Squaring the Circle: What the Air Traffic Control Sector Can and Cannot Learn from Other Sectors on WACC

Introduction

The regulation and transformation of the air traffic control (ATC) sector is a policy priority for the European Commission (EC). The EC’s Aviation Strategy published in December 2015 envisages a reduction of air traffic control charges by approximately 50% by 2035 while the Commission also envisages transformative investments in the modernisation of ATC systems to be delivered by operators. Achieving both will represent a delicate balancing act for all stakeholders.

With the current “reference period” (RP2) due to end in 2019, the Commission is now preparing the ground for the next period, which is expected to run from 2020 to 2024 (RP3). However, while the EC oversees the general process and sets targets for cost efficiency applied to operating costs and capital expenditure, the precise details of the regulatory settlement have to be hammered out by national regulators and operators.

Key areas of contention for RP3 will likely be the efficiency targets applied to operating costs as well as the allowed rate of return or weighted average cost of capital (WACC) allowance that is applied to new and existing investments. The WACC allowance is an important driver of investment incentives that are necessary for promoting the adoption of new technologies. The WACC allowance for RP2 was heavily disputed by various stakeholders and led to delays in the implementation of the performance plan for the Functional Airspace Block Europe Central (FABEC) area, amongst others. The WACC allowance for RP3 will be set at a time when financing conditions differ widely across different European countries and it will apply over a period that is likely to see the end of recent ultra-loose monetary policy in Europe.

These conditions represent a new challenge to ATC regulators and operators. However, there is a large body of precedent from other regulated sectors (e.g., airports, telecommunications, and energy networks) that can inform ATC regulators’ decisions, and which will ultimately determine the ability of individual ATC providers to deliver on their investment plans.
Setting the WACC for Regulated ATC Providers

General Principles
When implementing a price control framework for regulating monopolies, regulators set the allowed return on invested assets, which they estimate based on the firm’s WACC. (The appendix describes the concept of the WACC in more detail.)

Setting the allowed WACC for a regulated company requires the regulator to give special consideration to the particular circumstances of the activity in question when it comes to determining the company’s risk exposure. These considerations commonly include assessments of risks, such as exposure to fluctuations in traffic demand and the extent to which costs can be adjusted in response to changes in demand.

While there is relatively limited experience with setting WACC allowances for ATCs, there is substantial precedent from other sectors that regulators and ATC providers can draw on. However, in the case of setting a WACC allowance for ATC providers, there are at least three sector-specific factors that need to be examined in greater detail:

- ATC providers are “capital light” operations that need to cover a high share of costs that do not immediately vary with demand (“fixed costs”), which include labour costs in particular;
- ATC providers are often closely connected to their respective governments, requiring regulators to disentangle the impact of (perceived) government guarantees and the economic risk of the operations themselves; and
- ATC providers operating in diverse locations may encounter different local conditions with respect to financing costs and/or the income of their customers and their ability to bear certain charges.

Capital Light Operations and High Fixed Costs
ATC providers differ in their cost structure from most natural monopolies like utilities. While the latter have a large asset base that means their return allowance contains a significant “cash buffer” in the form of returns and potentially “delayable” maintenance expenses, the majority of ATC providers’ costs are labour costs that are not flexible in the short term. Companies with a higher proportion of fixed costs cannot adjust their cost base in response to demand and revenue fluctuations, so their “operating leverage” is higher. Operating leverage is the fixed cost proportion of a company’s overall cost base and is a source of systematic risk.

Figure 1 shows the impact of demand/revenue fluctuations on a company’s profit margin, depending on the company’s underlying cost structure (fixed vs. variable).
The chart on the left in Figure 1 shows that a firm whose costs are all variable maintains a constant profit margin, since it is able to completely adjust its costs in response to demand/revenue fluctuations. In contrast, a company whose costs are all fixed will experience its profit margin fluctuating with the underlying demand, because it cannot adjust its costs (see chart on the right).

The relationship between a company’s return on equity and operating leverage is widely supported by academic literature and has also been recognised by regulators including the UK Competition Commission and French regulator CRE. In determining the cost of equity impact, there are a number of empirical questions to be resolved in measuring operating leverage, including the appropriate metric to use and whether a static or a dynamic approach should be taken to measure operating leverage. The applicability of the individual measures will depend on the availability of relevant data and the method in which accounting definitions are applied.

**Impact of (Perceived) State Guarantees**
A number of ATCs are currently closely intertwined with their respective governments, leading to instances where rating agencies have awarded higher credit ratings to ATCs than they might have otherwise achieved. In considering whether to incorporate such uplifts into the WACC allowance, the following needs to be taken into account:

- Doing so implies implicit state aid from the guaranteeing government to users of the airspace;
- What is the likelihood of future support in light of i) potentially deteriorating credit ratings in some countries and ii) further privatisation in the sector; and
- What form does the relationship with the state take? For example, majority state ownership may have different implications for risk compared to minority arms-length state ownership.

In fixing a WACC for a five-year period at a level that incorporates the current expectation of government support, the regulator would expose the ATC to the risk of changes in the level of government support; something the ATC cannot control and therefore is not normally well placed to bear.

**Differences in Local Conditions**
While the regulatory frameworks do share common underlying features, recognizing and responding to local conditions continues to be important for any stakeholder looking to sensibly apply the European framework at the national level. ATC regulators in Europe have to take a
variety of factors into account, including i) local financing conditions, ii) local income levels and thus income elasticity of demand for air travel, and iii) differences in the share of revenue generated from transit customers compared with revenue generated from approach customers.

With respect to local financing, there are several aspects that affect an ATC’s access to funds. For example, the currency area that the ATC operates in may inhibit their access to debt, and investors operating in different currencies will face additional exchange rate risk. This could be particularly important for ATCs who operate in relatively small currency areas or in areas with very volatile currencies. In addition, ATCs that operate in countries with low political stability, high probability of sovereign default, or other macroeconomic risk factors may be required to pay higher returns to reflect these risks. All of these risks will typically be reflected in the so-called country risk premium, which reflects country-specific peculiarities.

Local income levels and the resulting income elasticities of demand are very important when it comes to determining the appropriate beta factor for an individual ATC provider. Demand from countries with lower income levels is likely to be more sensitive to changes in the economy than in countries with higher income levels. For example, the International Air Transport Association (IATA) estimates an income elasticity of demand of 1.3 for developed economies, compared to 1.8 for developing economies. As a result, ATCs in the lower income parts of Europe are likely to face greater risk from cyclical movements in the economy, which implies a higher WACC, while elasticities in excess of 1.0 highlight the risk of elastic demand for all providers.

Finally, ATCs that serve a greater proportion of transit customers are more exposed to a customer group that isn’t “captive” in the way approach customers are. The possibility for transit passengers, services to switch to airports, and routes served by other ATCs provides greater risk to these ATCs that are more exposed to transit passengers.

Is the Current European Commission Framework Fit for Purpose?

Lessons from Other Industries for the ATC Sector

In 2014 the Commission published a report on the WACC for air navigation service providers (ANSPs) by Steer Davies Gleave (SDG). The report left national regulators with significant leeway on certain parameters while being relatively prescriptive on others.

After the controversy and significant dispute between the EC and other stakeholders over the RP2 performance plans, a wealth of regulatory precedent has developed in other sectors that ATC regulators and providers should understand and bring to bear on the debate for RP3. In their white paper on RP3, the EC’s Performance Review Body (PRB) specifically mentions the railway infrastructure, telecommunications infrastructure, and energy transmission sectors as examples that it will consider.

The SDG recommendations on risk-free rate, equity risk premium (ERP), asset beta, and cost of debt and gearing will all need to be reviewed in light of current local market conditions and established regulatory precedent. Below we discuss some recent developments in ERP and asset beta estimation other regulators have designed to take account of recent developments. A full analysis of the WACC for ATC operators would have to consider other parameters as well to develop an approach that is fit for purpose.
Equity Risk Premium

While advocating the use of short-run historical government bond yields to estimate the risk-free rate, SDG recommends taking an approach that generally mixes historic, forward-looking, and survey evidence on the equity risk premium. This approach fails to make any explicit connection between the risk-free rate estimate and the ERP estimate. It thereby fails to take account of a wealth of academic research that supports the existence of a degree of inverse correlation between the two parameters. Ignoring inverse correlation essentially leads to an underestimation of the ERP by assuming that central bank intervention in the market for risk-free assets spills over one-for-one to all financial markets. Recent analysis by the German Bundesbank confirms that the existence of significant inverse correlation has increased the ERP.

Figure 2. Bundesbank Estimate of ERP versus German Federal Bond Yields

- Implied cost of equity
- Equity risk premium
- Yield on ten-year federal bonds

% weekly data
We find similar inverse correlation when we conduct corresponding analyses for other markets including the UK, the US, France, and Italy. Regulators in other sectors including energy networks have adapted their approaches to estimating the ERP to take account of the recent increase in the ERP in different ways. Amongst others, UK’s Ofgem and Italy’s AEEGSI have increased the ERP for every drop in the risk-free rate by assuming constant total market returns, while the Finnish EMVI uses the maximum of the short-run and the long-run average of the risk-free rate as a mechanism for ensuring the total market return (i.e., the sum of the risk-free rate and the ERP) is not set too low.

European regulators have also developed robust approaches for estimating a country risk premium for those countries that are not AAA rated. With WACCs coming up for review in all EU 28 countries, the appropriate consideration of local financing costs is essential.

**Asset Beta**

In 2014 SDG fixed a range for the asset beta from 0.3 to 0.5 by primarily looking at energy networks, which it viewed as being a similar risk sector despite the fact that energy networks i) usually do not face any volume risk and ii) have significantly lower operating leverage; both of which reduce the risk for energy networks compared to ATCs.

Energy networks are typically regulated under revenue caps, where any differences in revenue due to differences between planned and outturn volumes during one regulatory period can be recouped from customers in the next regulatory period. ATCs, on the other hand, are partially exposed to volume risk under their current form of price cap, as they can only pass through a portion of demand risk to customers—making ATCs higher risk.

An updated estimate of the asset beta will also need to take more account of recent trends that have seen the betas of energy networks increase. Figure 3 shows that recent asset beta estimates for various European energy networks were in the upper half of the range that SDG postulated in 2014 despite being lower risk (as discussed above). The regulatory decisions shown in Figure 3 confirm a similar trend in observed market data for listed energy network companies.\(^\text{17}\)

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**Figure 3. Recent (2016/17) Asset Beta Estimates for European Regulators for Electricity Networks**
The above graph demonstrates that a careful review of the appropriate forward-looking asset beta for ATCs will be indispensable for determining an accurate WACC. In doing so, regulators will need to take account of local conditions such as share of transit passengers, income elasticity of demand for flights, and local financing conditions. SDG’s 2014 analysis must be updated to reflect these local conditions in each market, and should also take account of differences in volume risk and operating leverage relative to other regulated sectors.

Taking Account of Potential Changes to the Regulatory Framework

The forward-looking WACC allowance will also need to take account of any changes in the risk profile brought about by changes to the regulatory framework. These may affect required compensation through factors such as the beta, the capital structure that can be supported, and the cost of debt.

The PRB White Paper and Commission Hearing on the performance objectives for RP3 raise a number of issues under discussion that have the potential to significantly affect the risk faced by ATC providers including:

• Increased volume risk through the introduction of price caps (which do not allow for any volume risk sharing);
• Removing inflation indexation of price controls; and/or
• Amending the incentive/penalty schemes to place more weight on outputs, such as performance on delay, than inputs, such as overall traffic levels, and altering the balance of incentives from being symmetric to asymmetric.

All of the above proposals are likely to increase the risk borne by ATC providers by making the scheme less cost-oriented by exposing ATC providers to greater demand and inflation risk as well as allocating the risk of converting inputs into outputs to the ATC provider. While such changes bring opportunities as well as challenges to ATC providers, the forward-looking WACC allowance will need to carefully consider the impact of any such changes to the regulatory framework; both in terms of systematic risk exposure reflected in the beta as well as asymmetric risk exposure, which may be reflected in the cost of debt and debt-bearing capacity.

Conclusion: Challenges Ahead, But the Sector Does Not Need to Reinvent the Wheel

ATCs in Europe face enormous investment requirements in the coming years, which in many cases have to be delivered by companies with cash-strapped governments as shareholders. In order for them to be able to deliver these investments, national regulators must allow for a rate of return on these investments that allows operators to attract and retain the required capital injections.
Determining the appropriate rate of return across different European countries requires an understanding of both general market conditions and local risk factors, including country risk and income elasticity of demand for air travel, as well as traffic composition (e.g., transit vs. terminal traffic, business vs. leisure traffic). There is a wealth of experience from other sectors (e.g., energy, telecoms, airports), both good and bad, that can be combined with an understanding of the specifics of the ATC sector to develop an estimate of the WACC that allows for the investment to be delivered. Even factors that may be specific to ATCs, such as their high proportion of fixed costs and relationship with the state in certain countries, have been reviewed by some regulators in other countries, providing a template for considering these issues in the ATC sector.

While this paper has been about the WACC, there are a host of other topics that will determine whether appropriate investment incentives are generated, including the efficiency challenge placed on operating costs and whether risk is allocated in a sustainable manner between users and ATC providers that may also benefit from reviewing the lessons learnt in other sectors.

Appendix A – The Weighted Average Cost of Capital

Companies typically have a number of options to obtain funding to finance their assets. These can be broadly divided into equity-based and debt-based funds, where equity-based capital generally requires a higher return than debt-based capital. The weighted average cost of capital (WACC) combines these different rates of return and denotes the average rate of return the company is required to pay for each unit of capital employed, which can be calculated as follows:

\[
WACC = \frac{\text{cost of equity}}{\text{debt + equity}} \times \text{cost of equity} + \frac{\text{cost of debt}}{\text{debt + equity}} \times \text{cost of debt}
\]

For regulated companies, the regulatory agency determines an allowed WACC that represents an estimate of the cost of capital that the company needs to earn from its operations to attract capital. While the cost of debt is commonly estimated by referring to market evidence on bond yields of comparable risk, the cost of equity is usually determined using the Capital Asset Pricing Model (CAPM). The CAPM stipulates that the cost of equity is the sum of a risk free rate and a sector-specific component to compensate for the extent to which the returns of an activity are affected by general market fluctuations:

\[
\text{cost of equity} = \text{risk free rate} + \beta \times \text{equity risk premium}
\]

- The risk free rate represents the return on a "risk free" asset, typically a local government bond.
- The beta represents the degree of co-movement between the activity’s returns and the overall market that the company operates in. The beta normally has to be based on an analysis of appropriately selected stock market-listed comparators.
- The equity risk premium (ERP) reflects the premium an investor requires to invest into a market portfolio instead of buying risk free assets. It can be estimated using historical evidence, economic modelling, or survey techniques.
Notes

1 The authors would like to thank Florian Mockel and Niko Czaplicki for research assistance and Dr. Richard Hern for peer review.
4 To this end, the Commission published a white paper in June 2016, followed by a written consultation and an open hearing in December 2016. The white paper set out a range of topics that would become relevant in the next regulatory period; however, its overarching theme is to promote large investments in technological change whilst simultaneously lowering tariffs.
5 “WACC” stands for “weighted average cost of capital” and denotes the total costs faced by a company for all its sources of capital, usually its cost of equity and its cost of debt.
6 The European Commission rejected both the initial and the revised version of the performance plan submitted by the FABEC states, claiming it did not meet the targets for cost-efficiency. A decision on the retrospective acceptance of the performance plan for the second reference period was not finalised until February 2017, i.e., two years into the actual regulatory period.
8 The systematic risk faced by investors in a firm was first recognised to include both operating risk and financial risk, as in Hamada (1972) and Rubinstein (1973). Afterwards, Levy (1974) and Mandelker and Rhee (1984) provided empirical evidence that operating leverage partly determines systematic risk. Damodaran now provides a formula to split the unlevered beta into operating leverage and business risk components. See http://people.stern.nyu.edu/adamodar/pdf/eqnotes/discrate2.pdf, p. 70.
13 ibid, paragraphs 5.13 and 5.14, p. 46-47.
15 If a reduction in the risk-free rate is not reflected “one-for-one” in a reduction in the required rate of return for an equity investment, the difference in rates of return on the overall market and risk-free assets increases. This difference is commonly called the “equity risk premium”. Hence there is a negative (inverse) relationship between the equity risk premium and the risk-free rate whenever the spillover effect is not 100%.
17 Note that a number of countries including the UK, Italy, and others have not had an energy network price control decision in the last two years. The beta estimates included in their latest decisions would therefore need updating and, hence, we do not include them in this sample.
18 Since SDG’s analysis in 2014, ENAV, the Italian ATC, has listed some of its equity on the Italian stock market in 2016, allowing a direct calculation of the beta for a European ATC. However, national regulators must be careful in interpreting ENAV’s beta estimate because of (1) the short period for which it has been listed so far; (2) potential illiquidity of shares in the Italian market; and (3) differences between the market ENAV operates in and local market conditions for other ATCs.
20 Within the two classes, debt and equity, there can be a number of subtypes (i.e., companies can issue different types of debt and offer various kinds of equity). Since debt holders hold priority over equity holders, they are less exposed to non-payment risks and accordingly require a lower return for their funds.
21 The Cost of Equity can also be calculated using the Dividend Growth Model (DGM). The DGM is a forward-looking model, whereas the CAPM is usually based on historical returns. A number of regulatory agencies employ the DGM either to validate the CAPM results or on its own.
22 The CAPM only includes systematic risk in the calculation of the cost of equity. Other models (e.g., the dividend growth model) exist that can also take account of other risks including asymmetric risks.
23 Using a local government bond rate in countries that are not AAA-rated will result in an estimate that combines the true risk-free rate with an estimate of the appropriate country risk premium that investors will demand for allocating their money to a higher risk country.
24 A beta greater than 1 indicates that the company’s returns are positively correlated with the overall market but are more volatile than the market. A beta between 0 and 1 still shows positive correlation but indicates that the company’s returns are less volatile than overall market returns. A beta smaller than 0 indicates that the company’s returns are negatively correlated with the returns of the overall market.
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