

5 October 2010

Mr John Pierce  
Chairman  
Australian Energy Market Commission  
Level 5, 201 Elizabeth Street  
Sydney NSW 2000

Via website: [www.aemc.gov.au](http://www.aemc.gov.au)

Attention: Eamonn Corrigan

Dear John,

### **Review into the use of Total Factor Productivity: Economic Insights Report**

Grid Australia welcomes the Commission's decision to undertake further analysis to test the operational performance of TFP-based regulation. In this regard, Grid Australia notes that the report and models developed recently by Economic Insights, and published on the Commission's website, are intended to assist stakeholders in better understanding the mechanics of TFP-based regulation.

Before making specific comments on the Economic Insights models and report, it is appropriate to reiterate the key messages that Grid Australia has already communicated to the Commission regarding the applicability of TFP-based regulation to electricity transmission:

- In late 2006, the Commission completed a detailed and wide-ranging review of the regulatory arrangements for electricity transmission. In its final determination on the regulatory framework for transmission<sup>1</sup>, the Commission concluded (amongst other things) that:
  - prescribed transmission services should be subject to a revenue cap;
  - the revenue cap should be determined using a building block approach; and
  - industry-wide benchmarks, such as TFP based approaches, are inappropriate given the lumpiness of transmission investment.

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<sup>1</sup> AEMC, Rule Determination, National Electricity Amendment (Economic Regulation of Transmission Services), Rule 2006 No.18.

- The Commission’s determination also noted the Expert Panel’s conclusion that the case for TFP “appears less compelling in electricity transmission, where significant lumpiness of future capital expenditure demands is an important part of the industry landscape”.<sup>2</sup>
- In light of the Commission’s determination on the regulatory framework for transmission and the Expert Panel’s comments on TFP, Grid Australia concurred with the Commission’s comments in its December 2008 Framework and Issues Paper that<sup>3</sup>:

“...there are serious questions about the suitability of applying a TFP based methodology to determine the revenue path of electricity transmission service providers. For these reasons, the existing building block approach may better accommodate situations where the investment profile is lumpy and uncertain because prices and revenues are more closely tied to a business’s own cost base.”

Turning to the Economic Insights models and report, Grid Australia questions some of the conclusions drawn by Economic Insights from its analysis. Grid Australia engaged Harding Katz Pty Ltd to comment on the Economic Insights report, and its advice is provided as an attachment to this letter. Grid Australia draws the Commission’s attention to the following comments in the Harding Katz report:

“We consider that the report and models developed by Economic Insights will assist stakeholders in developing a better understanding of the mechanics of TFP-based regulation. The work by Economic Insights therefore provides a useful contribution to the AEMC’s review of TFP-based regulation. That said, we also note that care is required in interpreting the analysis and conclusions presented in the Economic Insights report. In this regard, we note that:

- The forecast data used in the modelling is relatively stable, and this may lead to unrealistically stable TFP outcomes.
- The modelling examines one TFP-specification, and therefore does not test the sensitivity of the model outputs to alternative specifications. In addition, the chosen TFP-specification does not tackle some of the more potentially challenging and important design issues, such as how to address differences in reliability performance or topography.
- The modelling assumes that under the building block model X factors would be set to zero, contrary to the requirements of the National Electricity Rules. The criticisms of building block regulation made by Economic Insights appear to be a direct consequence of this modelling assumption.
- The modelling does not include an efficiency benefit sharing scheme for the building block model, and therefore an accurate comparison of the retention rates cannot be made.”

Harding Katz’s conclusions include the following comments:

“In our view, an objective appraisal of TFP-based and building block regulation should recognise the likely difficulties in establishing an appropriate TFP specification that truly reflected the productivity differences between the businesses, both in terms of TFP levels and growth rates.

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<sup>2</sup> Ibid, page 40.

<sup>3</sup> AEMC, Framework and issues paper, 12 December 2008, page 33.

Economic Insights' modelling does not include measures of input and output, such as topography or reliability, which may be important explanatory factors for the relative performance of network businesses."

Grid Australia concurs with the above conclusions.

Grid Australia has consistently noted the importance and difficulty of addressing differences in reliability 'outputs' in TFP-based regulation. For network businesses generally, service reliability is a key output and presents unique measurement challenges because it is usually the risk of service failure that needs to be assessed rather than service failure itself. This is particularly true of transmission networks that, correctly, rarely experience material service failures but consume 'inputs' with the objective of minimising the risk of such occurrences. Grid Australia notes that despite its criticality this issue is rarely considered in the discussion of TFP measurement, including in the Economic Insights report.

From Grid Australia's perspective, therefore, the Economic Insights' comparison between TFP-based and building block regulation proceeds without addressing this key design question. In this respect, the reported results and conclusions are open to challenge.

Grid Australia looks forward to further opportunities to engage with the AEMC and stakeholders in the relation to this review. If you require any further information from Grid Australia, please do not hesitate to contact me on 08 8404 7983.

Yours sincerely,



Rainer Korte  
**Chairman**  
**Grid Australia Regulatory Managers Group**

# **A note on the TFP spreadsheet models and report prepared by Economic Insights**

**Report prepared for Grid Australia**

**4 October 2010**





## 1. Introduction and background

The AEMC is presently conducting a review into the use of total factor productivity (TFP) for the determination of regulated revenues and prices. The review is considering the application of a TFP methodology to the economic regulation of services provided by electricity and gas distribution and transmission service providers<sup>1</sup>. As part of its TFP review, the Commission published a report and spreadsheet models in June 2010 that were prepared for it by Economic Insights<sup>2</sup>.

The Economic Insights report explains that the purpose of the spreadsheet models is to test the economic properties of a TFP based regulatory methodology against the current arrangements for building blocks regulation. The report notes that<sup>3</sup>:

“The objectives of constructing the model are: to assist the AEMC in its current review of a TFP-based regulatory methodology; to improve stakeholders’ understanding of the effects of a TFP-based methodology; and to provide a model for stakeholders to test their own scenarios (as requested by a number of stakeholder submissions to the AEMC). At this stage the purpose is not to test the efficacy of alternative TFP output and input specifications.”

Grid Australia has asked Harding Katz Pty Ltd to review and comment on the spreadsheet models and report prepared by Economic Insights. This note sets out our comments and the findings of our review, as follows:

- Section 2 provides an overview of the conclusions of the Economic Insights report;
- Section 3 sets out our comments on the forecast TFP data;
- Section 4 discusses the key differences between TFP and building block regulation;
- Section 5 comments on the distinction between specification error and forecasting error in TFP models;
- Section 6 sets out our comments on comparing pricing outcomes under alternative regulatory approaches;
- Section 7 comments on incentive properties; and
- Section 8 sets out our conclusions.

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<sup>1</sup> The TFP review is being conducted alongside the AEMC’s consideration of a Rule change proposal that seeks to allow the use of TFP as an alternative economic regulation methodology to be applied by the AER in approving or amending determinations for distribution network service providers.

<sup>2</sup> Economic Insights, A Model of Building Blocks and Total Factor Productivity-based Regulatory Approaches and Outcomes, June 2010.

<sup>3</sup> Ibid, page iii.



## 2. Overview of Economic Insights conclusions

Economic Insights analysis has led to a number of positive conclusions regarding the relative performance of TFP-based regulation. In particular, the Economic Insights report includes the following comments<sup>4</sup>:

“Compared to building blocks regulation, TFP-based regulation provides a more differentiated outcome by rewarding good performers and penalising poor performers. It does this by setting price cap parameters based on industry average performance rather than the DB’s own costs.”

The model demonstrates that relatively small errors in forecasts in building blocks regulation can lead to significant divergences of realised revenue from revenue requirements. Because forecasting errors will inevitably occur in practice, TFP-based regulation is likely to be a somewhat less risky alternative compared to building blocks regulation under normal circumstances. Similarly, when compared over an extended period and under normal circumstances, TFP-based regulation is likely to produce a less volatile price path for customers than building blocks regulation.

The scenarios examined in the accompanying spreadsheet models demonstrate that TFP-based regulation can handle significant changes and adverse shocks relatively well provided there are regular price resets or appropriate safeguard mechanisms in place.”

In addition, Economic Insights considers that the incentive properties of TFP-based regulation compare favourably with building block regulation<sup>5</sup>:

“The spreadsheet models also compare the incentives for DBs to make cost savings additional to those anticipated at review time. For relatively static changes such as one-off and recurrent opex reductions and one-off capex reductions, building blocks and TFP-based regulatory options of similar regulatory period length provide broadly similar incentives. All TFP-based options provide substantially stronger incentives than building blocks to reduce rates of input growth. For example, the TFP-based options offer far stronger incentives for ongoing capex reductions than does the building blocks approach.”

We consider that the report and models developed by Economic Insights will assist stakeholders in developing a better understanding of the mechanics of TFP-based regulation. The work by Economic Insights therefore provides a useful contribution to the AEMC’s review of TFP-based regulation. That said, we also note that care is required in interpreting the analysis and conclusions presented in the Economic Insights report. In this regard, we note that:

- The forecast data used in the modelling is relatively stable, and this may lead to unrealistically stable TFP outcomes.
- The modelling examines one TFP-specification, and therefore does not test the sensitivity of the model outputs to alternative specifications. In addition, the chosen TFP-specification does not tackle some of the more potentially challenging and important design issues, such as how to address differences in reliability performance or topography.
- The modelling assumes that under the building block model X factors would be set to zero, contrary to the requirements of the National Electricity Rules. The criticisms of

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<sup>4</sup> Ibid, page iii.

<sup>5</sup> Ibid, page iii.



building block regulation made by Economic Insights appear to be a direct consequence of this modelling assumption.

- The modelling does not include an efficiency benefit sharing scheme for the building block model, and therefore an accurate comparison of the retention rates cannot be made.
- Economic Insight's overall assessment of TFP-based regulation is unduly favourable given the limitations of the modelling exercise and the inferences that can be drawn from any hypothetical case study.

The remainder of this note comments in more detail on these matters, and concludes by setting out our overall findings.

### **3. Forecast data applied in the modelling**

Economic Insights has assembled 25 years of data for 5 hypothetical distribution companies; 15 years of this data is 'forecast'. We note that the forecast data shows constant input and output growth rates for each distributor. One effect of assuming a constant growth rates is that the TFP outcomes for each DB are stable over time. In particular, the TFP growth for each distributor ranges from only 1.21% per annum to 1.69% per annum across the 5 distributors over the forecast period of 15 years. This compares with historic TFP data which ranges from a low of -0.29% per annum to a maximum of 3.13% per annum.

We recognise that Economic Insights has provided stakeholders with the capability to input their own growth rate assumptions in order to test the model outputs. Nevertheless, in presenting 'base case' scenarios it may have been preferable to adopt forecast data that included a greater degree of variability in the TFP data across the 5 distributors.

Whilst we do not regard the stability of the forecast data as invalidating the conclusions drawn by Economic Insights, it does raise an important question regarding the likely volatility of TFP outcomes across distributors, and the extent to which this volatility may affect the performance of TFP-based regulation compared to building block regulation. Specifically, we would expect the outcomes from TFP-based regulation to show more variability if the model employed more realistic TFP growth rates over the forecast period.

### **4. Key differences between TFP and building block regulation**

As noted above, Economic Insights concludes that, compared to building blocks regulation, TFP-based regulation provides a more differentiated outcome by rewarding good performers and penalising poor performers. TFP regulation does this by setting price cap parameters based on industry average performance rather than the distributors' own costs.

TFP-based regulation should reward a distributor if its TFP grows more quickly over the forecast period than the historic industry average<sup>6</sup>. Whilst this form of regulation may reward 'good' performance, this is not necessarily the case. For example, a distributor that is already more efficient than its peers may find it relatively difficult to outperform the historic industry average in the forthcoming regulatory period. Therefore, unless a snap shot assessment is made of the relative efficiency of distributors at the start of the regulatory period, TFP-based regulation may not reward 'good performers', but will rather reward the 'best improver'.

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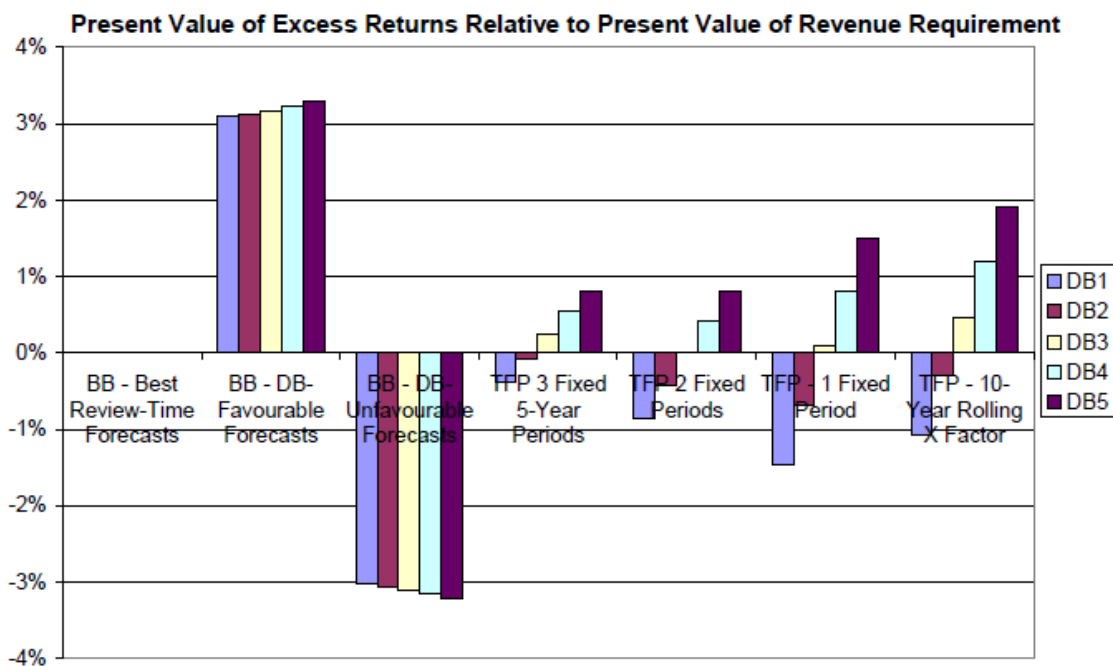
<sup>6</sup> In practice, this may not be the case if an output, such as reliability, is not priced. In these circumstances, a distributor's regulated revenue may not increase commensurately with its TFP growth.



Multilateral TFP has been applied in New Zealand to address the TFP level (i.e. the relative efficiency of distributors) as well as the TFP growth rate. The assessment of the TFP levels was factored into the setting of the X factors for the New Zealand distributors. Economic Insights would be well-positioned to comment on this issue in further detail as Dennis Lawrence has previously advised the New Zealand Commerce Commission on this matter.

A further potential difficulty arises if the preferred measure of TFP growth favours a particular type of distributor relative to others. In particular, Economic Insights’ modelling shows that the rural distributor (DB1) consistently under-performs in the TFP-based models compared to the urban distributor (DB5). This is illustrated in the base case scenarios as shown in Economic Insights Figure 1 (reproduced below). It should be noted that Economic Insights do not comment on the consistent under-performance of DB1.

Figure 1: Base case profitability indicators, years 11–25



Assuming that all distributors are equally efficient at the start of year 11, there are two possible explanations for the under-performance of DB1 under the TFP models, as illustrated in Figure 1 above:

- During the years 11-25, the rural distributor becomes less efficient than its urban counterpart, and therefore the lower rate of return is justified because DB1 is a ‘poor’ performer; or
- The rural distributor is unfairly disadvantaged by the chosen TFP measure. The apparent differences in performance may reflect geographical differences (for example scale efficiencies due to customer density) between distributors that are not captured in the selected measure of TFP.

Only the former explanation would support Economic Insights’ conclusion that TFP-based regulation rewards ‘good’ performers and penalises ‘poor’ performers. The latter explanation is more consistent with a design or specification error – an issue that we will discuss in further detail below.

We note that all forms of incentive regulation – including building block regulation - are intended to reward ‘good’ performance and penalise ‘poor’ performance. The key difference





between TFP and building block regulation is the extent to which revenues and prices are set according to industry-wide benchmarks. TFP-based regulation depends on industry-wide benchmarks, although building block cost assessments remain relevant in recalibrate revenues and prices.

By the same token, building block regulation also has regard to industry-wide benchmarks, although the focus of the benchmarking employed is not usually TFP. In Australia, regulators have been cautious in relying on industry benchmarks to set revenues and prices. In fact, the National Electricity Rules codify the role of benchmarking as only one of a number of factors that the AER must consider in its review of a company's forecast operating and capital expenditure. The use of TFP-based regulation to set revenues and prices would represent a significant departure from current regulatory practice.

In our view, an important difference between TFP and building block regulation resides in the regulatory process for setting revenue and prices. In particular, TFP-based regulation does not require any forecast expenditures to be submitted by the regulated business or to be reviewed by the regulator. As discussed in the next section, however, this apparent benefit must be weighed against the costs of designing the TFP regime.

## **5. Specification error versus forecasting error**

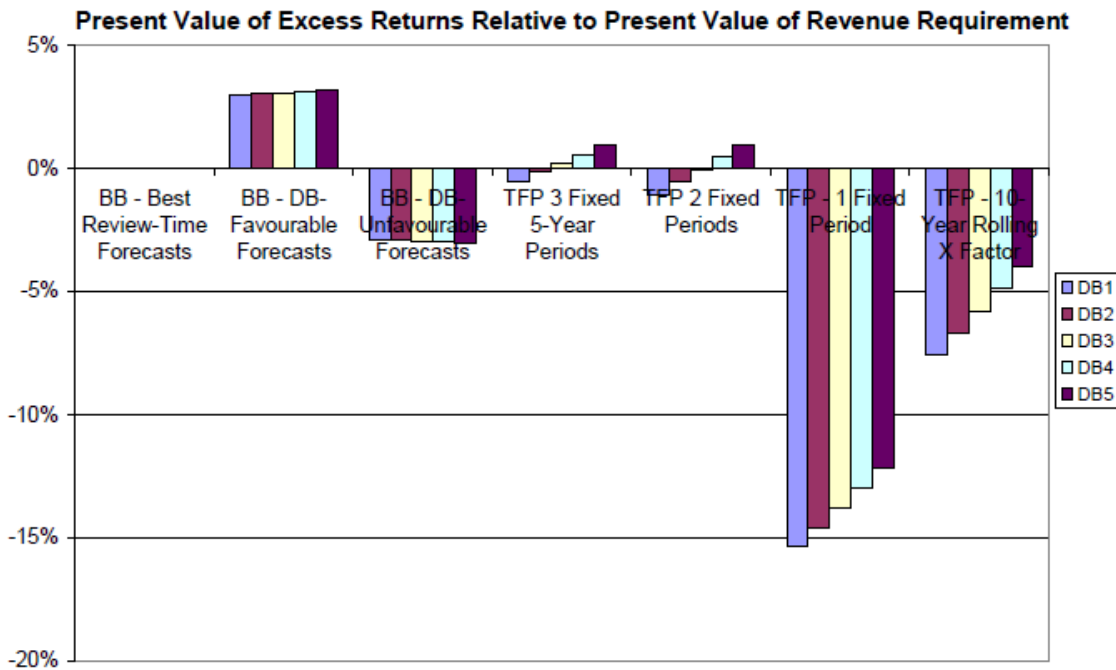
Economic Insights concludes that relatively small forecasting errors in building block regulation can lead to significant divergences of realised revenue from revenue requirements. In Economic Insights' view, because forecasting errors will inevitably occur in practice, TFP-based regulation is likely to be a somewhat less risky alternative compared to building blocks regulation under normal circumstances.

We do not agree with Economic Insights' conclusion that TFP-based regulation should be regarded as less risky. It is axiomatic that TFP-based regulation – which does not have any regard to forecast expenditure – is not prone to forecasting error. However, It does not follow that TFP-based regulation is low risk. As noted above, the chosen measure of TFP may unfairly favour some distributors compared to others where the outputs or inputs have not been specified correctly. It has already been noted that DB1 underperforms on all TFP models compared to DB5, either as a result of genuinely 'poor' performance or as a result of a misspecification error.

It is also important to recognise that the absence of forecast information from TFP-based regulation does lead to systematic divergences between costs and revenues, as shown in Figure 10 of Economic Insights report (reproduced below).



Figure 10: Anticipated increase replacement capex profitability indicators, years 11–25



In this example, as TFP-based regulation sets future revenues and prices according to historic measures of TFP, it cannot anticipate the increases in replacement capital expenditure in this scenario. The performance of the TFP one-period model and the TFP 10 year rolling X factor is inferior to the building block regimes, even if systematic regulatory error is assumed in the building block cases. It appears from the above scenario that distributors may reasonably regard this option as “more risky” than building block regulation, contrary to the conclusions reached by Economic Insights.

In this regard we note that very few distributors in Australia appear to support TFP-based regulation. In addition, we understand that Grid Australia is strongly opposed to TFP-based regulation. Presumably, this lack of support reflects an assessment by the regulated businesses that TFP-based regulation imposes additional risks or costs on the businesses which more than offset the likely benefits. In this sense, the conclusions drawn by Economic Insights from its modelling could be regarded as being inconsistent with the fact that few companies support TFP-based regulation.

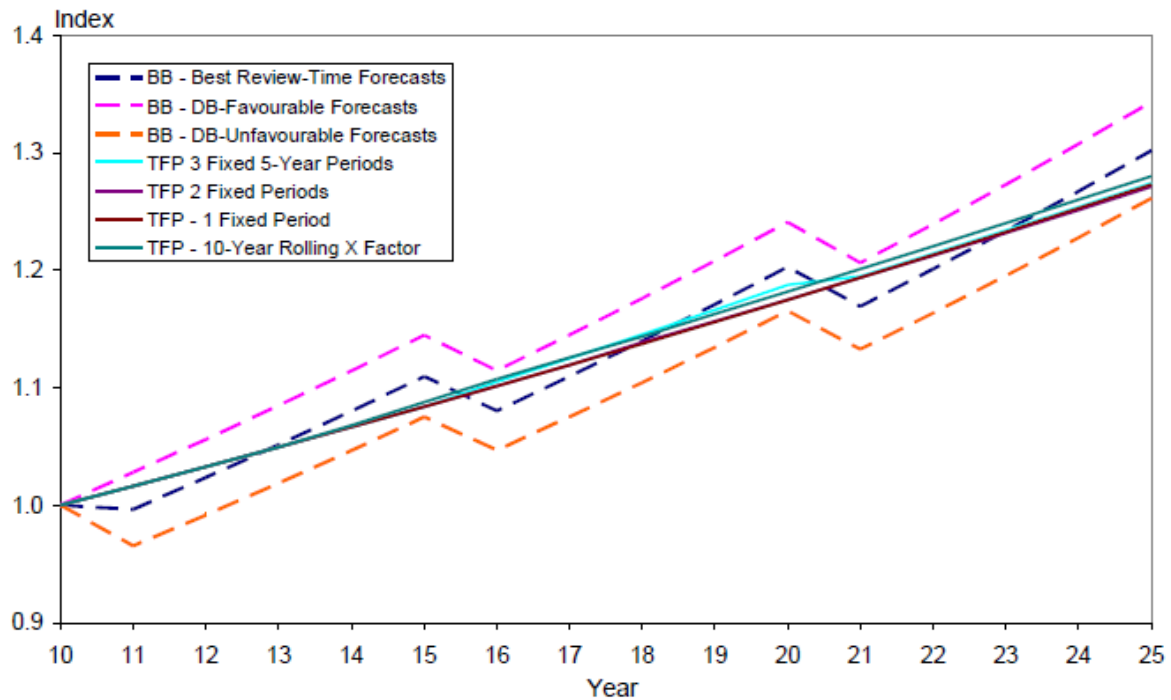
In our view, the above scenario illustrates that building block regulation is likely to be superior than TFP-regulation if there is an anticipated step increase in capital or operating expenditure. This conclusion is not surprising given the fundamental difference between the regimes: building block regulation sets revenues and prices according to future efficient expenditure requirements, whereas TFP-based regulation sets revenues and prices according to historic measures of productivity growth.

### 6. Comparing pricing outcomes

Economic Insights concludes that when compared over an extended period and under normal circumstances, TFP-based regulation is likely to produce a less volatile price path for customers than building blocks regulation. To illustrates this point, Figure 2 in Economic Insights’ report is reproduced below.



Figure 2: **Base case – overall prices paid by customers, years 10–25**



Economic Insights comments on the above figure as follows<sup>7</sup>:

“The overall prices paid by customers are presented in figure 2. The four TFP-based regulatory options all produce relatively smooth customer price indexes with only very minor ‘kinks’ at review time reflecting the presence of a  $P_0$  in those years in addition to the X factor. By contrast, the three building blocks cases produce more volatile customer price indexes, each with a distinct ‘zig-zag’ pattern. This reflects the relatively greater emphasis on  $P_0$  adjustments in the building blocks case, particularly where the X factor is set to zero (as it is in the base case).”

We note that Economic Insights has determined  $P_0$  by constraining X to equal zero. However, this approach is not consistent with the National Electricity Rules, which require that X must be set so as to minimise the variance between regulated revenues and costs in the final year of the control. The Economic Insights approach causes the building block prices to exhibit a ‘saw tooth’ effect. This outcome would not arise if the modelling reflected the National Electricity Rules requirements.

## 7. Incentive properties

In relation to incentives, Economic Insights concludes that for relatively static changes such as one-off and recurrent operating expenditure reductions and one-off capital expenditure reductions, building blocks and TFP-based regulatory options of similar regulatory period length provide broadly similar incentives. However, Economic Insights finds that all TFP-based options provide substantially stronger incentives than building blocks to reduce rates of input growth. Economic Insights notes that the TFP-based options offer far stronger incentives for ongoing capital expenditure reductions than does the building blocks approach.

<sup>7</sup> Ibid, page 23.



We note that the analysis presented by Economic Insights does not model the effect of an efficiency benefit sharing scheme that typically applies under building block regulation. The operation of these schemes can be quite complex and therefore modelling their operation is worthwhile. An important design feature of the AER's scheme is that it provides the company with a 30% share of any efficiency saving. Economic Insight's modelling shows a variation in retention rates for the building block regime ranging from 17% to 100%. We expect that if the effects of the efficiency benefit sharing scheme had been included the overall retention ratio would be close to 30% for all scenarios under the building block regime.

In addition, it is important to recognise that the power of the incentives provided under the building block regime can easily be changed. For example, capital expenditure is currently excluded from the efficiency benefit sharing scheme. If this treatment of capital expenditure were amended, the strength of the incentives under the building block regime could be enhanced.

The power of the incentives under building block regulation could be enhanced by extending the duration of the regulatory period. The recent RPI-X@20 review in the UK has proposed extending the regulatory period to 8 years. More generally, the design of the preferred regulatory mechanism – whether building block or TFP-based regulation – can be fine-tuned by adjusting the duration between resets or through the addition of adjustment mechanisms such as off-ramps or S-factor regimes. In contrast to Economic Insights' conclusion, we do not regard TFP-based regulation as necessarily having stronger or weaker incentives than building block regulation – much depends on the specific design features of each regime.

## **8. Concluding comments**

The report and spreadsheets developed by Economic Insights will greatly assist network companies in understanding the application of TFP-based regulation. It should therefore be regarded as a positive contribution to the AEMC's review.

This memo has identified the following modelling issues:

- The forecast data is relatively stable, and this may lead to unrealistically stable TFP outcomes.
- The modelling only examines one TFP-specification. As such, it does not explore the variability in outcomes from TFP-based regulation that could result from alternative specifications.
- The modelling assumes that under the building block model X factors would be set to zero, contrary to the requirements of the National Electricity Rules.
- The modelling does not include an efficiency benefit sharing scheme for the building block model, and therefore an accurate comparison of the retention rates cannot be made.

In terms of the model outcomes, the results are not unexpected. In our view, it is reasonable to draw the following conclusions:

- In circumstances where there are anticipated increases in costs, building block regulation can be expected to provide regulated companies with returns that are more consistent with the cost of capital, compared to the outcomes delivered under TFP-based regulation.



- Building block regulation performs poorly (that is, there are systemic differences between costs and allowed revenues) if it is assumed that the regulator makes systemic errors in assessing cost forecasts. TFP-based regulation, on the other hand, does not involve a forensic assessment of forecast expenditure and is therefore less prone to this type of regulatory error. It is, of course, prone to other types of 'regulatory error' - such as misspecification of the TFP indices or errors in estimating industry input costs.
- In our view, an objective appraisal of TFP-based and building block regulation should recognise the likely difficulties in establishing an appropriate TFP specification that truly reflected the productivity differences between the businesses, both in terms of TFP levels and growth rates. Economic Insights' modelling does not include measures of input and output, such as topography or reliability, which may be important explanatory factors for the relative performance of network businesses.
- A TFP-based regime may include a number of features that have not been considered in the Economic Insights report. For example, pass through arrangements and off-ramps could ameliorate some of the adverse outcomes that could arise from TFP-based regulation if significant increases in costs eventuate. These are matters that will need to be considered in detail if the TFP-based regime is further developed.