*Annex "A" to decision no. 39/2023 of 9 March 2023*

**Measure 10.5 of decision no. 38/2023. Determination of the rate of return on invested capital to be used for drafting proposals for the revision of airport charges.**

## 1. Foreword

This document outlines the methodology for determining the rate of return on invested capital and sets the applicable value from 1st April until the next update, for drafting proposals for the revision of airport charges, effective throughout the entire regulatory period.

On 9th March 2023, by decision no. 38/2023, the Authority adopted the regulatory act which approved the regulatory airport charges model.

Measure 10.5.4 "Variables of the rate of return on invested capital", under point 4, states that "*All variables for the determination of WACC are calculated on the basis of the criteria set out in this Model A [omitted]*".

## 2. General principles

The rate of return on invested capital for the airport sector is estimated using the CAPM/WACC methodology and is calculated with the following formula.

$$R = g \cdot \frac{R_d\,(1-t)}{1-T} + (1-g) \cdot \frac{R_e}{1-T}$$

where:

$R_d$      nominal rate of return on debt;

$R_e$      nominal rate of return on equity;

$g$      sector-specific notional financial debt ratio (*gearing*);

*(1-g)*      equity share;

*t*      tax shield, i.e. the IRES tax rate;

*T*      tax rate, composed of IRES + IRAP;

*R*      nominal pre-tax weighted average cost of capital (WACC), i.e. nominal rate of return on capital (before taxation); this rate is converted into real terms using the Fisher formula:

$$R_r = \frac{1+R}{1+\bar{P}} - 1$$

with:

$\bar{P}$      arithmetic mean of the inflation rates planned for the years of the regulatory period, as derived from the latest available Economic and Financial Document (*Documento di Economia e Finanza – DEF*) or alternatively, the public investment deflator published in the EFD, in accordance with Measure 10.5.1, point 1.

The nominal rate of return allowed on debt is determined with the following formula:

$$R_e = RFR + \beta_e \cdot ERP$$

with:

$R_e$      cost of equity;

*RFR*      risk-free rate;

$\beta_e$      equity beta (measure of non-diversifiable systematic risk of a share);

*ERP*      equity risk premium.

The nominal rate of return on debt estimates the amount a company would pay to obtain financing under market conditions. This indicator consists of two components: the risk-free rate and the debt premium, as expressed in the following formula:

$$R_d = RFR + p_d$$

with:

$R_d$        nominal rate of return on debt;

*RFR*      risk-free rate;

$p_d$        debt premium.

## 3. Estimation of WACC parameters

The Authority estimated the parameters of the WACC formula, as specified below, with data available as of February 2023.

### 3.1 RFR

The risk-free rate (RFR) used is the yield on the ten-year BTP[1], calculated based on the daily average values of the last 12 months available. The most recent data refers to 31/12/2022 (data source: Bank of Italy).

The annual average value is 3.167%, rounded to **3.17%.**

### 3.2 Gearing

Financial leverage, defined as the ratio of debt D to equity capital E (hereinafter: D/E)), is an indicator of a company's level of indebtedness.

To determine the sector-specific value of this indicator, account was taken of the average of the (if positive) debt-to-equity (D/E) ratios of airport managing bodies in the 2017-2021 period, in accordance with Measure 10.5.6, point 2. From the leverage value, the weighting ratio D/(D+E) (gearing), is also derived for both individual companies and for the sector.

The average D/E ratio (financial leverage) is **0.715**, corresponding to a gearing of **0.417** (data source: AIDA database - Bureau van Dijk).

### 3.3 Debt premium

The debt premium is set based on the average cost of debt (calculated as the ratio of financial expenses to financial debts) from the financial statements of airport managing bodies, in accordance with measure 10.5.6, point 3, with a maximum admissible limit of two percentage points. An analysis of the financial statements for the 2017-2021 period indicated a debt premium of 0.41% (data source: AIDA database - Bureau van Dijk).

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[1] "BTP" stands for Buoni del Tesoro Poliennali, Italian government bonds (TN)

### 3.4 Tax rate

In accordance with measure 10.5.5, point 4, a tax rate of **28.82%** has been calculated, resulting from the algebraic sum of the IRES and IRAP tax rates, with the latter being 4.82%, the maximum applicable rate.

### 3.5 Equity beta

The equity beta coefficient measures the systematic, non-diversifiable risk to which a company operating in a given market is exposed. It is calculated as the ratio between the covariance of the return of a given i-th asset and the market return, and the variance of the market return.

This value is determined through a comparative analysis of the so-called comparables, i.e. of the beta coefficients of other companies operating in the same or comparable sectors.

In this regard, the initially considered comparable companies are the airport managing bodies listed in Europe, mentioned in the Explanatory Report to decision no. 80/2022, outlined below:

- Aena SME SA
- Aeroports de Paris SA
- Copenhagen Airports A/S
- Flughafen Zuerich AG
- Fraport AG Frankfurt Airport Services Worldwide
- Flughafen Wien AG
- Malta International Airport PLC
- Aerodrom Nikola Tesla ad Beograd
- Aeroporto Guglielmo Marconi di Bologna SpA
- Toscana Aeroporti SpA.

These listed companies were subjected to the following liquidity stress tests:

- Traded days: percentage of trading days of the security compared to the market opening days;
- Bid-ask spread: calculated as the percentage difference between ask price and bid price, relative to the ask price;
- Share turnover: calculated as the sum of the daily trading volume divided by the average number of outstanding shares;
- Free float: calculated as the percentage of freely negotiable shares compared to the outstanding shares.

The results are shown in Table 1; the first test, considering a 95% threshold, led to the exclusion of Malta Airport; the second test, where stocks with a spread above 1% are classified as illiquid, led to the exclusion of Copenhagen Airport, Toscana Airport, Belgrade Airport, and Bologna Airport. The five remaining companies (Zurich, Frankfurt, Paris, Vienna, and AENA) show consistent and liquid share turnover values, with the exception of Vienna, which is further corroborated by its low free float value, indicating its exclusion from the comparables. In conclusion, the companies considered sufficiently liquid according to the aforementioned liquidity stress tests are AENA, Frankfurt Airport, Paris Airport, and Zurich Airport.

**Table 1: liquidity stress test results in percentage, data referred to five years**

| Name | Traded days | Bid-ask spread | Share turnover | Free float |
|---|---|---|---|---|
| Flughafen Zuerich AG | 100% | 0.09% | 338.08% | 61.25% |
| Flughafen Wien AG | 100% | 0.72% | 14.62% | 10.06% |
| Copenhagen Airports A/S | 100% | 1.10% | 1.81% | 1.40% |
| Fraport Frankfurt Airport AG | 100% | 0.13% | 317.26% | 39.73% |
| Malta International Airport PLC | 84% | 1.69% | 5.18% | 69.90% |
| Aeroports de Paris SA | 100% | 0.18% | 112.08% | 26.67% |
| Toscana Aeroporti SpA | 96% | 2.15% | 11.81% | 27.02% |
| Aerodrom Nikola Tesla ad Beograd | 95% | 2.31% | 4.04% | 100.00% |
| Aena SME SA | 100% | 0.08% | 134.25% | 48.77% |
| Aeroporto di Bologna SpA | 100% | 1.13% | 32.84% | 60.09% |

The following elements were therefore considered:

*i.* 4 comparables (Flughafen Zurich, Fraport, Aéroports de Paris, AENA);

*ii.* observation period: 5 years of daily data (02/03/2018 – 02/03/2023);

*iii.* reference market: STOXX Europe 600;

*iv.* data source: Eikon database, Refinitiv (calculation date: 06/02/2023).

**Table 2: Beta estimate: analysis of comparables (airport sector)**

| *Comparables* | *levered beta* | tax rate | D/E | *unlevered beta* |
|---|---|---|---|---|
| **Flughafen Zuerich AG** | 0.879 | 20.03% | 77.39% | 0.543 |
| **Fraport Frankfurt Airport AG** | 1.181 | 23% | 273.21% | 0.381 |
| **Aeroports de Paris SA** | 1.0092 | 33.49% | 288.05% | 0.346 |
| **Aena SME SA** | 0.9913 | 23.5% | 142.7% | 0.474 |

Delevering is carried out, in line with the methodology adopted by the Authority in previous decisions, using the leverage and tax rate calculated on accounting values. The average of the resulting beta values is 0.436. By applying the notional values set by ART for leverage and the tax shield, equal to 0.715 and 0.24, respectively, relevering is performed, resulting in an equity beta of **0.673**.

## 3.6 Equity Risk Premium

The Authority estimates the ERP using the Dimson, Marsh & Staunton (DMS)[2] time series. The ERP is estimated based on long-term historical averages, defined as the difference between the market return and the return on risk-free assets (i.e., government bonds), assuming that past trends can provide a meaningful estimate of the expected developments of the relevant parameters.

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[2] Credit Suisse Global Investment Returns Yearbook 2019.

In general, it should be noted that, usually, the arithmetic and geometric mean of returns derived from time series analysis typically represent the upper and lower bounds of the range within which the sought parameter (ERP) is estimated. In the past, the Authority has tended to assign greater weight to the arithmetic mean over the geometric mean. This approach is supported by benchmarking results with national regulators. Specifically, the Italian Regulatory authority for communications (AGCOM) reviewed the ERP parameter, setting it at 6.07%, by modifying the estimation methodology through DMS series. This involved shifting from a purely geometric mean to a weighted mean between the arithmetic and geometric means so as to implement the recommendations of the European Commission and BEREC on this subject. The weighting applied by AGCOM is 87% for the arithmetic mean and 13% for the geometric mean. Another benchmark supporting this choice is the outcome of the application of the so-called "Blume formula[3].
Considering the various comparison benchmarks, a value of **6.01%** has been estimated based on a weighted average between the geometric and arithmetic means of the long-term time series from Dimson, Marsh, and Staunton (data source: ART processing on data from Credit Suisse, London Business School).

## 4. Conclusions

Based on the methodology outlined in measure 10.5 of the Airport charges regulatory model, as detailed in paragraph 3, and using the resulting parameters, the nominal pre-tax WACC is set at **7.50%.** The real pre-tax WACC, determined by applying the average investment deflator rate from the Economic and Financial Document for the reference period, is **5.83%**.

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[3] Blume, M.E. (1974) "Unbiased estimators of long-run expected rates of return", *Journal of the American Statistical Association*, 69:347, pp.634-638.