Productivity and Economic Regulation

AusNet EDPR Customer Forum

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Outline

- What is productivity?
- Why is productivity important?
- How can networks make productivity gains?
- Some terminology
- How do we measure productivity?
- Use in regulatory framework
- AER's use of productivity in 2015 NSW/ACT EDPR
- Latest productivity results
- Implications for the Price Review

What is productivity?

- Productivity is a measure of the total quantity of outputs produced relative to the quantity of inputs used

- Increasing productivity allows more outputs to be produced using less inputs (or 'more to be done with less')

- Total productivity measures total output quantity relative to total input quantity

- Partial productivity measures total output quantity relative to the quantity of a particular input (eg opex or capital)

- Productivity can be measured relative to own performance over time (productivity growth) or relative to performance of peers in a particular year (productivity levels)

Why is productivity important?

- NSPs require revenue to cover their costs

- If costs are not being minimised (ie they are not efficient) then consumers are paying too much

- Consumers and the regulator don't know what the NSP's efficient costs are (ie they face an information asymmetry)

- Productivity measurement provides more information on the NSP's relative performance and helps address the information asymmetry

- The measurement of efficiency is central to the AER's task

- NEL says 'objective … is to promote <u>efficient</u> investment in, and <u>efficient</u> operation and use of, electricity services for the long term interests of consumers'

- AER must not accept expenditure proposals unless they reflect efficient costs

How NSPs make productivity gains

- Involves finding better ways of doing things
- Remove inefficient work practices and overstaffing
- Remove excessively conservative standards requirements
- Find low cost ways of extending asset life (eg pole sleeving)
- Base asset inspections on risk of failure profile rather than set time periods
- Base vegetation management on clearance requirements rather than set time frames
- Contracting out to specialised service providers
- Non-network solutions (eg demand management, distributed generation)

Some terminology

- Efficiency and productivity: efficiency generally refers to measuring productivity relative to peers in a particular year and achieving best performance possible (ie productivity levels)

- Relative efficiency performance ratio:

$$Efficiency\ score = \frac{Benchmark\ costs\ for\ produing\ the\ given\ level\ of\ outputs}{Actual\ costs\ incurred\ in\ producing\ the\ given\ level\ of\ outputs}$$

- The benchmark costs are assumed to be the minimum costs possible for the NSP if it operates efficiently, holding other things constant (eg the technology, input prices, output quantities, and/or operating environment, if relevant)

- The efficiency ratio is between 0 and 1, higher is better

- Measure using 'economic benchmarking'

Economic benchmarking

- Compares the overall quantity of outputs produced to the overall quantity of inputs used and costs incurred across DNSPs and/or over time

- Holistic, tops-down measure

- Simple concept but difficult to measure

- Major issue is how to compare firms that produce multiple output types and use multiple inputs types

- Put simply, how do you compare apples and oranges?

- Range of techniques used: total factor productivity (TFP), multilateral TFP, econometric cost functions, data envelopment analysis, stochastic frontier analysis

- Important to concentrate on a relatively small number of key outputs

Billed vs functional outputs (1)

- Billed outputs are those items an NSP actually charges customers for

- NSP charging practices have typically evolved on an ease of implementation basis rather than on a network cost-reflective basis

- High proportion of charges are on energy throughput

- Dimensions that customers may value such as reliability, continuity or speedy restoration after any interruption are not explicitly charged for

- Functional outputs are all those services NSPs provide to customers which are valued by customers (of which billed outputs are a subset)

Billed vs functional outputs (2)

- Under building blocks the revenue requirement is set based on the DNSP being expected to meet a range of performance standards and other deliverables required to meet the expenditure objectives

- Prices then have to be consistent with broad regulatory pricing principles

- In the case of building blocks, it will be important to measure output (and hence efficiency) in a way that is broadly consistent with the output dimensions implicit in the setting of NSP revenue requirements

- Points to functional rather than billed outputs specification

DNSP outputs included

- Economic benchmarking addresses the apples and oranges issue by taking weighted averages

- Output cost share weights are estimated using an econometric cost function

5 outputs included:

- throughput in GWh (13% weight)

- ratcheted peak demand in MW (18% weight)

- customer numbers (48% weight)

- circuit length in kms (24% weight)

- reliability (minutes off supply as negative output weighted by AEMO VCRs)

DNSP inputs included

In total productivity measures 6 inputs are included:

- Opex (network services opex deflated by a composite labour, materials and services price index)
- Overhead subtransmission lines (in MVAkms)
- Overhead distribution lines (in MVAkms)
- Underground subtransmission cables (in MVAkms)
- Underground distribution cables (in MVAkms), and
- Transformers and other capital (in MVA)

Total input quantity formed using observed cost shares for each DNSP

Operating environment factors

- Operating environment conditions can have a significant impact on network costs and measured efficiency and in many cases are beyond the control of managers

- Need to ensure reasonably like–with–like comparisons

- Adjust for at least the most important operating environment differences

- Some can be allowed for in models (eg undergrounding, network density)

- Others have been allowed for either before modelling (eg opex coverage) or after modelling (eg system structure)

- OEFs currently being reviewed

Use in regulatory framework

- Under Building Blocks regulator sets allowed revenue based on the revenue requirement from forecast efficient costs

- Regulator may accept NSP's proposal if it thinks proposed costs are efficient or substitute its own estimates if it thinks the proposed costs are not efficient

- Once the determination is made the NSP then has an incentive to achieve better productivity than that built into the decision as it can keep part of the profit from reduced costs

- EBSS (efficiency benefit sharing scheme) ensures incentive for timing of productivity improvements is not distorted by fixed regulatory periods

- Without the EBSS, NSPs would have incentive to mainly undertake productivity improvements in the early years of the regulatory period

AER's approach to assessment (1)

- Economic benchmarking is mainly used in opex assessment

- AER prefers the 'base/trend/step' assessment approach

- First, a base year close to the start of the next regulatory period is chosen

- Then an assessment is made of whether the NSP's proposed opex for that year is efficient – if it is not found to be efficient it is reduced

- Then the efficient base year opex is rolled forward using a 'rate of change' which takes account of forecasts of output growth, real input price growth and productivity growth

- Finally any proposed step changes in opex are assessed

- Productivity enters the base year assessment (major impact) and the trend assessment (lesser impact)

AER's approach to assessment (2)

- 2 stage process:

    1. Look at range of available evidence to form view on whether base year opex likely to be efficient – examine wide range of partial performance indicators, comprehensive performance measures, other reviews, DNSPs' proposals and own statements, etc

    2. If DNSPs' base year opex thought likely to be inefficient – as was the case with the NSW/ACT DNSPs – then proceed to form alternative opex forecast to support more detailed assessment

- Economic benchmarking is one of the methods that can be used in forming an alternative forecast

- Corroborating/explanatory evidence also sought

2015 NSW/ACT EDPR

- Economic benchmarking found NSW/ACT DNSPs' opex was not efficient
- Supported by other studies' findings of excess staffing, etc
- Alternative opex allowance formed drawing on economic benchmarking
- 4 economic benchmarking models produced broadly similar results, one econometric model chosen as preferred model
- Conservative efficiency target set using efficiency of fifth most efficient NSP (which was AusNet)
- Target then adjusted for OEFs not included in models
- Opex trend growth set at zero
- Produced opex cuts for 3 of the DNSPs of 30% or more
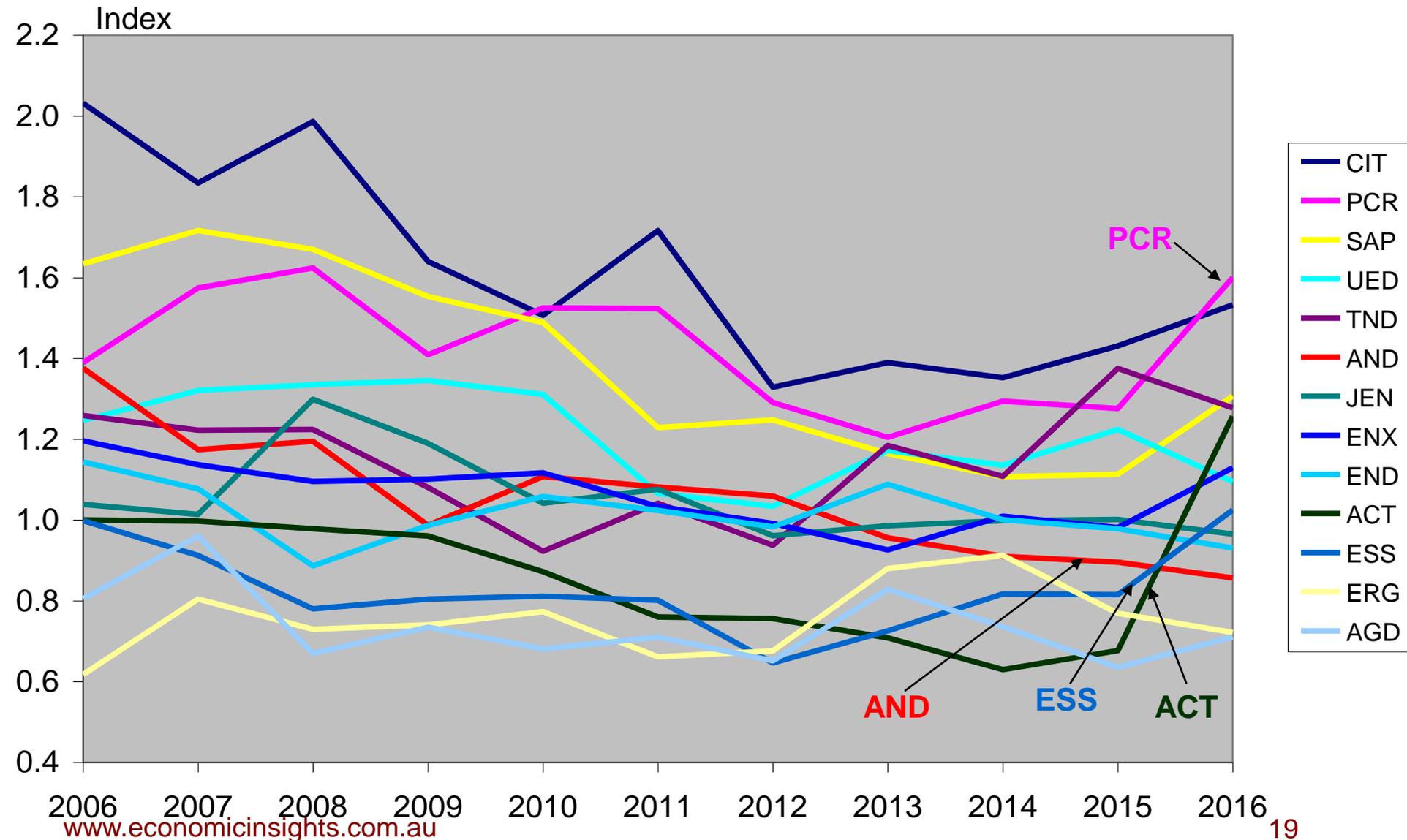- Lengthy appeals but target reductions now broadly achieved

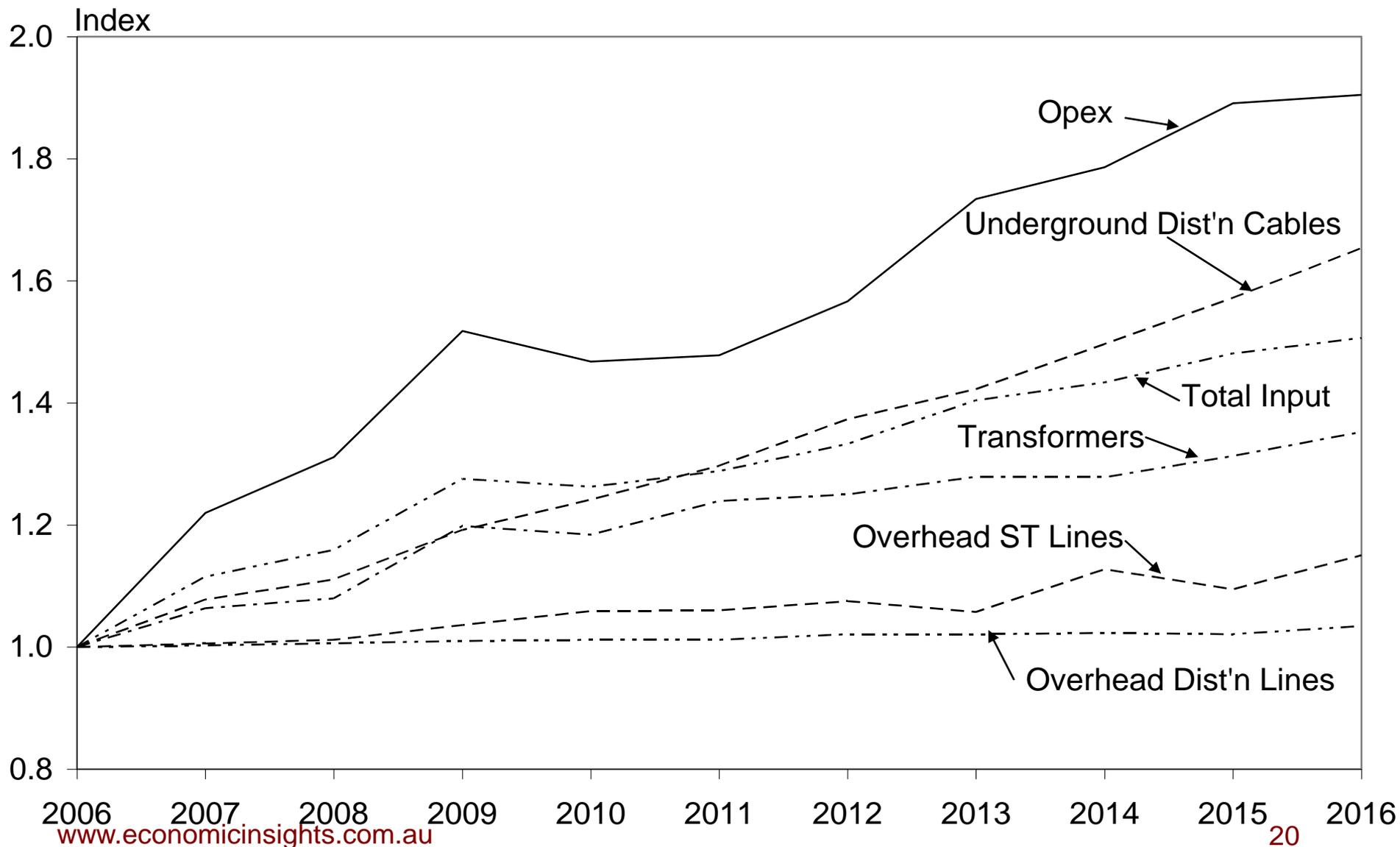# NSW/ACT EDPR opex efficiency score results (at sample average)
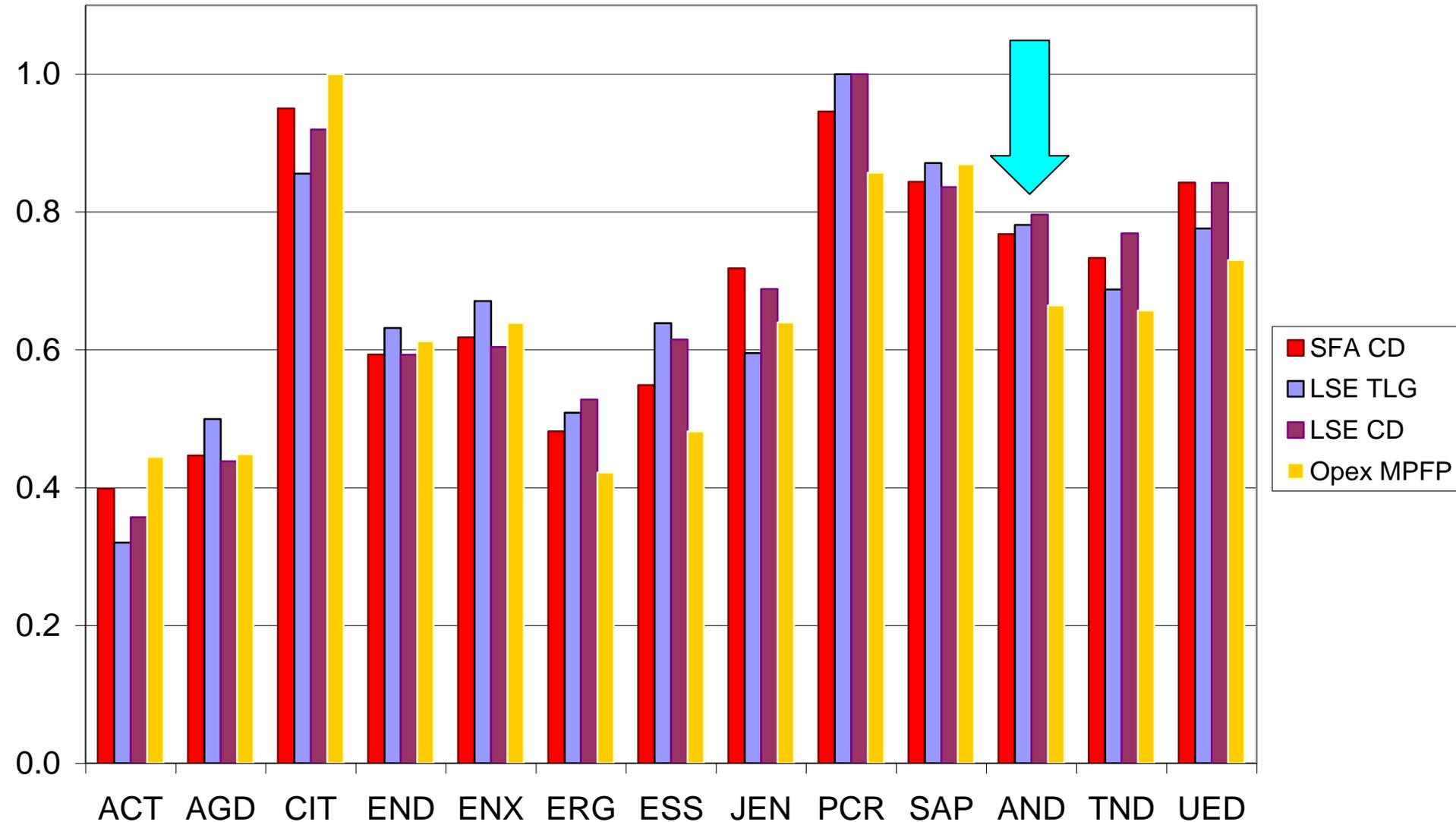
2017 Benchmarking Report: Total Productivity Indexes
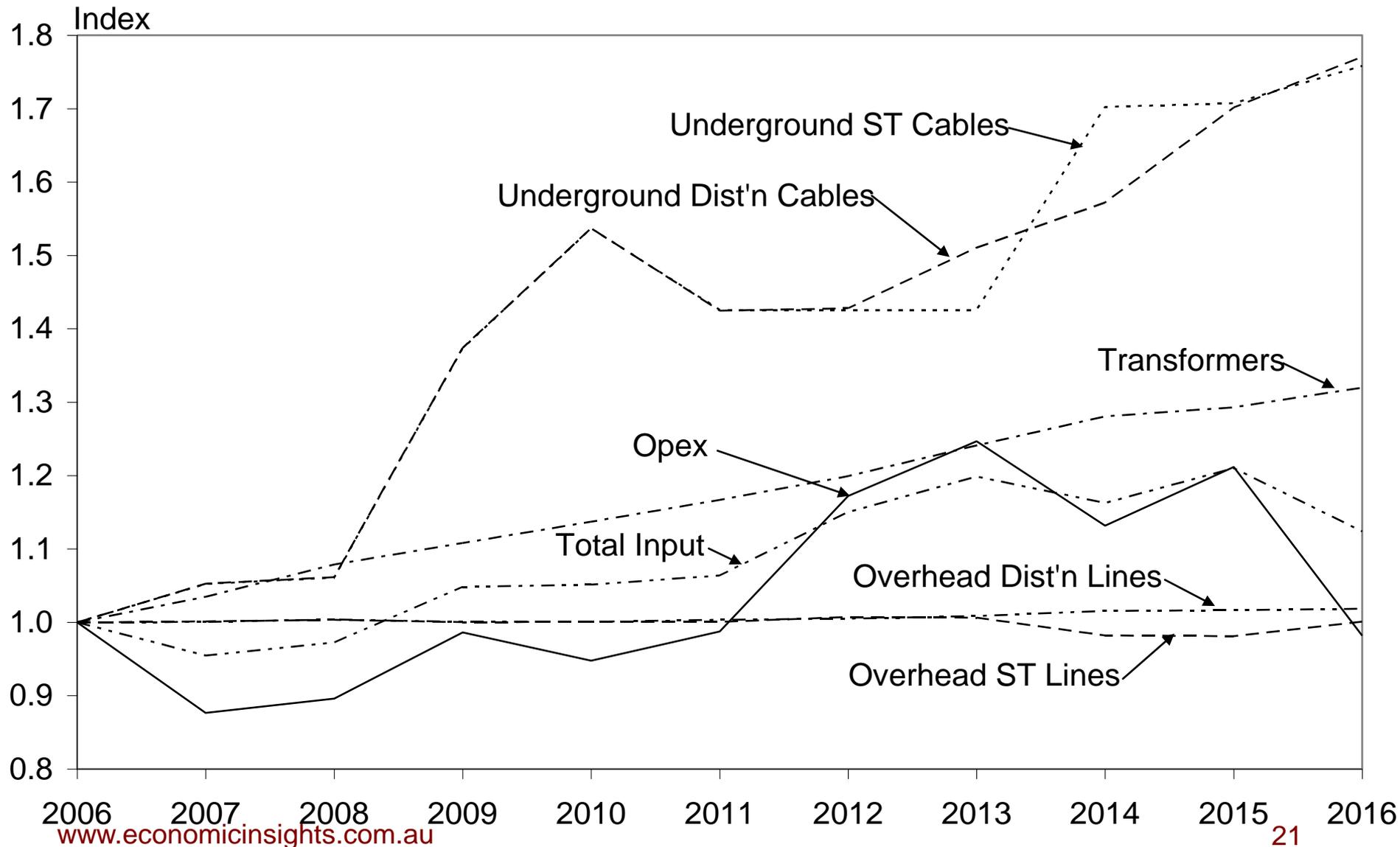
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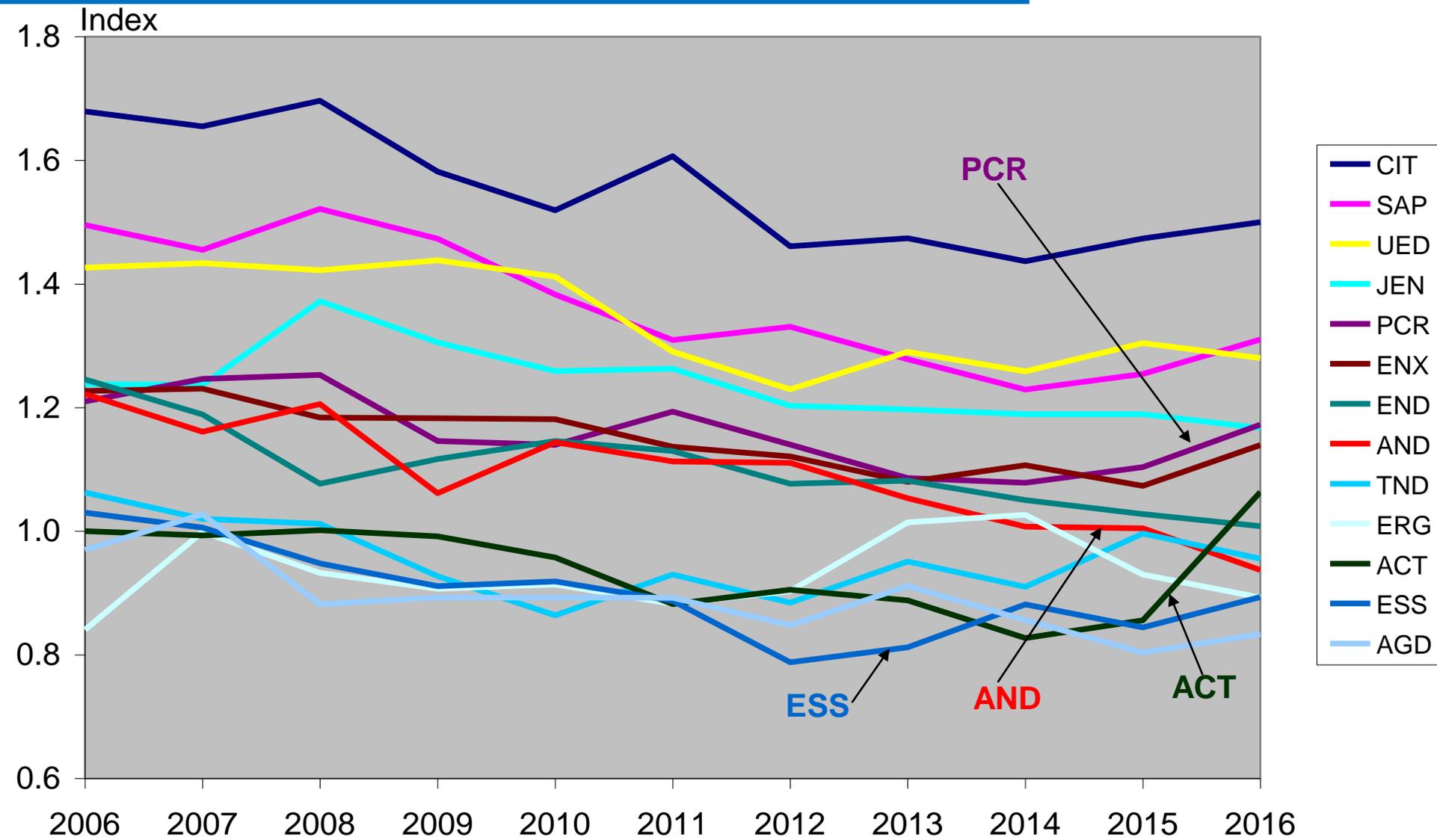
2017 Benchmarking Report: Opex Partial Productivity Indexes

2017 Benchmarking Report: AusNet Input Indexes

2017 Benchmarking Report: Powercor Input Indexes

Implications for the Price Review

- Productivity measurement and economic benchmarking has an important role to play in EDPRs

- AusNet's relative opex performance has slid over the last several years

- NSW DNSPs' relative performance likely to further increase as redundancy costs come out of opex

- Why is there a divergence between AusNet and Powercor

- Need to look at possible OEFs

- Is proposed base year opex efficient?

- Is zero still reasonable for the rate of change trend productivity growth rate or should it now be positive?