

TOLL ROAD VALUATION

A sting in the tail?

“Arbitrary, inconsistent, frequently opaque and often without justification - yet potentially important when it comes to asset valuation”. This is how infrastructure investment analyst **Robert Bain** describes his findings when he examined how traffic forecasting consultants were gauging long-term toll road performance

In response to a seemingly innocuous question regarding the common industry practice of ‘dampening’ longer-term traffic forecasts – i.e. attenuating growth in the outer years – I recently examined the subject in some detail. The objective was to understand what the international forecasting community was doing and why – and to determine

whether or not, in the grand scheme of things, it really matters. This is something you can do when you provide independent assessments of forecast integrity and credibility for a living! A stack of consultants’ reports sits behind me on my shelves.

Since establishing RBconsult back in 2008 I have reviewed 74 comprehensive toll road traffic and revenue (T&R)

studies. All of the major forecasting firms are represented (see Figure 1) although, subsequently, some of the names have changed – or disappeared – through mergers or acquisitions. The underlying portfolio of roads, bridges and tunnels shows broad geographic diversity although, given the extent of tolling in the US, it is perhaps unsurprising that North American projects should dominate (Figure 2).

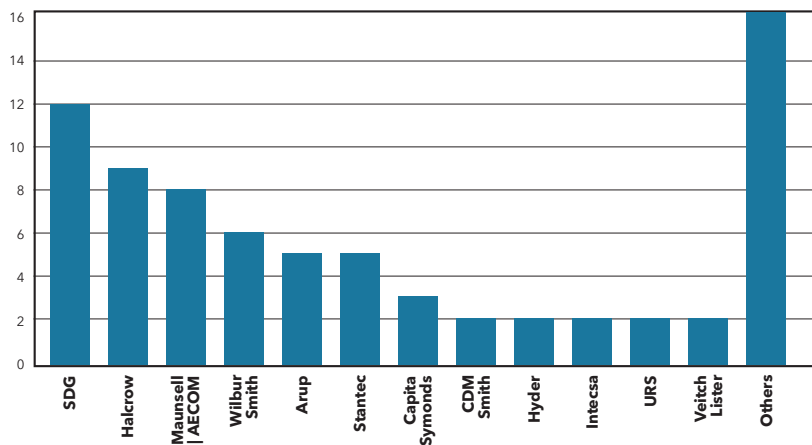
From this portfolio I chose a sample of 30 consultants’ reports for detailed examination. This sample was selected on the basis that it was broadly representative (in terms of forecasting firms and host jurisdictions) and recent. All of the sampled reports – and their embedded forecasts – were published in the last five years.

SAMPLE OVERVIEW

The sample overview is presented in Figure 3. The average forecast horizon was 45 years although the range was considerable (17 to 96 years). Typically a formal traffic model was used to forecast the first 20 to 25 years (average 22.4 years) – although, again, the respective range was significant (11 to 32 years). I have labelled this the ‘unadjusted period’.

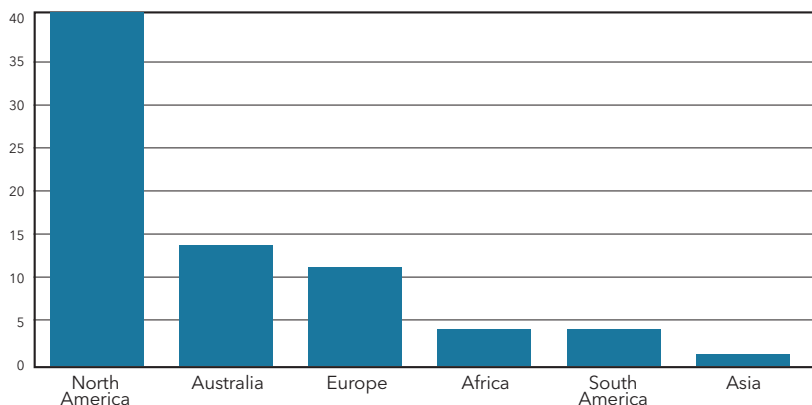
Interestingly, what consultants often refer to as the ‘post-modelled period’ (i.e. the dampened period, after the formal model’s horizon) was actually longer at just under 30 years (range: 6 to 71 years). This means that in a typical T&R study, the formal model is applied for less than half the total forecasting horizon. Over half of the cash flow-generating period of a typical toll road is assessed, not through any detailed analysis, but via some crude form of statistical extrapolation.

FIGURE 1: T&R REPORTS: CONSULTANTS



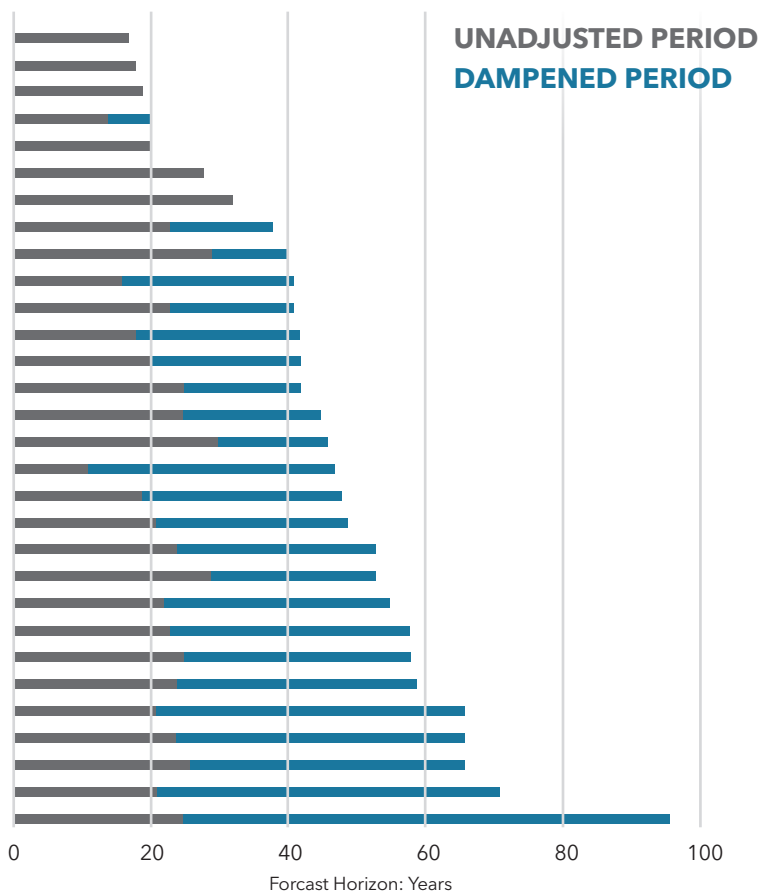
Source: RBconsult

FIGURE 2: T&R REPORTS: PROJECT LOCATION



Source: RBconsult

FIGURE 3: TOLL ROAD TRAFFIC FORECASTS



Source: RBconsult

DAMPENING METHOD

As can be seen from Figures 3 and 4, six of the 30 traffic forecasts did not have any form of dampening applied (horizons from

17 to 32 years) leaving 24 sets of projections to be examined further. Of those:

- Nine employed some sort of progressively reducing (or step-down) growth rate;

- Seven used a constant or ‘tick over’ growth rate (typically 1 percent or 0.5 percent per annum);
- Four reports simply talked about “extrapolation” and four remained silent on the subject.

Inconsistency was a key trait. Different methods were commonly employed by different consultants on the same project and different methods were employed by the same consultant on different projects.

Where progressively reducing growth rates were used, the terminal value (growth rate at the end of the forecasting horizon) was typically set to 1 percent, 0.5 percent or the profile was sculpted mathematically to reach zero.

REASONS FOR DAMPENING

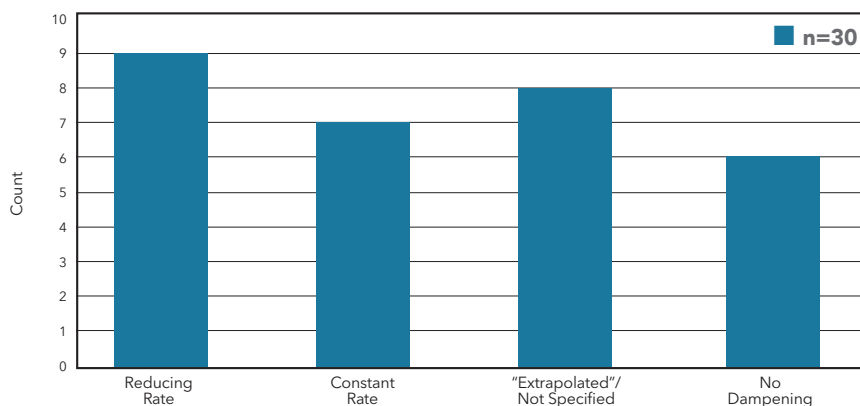
14 of the 24 reports which talked about dampening provided no explanation at all for why it was applied. They simply stated that it was (“...transaction rates were assumed to moderate”) or reported nothing at all. Only six reports linked dampening to geometric constraints; dampening being applied as the project’s capacity was reached. This was surprising as, in a number of cases, the forecasted demand clearly approached the road’s physical capacity or – in some cases – exceeded it!

Only one report explicitly linked the onset of dampening to the unavailability of forecasts for the explanatory variables used in the traffic growth model, and even this was vague:

“Beyond the 2030-2040 time frame through which the econometric input variables were available, forecast traffic is extrapolated based on the trend observed in the econometric model outputs.”

Although this was only stated in one report, it is one of the main reasons why traffic consultants move ‘off model’ in the latter forecasting years. Local population, income or employment forecasts themselves will have finite projection horizons (e.g. 25 years). That’s on the demand-side.

FIGURE 4: FORECAST DAMPENING METHOD



Source: RBconsult

On the supply-side, there may be some 20-year master plan that defines future network enhancements – and a lack of visibility thereafter.

The remaining three reports tied dampening specifically to concerns about increasing risk and uncertainty in long-term futures:

“...however long-term behaviour is uncertain. To cover that risk we have adopted more conservative growth assumptions in the long-term applying a growth dampening effect from 2035”.

“Due to the inherent uncertainty in forecasting beyond a 20-year time horizon...we have assumed a reducing annual traffic growth rate from around 1.5% per annum in 2032 reducing to zero by concession end. This provides a realistic growth profile in the later years of the concession.”

Given recent forecasting performance, readers may question the implied certainty in traffic forecasting within a 20-year time horizon!

“These cases assume a lower growth rate of traffic under uncertain conditions which indicates a more conservative growth model in the coming years for which GDP estimates are less clear...”

This raises an interesting question in terms of valuation. If traffic consultants are accommodating risk and uncertainty by moderating their traffic (and hence cash flow) projections and – later – asset valuation is accommodating risk and uncertainty (in part) through the specification and use of risk-adjusted discount rates, are we double-counting risk?

ARE WE DOUBLE-COUNTING RISK?

On the face of it, the answer should be “no” – if dampening and risk-adjusted discounting are serving separate purposes and being driven by separate objectives. I polled a number of senior (and seasoned) industry participants on the question and



Robert Bain

“Bids have been lost by less than the valuation difference that results”

this was their initial feedback. For them, growth dampening was generally associated with the physical constraints of a road network. As demand grows and capacity is approached, levels of service deteriorate to a point where further growth is inhibited. In a similar vein, a market reaching saturation would not be expected to grow at rates observed in the past – and this was also cited as a legitimate reason for dampening.

But this is not necessarily what traffic consultants are reporting. In three studies, dampening was specifically associated with long-term risk and uncertainty. And recall that in the majority of reports (14 out of 24) no justification for dampening was provided at all. A culture appears to have developed wherein it is simply ‘good practice’ to be very cautious about longer-

term growth. That may be commendable, but – in the absence of specific causal factors – it doesn’t necessarily mean that it is analytically correct to both reduce cash flows and apply a high discount rate.

If toll road cash flows were risk-free, the value of the asset would be the present value of these cash flows discounted back at a risk-free rate. As we introduce risk, we face a choice regarding how to accommodate that risk. We could use the same cash flows and add a risk premium to the (now risk-adjusted) discount rate or we could adjust the uncertain cash flows (producing certainty equivalents) and continue to use the risk-free discount rate.

The potential for double-counting certainly appears to be stronger in instances where there is an absence of separation between dampening and risk-adjusted discounting or – in the case of the majority of traffic studies reviewed – where there is a lack of visibility about what growth dampening is exactly supposed to reflect (and why). One valuation analyst consulted touched on this issue of separation – or lack thereof – when he stated that he would reduce the risk premium employed in their discount rate “if material dampening was present above that seen in comparable projects”.

Support for the double-counting warning came from various quarters. A senior UK government advisor responded to my question by stating that “I see no point in explicitly dampening the forecasts themselves (unless there are reasons for demand reducing). If that is being done, I would agree that risk is being double-counted.”

Professor Aswath Damodaran – a leading authority in the field of valuation (from the Stern School of Business in New York) – issues a similar caution in his book *Strategic Risk Taking*:

“The biggest dangers arise when analysts use an amalgam of approaches, where the cash flows are adjusted partially for risk, usually subjectively, and the discount rate is also adjusted for risk. It is easy to double count risk in these cases...”

LESSONS FROM ELSEWHERE

The toll road sector is not the only one that faces the challenges associated with long-term forecasts. Turning to aviation, in its *Manual on Air Traffic Forecasting*, the International Civil Aviation Organization (ICAO) provides specific guidance on longer-term forecasts which it defines as those with a 25- to 50-year horizon. Mimicking a product development cycle, it proposes an S-shaped (logistic) curve based on what it calls the market maturity concept:

“The implicit assumption...is that... global traffic should eventually level off at a rate equal to that of the world GDP growth rate as markets reach maturity.”

As such, it uses Revenue Passenger Kilometres divided by GDP (RPK/GDP) as its dependent variable, fits a curve to 37 years of historical data and projects forward on that basis (see Figure 5). The market maturity concept could equally be developed more formally in toll road traffic forecasting reports in terms of car ownership (‘motorisation’) saturation, trends in vehicle usage per capita, the relationship between travel demand and GDP growth, and so forth.

However a senior aviation forecaster pointed to the fact that such curves are not used in all circumstances: *“It’s not an approach we use. In particular, unless an*

airport has a very specific and immovable capacity constraint we don’t assume an asymptotic limit.”

It is also instructive to look at rail – particularly high-speed rail in the UK. In line with government guidelines on rail appraisal, the economic case for High Speed Two (HS2) incorporates a particularly strong variety of longer-term forecast dampening; a demand ‘cap’. Growth is set to zero at a future date when the demand for long-distance journeys reaches a certain level. In the latest appraisal iteration, that date is identified as 2036. However, the practice of demand capping is not without its critics and the Department for Transport itself appears to be somewhat lukewarm on what it describes as *“an important, albeit arbitrary assumption”*:

“While it is unreasonable to expect demand for rail travel to continue growing indefinitely, there is no evidence to suggest demand growth will stop at that particular point in time.”

The fact of the matter is that UK rail demand has grown very strongly over the past 20 years – even during the recession – and shows little (if any) sign of slowing. However the cap provides a useful insight into the implications of making alternative *“arbitrary”* assumptions about long-term demand growth. Relatively small changes

to those assumptions can have a material impact. The 2012 government appraisal of HS2 demonstrated that a cap in 2037 resulted in a benefit/cost ratio of less than 1.5 (‘low’ value for money), whereas pushing that out eight years to 2045 increased the ratio to over 2.0 (‘high’ value for money).

Another point worth noting is that use of a demand cap is being specified in a process – economic appraisal – that uses an unadjusted discount rate of just 3.5 percent (the social time preference rate). The uncertainty about long-term demand is therefore reflected in cash flow adjustments, not the discount rate (and certainly not both).

DOES IT MATTER?

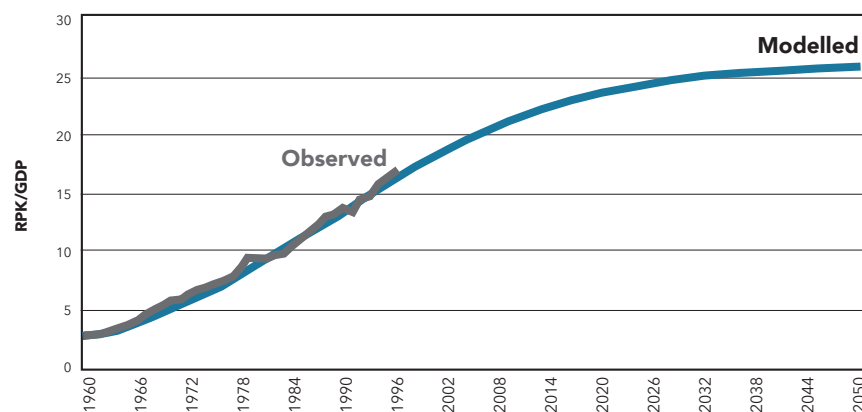
At first glance – given all the project risks in play – those associated with longer-term revenue projections may appear to be trivial. Discounting significantly reduces their contribution to the pot. However the fact of the matter is that bids have lost by less than the valuation difference that results from making alternative assumptions about if, when and how to dampen long-term traffic growth.

Notwithstanding, it would be good practice to bring this subject out of the shadows. As noted, traffic forecasting reports typically lack transparency in this regard. Recall that the reasons reported for dampening were generally limited. The reasons given for the choice of dampening method applied were absent entirely.

In terms of their treatment of traffic and revenue growth after the formally modelled period, forecasting consultants need to raise their game. They should be required to explain (a) what they did – and why, and (b) when they did it – and why. It would also be helpful for them to describe the revenue implications of making alternative – yet still plausible – assumptions about long-term traffic growth. ■

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FIGURE 5: ICAO LONGER-TERM AVIATION FORECASTS



Source: International Civil Aviation Organization (2006)