Note

To	Ralph Matthes, MEUG
CC	Stephen Franks, Nikki Pender, Franks and Ogilvie
From	David de Boer and John Stephenson
Date	13 March 2014
Subject	WACC uplift: preliminary advice

Dear Ralph

You have asked for our views on two questions in the Commerce Commission's current consultation paper on cost of capital Input Methodologies[1] (IMs):

- *What evidence is there in support of either the 75th percentile or a credible alternative (question 5)?*
- *In selecting an appropriate WACC percentile, how significant is it that regulated outputs are inputs to other sectors in the economy (question 6)?*

Our views on these two matters are that:

- the weight of evidence supports regulatory WACC being set at estimated WACC (notionally the mid-point or 50th percentile), given;
  - the logical conclusion that the mid-point is the value of WACC which minimises error in estimation of the 'true' WACC value
  - the existence of material limitations in analytical approaches used to suggest that the costs of WACC estimation errors are asymmetric
  - empirical evidence on the market value of regulated assets which suggests that a WACC at the mid-point likely over-compensates investment in regulated assets
  - an emerging shift in regulatory practice overseas with respect to reducing regulatory WACC which now makes the Commissions' current IMs something of an outlier
  - industry-specific circumstances and current regulatory frameworks commend a default WACC which excludes uplift
- the fact that regulated outputs are inputs to other sectors in the economy is a significant factor which should be taken into account in setting WACC IM's because;
  - assuming away 'secondary market effects' relies on strong and unrealistic assumptions of distortion free markets and perfect competition
  - unrealistic assumptions can only be justified for assessing well-defined project proposals or investment appraisal and when alternative, more realistic, analysis is too costly relative to the value at stake
  - the value at stake in a decision to lift regulatory WACC above the mid-point, affecting over $12 billion of regulated assets, demands a realistic and conceptually correct analysis.

[1] See "Invitation to have your say on whether the Commerce Commission should review or amend the cost of capital input methodologies. Published 20 February 2014.

What evidence is there in support of either the 75th percentile or a credible alternative (question 5)?

The Commerce Commission's use of the '75th percentile' of WACC has, to our knowledge, no strong evidentiary basis. The Commission made an assumption about the probability distribution of their WACC estimate and the 75th percentile from that assumed distribution was chosen.[2] This choice was based on judgement rather than evidence – a point highlighted in the High Court's decision on IMs last year.

The Commission's estimated mid-point (the expected value) for WACC did come from empirical observations and estimates. In other words, the mid-point has an evidential or empirical basis but the '75th percentile' does not.

Limited empirical analysis of the extent of error or bias in setting WACC

There is not a great deal of ex-post analysis evaluating the extent to which regulators make errors in their determinations of WACC, but the balance of evidence tends to suggest a bias towards setting WACC rates too high. For example during the middle period of the 2000's regulators in the UK appear to have adopted this approach to 'uplift' WACC in various regulatory determinations but from late in the period the practice was replaced by tighter definitions of WACC components that gave a narrow mid-point range, defined by the components rather than from an arbitrary WACC uplift.

Recent determinations, and current regulatory reviews in the UK have shied away from aiming high with estimates of WACC components and it appears to us that only one recent regulatory pricing review (the CER October 2013 mid-term review of EirGrid/ESB WACC) has considered a specific uplift, though this was not for reasons of estimation error.[3]

The question of whether there is evidence supporting use of the 75th percentile is of secondary importance to the more general question of whether there is evidence supporting the use of a WACC value which is <u>not</u> the most likely value for WACC (the estimated or mid-point WACC rate). The Commission's decision to err on the side of a WACC which is higher than its most likely (mid-point estimate) value reflected their concern that setting WACC lower than its 'true' value is more costly to consumers than the costs of setting WACC too high.

Concern about asymmetric impacts from estimation errors has its basis in theoretical and analytical (non-empirical) models.[4] The predictions from these models are that when a WACC rate is set too low investors may delay or cancel investment and the supply of goods and services falls. Consumers then cannot buy these services at any price and this means they are worse off compared to a situation where they are left paying higher than (workably) competitive prices due WACC being set too high.

These findings, while intellectually interesting, suffer from the usual shortcomings of theoretical and analytical models which abstract from the real world in order to focus on the issue of interest

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2 There was an empirical basis of sorts behind the numbers used – they were informed by estimated standard errors from components of the WACC – however the size of a standard error has no probabilistic meaning unless there is some prior knowledge of the underlying distribution from which the data is drawn. If the component estimates are from sufficiently large random samples (e.g. larger than 20) and are independent then standard errors can reasonably be assumed to normally distributed (according to the central limit theorem). To our knowledge none of these conditions were met in the Commission's estimates of the components of WACC.

3 The uplift was applied to reflect the transmission/distribution companies exposure to the heightened uncertainty in Irish financial markets in the period leading up to the final determination. CER noted that if conditions changed in the short term then the uplift could be reviewed.

4 The analysis of Dodds (Sept 2007) that the Commission have referred to in their 'Invitation to have your say …' presents a theoretical approach to estimating these effects given various assumptions about the nature of the asymmetry and then uses Monte Carlo simulation to test the consumer loss function on either side of the WACC mid-point.

and to keep analysis tractable. One practical example of this abstraction is that existing analytical research into asymmetric impacts from estimation errors pays attention to uncertainty affecting the investment decisions of the regulated entity, but we see no consideration of the effects of uncertainty in input prices on the investment decisions of purchasers of regulated services.

A recent report to the QCA includes material that is helpful in considering the asymmetry issue but equally helpfully, it includes a useful real world survey of the value of the regulated firms relative to the value of their RAB. The report is based on extensive real world research that suggests that a single WACC (set at the mid-point, not the 75th %) is over generous, allows regulated firms to 'game the regulatory system' and is likely a material contributor to the high EV/RAB ratios that are being observed in Australia and the UK.[5]

The lack of empirical evidence as to the benefits of raising WACC above mid-point estimates has led a number of overseas regulatory jurisdictions to now apply WACC rates at the mid-point (this is certainly now true in most of the regulated services in the UK) or to consider the idea of split WACC rates (this has been under close investigation by the Queensland Competition Authority).[6] This emerging practice provides some evidence (albeit of the crowd-sourcing variety) supporting the use of WACC rate at or below the mid-point of the regulators estimates.

Consumers matter

The existing analytical research does not consider the extent to which consumers are a broad range of people and organisations with different demands for regulated services and different abilities to pay. This kind of variation is important when evaluating welfare effects and therefore a vital element for understanding the extent to which higher prices are preferable to lower investment.

In our view, the size of welfare losses from high prices is as uncertain as the extent to which investment will be reduced by rates of return which are too low.[7] The existing research into asymmetric impacts from estimation errors ignores this source of uncertainty. This is not fatal to academic analysis but it is a significant problem if the findings are used for policy purposes or regulatory decision making in the real world.

The existing research is not well-tailored to New Zealand's regulatory context. For example, much of the research into risk asymmetry in the UK has focussed on operating risks, cash flow shocks and Beta risk factors rather than on the alleged investment asymmetries that sit underneath the Commissions' choice of the 75th percentile, or the potential damage to consumers' welfare from higher prices and inelastic demand.

The idea that low WACC rates and reduced investment are more damaging to consumer welfare than high prices is also dependent upon the specific assets, possible investments, and industries and regulatory regimes in question. For example:

- there is no evidence, conceptual or otherwise, that consumers benefit from higher prices being paid for existing assets
- if future investment or innovation could be a substitute for the investment of currently regulated services (such as distributed generation being a competitive substitute for transmission networks) then reduced investment by a regulated entity may not be a problem

[5] Refer report by Dr Ross Barry of First Principles, November 2013

[6] Refer QCA 'The Split Cost of Capital' Information Paper February 2014.

[7] The welfare losses to consumers could possibly be larger if the asymmetry, in reality, is greater on the consumer side.

- artificially raising rates of return could crowd out alternative investments if the perceived undersupply of investment in the regulated service is a signal for investment and innovation in substitute services
- the current regulatory regime in New Zealand allows for a process of evaluation (regulatory control periods, resets, and reviews) which can be used to test whether regulated WACC has been set too low and as a consequence it is unclear why 'investment incentives' need to be locked in up front.[8]

In selecting an appropriate WACC percentile, how significant is it that regulated outputs are inputs to other sectors in the economy (question 6)?

The fact that regulated outputs are inputs to other sectors in the New Zealand economy is a significant issue.

The Commission has noted that this issue of 'secondary market' effects is not considered in conventional cost benefit analysis of Transpower's capex proposals. We appreciate that this is the case but the CBA approach is a pragmatic solution to specific circumstances. It makes strong assumptions regarding markets being perfectly competitive, and about the absence of pre-existing distortions in the economy. These are not always reasonable.

The standard CBA assumptions, while very strong, can be reasonable for project-or investment-specific analysis simply because the costs of counting effects in a range of secondary markets can be very costly and may not have enough impact to change the overall assessment of a decision. These assumptions may also be reasonable when a policy or intervention has limited effects on incomes.

The standard CBA assumptions, particularly regarding competitive market adjustments to changes in prices or output quantities, are not reasonable in wide ranging policy or regulatory decisions affecting access to and prices of bottleneck and network monopolistic services. The value at stake in an uplift decision demands a more realistic and conceptually correct analysis.

One issue which is overlooked by the standard CBA approach, but needs to be considered in systematic policy decisions, are the impacts on productive potential and consequently income effects. Regulated outputs are often perfect complements in production – the costs are unavoidable, absent sufficient time for structural change in an economy. When these costs cannot be minimised through substitution, firms will face reduced returns and will reduce investment. This constrains productive potential and reduces economic welfare.

These dynamics are related to long-established findings in the optimal tax literature which show that taxes should be imposed on final goods and not on intermediate goods.[9] The reasoning behind this is that whatever the final distribution of goods to consumers (and hence consumer welfare) production should be as efficient as possible. This rules out differential taxes on different sectors of the economy or over time because these differential taxes will distort markets for inputs and reduce productive potential. This is relevant to the case of choosing a WACC percentile because prices which turn out to be too high will operate like a tax on intermediates, albeit without any welfare benefits that come from tax revenue and redistribution.

Standard CBA approaches also assume that prices adjust throughout all related markets but this is an extreme assumption for a small open economy. Export prices are not likely to adjust in

[8] The CER mid-term review of EirGrid/ESB WACC is a 'live' case in point.

[9] Diamond, P. and J. Mirlees (1971) 'Optimal Taxation and Public Production I: Production Efficiency', *American Economic Review,* vol. 88, no.1.

response to changes in prices of regulated outputs. Therefore, income effects are likely to be most pronounced in the case of export and import-competing industries.

This dynamic is one which frequently occurs in general equilibrium analysis.[10] One example comes from analysis of the effects of carbon pricing. Analysis by NZIER and others has shown that using general taxation to meet emissions reduction targets (by payments offshore) may be preferable to using carbon pricing policies because of the impacts that the carbon price has on the value of production in export sectors and New Zealand's international purchasing power (terms of trade). This finding is similar to the one from the optimal tax literature but it is exacerbated by exposure to international markets. The conditions under which this finding holds include other countries not employing similar carbon pricing policies and assuming that investors observe and respond to reduced returns.[11]

[10] Like CBA, CGE analysis typically assumes markets are perfectly competitive and adjust completely, however CGE analysis generally assumes no impact on factor prices and production costs in overseas markets – except to the extent that overseas markets are purchasing New Zealand exports.

[11] NZIER and Infometrics (2009) 'Economic Modelling of New Zealand climate change policy', Report to the Ministry for the Environment, May 2009.