



WORKING PAPER

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**Towards a simplified payment
formula as a reference point for
bus contract negotiation or
assessment.**

By

**David A. Hensher, Corinne Mulley and
Neil Smith¹**

¹ **Transit Systems Australia**

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ABSTRACT: The burgeoning commitment to contracting the delivery of bus services through competitive tendering or negotiated performance-based contracts has been accompanied by as many contract payments schemes as there are contracts. With the accumulation of experiences throughout the world, we are now in a position to identify a few key features of the diverse suite of payment formulae, in order to propose a simplified payment formula that has the potential to capture the majority of 'desirable' characteristics from a social and a commercial perspective. This formula may then be the basis for a reference point in contract negotiation or assessment. Setting aside the myriad of caveats and variations of existing contracts, this paper reasonably assumes that there are substantive common elements which capture the majority of variations in total cost per bus kilometre and cost per passenger, and can be used to establish a starting position to implement a simplified contract. We illustrate how a simplified reference payment formula might be calibrated and applied to calculate gross cost per passenger which incorporates gross cost per bus km, per hour and per peak bus, as well as passengers per bus kilometre. The paper overall offers a way forward to move towards an objective way of assessing the costs of delivering bus services with a simplified payment formula in the contract.

KEY WORDS: *Bus contracts; payment formulae; simplified contracts; international experience; reference point; cost; patronage; contract negotiation.*

AUTHORS: David A. Hensher, Corinne Mulley and Neil Smith

CONTACT: INSTITUTE of TRANSPORT and LOGISTICS STUDIES (C37)
The Australian Key Centre in Transport and Logistics Management

The University of Sydney NSW 2006 Australia

Telephone: +612 9351 0071
Facsimile: +612 9351 0088
E-mail: business.itlsinfo@sydney.edu.au
Internet: <http://sydney.edu.au/business/itls>

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1. Background

Since the first Thredbo conference in 1989, we have seen an explosion worldwide in reforms to the provision of local bus services. At each conference we identify additional locations beginning their reform agenda that involves, to varying degrees, a move away from a predominantly public monopoly supply, and a greater engagement in contracting reforms (see Hensher and Houghton 2004, Hensher 2007, Hensher and Stanley 2008, Bakker and van de Velde 2009, and Stanley and van de Velde 2009). These reforms vary from economic deregulation through to competitive tendering and negotiated contracts, with different amounts of performance-based prescription. Countries and jurisdictions within countries that have been engaged in institutional reforms in service delivery for many years are seen to sway back and forth between the regimes as they ‘learn’ from their own experiences as well the experiences of others. As an example, we see a proposal to return to economic deregulation in Sweden, after having chosen the route of competitive tendering for the last 15 years; however it is economic deregulation with a twist¹.

As we look back at the diverse range of procurement and payment mechanisms used to contract the provision of bus services (see Wallis and Hensher 2007, Wallis *et al.* 2010), we can identify some core elements of the contract payment regime, around which various conditions are detailed. Despite the heterogeneity of such payment methods, core elements can be characterised by mixtures of demand and supply criteria as both baseline and incentive linked, to varying degrees.

Candidate models can be classified as:

- (i) A pure cost-based model associated with cost per bus kilometre and no patronage or service incentives,
- (ii) A hybrid model based on patronage allocation and residual cost per bus kilometre without incentives,
- (iii) A pure cost-based model with patronage and/or service incentives, and
- (iv) A hybrid model with patronage and/or service incentives.

A pure cost-based model associated with cost per bus kilometre is typically the conversion of a total cost, and is determined by operating conditions and efficiency of scheduling. Operating conditions vary for many reasons, but the key cost sources are average speed, spread of service hours over each weekday and weekend, vehicle utilisation², dead running time, fleet financing (noting that a contract under competitive regulation should have agreed terms of depreciation, risk and economic life of assets), and scheduling efficiency issues such as layovers between trips which are often influenced by the degree of union influence in scheduling, but which is likely to affect vehicle scheduling as well.

¹ The Swedish Public Transport Authority (PTA) will design a services statement expressing demand for services, including strategic goals. Operators then apply for commercial based services, and the PTAs evaluate applications with respect to the goals set in the services statement. Some commercial traffic results and the non-commercial services will be tendered as Public Sector Obligations. This is controversial: there is a fear that co-ordinated services will be fragmented, that cherry picking will occur, and the prevention of cross-subsidy will increase costs to society. Some observers believe that this scheme is more about controlling cost than it is about improving services and increasing passengers. Some proponents believe that commercial and non-commercial services can co-exist, just like the UK model outside of London; however this model is showing how it is easier to ‘cut’ services suggesting that the removal of cross subsidy may well have equity impacts in the provision of services under budget constraint. The New Zealand experience however has not been good, with commercial services focusing on the peaks, and non-commercial tendered services in the off-peaks, where the latter is typically won by the incumbent peak service provider who tends to offload all shared costs to the tendered services, given the lack of competing bidders.

² Similar to the cost allocation formula used to use for costing contracts in Britain before competitive tendering, which allocated costs according to three variables - bus kilometres, bus hours, and peak vehicle requirements.

Patronage and service kilometre incentive payments also exist in a growing number of contracts, and are based on a range of approaches. In simple terms, the patronage incentive payment is linked to growth in patronage above an agreed benchmark; and service kilometres must be related to some gain in patronage otherwise it is an inefficient (and ineffective) cost driver.

Some contracts are net and others are gross. A net contract is where operators retain fare box revenue and bid for, or negotiate a (net) subsidy. In contrast, under a gross contract an operator bids or negotiates for the total cost of operating a pre-specified service, and the Authority retains the fare box revenue. Performance incentives, more commonly aligned with gross contracts, are typically related to reliability and other input measures for service quality, but can also include patronage-based incentives. Allocating and managing the revenue risks and uncertainties is something that has to be agreed between the parties. Gross contracts have some advantages over net contracts; in particular they remove one of the barriers to entry, as new entrants³ generally have significantly less information (especially information on patronage and revenue potential) on which to base their tender or negotiated prices. A gross contract also facilitates the introduction of integrated fares⁴ because it removes the need to allocate the revenue between operators and modes, but with gross contracts, the patronage-related risk is on the side of the Authority. In contrast there is generally a greater incentive for patronage growth on the operator side if the contracts are net, because in keeping the farebox revenue, they gain from any additional passengers generated above the agreed contract estimate.

We have not seen a net cost tender where bidders were provided with an accurate picture of the current revenue and/or patronage. This means that net cost tenders will have a high risk premium for the bidders, and this in turn gives a strong advantage to the incumbent. That is in large measure how NZ Bus has been able to maintain their effective monopoly in Auckland and Wellington for so long. Net cost contracts also have a higher risk to "network integrity" where operators put too much focus on their own position (especially where it operates within and between contract areas) without considering their role as part of the wider network.

In the following sections we set out a framework within which some 'ideals' for a generic and simple payment formula might be established, and used at least as the basis of a reference point to start negotiation and/or assessing tender bids. The main value of this is likely to be for government to benchmark operators on entering a negotiation or tendering process or for an industry association to do the same for its members (to see whose cost/profitability levels may need attention, one way or the other)⁵. The paper is also valuable in suggesting an objective way of assessing the costs of delivering bus services. This is critically important in critiquing existing systems and determining whether there is a justification for change of operator which can be disruptive, and for evaluating tenders.⁶

We demonstrate how the approach might work in a specific geographical location, with illustrative data used to calibrate weights that indicate the influence of factors that are sources of differences in costs between contract jurisdictions.

³ In the UK this did not deter new entrants – if they get it really wrong, they bow out of the contract and it is retendered. It is a steep but fast learning curve with information out there on successful contracts to use for information. Having said this, it does lead to less stable outcomes in the short run.

⁴ Although it has been shown in Holland, Paris, and the UK that patronage surveys of an ongoing nature are acceptable as a way of allocating revenue. In Sydney, for example, gross contracts still seem to inhibit integrated fare because of the unsubstantiated claim by government that different modes 'need' to have receipt of the flagfall fare component.

⁵ We acknowledge the advice of John Stanley.

⁶ As an example of a not uncommon situation, in a recent contract we are aware of, a bidder came in 10 percent under the incumbent on a contract and the tendering Authority rejected it, using evidence on best practice.

2. A proposed simplified model

We start with the assumption that an Authority would define the budget (B) for services (regardless of whether a contract is gross or net), set minimum standards (X) and a growth target (G). The minimum standards would be based on passengers per bus kilometre (or passengers per operating hour to allow for traffic congestion), as the key objective of service delivery. We also assume that bidders (if competitively tendered) or negotiators (typically an incumbent) would have access to 'relevant and reliable' data on the current services and patronage on which to base their 'offer' to the Authority.⁷

The offers should be in the form of required compensation per passenger, which should be indexed for inflationary changes (using standard indices) and the specific operating environment, as defined by conditions such as speed (based on average timetabled speed), spread of service hours, and bus utilisation. The point of these adjustments is to focus on the 'offer' where efficiency and effectiveness of service provision is under the control of the operator, and to standardise the offers for factors outside the operators' control. This is justified in more detail as follows⁸:

- *Average speed.* Slower average peak speed, due to traffic congestion and/or an inefficient on-board fare payment system (see Tirachini and Hensher 2010), for instance, will typically increase driving time and operating costs⁹. This speed can be either a peak speed or a speed for all services, where the latter may be a weighted average to reflect the distribution of average speeds by time of day if such data is available.
- *Spread of operating hours.* A higher ratio of timetabled operating hours during periods when penalty rates of labour pay apply (e.g., weekends and possibly very early in the morning on weekdays (e.g., before 5 am)), will typically increase operating costs.¹⁰ Non-timetabled school services should be included (if they are part of a contract), since many operators are likely to have a high incidence of such activity.
- *Average bus utilisation.* A higher number of annual service kilometres per peak bus, because of higher timetabled route frequencies, will have the effect of diluting fixed costs.¹¹ However we recognise that only a small proportion of cost might be considered to be actually fixed (e.g., bus registration and third party insurance). Other overhead costs will

⁷ If it is a negotiated context, then the incumbent is the same as the negotiating operator; if it is a competitive bid, then this is not the case. In some jurisdictions, historical patronage figures are available in the public domain or in a contract specification; but this is not common practice when the contract is being negotiated, as opposed to being subject to a competitive bid.

⁸ The calculation of these influences will vary from jurisdiction to jurisdiction. For example Transperth uses a simple model to calculate average speed using public timetables. This is an automatic output of their contract management model (TRIS), and leads to a simple contract adjustment every 12 months. One common way of calculating speed is as follows: Distance, based on route bus kilometres services arriving at the terminal between 0700-0900 and 1500-1800 hours, is the road centreline from a GIS Spatial layer Map, calculated using the shortest path algorithm between stops. The elapsed time is the end of trip time minus start of trip time, and speed is the ratio of distance divided by travel time. To calculate the spread of service vehicles hours, one way is as follows: define route bus services (excluding school services) arriving at the terminus between the start and end times of 0000-0700 hours, 0700 to 1900 hours, and after 7pm on weekdays, and separately for all of Saturday and all of Sunday. The publicly available timetable can be used to obtain actual hours of service and then the annual total hours can be calculated based on the number of School days, Weekdays, Sundays/Public Holidays and Saturdays.

⁹ It could be argued that slower speeds can also be the result of poor timetabling practices, which are under the control of the operator. However we believe the impact of slower speeds imposed by external factors in the operating environment will dominate here.

¹⁰ A greater spread of operating hours, along with increased midday off peak services, can allow the operator to build more straight, rather than broken shifts. This could lower wage costs per hour given wage agreements.

¹¹ We acknowledge that average vehicle utilisation could vary substantially over a contract period, especially in situations where for example government pumps extra buses into the network, but then restricting kilometres to those buses. For example, the 300 growth bus strategy in Sydney targeted kilometres at the peak, and kilometres attached to the growth buses was often half the km/bus of the existing fleet.

increase with activity (even if not in direct proportion), especially where there is a significant increase in kilometres suggesting bus utilisation on route buses is less likely to be under the operator's control. However, in some jurisdictions the peak includes the school peak. Efficient planning and scheduling by the operator can then have a major impact on the peak vehicle requirements (PVR) and therefore bus utilisation. In these situations there is a risk that a higher PVR will provide a higher cost per km simply because more buses have to be provided to handle the needs in this short peak. To account for this latter issue, we should include the PVR as a further adjustment of the operating environment. If there are mixed fleets, then a further adjustment may be required, whether due to maintenance and/or different ages of the fleet.

These three operating elements (plus the PVR) are typically context-specific influences not under the control of the operator, and have been found by the authors to be the key drivers¹² of the differences in gross cost per service kilometre and, to some extent, patronage. Each of these factors is directly impacted by the operator's network plan, which is largely under the control of the regulator (certainly under route contracts, but also in most area-wide contracts). Statistical analysis in Australia, for example, has shown that average peak speed is a major influence on differences in gross cost per bus kilometre efficiency across contract areas within a given geographical location. The UK practice, prior to economic deregulation, calculated payments for network subsidies on the basis of \$/km plus \$/hour plus \$/peak bus¹³, confirming that these adjustments have long been regarded as sensible adjustments for key cost drivers..

To enable government to budget effectively, while also recognising the need for sufficient financial flexibility to reward growth in patronage above baseline projections, the total contract value would have to be capped at a figure that represents an agreed growth target. This is a tricky area as most governments appear to budget on the assumption that their initiatives to promote public transport will not reach agreed targets, and are often surprised when growth actually occurs and leads to a demand for more resources. It has been our experience that growth can be extraordinarily variable on adjacent corridors, and is always far higher or far lower than expected. Predicting patronage appears to be a "black art" that no-one has a good handle on, except in an aggregated way (city wide). An "agreed growth target" should be a network target, and have the flexibility to handle variances between existing contractors.

We assume that the operator would have relative freedom to plan services¹⁴ except that:

- (i) Any decision to lower standards under the minimum set out in the contract would need agreement of the Authority;
- (ii) The Authority could require that services with lower passengers per bus kilometre (or per bus hour) be introduced either as a "kick start" or permanently, but only by paying fares that builds the patronage up to the defined (or agreed) minimum of passengers per bus kilometre (or per hour)¹⁵;
- (iii) The operator would have the freedom to grow services, with a requirement to note the priorities set by the Authority; and

¹² Although the cost of delivering services is influenced by many factors, we believe that we can capture the main elements in these three key influences that impact in a non-marginal way, and are also not able to be materially adjusted by the operator. That is, they are the result of the external environment, be it geographical, socio-economic, or institutional.

¹³ We thank Chris Nash for reminding us of this practice.

¹⁴ While recognising the increasingly political nature of bus services.

¹⁵ Given that many cities are moving to centralised revenue collection by Government, and the use of city-wide smart cards, the actual "fare" has little meaning to the contractor. If these fares vary between types of travel, e.g., they are paid for initial boardings, but not subsequent boardings as in Perth, or there are differentials between types of passenger – e.g., adults and pensioners, then these differences will distort the way operators develop services. This "fare" is really a management tool for incentivising the contractors.

- (iv) Where peak vehicle requirements are often dictated by the local market, this should be additionally included as recognition of the implications of PV requirements on bus utilisation.

This approach, we suggest, should remove second guessing and detailed analysis, and sets all the right market signals. It motivates the operator, but also protects the authority. It is simple to bid (or negotiate), simple to assess, and simple to manage. In the right hands (always a caveat) this could lead to rapid progress towards the Authority's targets.

This payment mechanism can be formally set out as follows (with bold elements set by the Authority). We develop the formula using \$/bus km, but the approach can also use a more general cost formula which distinguishes costs in terms of \$/km, \$/hour and \$/peak bus and which, if preferred, can be defined in terms of bus hours. The ultimate target in all cases is the identification of \$/passenger.

Define the Budget:

$$\mathbf{B} = \$/\text{passenger} * \text{number of passengers} \tag{1}$$

subject to

$$\text{passengers/bus-km} \geq \mathbf{X} \tag{2}$$

and

$$\mathbf{B}_{\max} = \$/\text{passenger} * \text{number of passengers} * \mathbf{\text{growth rate target}} \tag{3}$$

B, **X**, and **growth rate target** are set by the Authority. If passengers/bus-km is less than **X**, then a shadow fare will apply for the gap, as long as the regulator agrees on **X**¹⁶. The shadow fare might be defined as equal to the (actual fare * passengers per bus-km)/**X**. The number of passengers has to be predicted from previous periods (or demand studies in the case of new services), and agreed by all parties. A mix of passengers should be allowed for, including schoolchildren who in some jurisdictions travel for free on passes (and are treated as half fare). Passes on issue will have to be quantified in an appropriate way to obtain estimates of passengers/bus-km and this simplified contract provides an incentive to all parties to agree on this.

The cost per passenger has to reflect the operating environment, and hence must be calculated from a formula that accounts for at least those contextual effects that the operator has little or no control over. This requires the application of a formula such as that given in (4). This formula is a way of recognising and allowing for differences in costs that vary by the hour and the peak bus requirement, that are the basis of payment models based on \$/bus km plus \$/bus hour plus \$/peak bus.

$$\begin{aligned} \frac{\$}{\text{passengers}} &= \frac{\left(\frac{\$}{\text{bus km}}\right)}{\left(\frac{\text{passengers}}{\text{bus km}}\right)} \\ &= f\left(\begin{array}{l} \text{average peak speed, spread of service hours,} \\ \text{vehicle utilisation, peak vehicle requirements} \end{array}\right) \times \text{Annual CPI}_{\text{adj}} \end{aligned} \tag{4}$$

¹⁶ Passengers per bus km can vary enormously over a common network, and there are always many politically valuable services that will have a very low passengers per bus km. There are areas where the variation in passengers per bus km between routes within one contract area is 10:1. However, we anticipate passengers per bus km would be agreed as applying to a network rather than an individual route.

CPI_{adj} is the consumer price index adjustment factor per annum and must reflect important cost components such as wage and fuel costs. We recognise that indexation by the CPI is very inaccurate as a reflection of costs, especially when wages increase faster than the CPI, which is common in many jurisdiction (e.g., 1 to 1.5% per annum in Australia), and fuel can be very volatile. An indexation approach that is more cost-specific, in general, should be used if it is available.¹⁷

Formula (4) would need to be calibrated on existing operator data to obtain estimates of unknown parameters that define the role of context-specific influences. Such data should desirably come from the local context (such as all operators in a particular city or region), and be collected through a benchmarking program, although this is somewhat rare in most jurisdictions. If multi-operator data are used, then calibration will need to include the possibility of operator specific effects. On the other hand, if multi-operator data are not available, then some independent advice will be required on what variations in cost per bus km and passengers per bus kilometre are associated with each of the factors in formula (4). Alternatively, the use of extra-jurisdiction values could be used to open negotiations, particularly with incumbent operators. It is most unlikely that operators would remain silent if they felt the formula, based on data from outside their environment, is ‘out of range’ for their operations. For this reason the opening bid from the Authority, where no data exist in the operating environment, should be at the low end of what the Authority believes the relevant costs should be.

\$/passenger is a composite of \$/bus km (i.e., cost efficiency) and passengers per bus km. (i.e., network effectiveness). These two key performance indicators (KPIs) are arguably the main drivers of performance, and hence contract specification and compliance. As an example of how the adjustment may work, let us assume we have two alternative calibrated models¹⁸, in terms of the formulation of \$/bus-km. The rate per km payments (or translated to \$ per passenger as shown in equation (4)) is expected to cover all expenses, i.e., variable expenses, overheads, depot rent, margin etc., and all annualised capital costs would be calculated using a depreciation formula (e.g., economic life assumptions) used by the regulator (and not a commercial rule based on how an operator wishes to finance and depreciate assets).

The *first calibration* of gross cost per service km (\$/bus-km) is the formula given in Table 1, where the parameters are illustrative¹⁹.

Table 1: Calibration of gross cost per service km (\$/bus-km)*

Variable	Calibration coefficient
constant	4.908
average peak speed	-0.228
bus kilometre	-0.000055
spread of service hours	7.359
peak vehicle requirement	0065
Operator specific dummy variable	-0.0114

*All parameters are statistically significant at 95 percent level of confidence.

¹⁷ However, a related issue here is subsidy leakage (and one of the strong arguments for economic deregulation). Allowing for the specific effects of wage increases in particular means that there is less incentive for the operator to be harsh about trying to contain wages.

¹⁸ The parameter estimates used are not exact for any specific operating context, but are indicative of what we believe are reasonable estimates in metropolitan Australia.

¹⁹ The importance of noting the illustrative nature of the example is crucial. To emphasise this, we might have also selected a situation where the passenger/bus km ratio is 1.4 (as in Adelaide). We have used 10 in our example, which may be too high in many situations.

-0.228 indicates that every increase in the average speed of one km/hour in the peak reduces gross cost per bus-km by \$0.0228; -0.000055 indicates that every extra bus kilometre reduces gross cost per bus-km by \$0.000055 (or 5.5 cents /1,000 additional kms.); 7.359 suggests that a ten unit increase in the proportion of service hours during weekdays after 7pm and weekends (e.g., from 0.2 to 0.3) increases gross cost per bus-km by \$0.736; and 0.0065 indicates that one additional peak vehicle adds \$0.0065 to gross cost per bus km., 4.908 is a constant reflecting, on average across all operators, the role of other factors, and -0.0114 is a constant specific to an operator that accounts for other influences that are variations around the average for all operators in the set, that are specific to the operator.

To take a specific situation, assume that the average peak speed is 20kph, , average vehicle utilisation is 40,000 km per annum per bus, the spread of service vehicle hours is 0.3 (i.e., 30 percent are after 7pm on weekdays plus all of Saturday and Sunday), the PVR is 80 buses, and the cost index adjustment is 1.02. Then the application of the figures in Table 1 results in a gross cost/bus-km of $(-0.01140 - 0.0228*20 - 0.000055*40000 + 7.359*0.2 + 0.0065*80 + 4.908) * 1.02 = \4.32 per bus-km. Assuming average passengers/bus-km =10, the \$/passenger estimate applicable in equations (1) and (3) is \$0.432. Given the total forecast patronage, the budget can be calculated, and given the Authority approved growth rate target, the maximum available budget can also be calculated for the Authority.

To assess the realism of this simplified formula, we applied the formulae above using data from a number of operators in Australia and compared the \$/passenger outcome with the estimate from actual operator data on a subset of the sampled operators. We found that the calibration of formula (4) shown in Table 1 was able to reproduce the actual amount of money received to within \pm five percentage points²⁰. Such a variation might reasonably be built into the margin²¹. We therefore deem this adequate as a starting position for negotiation or bid assessment.

We also considered but rejected as inferior another way of establishing the cost efficiency component of the formula as a calibrated model, in which variations around the average performance of all operators in the predefined geographical context (formula 4) were identified. Each operator's costs are then adjusted to take account of operator-specific influences on gross cost per bus-kilometre. This *second specification* of gross cost per service km (\$/bus-km) is given as formula (5), with the actual calibrated model given in Table 2, excluding the peak vehicle requirement²².

Gross cost per bus – km

$$= f \left(\begin{array}{l} \text{(Average operator peak speed – all operators averaged peak speed),} \\ \text{(Operator } \frac{\text{km}}{\text{bus}} - \text{ average all operator } \frac{\text{km}}{\text{bus}}), \\ \text{(operator spread of service hrs – average of all operators spread of service hrs)} \end{array} \right) \quad (5)$$

²⁰ The data used is confidential; however we thank the specific operators for providing data to enable the calculations.

²¹

We received a comment that “5% error in reproducing actual payments would represent a substantial part of the operator margin of a third or more” (John Stanley, personal communication). We recognise there is a risk in this approach, and would prefer a mechanism where the onus is put on the operator to show why this approach should not be used. This could be done in negotiation. In principle, if the operator cannot show this, how do they know their margin is affected?

²² The peak vehicle requirement is only excluded because we have not identified a parameter estimate, but would otherwise be included in a real application.

*Table 2: Calibration of gross cost per bus- km (\$/bus-km)**

Variable	Calibration coefficient
constant	6.11187
average operator peak speed – all operators averaged peak speed	- 0.16843
operator km/bus – average all operators km/bus	-0.00015
Operator spread of service hrs – average of all operators spread of service hours	1.17412

Gross cost per bus-km* All parameters are statistically significant at 95 percent level of confidence.

This model produces estimates of gross cost per bus-km that are close to current values with the values for each operator being calculated by the inclusion of an operator specific constant. Most of the estimates vary by no more than 50c/km, (which might be deemed substantial in a typical range of \$3/km to \$7/km) but whilst simple, this is less accurate than the formulation in (4) and Table 1 above.

However, both approaches could be used in a benchmarking exercise in the sense of setting a cost efficiency level which would be expected if an operator were being assessed as if they were operating at best practice (replacing the ‘average for all operators \$/bus-km’ with best practice level)²³. This estimate is then multiplied by passengers/bus-km to obtain \$/passenger, which together with forecast patronage, provides an estimated budget as a starting position for negotiation or bid evaluation.

3. Conclusions

This paper promotes the idea that it is possible to develop a simplified formula for identifying the amount that a local bus operator should be paid under a gross or net contract to deliver a given level of service. The essential ingredients are few, but crucial: these are the gross cost per bus-kilometre (or an equivalent measure based on bus kms, bus hours and peak bus requirements), the patronage per bus-kilometre, and the consequent cost per passenger. Given patronage forecasts, a contract budget can be determined. The gross cost per bus-kilometre can be established using local data on operators who provide similar services, adjusting for differences in the operating environment.

We have shown that a simplified and transparent formula is possible, which has value as a reference point in negotiation of contracts, as first time or renewal, as well as in the assessment of bid offers under competitive tendering. Bus Associations can benefit by using this approach to advise potential operators entering into negotiations with government.

Despite the appeal of this payment formula, with such simplification comes a potential risk associated with the factors that are not explicitly considered, that might also play a role in the cost/bus-km.²⁴ All other factors are embedded in the overall constant in formulae 4 and 5. To

²³ We recognise that benchmarking involves comparing not just operators but their operational area, and differences could and do derive from both. However, where multiple operators bid for an *identical contract area*, the price differences can be extraordinarily close - less than one percent between the incumbents, but with some real divergence (both ways) from new entrants. This is why incumbents have survived in most of the re-tenders in Perth and Adelaide, for example. In these situations the costs and risks of changing operators are greater than any benefit derived from the differentials in the tender price.

²⁴ There are always variations between jurisdictions. Operators often use this argument as self justification. Once controls are used to measure variations in key inputs (e.g., the cost of fuel and wage levels) then we cannot see why there are any differences other than average operating speeds. The first two can be significant – often as high a differential as 15 percent between Australian cities, and movements in speed can have dramatic impacts on contracts. However if these are allowed for there is likely to be little difference between operating a bus in the different Australian capital cities, for example. We believe that the focus by some operators on their unique environment is a self-serving mythology to protect their profits, their inefficiencies and their security. If an operator can bid in a jurisdiction accounting appropriately for the cost of fuel, wages and average speed, then

resolve this, we could allow for operator-specific constants²⁵ (as shown in Table 1) if we have data of sufficient quality to be able to allow for unique constants (normalised as zero for one operator). Given the confidential nature of data that is likely to be required, the use of operator-specific constants by the regulator is certainly feasible, but could not be made available to all operators, incumbent or otherwise, and would require some careful consideration of the suitability of such constants in situations that are likely to vary in the presence of another service provider.

The payment model proposed in this paper fundamentally alters the whole net vs. gross contract discussion. The only real value of a net contract, *from an operator's perspective*, appears to be the incentives it provides; in all other areas it is a negative (e.g., co-ordinated planning, integrated ticketing, transparent tendering), although such negatives are positives for government. Given that the proposed model has a built-in incentive for both operator and regulator, it can replace both net and gross contract models. While the cost/passenger approach does not shift the revenue risk to the operator, if payment is based on that measure, since the negotiating framework is premised on agreed cost outcomes and agreed forecasts of network patronage (with initial estimates of patronage per operator). Fares can accommodate variations in patronage that have been agreed in advance and so the operator carries no revenue risk. On the other hand operators are incentivised to build patronage through the agreement of targets. Importantly too there could be possibilities to modify the final contract where shortfalls in patronage from the starting base have a different marginal impact on what the operator receives from increases. Fundamentally this is an important issue in an environment where it is difficult for operators to adjust their frequency and/or network in response to declining patronage or in an environment where overall patronage is falling.

A hope is that the ideas in this paper might move the debate away from the controversial debate on tenders vs. "trusted partnerships" towards how to use the way the private sector works to maximise the benefits to government and the community. In addition, given what we believe are the key drivers of cost efficiency (or cost per vehicle km or hour), we must express caution about the existence of factors that drive costs that cannot be simply and objectively measured (recognising the dominant role of fuel, wages, and average speed). This may minimise the need for benchmarking in order to make assessments. Time will tell.

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benchmarking best practice would be identified, which may be better than benchmarks existing with all incumbent operator's in protected domains. Vested interests do not like this.

²⁵ One consultant stated: "I quite like the idea of operator-specific constants as putting the blow torch on the tails of the distribution".

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