NERA
ECONOMIC CONSULTING

ECONOMIC CONSIDERATIONS FOR FORECASTING PRODUCTIVITY

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AER productivity stakeholder workshop

Insight in Economics™

The AER's task/Why are we talking about productivity

- Productivity is **one** piece of the opex puzzle:

$$Opex_t = \prod_{i=1}^{t}(1 + rate\ of\ change_i) \times \left(A_f^* - efficiency\ adjustment\right) \pm step\ changes_t$$

$$Rate\ of\ change_t = output\ growth_t + real\ price\ growth_t - productivity\ growth_t$$

- **Statutory objectives** guide how we think about the puzzle:
  - Opportunity to recover efficient costs = productivity gains need to be achievable
  - LTIC = need to recover efficient costs, but also reasonable to expect productivity gains

Productivity shouldn't be viewed in isolation of the rest of the opex forecast.

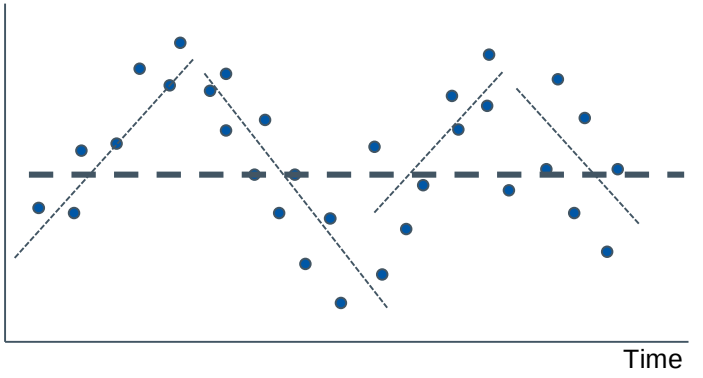
"Does the combined opex forecast reflect the efficient costs of providing services at a quality level consumers desire?"

Criteria that should be applied to satisfy obligations under NEL and NER

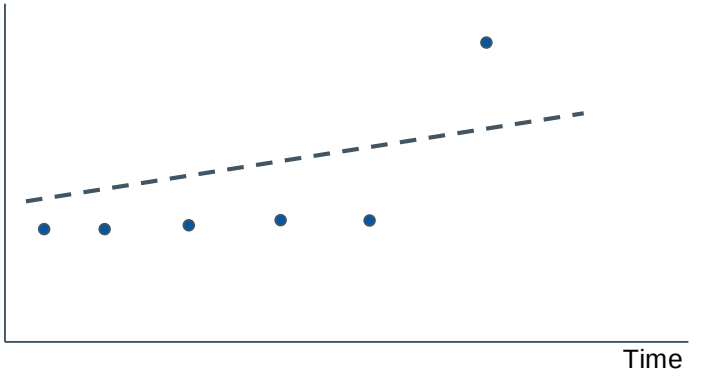
1. Captures underlying trends in productivity for NSPs
2. Ongoing productivity is separated from catch-up
3. Approach is stable over time
4. Doesn’t distort incentives

Criterion 1: Capturing underlying trends in productivity

- Ideally measure is ***electricity specific*** and captures ***technical change***.
- Too short a period introduces the **risk of cyclicality** driving the results



- Similarly, **one-off, nonreplicable cost savings or "noise"** may drive measured productivity and result in a measure that can't be achieved going forward



Using a long term trend reduces noise and impacts of cyclicality

Criteria 2 and 3: Removing catch-up/structural change and providing stability

Various options for removing catch-up and one-offs

Option		Description of approach	Stability and simplicity
Direct comparators	Filtering	Remove inefficient firms and firms/time periods effected by structural change	Requires either subjective judgements or a forensic assessment of each firm. The former is unlikely to be stable and the latter would be overly complex.
	Long term trends	By taking a long enough time series across all firms, these issues can "come out in the wash"	Simpler and stable, but may not deal with industry wide changes if time period is too short.
	Econometrics	Try and achieve the same thing as filtering with econometrics	Deals with the subjectivity problems of filtering **if the model is right.**
Indirect comparators		Find other sectors expected to have similar gains and are unlikely to be experiencing catch-up	More difficult as comparison needs to be appropriate and **other sectors need to be tested for catch-up**

Filtering the sample is subjective/complex, econometrics is better if the model is right.

Using a long term trend reduces the need to consider short term catch-up and is simple and stable.

International approaches

Country	Regulatory Methods
UK	• Ofgem use a long term trend to set productivity in gas and electricity. • Draw on EU KLEMS, which calculates TFP and PFP using data from 1970 to 2007. • Use data from a weighted average of industries as data from energy is distorted by privatisation and catch up.
US	• Heterogeneous picture across state and provincial regulators. Some (California, Maine, Massachusetts, Oregon, British Columbia, Alberta) use TFP-based approach. • FERC Form 1 dataset is a source for electricity distribution data from 1994 until the present that is widely relied upon. • Some states (Massachusetts, Alberta) use the longest available data, reaching back to 1973.
Germany	• Use DEA and SFA estimation for efficiency benchmarking. • Productivity growth estimated separately for electricity and gas sectors • Aims to use the longest possible sampling period “to smooth out temporary effects”. This entails 2006-2016 for gas, and 2006-2017 for electricity. • Use a Malmquist index, which can identify frontier shift and catch-up effect separately

International regulators use long term trends to forecast productivity

Measured productivity can be negative even if firms are not becoming less productive

- Many of the AER's measures show long term negative trends
  - MPFP
  - Time trend in econometric cost models
  - Labour productivity

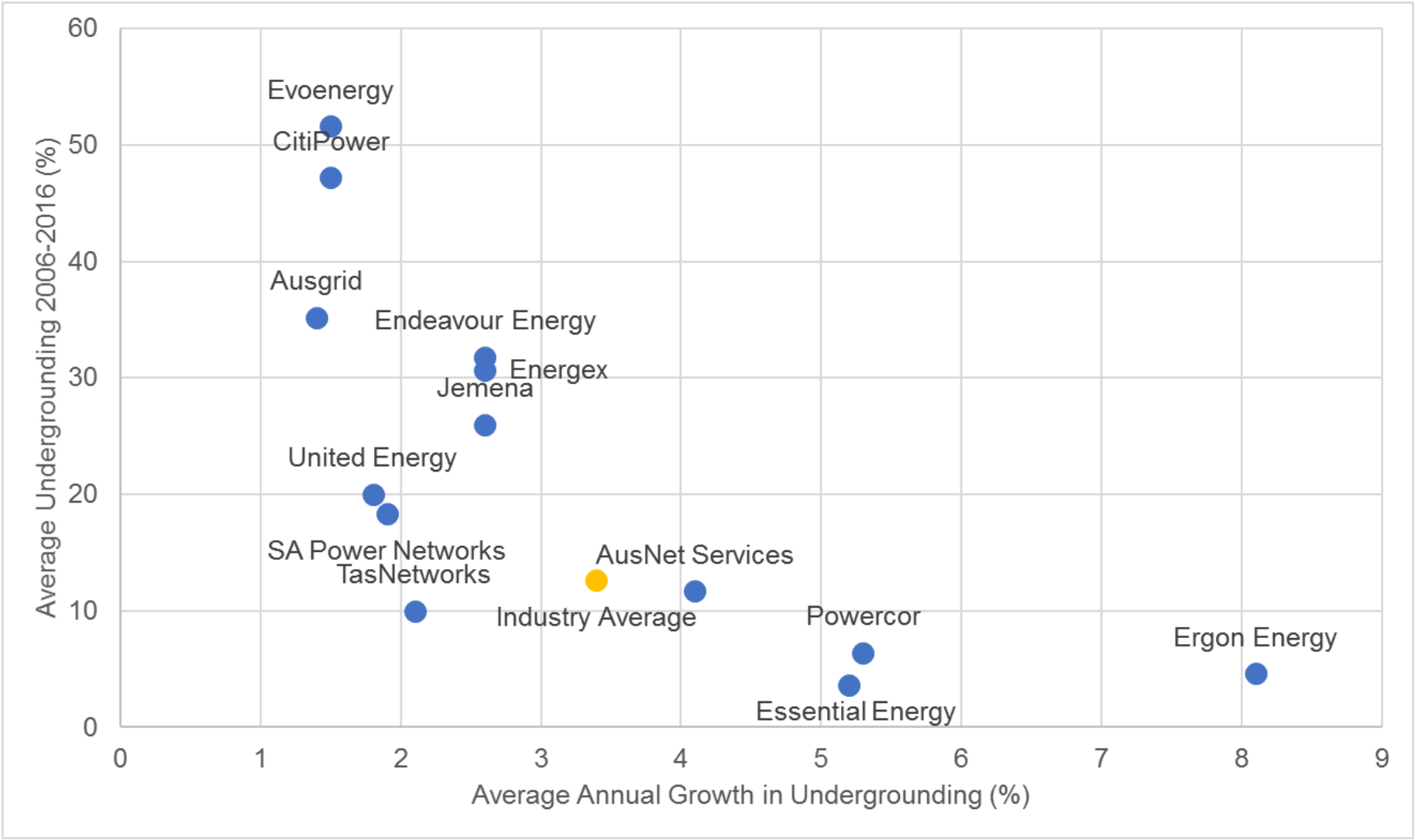
- Negative measured productivity can be the result of:
  - Cyclicality
  - One-offs structural and non-BAU changes
  - **Or we might be measuring the wrong thing?**

Negative measured productivity can be the result of NSPs producing "outputs" that are not captured in the productivity measure

If this is the case, the output scaling may under-forecast opex requirements…

AER's previous approach of setting 0% productivity growth can be interpreted as recognition that assumed output drivers may undercompensate NSPs

Undergrounding: there is no `industry wide efficient rate of undergrounding`



Undergrounding varies across firms as the need/ability to underground varies

Undergrounding: AER is implicitly assuming an `industry wide efficient rate of undergrounding`

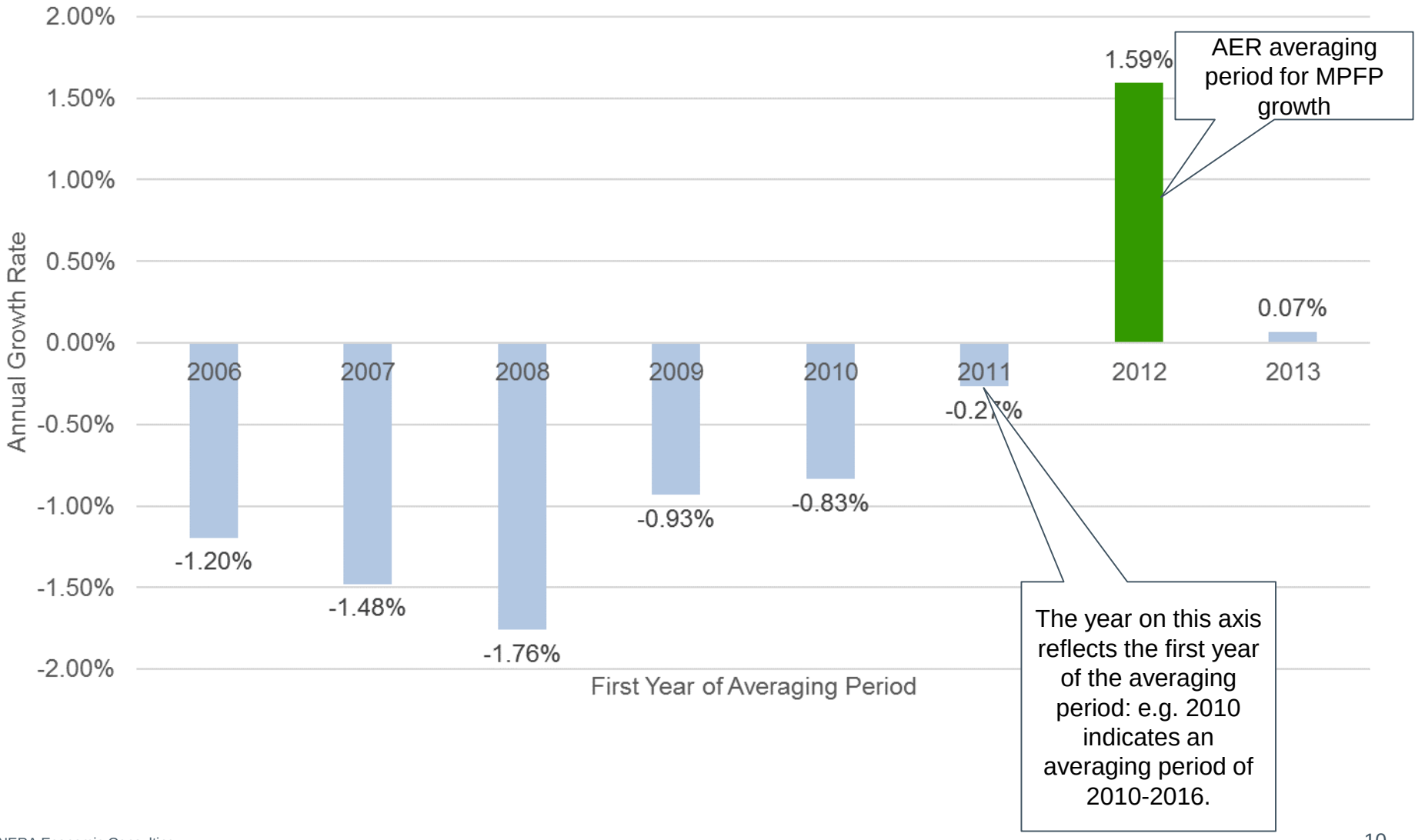
- Historic undergrounding varies materially across firms
- Undergrounding often driven by government policy (e.g. bushfire risk, visual amenity)
- Forward looking undergrounding likely to vary materially across firms
  - Urban NSPs: may be running out of lines to efficiently underground
  - Rural NSPs: haven't undergrounded much historically and future undergrounding may not pass RIT-D or is driven by govt policy

Not appropriate to expect all firms to underground at the same rate

Firms that can not underground at the "industry average rate" will be denied the opportunity to recover their costs

MPFP: The starting point for calculating the trend is extremely important

MPFP trend for different starting years



MPFP: The AER's approach isn't stable and alternative methods could improve it

AER approach	Alternative approach	NERA comment
Use most recent 5 years	Use all available data	Using all data **reduces noise and subjectivity.** If concerned with industry-wide structural changes – use econometrics or follow Ofgem and look at other sectors.
Simple average	Weighted average	Small firms given same weighting as large firms, **weighted average is more suitable when estimating the frontier**
Compound growth	Regression trend	With compound growth, first and last year have large impact. Regression trends make use of all data points and **provide a more stable estimate**
Drop firms that are "materially inefficient"	Use all firms and a long term data trend or attempt to control for firm effects with econometrics	Selecting firms to drop requires either subjectivity or a forensic analysis of each firm's situation. Using all firms **reduces subjectivity and is therefore more stable**.

MPFP analysis can be improved, but still may not be fit-for-purpose due to data or model structure issues

Conclusions

Long-term trends are preferable

- Can deal with idiosyncratic catch-up
- Remove noise and cyclicality
- Simple and stable over time
- Supported by International precedent

Relevance of undergrounding varies across NSPs

- Not all firms have the same potential or need for undergrounding
- Firms that cannot underground economically should not be penalised

The calculation of the MPFP trend should be reconsidered

- Long term v short term
- Compounding v regression trend
- Simple v weighted average
- Does it measure a frontier shift?

Negative measured productivity may indicate a problem with the models instead of poor performance

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