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Report | 30 September 2014

Cross Submission on Dobbs and NZIER

Prepared at the request of

BARNZ

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Executive Summary

As part of its further work on WACC, the Commerce Commission has invited cross-submissions on recent work by Professor Ian Dobbs and by NZIER. This cross-submission on those papers was requested by BARNZ, but represents the independent views of the author and is prepared under the High Court's Code of Conduct for expert witnesses.

NZIER

The NZIER submission draws on recent data disclosed by electricity distribution businesses (EDBs) in New Zealand. It is particularly relevant because many submissions have discussed the assumed causal chain through which a higher WACC allowance is thought to induce more investment, and consumers are thought to gain service quality benefits from that extra investment.

There is very little evidence available on the first part of this chain (a few percentage points on WACC bringing forth extra investment), but a number of submissions have assumed this would occur and then looked for the resulting consumer benefits.

By aggregating and summarising the reliability data, NZIER have shown that most of the unreliability of distribution networks is *not* readily fixed by extra investment. Of the network outages in 2013, only 22% appear to be clearly amenable to prevention via extra investment.

NZIER also develop some estimates of the potential value consumers place on extra reliability. This work seems quite preliminary, but it does indicate some plausible findings, such as the fact that valuations will tend to vary across consumer types. Residential outages appear to have quite modest costs on a per-consumer basis.

Dobbs

We consider it very useful for the Commission to have asked Professor Dobbs for comment directly. In our view his comments are very helpful in clarifying the key assumptions in his model, which are not well aligned with the task to which the model has been adapted in these proceedings. In particular, it is assumed that

- The investment serves end-users directly, rather than being combined with an electricity retailing service and on-sold to end-users;
- There is no pre-existing demand for the infrastructure, as opposed to a service quality improvement for which demand is highly dependent on the existing service;
- There is an obligation on the service provider to install new assets, whereas electricity distributors in New Zealand are only obliged to maintain connections to premises already connected in 1993; and
- Whereas the Dobbs model assumes the WACC is not indexed in any way, under the IMs the parameters are reviewed periodically, providing an opportunity to revise the allowance and reducing the case for an uplift.

Perhaps the main contribution however is to analyse in detail the issues relating to maximum consumer willingness-to-pay. In the model, consumer surplus is infinitely large because the demand curve is assumed to have a constant elasticity. This means that when consumers are deprived of service through a lack of investment, their loss is infinitely large, so they are therefore willing to pay very high WACC allowances to avoid this loss. Clearly this is unrealistic. While Frontier Economics attempted to "fix" this problem we agree with Professor Dobbs that their method does not pass basic sanity checks, that the true value of consumer surplus is likely to be much lower, and that the argument for high WACC percentiles is correspondingly much weaker.

Professor Dobbs also makes some comments about the welfare function underlying his model. These comments further underline the gap between the model and the real world facing the Commission. For example, Professor Dobbs notes that a pure consumer surplus welfare function could, in his model, result in a zero allowance for WACC. While a feasible outcome in the model, this is not a feasible outcome in the real world because it would not be in the "long-term" interests of consumers.

For these reasons, we consider that Professor Dobbs has placed appropriate caveats on his model and the applications to which it can be put. The fact that he designed it for a quite different purpose than the task facing the Commission does not, in our view, invalidate all of the submissions that have cited it and commented on it or adapted it. Rather it is indicative of the weight the Commission should attach to these submissions.

1 NZIER Submission

The NZIER paper adds to the empirical evidence before the Commission in a sensible way. NZIER have looked at the reliability/interruptions data from most recent disclosures by electricity distribution businesses (EDBs). They focus on Class C interruptions, a decision we endorse. The following table shows the classification of outages.

Category	Description
Class A	planned interruptions by Transpower
Class B	planned interruptions on the network
Class C	unplanned interruptions on the network
Class D	unplanned interruptions by Transpower
Class E	unplanned interruptions of EDB owned generation
Class F	unplanned interruptions of generation owned by others
Class G	unplanned interruptions caused by another disclosing entity
Class H	planned interruptions caused by another disclosing entity
Class I	interruptions caused by parties not included above

Since the issue revolves around investments by the distribution networks and their impact on reliability, we consider it is reasonable to focus on "unplanned interruptions on the network". Planned interruptions are likely to impose smaller costs on customers and may be correlated with the installation of new equipment or major periodic maintenance.

NZIER then calculate SAIDI and SAIFI indices by aggregating across EDBs and undertake several comparisons. This analysis suggests that the investment incentive at the heart of the WACC percentile debate is only relevant to around 22% of electricity distribution network outages.[1]

There are some caveats on this analysis, an important one being the classification of which kinds of outages are investment related. However closer examination could reduce or increase the number of outages linked to investment (for example, gear failure can still occur in a well-maintained network). It might also be useful to bring Transpower's outages into the analysis.

Nevertheless, on the face of it this is very relevant information, and tends to undermine the case for a high WACC percentile.

NZIER goes on to analyse outage-related operating costs for both outage avoidance (eg vegetation control) and outage recovery. In total these amount to a lot (2.7 times) more than EDBs spent on reliability investments for the 2013 year ($107m vs $39m). It is worth noting the revenue impact of this comparison. Using 8% as the WACC, the extra

[1] 22% = 40% x 55%, reflecting the fact that 55% of outages are Class C and 40% of those could be linked to investment (i.e. line failure).

$39m invested would have yielded extra revenue of $3.1m which is a very small share of the $107m of reliability-focussed operating costs.

What can we conclude from this? There are several propositions that seem worthy of further consideration, including the following.

- EDBs already have quite high-powered incentives to invest in network reliability if this would avoid operating costs.
- The scale of outage-related operating costs suggests that substitution of capital is not actually an effective solution.

That view is further supported by examination of the causes of outages:

Lightning
Vegetation
Adverse weather
Adverse environment
Third party interference
Wildlife
Human error
Cause unknown
Defective equipment

All but the last two categories seem to be outage causes that would be difficult to avoid through capital investment.

The NZIER paper goes on to briefly consider "an approach to valuing reliability" that is based on an unpublished update to work NZIER has previously undertaken for the Electricity Authority (EA). This work usefully highlights the fact that outages have different costs for different user types. This finding was also reported by the EA, which, for example, estimated different valuations across different locations within New Zealand.

We note that both NZIER's values and those reported by the EA appear to be genuine consumer valuations rather than estimates of the impact on GDP.

2 Dobbs Submission

Given the focus on the Dobbs (2011) model it was wise of the Commission to request a comment from Professor Dobbs directly. Having reviewed his submission, we consider it very helpful in clarifying the key features of the model, its potential areas of application and the adaptation to which it has been put by Frontier Economics.

Three issues are of particular note from Professor Dobbs' submission.

- The investment problem being modelled;
- Maximum willingness-to-pay; and
- Welfare function issues.

2.1 The investment problem

It is clear from his submission that Professor Dobbs had in mind a particular type of investment when building his model. He was interested in a new service rather than an existing one. He says:

> *The original model assumes that new investment is in a new service for which there is independent demand – that is, demand that is independent from that for the existing service(s). In gas and electricity transmission and distribution, one might see how this might be a good fit – if for example, new investment was directed to supplying new communities, for example. However, it appears to me that it is likely that 'new' investment is more likely to be in the area of strengthening capacity and reliability of the existing network, or reducing network costs (e.g. smart grid investment). It seems odd to view there being a demand curve for this new investment, separately from the demand curve for the existing investment.*

This seems a very important point, especially in view of the considerable discussion in submissions of electricity reliability investments, which are definitely not "directed to supplying new communities". Professor Dobbs goes on to note that he has basic infrastructure in mind, rather than the supply of energy services over that infrastructure and that he assumes the service provider to be under an obligation to serve (situations more likely to be found in the telecommunications sector than in electricity). New Zealand's electricity distributors have no obligation to serve new locations within their network regions. There is (at s105 of the Electricity Act 2010) a grandfathered provision to maintain supply to premises that were already connected in 1993, but nothing more general.[2]

The service obligation assumption, combined with the assumption of investment in new infrastructure with independent demand, are likely to be essential motivations for constructing the Dobbs (2011) model in the first place. For example if not for the service obligation, one could simply put the project up for tender and allow the market (effectively) to set the required rate of return through a bidding process.

[2] Under the Code administered by the EA, distributors are also obliged to do certain things in respect of distributed generators but not consumers.

As Professor Dobbs notes, in a setting that lacks the demand independence he assumed, there will be a cross-price elasticity of demand between users of existing services and users of the "better" service, and this needs to be taken account of in the model.

2.2 Maximum willingness-to-pay

Professor Dobbs has provided a very helpful review of the willingness-to-pay issues that arise from Frontier Economics adaptation of his model. The key point here is that when the demand curve is assumed to have a constant elasticity, consumer surplus in infinite (there is no finite vertical intercept). Losing that surplus, for example because new investment is not forthcoming, therefore incurs an infinitely large loss. It follows that consumers will prefer to pay very large prices to avoid this infinitely large loss.

Professor Dobbs discusses in detail the options for avoiding this incorrect and assumption-driven result, including by linearising the demand curve. His analysis, particularly as reported in Table 4, shows the very large difference between the results reported by Frontier Economics and the outcomes when an alternative method is used.

In this section of his paper (4.2) Professor Dobbs also points towards the need for sanity checking one's results. For example, it seems totally unrealistic to believe that deferring investment in electricity networks would impose an *annual* cost on consumers of $263bn. We also agree with Professor Dobbs' comments on the likelihood that demand for new investment is likely to be considerably more elastic than demand for one's existing network connection.

2.3 Welfare function issues

In paragraphs 19 to 21, Professor Dobbs discusses issues arising from the potential objectives of maximising consumer surplus or some mix of consumer and producer surplus. He concludes at paragraph 21 by saying

> *For this reason, I am not entirely sanguine with the idea of putting greater weight on CS as a 'mechanism' for generating a lower predicted AROR.*

Our reading of this section suggests that it is tied very closely to the model. The model itself is very sensitive – i.e. it generates extremely different results – to assuming that consumer surplus is the criterion. Because of this, Professor Dobbs would prefer that a lower predicted AROR not be generated from his model in this manner.

In our view this does not cut across the submissions we have previously made with respect to the welfare function. We have consistently argued that the "long term" qualifier in the Part 4 purpose statement is adequate protection against a zero rate of return, and that position is not contradicted by Professor Dobbs.

On this point, we consider that, just as the Dobbs (2011) model is not well suited to analysing reliability investments (one would need a different model), it is also not well suited to setting a WACC percentile as such. This interpretation seems entirely

consistent with the caveats Professor Dobbs articulates on its use for that purpose, most notably in paragraph 4.

> *My other concern lies with the extent to which the model can be used as a quantitative guide to the best choice of percentile to set for the allowed rate of return. This kind of model articulates why a significant uplift is warranted, but in my opinion, it is unclear how much quantitative significance should be placed on the model predictions. For example, there are reasons for considering the uplift should be greater (because there are sources of uncertainty, notably over future demand and technology, that are explicitly ignored in the model)1, and reasons for why it should be smaller (because there are other ways in which reliability and investment can be influenced by the regulator, because decision makers do not necessarily behave as Neoclassical economic theory predicts etc.).*

This does not mean that no weight should be given to submissions that have discussed the model, merely that it is not a silver bullet for the Commission. Our observations are that this is consistent with the way the Commission has considered submissions on the model.

2.4 Conclusion on Dobbs Report

We consider that Professor Dobbs has made a very useful and important contribution. His report has highlighted the abstract nature of the model that we and others have previously commented upon, and drawn particular attention to several features that have not been closely scrutinised.

For example, in paragraph 23, Professor Dobbs notes that for simplicity his model assumes a one-time setting of the WACC, which is not always what occurs. Indeed, it does not occur under the IMs because the WACC parameters are reviewed periodically. This reduces the need for an uplift as we have previously submitted.