürich AG (SWX:FHZN)	0.71	0.71	0.82	0.87	0.81
	BKW AG (SWX:BKW)	0.45	0.42	0.59	0.54	0.51
	Swisscom AG (SWX:SCMN)	0.42	0.58	0.59	0.66	0.60
	Sunrise Communications Group AG (SWX:SRCG)	0.45	0.47	0.54	0.73	0.61
	Average	**0.51**	**0.55**	**0.63**	**0.70**	**0.63**
UK	Dart Group PLC (AIM:DTG)	0.39	0.64	0.57	1.31	0.92
	International Consolidated Airlines Group, S.A.(LSE:IAG)	0.68	0.57	0.83	0.95	0.82
	easyJet plc (LSE:EZJ)	0.57	0.17	0.60	0.85	0.65
	Air Partner plc (LSE:AIR)	0.68	0.70	1.45	0.84	0.89
	Gama Aviation Plc (AIM:GMAA)	0.40	0.16	0.16	0.25	0.25
	SSE plc (LSE:SSE)	0.61	0.63	0.48	0.45	0.51
	United Utilities Group PLC (LSE:UU.)	0.48	0.41	0.43	0.33	0.38
	Severn Trent Plc (LSE:SVT)	0.44	0.47	0.52	0.34	0.41
	Pennon Group Plc (LSE:PNN)	0.53	0.48	0.48	0.47	0.48
	TalkTalk Telecom Group PLC (LSE:TALK)	0.67	0.96	0.15	0.87	0.73
	Gamma Communications plc (AIM:GAMA)	0.48	0.43	0.58	0.81	0.65
	Average	**0.54**	**0.51**	**0.57**	**0.68**	**0.61**
	Weighted Average of asset beta	**0.60**	**0.62**	**0.59**	**0.70**	**0.65**

Table 11 - Extended calculations for asset beta per ANSPs for RP2. Source: Capital IQ data base

Gearing (D/E)

Country	Company Name	2015	2016	2017	2018	2019
Austria	Flughafen Wien Aktiengesellschaft (WBAG:FLU)	27.13%	21.20%	12.72%	11.25%	15.06%
	VERBUND AG (WBAG:VER)	79.58%	55.97%	38.22%	19.99%	38.06%
	Telekom Austria Aktiengesellschaft (WBAG:TKA)	79.77%	67.99%	49.24%	66.07%	61.10%
	Average	**62.16%**	**48.39%**	**33.39%**	**32.44%**	**38.07%**
Belgium	Proximus PLC (ENXTBR:PROX)	24.01%	25.26%	29.01%	34.83%	29.70%
	Elia System Operator SA (ENXTBR:ELI)	103.02%	87.29%	95.03%	122.13%	101.48%
	Average	**63.52%**	**56.27%**	**62.02%**	**78.48%**	**65.59%**
Bulgaria	Oil and Gas Exploration and Production AD (BUL:4O1)	-14.11%	-13.28%	-17.05%	-17.67%	-16.00%
	EBIOSS Energy, SE (BME:EBI)	50.46%	95.35%	146.72%	NM	121.03%
	Capman Green Energy Fund AD (BUL:C4P)	0.00%	0.00%	0.00%	0.00%	0.00%
	Average	**12.12%**	**27.36%**	**43.22%**	**-8.83%**	**35.01%**
Croatia	INA-Industrija nafte, d.d. (ZGSE:INA)	10.62%	8.96%	4.54%	5.47%	6.33%
	Hrvatski Telekom d.d. (ZGSE:HT)	-26.61%	-16.97%	-20.24%	-22.37%	-19.86%
	Luka Rijeka d.d. (ZGSE:LKRI)	-28.08%	-18.91%	-4.37%	1.28%	-7.33%
	Average	**-14.69%**	**-8.97%**	**-6.69%**	**-5.20%**	**-6.96%**
Cyprus	Petrolina (Holdings) Public Ltd (CSE:PHL)	63.14%	78.82%	72.55%	64.21%	71.86%
	Average	**63.14%**	**78.82%**	**72.55%**	**64.21%**	**71.86%**
Czech Republic	CEZ, a. s. (SEP:CEZ)	54.60%	58.81%	51.33%	52.30%	54.15%
	Average	**54.60%**	**58.81%**	**51.33%**	**52.30%**	**54.15%**
Denmark	Københavns Lufthavne A/S (CPSE:KBHL)	18.18%	11.86%	13.60%	16.54%	14.00%
	Average	**18.18%**	**11.86%**	**13.60%**	**16.54%**	**14.00%**
Estonia	AS Tallinna Sadam (TLSE:TSM1T)	NM	NM	NM	31.96%	31.96%
	AS Tallink Grupp (TLSE:TAL1T)	83.61%	80.02%	56.93%	63.08%	66.68%
	AS Tallinna Vesi (TLSE:TVEAT)	21.61%	22.97%	25.30%	17.89%	22.05%
	Average	**52.61%**	**51.50%**	**41.11%**	**37.64%**	**40.23%**
Finland	Finnair Oyj (HLSE:FIA1S)	NM	-13.15%	-14.68%	-42.20%	-23.34%
	Neste Oyj (HLSE:NESTE)	19.81%	8.78%	3.99%	0.31%	4.36%
	Average	**19.81%**	**-2.19%**	**-5.35%**	**-20.94%**	**-9.49%**
France	Air France-KLM SA (ENXTPA:AF)	NM	NM	NM	NM	NA
	Aéroports de Paris SA (ENXTPA:ADP)	30.17%	32.83%	26.24%	31.70%	30.26%
	Iliad SA (ENXTPA:ILD)	9.24%	15.31%	20.79%	54.95%	30.35%
	Electricité de France S.A. (ENXTPA:EDF)	NM	NM	137.12%	93.17%	115.14%

Country	Company Name	2015	2016	2017	2018	2019
	Orange S.A. (ENXTPA:ORA)	72.50%	62.96%	59.03%	72.69%	64.90%
	ENGIE SA (ENXTPA:ENGI)	45.48%	52.40%	42.06%	53.84%	49.43%
	Suez SA (ENXTPA:SEV)	77.07%	84.30%	74.57%	94.09%	84.32%
	Average	**46.89%**	**49.56%**	**59.97%**	**66.74%**	**62.40%**
Hungary	MOL Magyar Olaj- es Gazipari Nyilvano-san Mukodo Reszvenytarsasag (BUSE:MOL)	32.91%	32.20%	18.19%	14.36%	21.58%
	Magyar Telekom Telecommunications Public Limited Company (BUSE:MTELE-KOM)	87.82%	67.53%	61.44%	56.96%	61.98%
	Average	**60.37%**	**49.86%**	**39.81%**	**35.66%**	**41.78%**
Germany	Deutsche Lufthansa AG (DB:LHA)	145.00%	NM	54.81%	99.48%	77.14%
	Fraport AG (XTRA:FRA)	61.11%	53.84%	45.61%	65.50%	54.99%
	Deutsche Telekom AG (DB:DTE)	72.28%	78.04%	77.45%	78.45%	77.98%
	Telefónica Deutschland Holding AG (DB:O2D)	12.29%	10.32%	11.79%	15.28%	12.46%
	RWE Aktiengesellschaft (DB:RWE)	NM	93.87%	94.26%	-6.71%	60.47%
	freenet AG (DB:FNTN)	9.98%	51.98%	42.93%	87.13%	60.68%
	Average	**60.13%**	**57.61%**	**54.47%**	**56.52%**	**57.29%**
Greece	Aegean Airlines S.A. (ATSE:AEGN)	-26.40%	-43.45%	-43.72%	-46.35%	-44.51%
	Hellenic Telecommunications Organiza-tion S.A. (ATSE:HTO)	22.16%	16.34%	16.39%	19.24%	17.32%
	Terna Energy Societe Anonyme Com-mercial Technical Company (ATSE:TEN-ERGY)	127.07%	NM	124.64%	101.54%	113.09%
	Average	**40.94%**	**-13.56%**	**32.44%**	**24.81%**	**28.64%**
Ireland	Ryanair Holdings plc (ISE:RY4C)	-1.66%	3.29%	4.90%	12.57%	6.92%
	Lansdowne Oil & Gas plc (AIM:LOGP)	45.28%	22.75%	22.50%	10.24%	18.50%
	Average	**21.81%**	**13.02%**	**13.70%**	**11.41%**	**12.71%**
Italy	Aeroporto Guglielmo Marconi di Bo-logna S.p.A. (BIT:ADB)	-1.89%	4.24%	1.79%	2.33%	2.79%
	Tiscali Spa (BIT:TIS)	NM	138.11%	148.40%	NM	143.26%
	Ascopiave S.p.A. (BIT:ASC)	24.75%	16.23%	15.94%	18.00%	16.72%
	ERG S.p.A. (BIT:ERG)	84.44%	109.33%	55.41%	58.42%	74.39%
	Edison S.p.A. (BIT:EDNR)	30.31%	24.51%	2.93%	8.59%	12.01%
	Telecom Italia S.p.A. (BIT:TIT)	130.74%	NM	NM	NM	NA
	Iren SpA (BIT:IRE)	135.96%	139.96%	88.60%	95.38%	107.98%
	Average	**67.39%**	**72.06%**	**52.18%**	**36.54%**	**59.52%**
Latvia	AS Latvijas Gaze (RISE:GZE1R)	-19.00%	-46.79%	4.21%	6.71%	-11.96%
	Average	**-19.00%**	**-46.79%**	**4.21%**	**6.71%**	**-11.96%**
Lithuania	LITGRID AB (NSEL:LGD1L)	56.78%	46.15%	42.67%	37.96%	42.26%
	Average	**56.78%**	**46.15%**	**42.67%**	**37.96%**	**42.26%**

Country	Company Name	2015	2016	2017	2018	2019
Malta	Malta International Airport p.l.c. (MTSE:MIA)	4.01%	2.63%	-0.12%	-2.05%	0.15%
	Average	**4.01%**	**2.63%**	**-0.12%**	**-2.05%**	**0.15%**
Netherlands	Koninklijke KPN N.V. (ENXTAM:KPN)	53.27%	64.85%	48.29%	65.26%	59.47%
	Average	**53.27%**	**64.85%**	**48.29%**	**65.26%**	**59.47%**
Norway	Equinor ASA (OB:EQNR)	37.47%	37.14%	29.16%	21.39%	29.23%
	Aker BP ASA (OB:AKERBP)	NM	41.18%	38.22%	22.25%	33.89%
	Average	**37.47%**	**39.16%**	**33.69%**	**21.82%**	**31.56%**
Poland	PGE Polska Grupa Energetyczna S.A. (WSE:PGE)	20.20%	33.23%	37.75%	52.87%	41.28%
	ENEA S.A. (WSE:ENA)	82.44%	103.02%	105.29%	122.12%	110.14%
	TAURON Polska Energia S.A. (WSE:TPE)	NM	NM	NM	NM	NA
	Polskie Górnictwo Naftowe i Gazownictwo S.A. (WSE:PGN)	2.32%	3.22%	2.94%	1.25%	2.47%
	Orange Polska S.A. (WSE:OPL)	50.34%	98.55%	87.82%	113.01%	99.79%
	PKP Cargo S.A. (WSE:PKP)	42.30%	68.49%	61.05%	69.68%	66.41%
	Average	**39.52%**	**61.30%**	**58.97%**	**71.79%**	**64.02%**
Portugal	Galp Energia, SGPS, S.A. (ENXTLS:GALP)	29.28%	18.07%	16.76%	15.82%	16.88%
	REN - Redes Energéticas Nacionais, SGPS, S.A. (ENXTLS:RENE)	NM	NM	NM	NM	NA
	Average	**29.28%**	**18.07%**	**16.76%**	**15.82%**	**16.88%**
Romania	Societatea Energetica Electrica S.A. (BVB:EL)	-47.13%	-41.02%	-13.89%	-4.97%	-19.96%
	S.N.G.N. RomGaz S.A. (BVB:SNG)	-26.44%	-31.60%	-23.94%	-12.05%	-22.53%
	Average	**-36.79%**	**-36.31%**	**-18.92%**	**-8.51%**	**-21.25%**
Slovakia	SLOVNAFT, a.s. (BSSE:1SLN01AE)	4.50%	5.73%	-6.96%	-0.85%	-0.69%
	Average	**4.50%**	**5.73%**	**-6.96%**	**-0.85%**	**-0.69%**
Slovenia	Telekom Slovenije, d.d. (LJSE:TLSG)	60.71%	55.88%	54.77%	96.04%	68.90%
	Average	**60.71%**	**55.88%**	**54.77%**	**96.04%**	**68.90%**
Spain	International Consolidated Airlines Group, S.A. (LSE:IAG)	25.09%	40.27%	9.43%	10.99%	20.23%
	Aena S.M.E., S.A. (BME:AENA)	59.96%	43.27%	28.83%	33.42%	35.17%
	Red Eléctrica Corporación, S.A. (BME:REE)	48.83%	52.86%	48.25%	45.46%	48.86%
	Endesa, S.A. (BME:ELE)	26.17%	27.76%	30.42%	31.30%	29.83%
	Repsol, S.A. (BME:REP)	107.58%	61.97%	47.87%	38.55%	49.46%
	Cellnex Telecom, S.A. (BME:CLNX)	21.74%	45.43%	53.02%	60.38%	52.94%
	Enagás, S.A. (BME:ENG)	69.87%	91.74%	83.67%	72.92%	82.78%
	EDP Renováveis, S.A. (ENXTLS:EDPR)	55.59%	50.85%	45.66%	43.62%	46.71%
	Average	**51.85%**	**51.77%**	**43.39%**	**42.08%**	**45.75%**

Country	Company Name	2015	2016	2017	2018	2019
Sweden	SAS AB (publ) (OM:SAS)	17.32%	32.73%	-3.20%	3.82%	11.12%
	Telia Company AB (publ) (OM:TELIA)	43.51%	45.83%	39.40%	43.22%	42.82%
	Tele2 AB (publ) (OM:TEL2 B)	26.06%	29.36%	20.76%	35.98%	28.70%
	Average	**28.96%**	**35.97%**	**18.98%**	**27.67%**	**27.54%**
Switzerland	Flughafen Zürich AG (SWX:FHZN)	14.07%	10.42%	8.34%	13.62%	10.79%
	BKW AG (SWX:BKW)	24.91%	24.14%	15.72%	16.24%	18.70%
	Swisscom AG (SWX:SCMN)	42.60%	41.63%	32.52%	36.56%	36.90%
	Sunrise Communications Group AG (SWX:SRCG)	64.87%	57.49%	30.26%	31.75%	39.83%
	Average	**36.61%**	**33.42%**	**21.71%**	**24.54%**	**26.56%**
UK	Dart Group PLC (AIM:DTG)	-36.93%	-22.92%	-19.99%	-40.08%	-27.66%
	International Consolidated Airlines Group, S.A.(LSE:IAG)	25.09%	40.27%	9.43%	10.99%	20.23%
	easyJet plc (LSE:EZJ)	-4.30%	-8.88%	-11.48%	-9.06%	-9.81%
	Air Partner plc (LSE:AIR)	-29.05%	-36.44%	-21.55%	-23.22%	-27.07%
	Gama Aviation Plc (AIM:GMAA)	5.73%	25.28%	9.28%	2.86%	12.47%
	SSE plc (LSE:SSE)	49.67%	47.85%	68.08%	86.27%	67.40%
	United Utilities Group PLC (LSE:UU.)	105.97%	116.16%	130.87%	148.35%	131.79%
	Severn Trent Plc (LSE:SVT)	103.95%	111.10%	120.73%	143.41%	125.08%
	Pennon Group Plc (LSE:PNN)	79.09%	87.69%	92.88%	112.91%	97.83%
	TalkTalk Telecom Group PLC (LSE:TALK)	34.02%	51.25%	52.32%	61.49%	55.02%
	Gamma Communications plc (AIM:GAMA)	-6.39%	-6.59%	-5.25%	-4.53%	-5.46%
	Average	**29.71%**	**36.80%**	**38.66%**	**44.49%**	**39.98%**
	Weighted Average of gearing	**48.32%**	**47.68%**	**41.65%**	**42.02%**	**44.82%**

Table 12 - Extended calculations for gearing per ANSPs for RP2. Source: Capital IQ data base

Cost of debt

Country	2015				2016				2017				2018				2019			
	R_f	Spread	CRP	CoD	Spread	R_m	CRP	CoD	R_f	Spread	CRP	CoD	R_f	Spread	CRP	CoD	R_f	Spread	CRP	CoD
Austria	0.7%	1.0%		1.7%	0.4%	0.7%		1.1%	0.6%	0.7%		1.3%	0.7%	1.3%		2.0%	0.5%	1.3%		1.8%
Belgium	0.9%	0.8%		1.7%	0.5%	0.7%		1.1%	0.7%	0.7%		1.4%	0.8%	1.1%		1.9%	0.6%	1.1%		1.7%
Bulgaria	n/a	2.2%	2.8%	0.0%	n/a	1.6%	2.7%	0.0%	n/a	1.3%	2.2%	0.0%	n/a	2.0%	2.6%	0.0%	n/a	2.0%	2.6%	0.0%
Croatia	4.2%	2.2%	3.7%	10.1%	3.6%	1.6%	4.3%	9.5%	2.9%	1.3%	3.5%	7.6%	2.3%	2.0%	4.2%	8.4%	1.9%	2.0%	4.2%	8.1%
Cyprus	3.9%	1.1%		5.1%	3.8%	1.1%		4.8%	3.3%	0.8%		4.1%	2.4%	1.5%		3.9%	n/a	1.5%		0.0%
Czech Republic	0.7%	2.2%	1.0%	4.0%	0.4%	1.6%	1.0%	3.0%	1.1%	1.3%	0.8%	3.2%	2.0%	2.0%	1.0%	5.0%	2.0%	2.0%	1.0%	5.0%
Denmark	0.7%	2.2%	0.0%	2.9%	0.3%	1.6%	0.0%	1.9%	0.5%	1.3%	0.0%	1.9%	0.5%	2.0%	0.0%	2.5%	0.2%	2.0%	0.0%	2.2%
Estonia	n/a	1.1%		0.0%	n/a	1.1%		0.0%	n/a	0.8%		0.0%	n/a	1.5%		0.0%	n/a	1.5%		0.0%
Finland	0.7%	1.1%		1.8%	0.4%	1.1%		1.4%	0.5%	0.8%		1.3%	0.6%	1.5%		2.1%	0.4%	1.5%		1.9%
France	0.9%	0.9%		1.8%	0.5%	0.6%		1.1%	0.8%	0.6%		1.4%	0.8%	1.2%		2.0%	0.5%	1.2%		1.7%
Germany	0.5%	1.1%		1.7%	0.1%	1.1%		1.2%	0.4%	0.8%		1.2%	0.5%	1.6%		2.1%	0.1%	1.6%		1.7%
Greece	10.1%	4.1%		14.2%	8.3%	3.7%		12.0%	6.0%	3.4%		9.4%	4.2%	4.4%		8.6%	3.7%	4.4%		8.1%
Hungary	3.5%	2.2%	3.7%	9.4%	3.2%	1.6%	3.1%	7.9%	3.0%	1.3%	2.5%	6.8%	3.1%	2.0%	3.1%	8.1%	3.5%	2.0%	3.1%	8.5%
Ireland	1.2%	1.0%		2.2%	0.7%	0.7%		1.5%	0.8%	0.7%		1.5%	1.0%	1.3%		2.3%	0.7%	1.3%		2.0%
Italy	1.7%	1.1%		2.8%	1.5%	1.1%		2.5%	2.1%	0.8%		2.9%	2.6%	1.6%		4.2%	2.8%	1.6%		4.4%
Latvia	0.9%	2.2%	1.8%	4.9%	0.9%	1.6%	1.7%	4.2%	0.9%	1.3%	1.4%	3.6%	1.1%	2.0%	1.7%	4.7%	0.9%	2.0%	1.7%	4.5%
Lithuania	n/a	2.2%	1.8%	0.0%	n/a	1.6%	1.7%	0.0%	n/a	1.3%	1.4%	0.0%	n/a	2.0%	1.7%	0.0%	n/a	2.0%	1.7%	0.0%
Malta	n/a	1.1%		0.0%	n/a	1.1%		0.0%	n/a	0.8%		0.0%	n/a	1.6%		0.0%	n/a	1.6%		0.0%
Netherlands	0.7%	1.1%		1.8%	0.3%	1.1%		1.3%	0.5%	0.8%		1.3%	0.6%	1.6%		2.2%	0.3%	1.6%		1.9%
Norway	1.5%	1.9%	0.0%	3.4%	1.3%	1.4%	0.0%	2.7%	1.6%	1.1%	0.0%	2.7%	1.9%	1.7%	0.0%	3.6%	1.8%	1.7%	0.0%	3.5%
Poland	2.7%	2.2%	1.3%	6.2%	3.0%	1.6%	1.2%	5.9%	3.4%	1.3%	1.0%	5.7%	3.2%	2.0%	1.2%	6.4%	3.1%	2.0%	1.2%	6.3%
Portugal	2.4%	1.1%		3.6%	3.2%	1.1%		4.3%	3.1%	0.8%		3.8%	1.9%	1.6%		3.4%	1.4%	1.6%		3.0%
Romania	3.6%	2.2%	3.3%	9.1%	3.4%	1.6%	3.1%	8.1%	4.0%	1.3%	2.5%	7.8%	4.8%	2.0%	3.1%	9.9%	5.2%	2.0%	3.1%	10.3%
Slovakia	0.9%	1.1%		2.0%	0.6%	1.1%		1.6%	1.0%	0.8%		1.8%	0.9%	1.6%		2.5%	0.7%	1.6%		2.3%
Slovenia	1.7%	1.1%		2.8%	1.2%	1.1%		2.2%	1.1%	0.8%		1.9%	1.1%	1.6%		2.7%	n/a	1.6%		0.0%
Spain	1.7%	1.1%		2.9%	1.4%	1.1%		2.5%	1.6%	0.9%		2.5%	1.4%	1.9%		3.3%	1.2%	1.9%		3.1%
Sweden	0.7%	2.6%	0.0%	3.4%	0.4%	1.8%	0.0%	2.2%	0.7%	1.5%	0.0%	2.2%	0.7%	2.1%	0.0%	2.8%	0.4%	2.1%	0.0%	2.5%
Switzerland	-0.1%	0.3%		0.2%	-0.3%	0.2%		-0.1%	-0.1%	0.1%		0.0%	0.0%	0.2%		0.2%	-0.2%	0.2%		0.0%
United King-dom	1.8%	1.6%		3.5%	1.2%	1.3%		2.5%	1.2%	1.3%		2.5%	1.4%	1.7%		3.1%	1.3%	1.7%		3.0%

Table 13 - Extended calculations for cost of debt per country for RP2. Source: Damodaran, Bloomberg and EY valuation services