



Europe Economics

# Operating Leverage of EirGrid/ESBN *Implications for PR4 Beta*

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# Contents

I	Operational Gearing and Beta .....	I
1.1	Introduction .....	I
1.2	Building blocks of the PR4 EirGrid regulatorily determined asset beta .....	I
1.3	How operational gearing affects beta .....	2
1.4	Differences between the operational gearing of EirGrid and ESNB .....	2
1.5	EirGrid special allowances .....	3
1.6	Remarks on evidential basis .....	4
1.7	Materiality .....	4
1.8	Remarks and Conclusion .....	5



# 1 Operational Gearing and Beta

## 1.1 Introduction

Previous analysis from Europe Economics has investigated two issues:

- Whether the nature of the underlying industry risks faced by ESBN and EirGrid differ — it was concluded that they do not.<sup>1</sup>
- Whether the structure of the EirGrid business differs materially from ESBN in ways that suggest applying the same cost of capital as ESBN's to the EirGrid RAB would not produce an adequate allowance — it was concluded that it did.<sup>2</sup>

Given the above points, we considered the following options:

- Maintain the status quo (i.e. the PR3 approach).
- Maintain the current regulatory structure but treat EirGrid as a business with higher operational gearing than ESBN and adjust its beta accordingly.
- Integrate the EirGrid TSO business with other assets, for the purposes of price regulation.
- Recalculate the RAB to more adequately capture the full enterprise value.
- Apply a margin approach to EirGrid.

CER asked us to investigate whether the use of an operational gearing adjustment might produce a tangible improvement over the PR3 approach. This note reports on that analysis.

## 1.2 Building blocks of the PR4 EirGrid regulatorily determined asset beta

The regulatorily determined asset beta for EirGrid, when multiplied by the value of EirGrid's regulatory asset base (RAB), provides a return allowance in the calculation of EirGrid's overall price limits. But at PR4 as in PR3 this is not the only relevant allowance. EirGrid also receives a number of special allowances, reflecting its special operational requirements. The regulatorily determined asset beta has, in past price controls, featured in the calculation of these other allowances. The issue of how to take account of differences between the EirGrid and ESBN betas can therefore be conceived of as the answer to one of two questions:

- a) For a given way of calculating these additional allowances from an EirGrid regulatorily determined asset beta, does the final allowance properly reflect EirGrid's overall asset beta after adjusting for operational gearing?
- b) Does the way in which these other allowances are calculated from and EirGrid regulatorily determined asset beta correctly characterise how EirGrid's overall asset beta would differ from its pre-operational-gearing-adjusted asset beta?

The latter question — i.e. the question of whether the calculation method is correct — can be interpreted as implying that the intention of these other adjustments is to take account of precisely those operational gearing issues that are under consideration here. The former question regards these other allowances as achieving some other exogenously-given purpose, and asks only whether the overall effect is correct.

Under that approach, the EirGrid regulatorily determined asset beta can be seen as a residual obtained from the following calculation:

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<sup>1</sup> See Section 5 of "PR4 WACC for EirGrid and ESB Networks", January 2015.

<sup>2</sup> See "EirGrid: The RAB-WACC Approach and Alternatives", January 2015.

EirGrid regulatorily determined asset beta = ESNB Asset Beta x EirGrid to ESNB relative operational gearing adjustment – beta value of EirGrid special allowances.

### 1.3 How operational gearing affects beta

A firm's operating leverage refers to the level of its fixed costs relative to variable costs. Intuitively, in the same way as financial leverage (a commitment to fixed debt charges) increases the beta of an investor's portfolio, operational leverage or gearing (a commitment to fixed production charges) adds to the beta of a capital project.

To see formally how this relates to beta, first note that the present value of an asset is equal to the present value of revenues, less the present values of fixed and variable costs:

- $NPV(asset) = NPV(revenue) - NPV(fixed\ costs) - NPV(variable\ costs)$

This equation can be re-arranged to be expressed with respect to the present value of revenue:

- $NPV(revenue) = NPV(asset) + NPV(fixed\ costs) + NPV(variable\ costs)$

Given this expression, the beta of the present value of the asset's revenue (as distinct from the beta of the present value of the asset itself) can then be expressed as:<sup>3</sup>

- $\beta_{REV} = [NPV(asset) / NPV(revenue)] \cdot \beta_{ASSET} + [NPV(fixed\ costs) / NPV(revenue)] \cdot \beta_{FIXED} + [NPV(variable\ costs) / NPV(revenue)] \cdot \beta_{VARIABLE}$

By definition, the beta of fixed costs should be approximately zero, while the betas of revenue and variable costs should be approximately equal as they both change in response to output. Noting these, and rearranging the above expression implies.

- $\beta_{ASSET} = \beta_{REV} \cdot \left(1 + \frac{NPV(fixed\ costs)}{NPV(asset)}\right)$

This shows, therefore, that firms with a high ratio of fixed costs to asset value have higher asset betas.

### 1.4 Differences between the operational gearing of EirGrid and ESNB

Evidence based on submissions for the PR4 price review show that EirGrid and ESNB have significantly different levels of operational gearing. In the table below we compare EirGrid's and ESNB's operational gearing. We estimate that EirGrid's operational gearing is around 5.3 times ESNB's.

<sup>3</sup> We derive this expression using the second proposition the Modigliani-Miller Theorem (the cost of equity capital is a linear function of the debt-equity ratio).

**Table 1.1 Operational gearing<sup>4</sup>**

Operator	Formula	Op. Gearing (multiple)
Eirgrid	$I + NPV(FC) / NPV(AV)$	7.20
ESBN	$I + NPV(FC) / NPV(AV)$	1.35
<b>Eirgrid/ESBN</b>	<b>Ratio Eirgrid/ESBN</b>	<b>5.34</b>

Source: PR4 decision.

## 1.5 EirGrid special allowances

In PR4 EirGrid has two potentially relevant special allowances:

- A “Stage I Working Capital” (“side RAB” during PR3) allowance.
- A “Return On Other Working Capital” allowance.

We understand that the “Stage I Working Capital” allowance allocated some additional RAB to EirGrid, by which its regulatorily determined WACC was multiplied, accounting for assets that EirGrid holds only for a short period before passing on to ESBN. Given the nature of this allowance, it does not appear to be intended to serve as an operational gearing difference adjustment. We therefore exclude it from our analysis.

The “Return on Other Working Capital” allowance is intended to cover the costs of the working capital that EirGrid has to hold as a consequence of its business organisation and its payment terms. This allowance can be seen as (at least to a significant extent) the counterpart of the operational gearing risk differential (and other business organisation differences): because EirGrid has a materially different ratio of fixed to variable costs (and because of other differences), it has to hold a stock of working capital. The cost of that working capital is, therefore, one measure of the cost of additional risk EirGrid faces on account of its business model.

A key methodological question for the CER is therefore — as noted in previous reports — whether the status quo (i.e. PR3) approach, including the Return on Other Working Capital adjustment, provides an adequate framework within which to provide EirGrid with an appropriate return on investment. In blunter terms: is it better to estimate a working capital cost (perhaps refining the formula from the PR3 determination,<sup>5</sup> if a good evidential basis for such refinement can be provided) or is it better to replace the Return on Other Working Capital allowance with a straightforward operational gearing adjustment to the WACC?

In many ways the key methodological question comes down to two points:

- Evidential base — is the evidence on which one might estimate an operational gearing adjustment more or less secure than the evidence upon which the Return on Other Working Capital allowance is calculated?

<sup>4</sup> Data needed:

- **Fixed Costs (NPV over '16 – '20):** “Total Internal Costs” (category of opex) + Depreciation + Cost of debt financing (calculated as Allowed CoD + RAB).
- **Asset value (Value in mid-period: '18):** average of OAV and CAV. (exclude Stage I RAB).
- **Discount Rate:** regulatory allowed.
- We need those inputs for both ESBN and Eirgrid.

We used an iterative approach between NPV and WACC to get to a fixed point.

<sup>5</sup> Remuneration for other working capital is calculated according to the following formula: Remuneration for working capital = (Factor A x (external costs + (Factor B x imperfections charge)) x cost of capital) + (Factor C x transmission revenue).

- **Materiality** — Does the choice between an operational gearing adjustment and a Return on Other Working Capital allowance actually make a significant difference to the overall answer?

## 1.6 Remarks on evidential basis

Our previous analysis has suggested that the use of an operational gearing adjustment is a pragmatic response to the infeasibility of adjusting EirGrid's RAB to reflect, more accurately, various intangibles and to the infeasibility of various other corrections that, in an ideal world of limitless analytical resources and full information, might give a truer picture of EirGrid's appropriate aggregate return.

Even in respect of the operational gearing itself, although we believe we have sufficient data to produce a meaningful estimate, there are natural concerns about its robustness. The estimates we report below could have been produced in other ways with significantly different answers. The operational gearing analysis here should be regarded as a "best endeavour estimate".

It is, of course, true that almost all analysis in economic regulation involves some uncertainties, judgements and pragmatic adoption of the best estimate available. But in the case of the operational gearing adjustment here, the departure from a reasonably secure value to the best endeavour estimate is rather large — the effective beta involved will be, as we shall see below, somewhere between four and six times the ESNB beta. That gap between the reasonably secure evidential basis and the adjustment is rather a large one to accept without attributing it more concretely.

One advantage of the Return on Other Working Capital allowance is that it involves a more concrete "filling in" of that gap — the additional allowance involved is attached to something specific for which costs can be estimated. We have not attempted to validate all aspects of the Return on Other Working Capital allowance calculation — doing so falls outside our remit here. But we do note that its evidential basis and hence ability to be debated by stakeholders is richer than that of the operational gearing adjustment in which, by contrast, apparently small differences in the calculation have large impacts once the leveraging process of the calculation comes into play.

## 1.7 Materiality

### 1.7.1 EirGrid's pre-adjustments beta

EirGrid's pre-adjustment asset beta (i.e. before taking account of the Return on Other Working Capital allowance) can be derived applying the formula shown in Section 1.2 to the figures estimated in Section 1.4. We find a pre-adjustment asset beta of 1.98.

**Table 1.2 EirGrid's pre-adjustment beta**

Item	Formula	Value
Revenue beta	PR4 determination	0.37
Uplift for operational gearing	Ratio $\frac{1 + \text{NPV(FC)}}{\text{NPV(AV)}}$ Eirgrid/ESBN	5.34
<b>Eirgrid's pre-adjustment asset beta</b>	<b><math>\text{Beta}_{\text{Rev}} * [1 + \text{NPV(FC)} / \text{NPV(AV)}]</math></b>	<b>1.98</b>

Source: PR4 decision.

### 1.7.2 The beta value of EirGrid's special allowances

The value of the special allowance for "Return on Other Working Capital" during PR4 is around €3m p.a. (2014 prices). This extra allowance increases significantly the out-turn return on capital, as the allowed



return based on WACC \* RAB is around €1.7m p.a. (2014 prices). ESNB does not receive these special allowances, which is consistent with its lower operational gearing.

We have estimated the beta value of the special allowances by expressing them as a return on EirGrid's RAV in percentage numbers, and then deriving the implied asset beta of this extra return on capital, holding all the other inputs (i.e. cost of debt, risk-free rate and equity risk premium) constant. We estimate that these special allowances translate into an additional 1.58 points to EirGrid's asset beta. In other words, if EirGrid did not receive this special allowance, it would need an extra 1.58 points on its beta to achieve the same overall return on capital.

### 1.7.3 EirGrid's post-adjustments asset beta

The methodological challenge to derive a final estimate of the asset beta is it affects the WACC of EirGrid, while the value of the special allowance of EirGrid are a function of the allowed WACC.<sup>6</sup> We have found the fixed point using an iterative process.

The below shows how we derive the post-adjustment asset beta. We find a post-adjustment asset beta of 0.39 for PR4, had this method been applied, given the ESNB (or "raw" EirGrid) beta of 0.37.

**Table 1.3 EirGrid's post-adjustment beta<sup>7</sup>**

Item	Formula	Value
Revenue beta	PR4 determination	0.37
EirGrid's pre-adjustment asset beta	$\text{Beta}_{\text{Rev}} * [1 + \text{NPV}(\text{FC}) / \text{NPV}(\text{AV})]$ (a)	1.98
Beta value of adjustments	Based on return (%) value of special allowance (b)	1.58
<b>EirGrid's post-adjustment asset beta</b>	<b>(a) – (b)</b>	<b>0.39</b>

Source: PR4 decision, Europe Economics analysis.

Note : numbers may not add up in the report table due to rounding.

## 1.8 Remarks and conclusion

The analysis above suggests that an operational gearing approach might have produced a slightly higher overall value for EirGrid's return that was provided by the sum of EirGrid's return on RAB allowance and "Return on Other Working Capital" allowance at PR4 — equivalent to a 1.98 asset beta for EirGrid rather than the 1.95 equivalent provided by the PR3 approach if we assume a 0.37 asset beta.<sup>8</sup>

However, the scale of this differential should be understood in the context of the uncertainty of the calculation. With a risk-free rate of 1.9 and an Equity Risk Premium of 4.75, and the other parameters besides the asset beta as per the pre-aiming up PR4 determination,<sup>9</sup> a 1.98 asset beta implies a cost of capital of 13.3 versus the 13.2 implied by an asset beta of 1.95. That is a difference of close to 1 per cent.

<sup>6</sup> Remuneration for other working capital = (Factor A x (external costs + (Factor B x imperfections charge)) x cost of capital) + (Factor C x transmission revenue).

<sup>7</sup> Data needed:

Beta value of adjustments calculated using EirGrid's:

- **Special allowances** i.e. "Return on Other Working Capital" allowances.
- Average of **OAV** and **CAV**.
- **ERP** and **WACC** from regulatory decision.

We used an iterative approach between Return on Other Working Capital and WACC to get to a fixed point estimate of the beta value of the adjustment.

<sup>8</sup> 1.95 is 0.37 plus the beta value of the Return on Other Working Capital allowance (1.58).

<sup>9</sup> PR4 WACC for EirGrid and ESB Network, p55.

The uncertainties inherent in the operational gearing adjustment calculation are almost certainly much greater than 1 per cent.

Furthermore, the actual WACC provided for EirGrid was 4.80 per cent (real, pre-tax) not the 4.58 per cent (after aiming up) produced by the calculation based upon an asset beta of 0.37. That additional 0.22 per cent can be regarded as equivalent to an additional beta of 0.05.<sup>10</sup> That additional 0.05 of asset beta more-than-covers the differential between the operational gearing-based estimate and the working-capital-based one.

We are therefore of the view that

- a) it is by no means obvious that an operational gearing adjustment would have provided a different answer from that provided by the Return on Other Working Capital allowance at PR4. Our estimates fall well within the bounds of uncertainty of the data and within the bounds of interpretation of the PR4 decision. A more elaborate operational gearing adjustment process, carried out and challenged over an extended period, might well have produced much the same answer as the return on working capital allowance; and
- b) there are important evidential advantages to the Return on Other Working Capital allowance approach that allow for more constructive debate and stakeholder input, relative to the operational gearing approach.

Our recommendation is therefore that the Return on Other Working Capital allowance approach appears to address the issues we have previously identified regarding differences in the EirGrid versus ESBN businesses, and should be persevered with (albeit potentially refined) at PR4.

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<sup>10</sup>  $0.22/4.75 = 0.05$ .