

# **Frontier Productivity Growth**

**A report prepared for the Energy Networks Association**

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## 1. Introduction

This paper contains a review of Ofgem’s July 2020 approach to estimating frontier productivity growth. It builds on our previous February 2019 paper<sup>1</sup> for the GB gas distribution networks and seeks, in particular, to locate the judgments that Ofgem is required to make later this year in its final RIIO-GD2/T2 determinations within the proper macroeconomic context.

The paper is structured into three main parts, as follows:

- section 2 develops the observations that we made in our first paper about the UK “productivity puzzle” and about the importance of addressing head on the impact that slow economy-wide productivity growth can be expected to have on energy network businesses. It also considers the effects that the COVID-19 pandemic and ensuing economic turbulence might have on productivity in the short and medium term;
- section 3 makes a number of more technical observations about the analysis in the CEPA report<sup>2</sup> published alongside Ofgem’s draft decision document; and
- section 4 concludes.

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<sup>1</sup> First Economics (2019), Frontier productivity growth: a report prepared for the Energy Networks Association.

<sup>2</sup> CEPA (2020), RIIO-GD2 and T2: cost assessment – frontier shift methodology paper.

## 2. Macroeconomic Context for RIIO-2

### 2.1 Recap of First Economics' February 2019 report

Our 2019 paper explained that estimates of frontier shift are typically obtained via benchmarking to historical rates of productivity growth in industries with similar characteristics. In its RIIO-GD1/T1 reviews, Ofgem's reading of the comparator data was that a frontier energy network ought to be able to reduce its opex by 1.0% per annum and its reopex/capex by 0.7% per annum. Table 2.1 shows that this tallied very closely with views expressed by the Competition Commission (CC) and the Competition & Markets Authority (CMA) in recent regulatory decisions, as well as estimates made by other economic regulators in price reviews conducted up until 2017.<sup>3</sup>

**Table 2.1: Assumptions made by regulators about rates of annual frontier productivity growth in decisions issued up to 2017**

	Opex	Capex
Ofgem, RIIO-GD1/T1, 2012	1.0%	0.7%
CC, Northern Ireland Electricity, 2014	1.0%	1.0%
Ofgem, RIIO-ED1, 2014	1.0%	0.7% to 1.0%
Utility Regulator, NI Water, 2014	0.9%	0.6%
CMA, Bristol Water, 2015	1.0%	-
Utility Regulator, GD17, 2016	1.0%	1.0%

We went on to suggest that it had become quite difficult for a regulator simply to roll forward such assumptions into new price controls. One of the major economic issues of the day has been the UK economy's failure to replicate pre-2008 rates of productivity growth since the global financial crisis, and it seemed to us that companies and Ofgem unavoidably had to come to a view during the RIIO-2 reviews on the implications that lower economy-wide productivity improvements would have for the rate of energy network efficiency improvement during the 2021-26 regulatory period.

Table 2.2 reproduces estimates made by the Bank of England<sup>4</sup> in 2019, which neatly capture the scale of the drop that there has been in the trend rate of productivity growth since 2008.

**Table 2.2: Bank of England estimates/forecasts of annual total factor productivity growth**

	1998-07	2008-10	2011-14	2015-18Q3	2018Q4-22Q1
TFP growth	1.0%	-0.6%	-0.1%	0.2%	0.3%

Source: Bank of England.

Our assessment was that it was unlikely that energy networks would be immune from the factors that have been weighing on productivity growth in the rest of the economy. We took this view in part, because there was clear evidence of a slowdown in productivity improvement in regulated industries at around the same time as recorded rates of

<sup>3</sup> The table does not include the estimate that Ofwat made of frontier shift in its PR19 final determinations. This decision is currently the subject of a CMA redetermination process.

<sup>4</sup> Bank of England (2019), Inflation report, February.

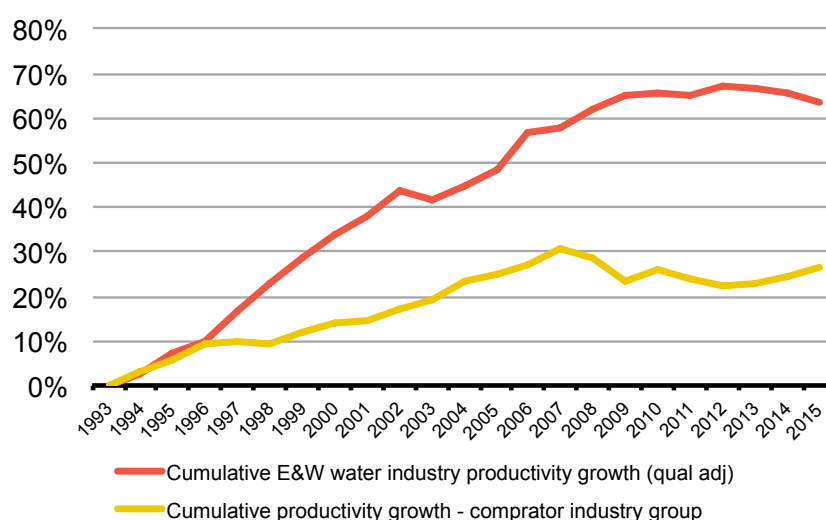
productivity growth began to decline in other industries. Table 2.3 summarises the electricity distribution networks’ experiences (as the sector in which data availability allows for the clearest pre- and post-crisis comparisons).

**Table 2.3: Electricity DNOs’ average annual total factor productivity growth**

	DPC1/2	DPCR3	DPCR4	DPCR5	RIIO-ED1
TFP growth	3.3%	4.0%	3.2%	-1.2%	0.4%

Figure 2.1 depicts a similar picture in the England & Wales water industry (red line) and in a broader basket of twelve non-regulated comparator industries (yellow line).

**Figure 2.1: Total factor productivity growth (cumulative)**



Source: Frontier Economics (2017), Productivity improvement in the water and sewerage industry in England since privatisation.

We also thought that the structure of the network industries meant that there is a direct feed through from productivity growth in other sectors of the economy through to overall energy network productivity. A modern-day network business will typically out-source most of its capital expenditure and maybe around one quarter of its operating expenditure, meaning that its ability to deliver efficiency improvements is dependent to a considerable degree on the ability of its contractor partners to deliver new cost savings. To the extent that these firms are struggling with productivity, it seemed to us that energy networks are also likely to find it more difficult to make productivity improvements than in the past.

We did not feel after looking at the above data that we were able to come to a precise estimate of the ongoing productivity growth that frontier network companies should be including in their business plans. Instead, we recommended that each company needed to make their own assessments of possible trajectories for the RIIO-2 period informed by both the analysis in our paper and their own experiences with alliances and other supply chain partners.

## 2.2 Ofgem’s July 2020 draft determination

Most gas distribution and transmission companies recognised the importance of the points that we had put to them and went on to explain in their December 2019 business plans how they thought that wider macroeconomic trends were relevant to their businesses. However, we were surprised to see Ofgem choose not to dwell on the “productivity puzzle” in its July

2020 draft determination document.<sup>5</sup> Ofgem instead wrote a single paragraph on the topic, as follows:

We have considered including productivity growth forecasts from the Office of Budget Responsibility (OBR) and Bank of England (BoE). These forecasts are influenced by short and medium term risks to the economy such as the UK's exit from the European Union and COVID-19. In the context of a rising trend in longer term productivity forecasts, we do not wish to place significant weight on such economy-wide and short-term forecasts, as network companies are not exposed to these short-term risks (to volume and revenue) as their comparators in the wider economy and are better able to withstand any short-term shocks. OBR and BoE forecasts may therefore underestimate productivity in network companies and are not appropriate for setting ongoing efficiency.

From our standpoint, the brevity of this analysis is hard to reconcile to the importance of the issues at hand. The RIIO-2 reviews are the first real opportunity that Ofgem has had to consider the apparent slowdown in regulated industry productivity growth, as well as the UK's disappointing recent productivity record, and we would have expected a regulator to want to chew over both the economic analysis and the accompanying diagnoses and prognoses that have been issued by different commentators. It was jarring, therefore, that Ofgem elected deliberately not to confront the subject head on.

We also have difficulties with specific aspects of the statement set out above.

First, we think that Ofgem is wrong to characterise the decision it has to make in its RIIO-2 reviews in terms of whether it should or should not to place weight on particular short-term forecasts. The OBR and Bank of England numerical projections may or may not prove to be correct, and we recognise – as, indeed, the OBR and the Bank of England recognise – that there was a considerable uncertainty around the future path of productivity growth even before the COVID-19 pandemic. The main issue here, however, is not whether forecasters can forecast accurately but the clear and incontrovertible evidence that there has been a demonstrable step change in productivity growth across the UK economy since the global financial crisis and the question of how this stall is affecting and will continue to affect the companies that Ofgem regulates.

Second, the reference to a “rising trend in longer term productivity forecasts” is misleading. As we set out in section 2.1, the overall picture can be more accurately described as one in which:

- productivity growth has fallen markedly from the rates of growth that industries achieved prior to 2008; and
- there is hope that productivity growth will soon start to recover, but without any real expectation that growth rates will revert to pre-2008 norms.

It is quite wrong, therefore, to think of lower productivity growth as a short-term issue or a temporary blip. Ofgem only has to look at the number of words that economists have written on productivity in recent years<sup>6</sup> to know that something has happened that has affected the country's economic fundamentals in a significant way.

Third, we agree with Ofgem that there could be something in the notion that regulated energy network companies might be impacted differently by the factors that have been holding back economy-wide growth. The question that logically follows is: to what degree? This demands further investigation and analysis. Ultimately Ofgem then needs to make a judgment on the extent to which it ought to allow for a slowdown in energy network productivity growth in the content of falling productivity growth elsewhere, taking account of

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<sup>5</sup> Ofgem (2020), RIIO-2 draft determinations.

<sup>6</sup> We provided a sample of references in annex 2 of our 2019 paper.

the drivers of productivity growth throughout the industry supply chain. It cannot just dismiss the wider macroeconomic picture as an irrelevance on the basis that energy networks are regulated monopolies.

We therefore think that the short paragraph that Ofgem placed in its July 2020 document fails to do justice to a complex subject area. We also think that Ofgem could usefully utilise the time that it has before it issues final determinations at the end of the year to expand on the evidence and analysis that it has produced to date.

### 2.3 Suggested approach

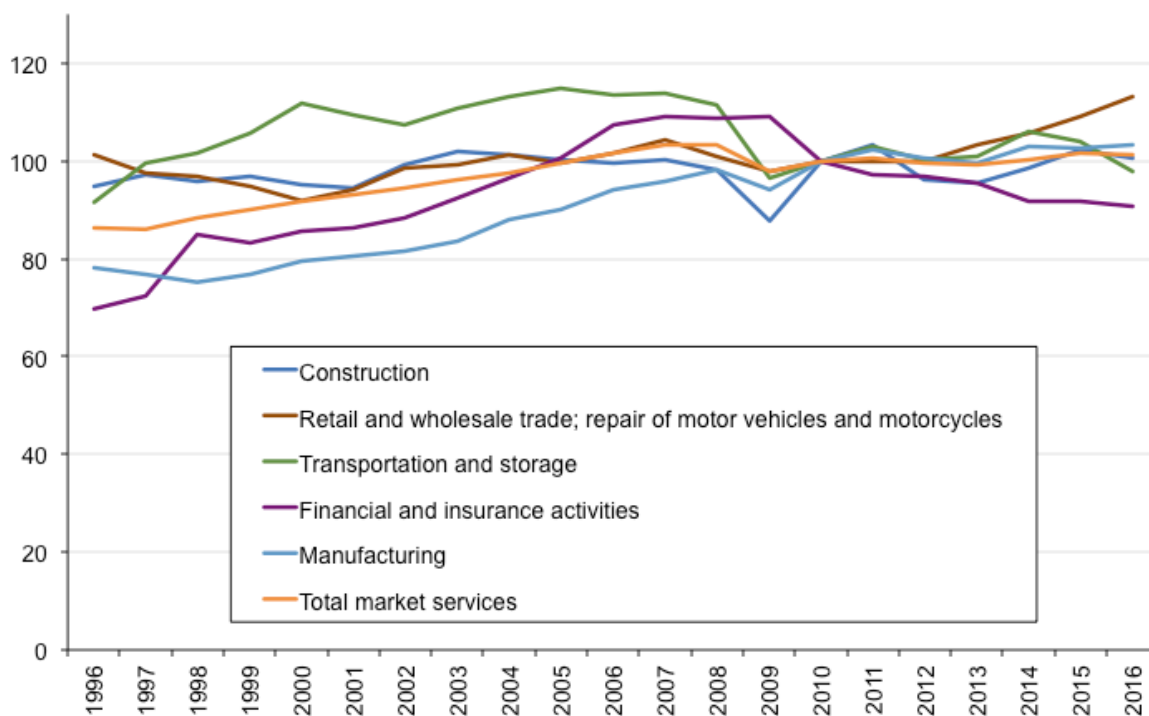
Taking the above points together, we consider that it is essential to approach the judgment that has to be made when assembling RIIO-2 price controls in terms that address directly the question of whether to allow for lower frontier productivity growth than regulators have typically assumed in the past.

We think that this can best be done by identifying in turn:

- the trend rate of productivity growth in comparator sectors of the UK economy prior to the 2008 global financial crisis; and
- the trend productivity growth that there was in the same comparator sectors since 2010 up until the start of 2020.

The source EU KLEMS data for this analysis is given in Figure 2.2. We also provide more up-to-date ONS series in annex A of the report, which presents a near-identical picture through to 2019.

**Figure 2.2: Value-added productivity (2010 = 100)**



Source: EU KLEMS.

On a visual inspection of figure 2.2, it should be apparent that the tram lines for Ofgem's RIIO-2 decision are going to need to be defined in terms of:

- the positive rate of productivity improvement seen in most comparator industries up to 2008; and
- the near-zero productivity growth that there has been, on average, since 2010.

In sections 3 and 4 of this paper, we give take on the technical assumptions and choices that we think Ofgem ought to make when it seeks to draw precise quantitative benchmarks from the above data set.

## 2.4 COVID-19

When making its determination, Ofgem will also need to take account of the impact that COVID-19 is likely have on productivity growth. As with a number of other aspects of the price control, it is difficult to be definitive as at August 2020 on what the implications of the pandemic will be, with the epidemiological outlook and the economic outlook both still moving around in the face of numerous uncertainties. It may nonetheless be helpful to capture the sense of direction that the OBR<sup>7</sup> and the Bank of England<sup>8</sup> have set out in their most recent publications. (Note that the latest OBR and Bank of England analysis was released after Ofgem issued its draft determination.)

Both bodies have stated that productivity will be weighed down by forced changes in working practices during the ‘containment’ phase of the pandemic response. The gas distribution and transmission networks are better placed than we are to explain how they have been affected by these changes, but several of the productivity-reducing reactions highlighted in the published reports – working from home, social distancing measures – look to us to be as relevant to the energy networks as to any other firm in the economy.

Looking more broadly, the experts see a mix of positives and negatives for productivity growth in the short term. On the one hand, there are worries that the COVID-19 shock will both reduce the amount of innovation that comes from new firms entering the economy and increase the capital scrapping that arises when firms exit markets. Balanced against this, infant companies tend initially to achieve lower levels of productivity than established companies, while firms that exit the markets tend to be less productive than surviving firms.

In the medium term, the key factor that the OBR and Bank of England both focus on is the amount of “scarring” that there will be from decisions that companies make in 2020 and 2021. The chief concern here is the extent to which current uncertainties and the build-up of corporate debt will cause firms to put investment and R&D expenditure on hold. If there are sustained cutbacks in these areas, lower spending might stifle innovation and inhibit the kind of productivity growth that would emerge naturally in more normal economic conditions.

The OBR’s assessment after weighing these factors is as follows:

Our upside scenario assumes a short-lived rise in unemployment, that the business investment lost during lockdown is recovered afterwards, and that business failures are limited. Consequently, it assumes scarring is negligible and output follows the path assumed in our March forecast beyond the near term. The central and downside scenarios both assume some scarring, with output at the five-year horizon lying 3 and 6 per cent below our March forecast in our central and downside scenarios respectively. Broadly, this is the result of three factors: a longer-lasting rise in unemployment; permanently forgone business investment, which reduces capital deepening and productivity growth; and business failures that result in capital scrapping and the loss of intangible capital. The size of the scarring effect is highly uncertain given the difficulties in predicting how the economic disruption in any given scenario would feed through these various channels. Nevertheless, they are in line with external estimates, and it seems

<sup>7</sup> OBR (2020), Fiscal sustainability report, July 2020.

<sup>8</sup> Bank of England (2020), Monetary policy report, August 2020.

reasonable to believe that the longer output remains below its pre-crisis level, the greater such effects are likely to prove.

The Bank of England's central case assumptions are similar:

Key judgement 2: there is some long-lasting scarring, largely due to persistent weakness in productivity.

The risks around activity in the medium term are also judged to be weighted somewhat to the downside. The downside risk to activity from uncertainty is likely to translate into downside risks to GDP over the medium term. In particular, uncertainty can weigh on decisions which incur fixed costs for firms, such as investment and hiring. Slower recoveries in investment and hiring could also weigh on the supply capacity of the economy through their spillover effects on productivity growth and labour market mismatch. The downside skew to activity in the medium term is judged to be somewhat lower than in the near term, however.

As in the preceding discussion, the question for Ofgem to opine on in December is how far the energy network sector will be affected by the wider economic headwinds. There seems to be a general acceptance that 2020 will be a lost year for productivity growth across the economy. Thereafter, concerns about capital shallowing perhaps ought not to be so relevant in a regulated, monopoly industry. However, Ofgem will also need to consider the impacts that COVID-19 and recession are having all the way down through the industry supply chain. It may be that the regulated licensees themselves are largely unaffected by "scarring", but it could still be that contractor partners struggle to manage the effects of revenue loss and future uncertainty. Where this is the case, it is not unreasonable to think that COVID-19 could ultimately impact network costs in an unfavourable way.



### 3. Technical Review of CEPA's Report

In section 2.3 we said that Ofgem ought to define the upper and lower bounds to the assumptions that it can legitimately make about RIIO-2 frontier productivity improvement with reference to the pre- and post-crisis rates of productivity in comparator industries.

We offer the following comments on the way in which CEPA has said that Ofgem can draw information from the EU KLEMS database.

#### 3.1 Gross output vs value-added productivity measures

CEPA observes that productivity can be measured in terms of:

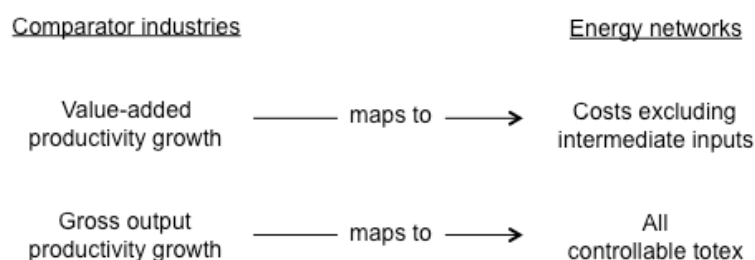
- the ratio of value added to labour and capital inputs; or
- the ratio of gross output to all inputs.

In a growth accounting exercise, the first of these measures isolates the ease with which a firm is able to transform intermediate inputs into a finished product or service. The second measure tracks the way in which a final output is produced out of the full range of capital, labour, energy, materials and services that an industry draws upon.

Ofgem is entitled to use either or both of these measures to define the productivity growth that it expects the energy networks to deliver during the RIIO-2 period. However, there has to be an internal consistency within the calculations, i.e.:

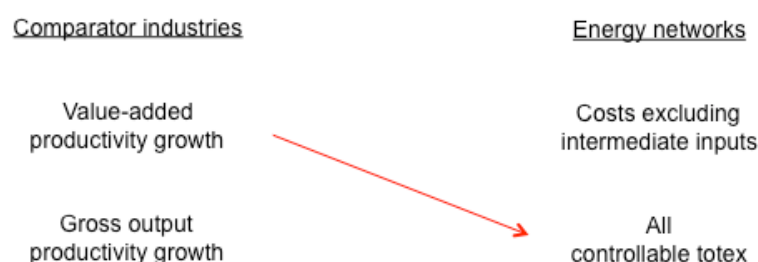
- if Ofgem is benchmarking to the value-added productivity growth achieved by comparator firms, Ofgem has to apply its chosen benchmark to the value-added that the energy networks themselves generate in their activities; and, similarly
- if Ofgem is benchmarking to the gross output productivity growth achieved by comparator firms, Ofgem is logically permitted to allow for a comparable quantum of cost savings across the whole of the networks' expenditure base.

**Figure 3.1: Admissible benchmarking approaches**



For reasons that are not entirely clear to us, there is not this internal coherence in CEPA's work. Instead, CEPA recommends that Ofgem can take benchmarks for value-added productivity growth and challenge the networks to deliver the selected rate of productivity growth across the whole of their totex. Subsequently, Ofgem goes on – wrongly – to evaluate the merits of value-added vs gross output productivity metrics solely in terms of statistical accuracy, without recognising that the way in which it intends to apply its chosen metric matters.

**Figure 3.2: CEPA’s/Ofgem’s preferred benchmarking approach**



This is a straight-forward pick’n’mix error. If Ofgem wishes to use value-added productivity growth metrics it needs to isolate the value-added within energy network companies’ expenditures and provide for future cost savings only in this portion of firms’ costs – i.e. excluding materials and ‘other’ costs. Based on the breakdown of costs that Ofgem has cited in its work on real price effects, this would entail providing for future productivity growth in approximately three-quarters and  $\times$  of gas distribution and transmission totex respectively. (NB: we applied exactly this methodology in our RIIO-GD1 work for the GDNs.)<sup>9</sup>

**Table 3.1: Value-added as a % of controllable totex**

	<b>GDNs</b>	<b>NGGT</b>	<b>NGET</b>	<b>SHET</b>	<b>SPT</b>
Labour	70%	$\times$	$\times$	$\times$	$\times$
Plant and equipment	4%	$\times$	$\times$	$\times$	$\times$
Transport	2%	$\times$	$\times$	$\times$	$\times$
Value added	76%	$\times$	$\times$	$\times$	$\times$

Source: Ofgem draft decision document.

Alternatively, if Ofgem prefers to give a cost challenge across the whole of companies 2021-26 controllable totex, it needs to reference comparator productivity growth in gross output terms. This would entail locking in the required -0.6% to -0.3% downward adjustments to value-added productivity growth benchmarks that CEPA identifies in its work.

Either way, we can be clear that the productivity estimate in Ofgem’s draft determination is too high in relation to the assembled comparator evidence.

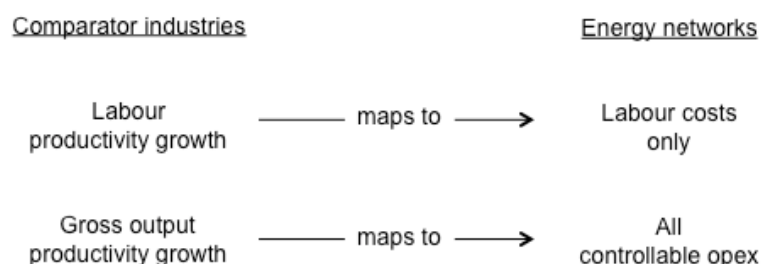
### 3.2 Total factor productivity vs partial productivity measures

CEPA suggests that Ofgem can use a partial productivity measure – i.e. labour productivity growth – when estimating potential opex productivity growth. Provided that Ofgem is allowing elsewhere in its calculations for the investment that permits companies to substitute capital for labour and increase output per worker, this is a reasonable approach. However, it follows, once again, that Ofgem has to make sure that it uses labour productivity growth only to relevant categories of energy network expenditure and not to total costs.

The appropriate mapping in this case is shown in figure 3.3 overleaf.

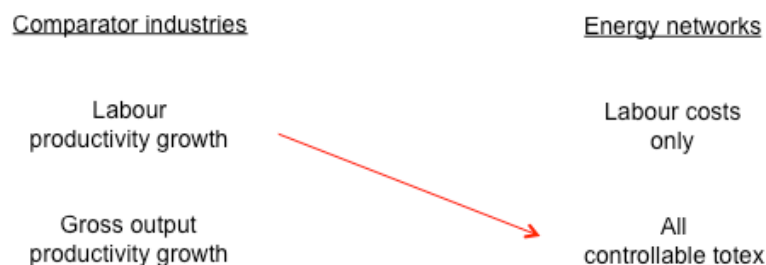
<sup>9</sup> See, for example, First Economics (2012), The scope for future productivity growth: a report prepared for Northern Gas Networks, section 4.2.2.

**Figure 3.3: Admissible benchmarking approaches – opex**



Neither CEPA nor Ofgem apply the correct mapping in their calculations. Instead, both apply benchmarked rates of growth in output per worker to non-labour inputs like materials costs.

**Figure 3.4: CEPA’s/Ofgem’s preferred benchmarking approach – opex**



This constitutes another pick’n’mix error, which Ofgem needs to correct before it makes its final determination

### 3.3 Time period

We discussed the overall considerations that we think should guide Ofgem’s use of historical data in section 2. Putting to one side momentarily the questions there are about how best to anticipate what companies might be able to achieve in the next five years, we can note at a more technical level that CEPA’s selection of a 1997-2016 reference period is problematic for two reasons.

First, on any reasonable reading of the data, the chosen start date and end date do not give a homogeneous sample of data. Rather, the 1997-2016 statistics are really a composite of pre-2008 data, the 2008-10 recession/recovery and the subsequent post-crisis economy, with an obvious structural break in the middle. This can be seen clearly in figures 2.1 and 2.2 and in the statistics in table 3.2 overleaf.

**Table 3.2: Average productivity growth by period (%)**

	1997 to 2007	2007 to 2010	2010 to 2016
Construction	0.3	-0.1	0.1
Retail and wholesale trade; repair of motor vehicles and motorcycles	0.7	-1.4	2.1
Transportation and storage	1.3	-4.2	-0.4
Financial and insurance activities	4.2	-2.8	-1.6
Manufacturing	2.3	1.4	0.5
Total market services	1.9	-1.1	0.2

Source: EU KLEMS and First Economics' calculations.

Aggregating the three columns of the table into a single, composite productivity out-turn obscures what is really happening in the underlying data. Implicitly, CEPA's 1997-2016 averages give a ~50% weighting to pre-crisis productivity growth, ~15% weighting to the crisis/recovery period and ~35% weighting to post-crisis data. CEPA did not, however, choose these weights consciously. Instead, they come about by chance rather than via any sort of analytical judgment. Consistent with our earlier comments, we think that it is much better to weight the evidence in a more deliberative manner.

When doing so, the second point we would then make is that it makes more sense to think in terms of tram lines set with reference to pre-2008 productivity growth and post-2010 productivity growth rather than CEPA's preferred 1997-2006 and 2006-16 periods. While we can understand CEPA's logic of wanting to map to business cycles, there is not a single unique way of defining the start date and end date of any individual cycle. In contrast, a pre-2008 and post-2010 classification captures very directly the change in the trend rate of productivity growth that occurred after the 2008-10 recession.

### 3.4 Geometric vs arithmetic averages

The figures in table 3.1 above are compound annual growth rates. We have not been able to replicate the sector-by-sector figures that CEPA cites in its report, but it looks to us like CEPA might be quoting the simple arithmetic average of 12-month productivity growth rates. If this is the case, CEPA's methodology is a departure from the approach that is usually employed in frontier shift studies. It also fits incongruously with the way in which Ofgem is applying productivity growth rates in its RIIO-2 totex calculations – i.e. Ofgem is using compound productivity growth to rebase 2018/19 efficient expenditure through to 2025/26.

CEPA may wish to relook at this aspect of its calculations in the light of Ofgem's draft determination methodology. We note that compound annual growth rates appear to be up to 0.3% lower than CEPA's reported figures.<sup>10</sup>

### 3.5 Choice of sectors

CEPA's recommended productivity growth ranges are based on the average of its calculations of out-turn productivity growth rates in two subsets of the UK economy:

- subset 1 – construction; wholesale and retail trade, repair of motor vehicles and motorcycles; transportation and storage; financial and insurance activities; and

<sup>10</sup> For instance, we calculate the average annual rate of growth in construction industry value-added productivity growth in the period 2006 to 2016 was 0.1%. This compares to a figure of 0.4% cited by CEPA.

- subset 2 – all industries except real estate, public administration and defence, education, and health and social work.

In relation to subset 1, we agree that CEPA has correctly identified the four most logical comparator sectors for an energy network business. We also agree that there is a case for placing more weight on the construction industry, with commensurately less weight on the other industries, due to the concentration of construction-like activity within energy network totex.

In relation to subset 2, we question how much weight Ofgem should put on a broad measure of near-economy-wide productivity growth. CEPA's chosen basket of industries rightly excludes three public-sector industries worth ~20% of the total economy (in value-added terms). However, the remaining ~80% contains a number of sectors that would not usually be thought of as good comparators for energy networks, such as the mining, agriculture, accommodation and food services, and arts and entertainment industries, as well as a residual amount of public sector activity.

The thinking in previous productivity benchmarking exercises has been that it is important to construct a 'nature-of-work comparator' that matches up as closely as possible the mix of activities that a regulated company conducts (NB: an exactly analogous thought process applies in the analysis of real price effects). The second of CEPA's comparator groups falls a long way short of this standard. Accordingly, we do not think it deserves to be given the same weight as the subset 1 comparator group.

### **3.6 Forward-looking forecasts**

CEPA's ranges contain two overlays to capture some of the uncertainty that we have highlighted in relation to the medium-term outlook for productivity:

- a potential downward adjustment to reflect the possible persistence of recent weak economy-wide productivity growth; and
- a potential upside adjustment to reflect what CEPA says is the OBR's optimism about future labour productivity growth rates.

The second of these adjustments, which CEPA states could potentially add +0.05% to the RIIO-2 frontier efficiency challenge is based on projections made before COVID-19. In its July 2020 fiscal sustainability report,<sup>11</sup> the OBR states:

In the central scenario, the level of productivity in the medium term is 2 per cent lower than in March and it is a further 2 per cent lower in the downside scenario.

This takes away the rationale for any potential upside adjustment.

Our suggestion is that Ofgem should consider the need for a possible downward adjustment as part of the overall judgment that we are asking it to make in December 2020.

### **3.7 Innovation funding**

CEPA posits in its report that the innovation funding that Ofgem has handed out to the energy networks since 2010 could have a positive impact on future rates of productivity growth. It ultimately recommends that Ofgem can consider adding 0.2% per annum to the productivity growth rates that emerge from a conventional benchmarking exercise.

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<sup>11</sup> OBR (2020), Fiscal sustainability report, July 2020.

We have reviewed the arguments that CEPA makes. However, we are not convinced that CEPA has adduced sufficient evidence to warrant the inclusion of a 0.2% uplift over comparator productivity growth rates.

It is important, first of all, to ask how often innovation funding goes to projects that are unlocking long-term cost reductions versus the achievement of other objectives like quality of service, environmental/sustainability, and safety improvement. It is noteworthy in this regard that three of the four examples of successful innovations that CEPA identifies on p.21 of its report (substitution of natural gas with hydrogen, biomethane injection, and carbon emission reduction) are about delivering better outcomes for customers and the environment rather than cost savings.

We then need to know what percentage of any efficiency savings that RIIO-1 innovation funding has unlocked are already reflected in Ofgem's base totex modelling versus what proportion are still to come through after 2019. If, as seems likely, some of the efficiency has already impacted expenditure in the first six years of the RIIO-1 controls, it would be inappropriate for Ofgem to account for the same savings a second time in its estimate of future, yet-to-be-achieved productivity growth.

To the extent that innovation funding can be expected to increase the post-2019 run-rate of ongoing productivity improvement, the next question is whether regulatory support enables the energy networks to out-perform other sectors of the economy or whether regulation is merely replicating the activity and outcomes that one sees in competitive markets. Our recollection is that the original rationale for setting up ring-fenced funds was to remedy what was seen as a deficit in energy networks' R&D expenditures due to regulation. It is not at all clear to us, therefore, that the interventions that Ofgem has been making should be characterised as transforming the energy network companies into super-innovators with a superior track record to firms in the rest of the economy. Rather, it seems more natural to think in terms of Ofgem plugging a gap that might otherwise have seen a regulated sector fall short of the natural innovation, and attendant productivity growth, that goes occurs in CEPA's chosen comparator industries.

Finally, CEPA notes that several aspects of its 0.2% quantification are quite arbitrary, notably:

- the profiling of cost savings between the RIIO-1, RIIO-2 and later price control periods;
- the assumption that innovation expenditure ought to generate a positive payback within 20 years; and
- the estimate of what constitutes a reasonable rate of return.

When these points are put alongside the difficulties that there are in linking innovation funding directly to productivity growth and out-performance of comparator industries, it is hard to conclude that the 0.2% is anything other than one illustrative thought experiment among many hypothetical scenarios that one could conceivably draw up. Accordingly, we do not think that Ofgem has anything like the evidence that it requires as a regulator to make an upward adjustment to the comparator benchmarks.

#### 4. Conclusion

Correcting for the observations that we make in section 3 – i.e. the pick’n’mix error in applying value-added productivity growth rates to all totex, the filtering of time periods, geometric vs arithmetic averages, the choices of comparator sectors, and the 0.2% innovation uplift – will reduce the historical benchmarks that CEPA and Ofgem obtain from the EU KLEMS data set significantly below the 1.44% (opex) and 1.22% (replex/capex) figures that Ofgem used in its draft determination.

We do not consider that it is necessary to restate the views that we have given in previous First Economics papers about the appropriate replacement figures.<sup>12</sup> Instead, we can simply point out that there is, given the passage of time, no new data that would cause the reading that Ofgem takes from pre-2008 experience to be any different from the reading that Ofgem and other regulators have taken in previous price control reviews, as set out again in table 4.1.

**Table 4.1: Assumptions made by regulators about rates of annual frontier productivity growth in decisions issued up to 2017**

	<b>Opex</b>	<b>Capex</b>
Ofgem, RIIO-GD1/T1, 2012	1.0%	0.7%
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Ofgem, RIIO-ED1, 2014	1.0%	0.7% to 1.0%
Utility Regulator, NI Water, 2014	0.9%	0.6%
CMA, Bristol Water, 2015	1.0%	-
Utility Regulator, GD17, 2016	1.0%	1.0%

The key question for Ofgem to opine on in December is: is there reason to set the RIIO-2 frontier productivity growth assumption somewhere below the figures in the above table? We have shown in this paper that both of the major new pieces of information that have emerged since the RIIO-1 determinations – the failure of UK companies to revert to pre-2008 productivity growth rates and COVID-19 – point down rather than up. We have also said that it is not straight-forward to discern exactly how much the energy networks will be affected by whole-economy headwinds in comparison to other industries.

We are happy to admit that we do not have all the answers to the conundrum. The only firm conclusion that we feel able to draw as outsiders in what is undeniably a challenging corner of the RIIO-2 reviews is that Ofgem needs to tackle this issue head on in its internal discussions and in its final determination document. To do otherwise would be tantamount to side-stepping completely one of the key determinants of companies’ 2021-26 expenditures.

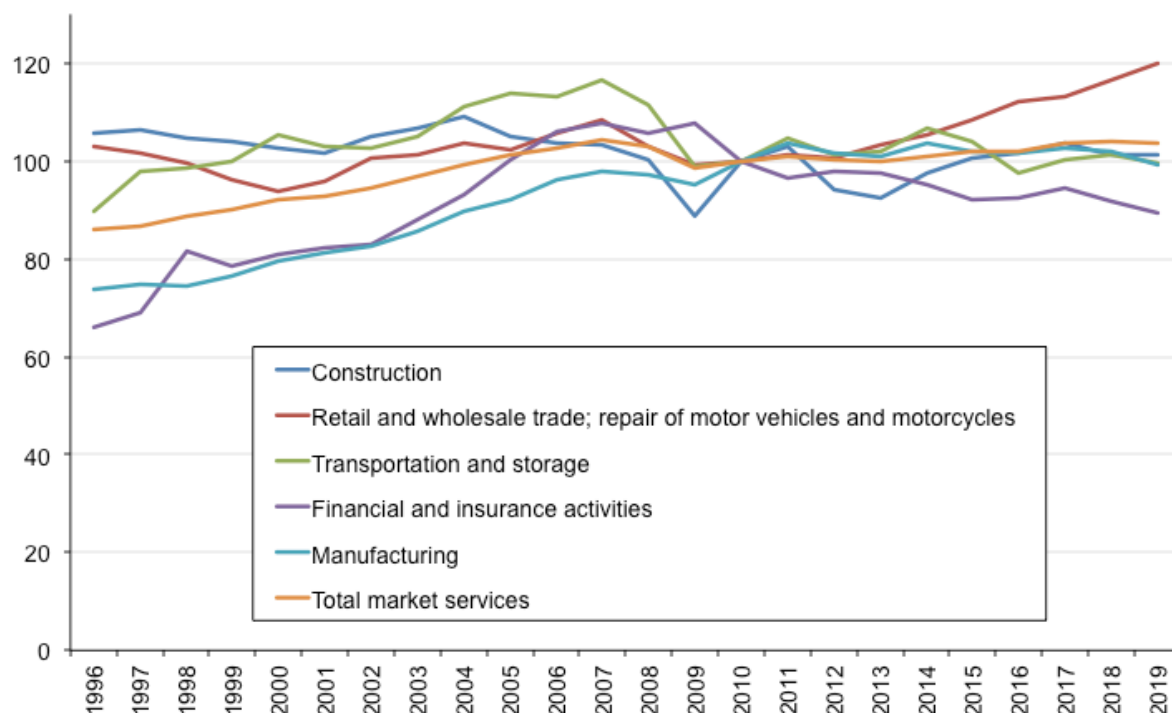
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<sup>12</sup> Our previous reports can be accessed at: <http://www.first-economics.com/reports.html>.

## Annex A

The sector-by-sector productivity data in section 2 of the report comes from the EU KLEMS project<sup>13</sup> – a database compiled by academic researchers that contains growth accounts for all of the EU’s member states. The most recent release from this database, issued in 2019, goes up to 2016 only. More recent UK data has been published by the Office of National Statistics in the form of a regular quarterly release of multi-factor productivity estimates. Figure A1 picks out the most relevant statistics from the ONS’ July 2020 issue.<sup>14</sup>

**Figure A1: ONS multi-factor productivity growth estimates for selected industries (2010 = 100)**



Source: ONS.

Figure A1 is very similar to figure 2.2 in that only one industry (retail and wholesale trade) shows any meaningful productivity growth in recent years, with productivity growth in most of the other industries trending close to or below zero.

<sup>13</sup> <https://euklems.eu/>

<sup>14</sup> <https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/datasets/multi-factorproductivityexperimentalestimatesreferencetables>