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Spatial Alliances of Public Transit Operators: Establishing operator preferences for area management contracts with Government

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ABSTRACT: Scheduled transit services in many countries are provided by operators within geographical jurisdictions protected from competition with other public transit operators, although unprotected from competition by other modes, especially the car. This increased competition in many developed economies has led to a loss of market share of urban transit and contributed to the growing crisis in escalating costs of service provision (leading to pressure for increasing subsidy support). The response to this throughout the 1990s has seen governments progressively introducing market reforms centred on competitive tendering and economic deregulation. In more recent years, performance-based contracts have become popular variants, with an increasing number of incentive payment criteria introduced to not only promote cost efficiency but also aimed at growing patronage. Where such reform has involved area wide contracts, the boundaries of the contract areas have been essentially preserved. In recognition of the growing support for bus-based transit systems (variously referred to as bus rapid transit, busways and transitways), which offer increasing promise in growing public transit patronage, the NSW government in Australia has introduced reforms that require existing operators in the Sydney metropolitan area each currently holding an area contract (87 contracts) to work together under fifteen new spatial contracts. These new contracts overlay the existing contract areas and give incumbent operators the first option to participate. In this paper we assess ways in which operators might coalesce to deliver ongoing and new 'regional' services within these new trusting partnerships. Operator business preferences and potential barriers to cooperation are identified through stated preference experiments.

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1. Introduction

Governments in a growing number of jurisdictions have to deal with many individual contracts with bus operators. The contract areas being serviced are typically the result of antecedents in which public and/or private operators were given assumed grandfather monopoly rights to provide services in a spatial setting. In the Sydney context, for example, private operators have invested heavily in their businesses over many years, carrying growing risks while receiving some financial support from government through a range of subsidies and concession reimbursements.

There is a desire of government in some countries to amalgamate contracts to both reduce the administrative burden of regulating many contracts as well as to support a belief that fewer but larger contracts would produce large economies from network integration[1]. A 2003-04 review of the bus sector in News South Wales (Ministry of Transport 2004) promoted the idea of 15 contract areas for Sydney (down from 87), and a requirement that incumbent operators in each of these areas work out a plan to deliver services under a single contract. These services are divided into local and regional services (the latter serving government-defined strategic corridors that operate within and between contract areas). The regulator will then work with a single operating entity per contract area. This proposal has recently been implemented as part of the NSW Public Transport Amendment (Bus Reform) Bill 2004 with effect from January 1, 2005.

This paper takes a close look at how one might structure a business proposition between a single entity interfacing with government upstream and with each operator downstream. We begin with an overview of the issues to be taken into account by the operating parties when entering into a cooperative venture. This is followed by the development of a framework within which to evaluate the features of a business proposition that are most preferred by each operator when entering an alliance and the extent to which specific attributes define barriers to cooperation. We are as much interested in the power relationships that will inevitably exist (and degrees of trust and mistrust), as we are in the influence that differences in the operating performance of operators required to work together under a single contract will have on the outcome.

We use the stated choice experimental design method to identify the determining influences of each participating operator in a new area management contract and what contract specification appears to offer the best outcome to all parties in a cooperative venture.[2] We seek to identify operator preferences and potential barriers to cooperation.

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[1] In the 2003-04 review of the private bus industry in NSW, the Ministry of Transport (MOT) used an analogy in which it was suggested that combining operators in an area into one large operator is like building a road where we have sub-contractors. We find the analogy misleading. The road building example brings together *specialists* who support each others' particular expertise and as such add huge value along the supply chain. In the case of requiring geographically adjacent bus operators to work as one operator, however, we are not bringing specialists together (the economy of scope argument), rather we are adding up the same types of expertise (albeit with some slight differences in terms of performance).

[2] In assessing the potential gains from spatial aggregation, we must be careful to not attribute any found net gains to this alone, since an important element of the reform process has been the introduction of a performance-based contract regime in which operator's are required to deliver baseline services under benchmark best practice, with incentive payments for additional services and patronage growth (Ministry of Transport 2004).

2. Structuring a business proposition for area management contracts (AMCs)

A requirement for incumbent operators to work together (including options for buy outs) in order to comply with the government's new reform agenda is, in the Sydney context, a very challenging ask for many operators. Spatially adjacent operators in Sydney do not have a strong history of cooperation, and indeed there are many examples of hostility and criticism of specific operators who are poor performers and/or do not have a strong commitment to the global interests of the industry as a whole. The buying in from international players since the late 1990s has added to this concern, given that the shareholders are off shore and often have limited interest in the local market other than to minimize costs and repatriate profits[3].

Despite the clear statement by government that there are no 'grandfather monopoly rights' within existing regions, incumbent operators who currently operate services in locations that have been deemed by government to be part of a new area contract regard their status as providing them with rights to current and future business (i.e., passengers) within the "home region". These rights may however be sold at a price to other operators who are transiting the home region, perhaps on corridor routes newly established under the legislation. Such operators may wish to carry transit passengers through the home region, or to pick-up new passengers within the home region. The hope of the new legislation in Sydney is that the alliance, through an AMC, will promote patronage through increased connectivity and frequency associated with the corridors and through reduced costs associated with longer corridor routes and improved business practices resulting from the lead of better operators.

Contracts between the separate operators might define the outcomes of such inter-alliance transactions. For example, the fees/km for passenger rights in the home region could reflect the profitability/km, set at F_{cr} and F_l for cross regional and local passengers respectively. In this environment all operators would trade "home" rights for "foreign" rights. One challenge in establishing an area management contract is to determine a set of F's to deliver revenue sharing within the alliance that will be acceptable to each operator and maximize the new rewards to each alliance member.

Given that a new layer of trusting partnership between common-contract operators will emerge under the reform process, operators will have to work co-operatively if they wish to continue in the industry. There are a number of structural relationships that could be formalized. Given that each incumbent operator is a candidate participant, we might describe their status as a "lending" operator who would allow "borrowing" operators (be they the new business entity, another incumbent operator or even a third party contractor) to carry passengers within the "home" area and to do "exporting" business therein. Where such co-operative work occurs within a sub-group of operators, the sub-group can be defined as an amalgamation, and the amalgamated unit (which 'legally owns' the AMC) would be the only interacting agent with the regulator, rather than the separate operators.

An operator carrying passengers within the home area has the only claim on the generated value, and equity principles should require that the lending operator be compensated for business conducted in the home area by borrowing operators. Within the unit, cross claims

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[3] Such commentary is factual, based on comments provided by a growing number of such businesses in Sydney.

can be established on the compensation account. The equity principles governing cross claims might include[4]:

a) the *separate legal entity* principle under which each operator is recognized as a legal entity with a claim on value generated by itself or its assets (e.g., home operator claims for traversing and pick-up business undertaken by borrower operators within the home area);

b) the *group enterprise* principle under which all operators have a claim on value generated by the functioning of the sub-group as a unit (e.g., the existence of the amalgamation may generate new patronage due to generally improved connectivity, and all operators in the group would have a claim on this value); and,

c) the *pari passu* principle under which all operators are to be treated equally in the settlement of claims.

When the alliance members are co-operative, the alliance might be expected to perform better than the two individual operators before the implementation of the review proposals[5]. A number of options for the distribution of alliance revenue could be considered (and their relationship to equity principles noted), for example:

(a) Total alliance revenue could be distributed according to relative revenues before the implementation (no incentive to contribute)

(b) Total alliance revenue could be distributed according to relative costs in alliance support activities (corridor, feeder); and non contributors would be assessed by isolated application of the funding model.

(c) Same as (b) but contribution of patronage to an alliance corridor could be regarded as an alliance support activity.

(d) If extra revenue is generated, members could be allocated the same revenue as before the implementation, and extra alliance revenue could be distributed according to relative costs in alliance support activities.

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[4] Transparency is also an important issue and is much more likely to prevail under the previous larger number of contract areas than with a few large areas. There are plenty of good local examples of scale producing cost inefficiencies without any compensating increase in service levels. For example, the performance levels with *existing large operators* such as the State Transit Authority (STA) and Westbus are not as good as smaller operators. Of particular interest is the purchase by Westbus of a smaller (80 vehicle fleet) and more efficient operator, Glenorie Buses and the decision to operate it separately in order to preserve its performance. Westbus, excluding the Glenorie business, went into voluntary administration on February 1, 2005 as a result of the failure of National Express (the UK main shareholder) to raise bank credit. What this suggests is that companies could still operate separately (with or without different livery etc.), yet still share a contract region under many legal entities.

[5] This is the expectation of the regulator.

The primary issue is defining the claims under (a) and (b)[6]. The options include:

- A claim for traversing by borrower operators under (a) is compensation for not receiving passengers dropped-off for home operator pick-up at the home boundaries. The value of the traverse, VT, could be imputed net revenue per traversing passenger, given by a net fare component less the cost of pickup. The lender operator is entitled to a proportion P_{VT} of VT.

- A claim for pick-ups by borrower operators under (a) might be compensation for the borrowed passenger. The value of the pick-up, VPU, could be imputed net revenue for pickup, given by an average net fare component. The lender operator is entitled to a proportion P_{VPU} of VPU. (Note: we may have $P_{VPU} = P_{VT}$)

- A claim for generated group business might be imputed from a comparison of pre- and post-amalgamation business, GB. All operators are entitled to an equal share of GB.

Within the context of an agreed area management company, issues that need to be captured in the development of a model to reveal participating operator preferences and hence potential barriers to cooperation under an AMC include the structure of equity, the basis of contribution, the splitting of income, the compliance by all members with the contract requirements, the resourcing of the AMC, the operational management of the company, fleet maintenance and service delivery requirements, sharing of growth, the nature and extent of an exit process and other financial matters such as taxation. These issues are candidates for the set of attributes in the design of the stated choice experiment designed to reveal operator preferences for alternative AMC structures and the potential barriers to cooperation where preferences diverge widely on specific attributes and their levels.

The business proposition sketched out above offers a possible way of giving incumbent operators first call on servicing a common-contract area as an alternative to a single entity, while recognizing the existing contract area arrangements and putting to the test the ability of operators to cooperate in a spatial alliance as an alternative to forced sale to a single operator, be it one of the existing incumbents or an outsider.

3. Revealing operator preferences for a cooperative alliance through an AMC

Each operator brings to the negotiation table a set of preferences that represent how they want to see their organization participate in a new area management company (AMC). These preferences are assumed to be consistent with a business-specific utility maximization rule. Through negotiation however, each participating operator may have to

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[6] A secondary issue, not considered herein, is defining a process to settle the cross claims. A simple model would determine P_{VT} and P_{VPU}, within acceptable bounds, to ensure a resolution. If no resolution is available, a payout rate, p_i, for each borrowing operator could be determined by a simple model. In the Sydney case where operator losses may be usual, resolution may involve losses. The regulator would negotiate with the amalgamated unit which would present the case for subsidies as influenced by resolution values of P_{VT} and P_{VPU}.
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make compromises to arrive at set of agreements that will enable the AMC to fulfill its obligations under the new area contract.

We propose the following model system as a way of establishing the preferences of each operator and the role that each operator's individual preferences play in establishing the group preference function.

Stage 1: Each operator participates in a stated choice experiment with common choice sets but with permissible different information processing strategies (IPSs). The behavioural process assumes that each operator acts *as if* they are a utility maximiser. The operator-specific models define utility expressions of the form: U(alt *i*, operator *q*) i=1,…,J; q=1,…,Q where *alt* defines an alternative business proposition for the AMC. For example, with two operators and three alternative business propositions we have U(a_1q_1), U(a_2q_1), U(a_3q_1) for operator 1 and U(a_1q_2), U(a_2q_2), U(a_3q_2) for operator 2. An unlabelled stated choice design (see below) will be established to parameterise this independent-utility-maximising choice model, conditional on the IPS of the respondent.

The relative attribute preservation of the IPS of the respondent is identified by prompting respondents to indicate the attributes that were ignored or given little attention for each business proposition. Simple questions about the IPS enacted by respondents within each choice set can be used to test a range of IPS choice models of varying complexity (see Hensher 2004, DeShazo and Fermo 2004). This information is used to condition the utility expressions as follows: ignored attributes are assigned a marginal utility of zero for a given alternative and choice set[7].

The base utility expressions (i.e., without any interaction effects or direct covariate effects) are of the general form:

$$U_{qj} = \alpha_j + \beta_{qjk} * \mathbf{x}_{qjk} + \varepsilon_j, \tag{1}$$

where $\mathbf{x}_{qjk}$ is a vector of design attributes associated with operator *q* and business proposition *j*, β_{qjk} is the corresponding vector of random marginal utility parameters, α_j is an alternative-specific constant (which is omitted in the case of an unlabelled experiment) and ε_j represents the unobserved effects. The effect of the IPS used by a respondent for a given choice set is implementing by setting $\beta_{qjk} = 0$ if *k* is ignored for a business proposition *j* for operator *q*. The mean and the standard deviation of the random preference parameters β_{qjk} across the sample of operators can both be decomposed, and hence explained, by deliberation attributes such as the number of years involved in the business, whether an operator is a family-based or multinational business; prior experience in alliances, and general IPS-related information such as the number of attributes ignored. Regardless of which approach is adopted, such contextual influences can also be interacted with design attributes in model estimation. This modelling structure lends itself to the heterogenous mixed logit (HML) model, which is our econometric model of choice for this methodology, detailed in Section 4.

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[7] Cognitive burden is often cited as a reason for ignoring (or paying little attention) to specific attributes. There is a lack of evidence to suggest that cognitive burden associated with a stated choice task is any different (or additive to) that which influences specific individuals in all the decisions they make in real markets.

Stage 2: All parameters estimated from stage 1 are fixed and imported[8] into a joint operator model. For example, with two operators and three business propositions, there are nine joint business propositions – $U(a_1a_1)$, $U(a_1a_2)$, $U(a_1a_3)$,...., $U(a_3a_1)$, $U(a_3a_2)$, $U(a_3a_3)$, referred to as propositions p=1,...,P. Three of the joint business propositions imply non-negotiated cooperation (i.e. $U(a1a1)$, $U(a2a2)$, $U(a3a3)$). The stage 2 choice is between combinations of operator-specific business propositions with one business proposition the chosen pair.

A model is then specified of the following form (for two operators, q, _q):

$$U(a_1a_1) = ASC_{a1a1} + \lambda_{qp}*(\beta_{1q}x_{1q} + \beta_{2q}x_{2q} + ...) + (1-\lambda_{qp})*(\beta_{1\_q}x_{1\_q} + \beta_{2\_q}x_{2\_q} + ...)$$

$$U(a_1a_3) = ASC_{a1a3} + \lambda_{qp}*(\beta_{1q}x_{1q} + \beta_{2q}x_{2q} + ...) + (1-\lambda_{qp})*(\beta_{1\_q}x_{1\_q} + \beta_{2\_q}x_{2\_q} + ...) \qquad (2)$$

$$U(a_3a_3) = ASC_{a3a3} + \lambda_{qp}*(\beta_{1q}x_{1q} + \beta_{2q}x_{2q} + ...) + (1-\lambda_{qp})*(\beta_{1\_q}x_{1\_q} + \beta_{2\_q}x_{2\_q} + ...)$$

The power measures for operators *q* and *_q* sum to one, making comparisons of operator types straightforward. If the two power measures are equal for a given attribute *mix defining a proposition* (i.e., $\lambda_{qp} = (1 - \lambda_{qp}) = .5$), then group choice equilibrium is not governed by a dominant operator with respect to proposition *p*. In other words, regardless of the power structure governing other attributes, operator types *q* and *_q* tend to reach perceptively fair compromises when bridging the gap in their preferences for each proposition. If the power measures are significantly different across operator types (e.g., $\lambda_{qp} > (1 - \lambda_{qp})$ for two operators), then λ_{qp} gives a direct measure of the dominance of one operator type over the other with respect to attribute mix in proposition *p*; as λ_{qp} increases, so does the relative power held by operator type *q* over *_q*. For example, the power measures may reveal that one operator type tends to get its way with regard to monetary concerns, whereas the other operator type tends to get its way with regard to concerns for levels of service. These relationships can be examined further at the sub-type level (by decomposition of the random parameter specification of λ), in order to reveal deviations from the inferred behaviour at the sample level that may be present for a particular type of relationship.

This model is straightforward to estimate, holding all β's fixed, with each λ_{qp} and the alternative-specific constants (ASC's) free parameters. λ_{qp} as a power indicator can be a random parameter and a function of other criteria, especially the deliberation attributes, and can be specific to each attribute within and/or between business propositions, or constrained as the analyst sees fit.

In the current study with a small illustrative data set, we will not be estimating stage 2 on *actual* pairs in real contract contexts (left to future research), since we will need lot of pairs or triples of operators to obtain enough data. We will however be able to identify specific operators (disguised as operator 1, 2, 3 etc.) and use the findings for each operator to establish the extent to which they would cooperate *if they were required* to work together under a single AMC. Stage 2 could be implemented by randomly assigning operators to pairs and establishing the nature of the power relationship under this condition. This is still useful and establishes the value of the method.

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[8] The alternative-specific constants may not be imported.

4. The heteroscedastic mixed logit operator preference model[9]

We assume that a sampled operator q ($q=1,\ldots,Q$) faces a choice among J business propositions in each of T choice situations. Operator q is assumed to consider the full set of offered business propositions in choice situation t and to choose the business propositions with the highest utility. The utility associated with each alternative j as evaluated by each operator q in choice situation t, is represented in a discrete choice model by a utility expression of the general form in (3).

$$U_{jtq} = \boldsymbol{\beta}'_q \mathbf{x}_{jtq} + \varepsilon_{jtq}, \tag{3}$$

where $\mathbf{x}_{jtq}$ is the vector of explanatory variables, including attributes of the alternatives, characteristics of the business and descriptors of the decision context and choice task itself in choice situation t. The components $\boldsymbol{\beta}_q$ and ε_{jtq} are not observed by the analyst and are treated as stochastic influences. Note that $\boldsymbol{\beta}_q$ is assumed to vary across operators.

Operator-specific heterogeneity is introduced into the utility function through $\boldsymbol{\beta}_q$ Thus,

$$\boldsymbol{\beta}_q = \boldsymbol{\beta} + \Delta \mathbf{z}_q + \boldsymbol{\Gamma}_q \mathbf{v}_q = \boldsymbol{\beta} + \Delta \mathbf{z}_q + \boldsymbol{\eta}_q, \tag{4}$$

or $\beta_{qk} = \beta_k + \boldsymbol{\delta}'_k \mathbf{z}_q + \eta_{qk}$ where β_{qk} is the random parameter whose distribution over operators depends in general on underlying parameters, $\mathbf{z}_q$ is observed data and the random vector $\boldsymbol{\eta}_q$ endows the random parameter with its stochastic properties. For convenience in isolating the model components, we define $\mathbf{v}_q$ to be a vector of uncorrelated random variables with known variances and denote the matrix of known variances of the random draws as $\mathbf{W}$.

Since $\boldsymbol{\beta}_q$ may contain business-proposition specific constants, η_{qk} may also vary across choices and, in addition, may thus induce correlation across choices. Note that $\boldsymbol{\beta}_q$ and its components are structural parameters $(\boldsymbol{\beta}, \Delta, \boldsymbol{\Gamma}_q)$ and choice situation invariant characteristics of the individual, $\mathbf{z}_q$. They do not vary across choice situations or across choices (save for the extent that components of $\mathbf{x}_{jtq}$ are choice specific). The terms $\boldsymbol{\beta} + \Delta \mathbf{z}_q$ accommodate heterogeneity in the mean of the distribution of the random parameters. Previous applications of the mixed logit model have assumed homoscedasticity in the model, which results if $\boldsymbol{\Gamma}_q$ is assumed to be a matrix of constants. Then,

$$\mathrm{Var}[\boldsymbol{\beta}_q \mid \mathbf{z}_q] = \boldsymbol{\Gamma}\boldsymbol{\Sigma}^{1/2}\mathbf{W}\boldsymbol{\Sigma}^{1/2}\boldsymbol{\Gamma}' \tag{5}$$

We will assume that $\boldsymbol{\Gamma}$ is an unrestricted lower triangular matrix. Thus, with no loss of generality, we assume that $\mathbf{W}$ is diagonal and contains no unknown parameters. Variance heterogeneity is introduced into the model as follows: Let $\boldsymbol{\Sigma}_q = \mathrm{Diag}[\sigma_{1q}, \sigma_{2q}, \ldots, \sigma_{Kq}]$ where

$$\sigma_{qk} = \sigma_k \times \exp(\boldsymbol{\theta}'_k \mathbf{h}_q) \tag{6}$$

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[9] This section is based on Greene, Hensher and Rose (in press).

and $\mathbf{h}_q$ is a vector of M variables that enters the variances. With this explicit scaling, we now assume that the diagonal elements of $\mathbf{\Gamma}$ are equal to one (again, with no loss of generality, since the scaling will now appear in $\mathbf{\Sigma}_q$). The full model for the variances in the model is given as equation (7).

$$\text{Var}[\mathbf{\beta}_q | \mathbf{\Omega}, \mathbf{z}_q, \mathbf{h}_q] = \mathbf{\Phi}_q = \mathbf{\Gamma}\mathbf{\Sigma}_q^{1/2}\mathbf{W}\mathbf{\Sigma}_q^{1/2}\mathbf{\Gamma}' \tag{7}$$

where $\mathbf{\Omega} = (\mathbf{\beta}, \mathbf{\Delta}, \mathbf{\Gamma}, \mathbf{\Sigma}, \mathbf{W})$, the component structural parameters of $\mathbf{\beta}_q$. We now have a functional form for an attribute in which its preference profile across a sample is represented by a mean and a standard deviation expression of the general form:

$$\mathbf{\beta}_q = \pm \exp[\mathbf{\beta}_0 + \mathbf{\delta}_k'\mathbf{z}_q + \mathbf{\sigma}_k \times \exp(\mathbf{\theta}_k'\mathbf{h}_q)^*v_i] \tag{8}$$

where the sign for the entire expression is imposed by the analyst to represent the behaviourally required sign, v_q is an analytical distribution selected by the analyst, and all other terms are defined above.

The *mixed logit* class of models assumes a general distribution for β_{qk} and an IID extreme value type 1 distribution for ε_{jiq}. That is, β_{qk} can take on different distributional forms. For a given value of $\mathbf{\beta}_q$, the *conditional* (on $\mathbf{z}_q$, $\mathbf{h}_q$ and $\mathbf{v}_q$) probability for choice j in choice situation t is multinomial logit, since the remaining random term, ε_{jiq}, is IID extreme value:

$$\mathbf{P}_{jtq}(\text{choice } j \mid \mathbf{\Omega}, \mathbf{X}_{tq}, \mathbf{z}_q, \mathbf{h}_q, \mathbf{v}_q) = \exp(\mathbf{\beta}_q'\mathbf{x}_{jtq}) / \Sigma_j \exp(\mathbf{\beta}_q'\mathbf{x}_{jtq}) \tag{9}$$

where the full set of attributes and characteristics is gathered in $\mathbf{X}_{tq} = [\mathbf{x}_{1tq}, \mathbf{x}_{2tq}, \dots, \mathbf{x}_{Jtq}]$.

5. In-depth Interviews used to reveal the agenda

To guide the selection of attributes and associated levels for the stated preference study, designed to reveal operator preferences for cooperative alliances in an Area Management Company (AMC), we undertook, in late 2004, extensive in depth interviews with a number of owners and managers of private bus businesses in Sydney who are participants in the 12 area contract regions not managed by the government operator. We summarize the main points, preserving the confidential nature of the material in respect of specific AMCs that were being worked out at the time of the interviews.

The in depth interviews were unstructured and guided by very general background themes designed to provide a starting position for discussion. For example, one background theme used to stimulate dialogue was the perceived role that each operator might play in an AMC; another was alternative ways that each operator might measure their contribution for purposes of sharing revenue and costs. The information gathered was sorted so as to reveal the diversity of the agenda of each operator and a natural grouping of themes that can be translated into specific attributes for inclusion in the stated preference study.

5.1 Top-of-mind issues

Operators in NSW do not confine their discussion of cooperative issues to their present individual circumstances, and this more general approach is a result of the fluidity and uncertainty in the bus services environment that has resulted from the introduction of recent reform. Area participants and even area boundaries are rapidly changing as individual operators come to terms with the impact of reform, and further changes are expected when contracts are renewed in seven years time. As a result, operators are able to comment on a broad range of initiatives and discuss their preferences under a range of hypothetical circumstances.

Top-of-mind issues tend to follow two lines of discussion: anticipating and responding to the changing environment in the short-term; and establishing and strengthening the inter-operator partnerships which are seen as the inevitable outcome of reform in the longer term.

In the short-term, a number of aspects of the newly introduced reform remain unclear to operators, and the potential impact of new contractual requirements and payment methodologies is the subject of much speculation. Of particular interest are the threat of individual operator exit and the impact of fare standardization across the metropolitan area, as well as the tentative steps that have been taken to form the area-based contractual arrangements that are required by government. Examples of the latter include investigation of contractual options for partnership, the establishment of within-area boundaries in consultation with partner companies to avoid conflict over new patronage areas, and the apportionment of centralized assets such as depots to multiple new contract areas (for operators who will participate in more than one area under the new regime).

While operators spontaneously discuss in detail the likely response to reform over the coming months, longer-term considerations are also top-of-mind. Quality partnership relationships are seen as the key to long-term survival, and operators are anxious to either rapidly build these relationships or limit their exposure to partnership failure. Preferred long-term response to reform is highly polarized, with some (mostly small) operators aiming to form close alliances with partners, and other (larger, international) operators intending to buy out partners where possible. Both groups of operators share concerns about potential barriers to cooperation, including the extent to which all partners have an ongoing commitment to the industry (long-term rather than short-term focus) and the professionalism of partners' operations. Operators provide examples of perceived professional shortfalls including the misuse of confidential data, insufficient management skills (particularly in the financial arena), inefficient or ineffective operations and insufficient planning for growth of patronage and services.

5.2 Formation of an Area Management Company (AMC)

Most operators, at the time of the interview were in the process of establishing a lead entity, as required by government, and a number of models were under discussion. At one end of the spectrum, a single operator becomes the lead entity, subcontracting bus services

to other operators in the area. At the other extreme is the formation of a fully integrated AMC, a new company formed to take advantage of the benefits of a fully-fledged alliance. In between these extremes is a range of options, such as the establishment of a "shelf" company designed to meet the government's minimum requirements: receive revenue, split income among partner operators (in a manner not finalized by most operators) and report to the regulator. The preferred model depends greatly on both the relative power of the operators in each area and perceived benefits and barriers to cooperative alliance. Major points of difference among operators in their perceptions of these benefits and barriers will now be discussed.

5.3 Shareholding and voting rights

Loss of control of the business entity is a major barrier to alliance for most operators, and particularly for smaller operators. The shareholding and voting rights on offer in any proposed AMC is therefore of great importance to operators, and can be expected to shape their preferences for an alliance model. Shareholding options for an AMC include equal shares, shares based on operator size (measured in either bus kilometers, bus numbers or number of passengers), or shares based on size with the opportunity for smaller companies to buy out a portion of a larger company to ensure that no one company has majority ownership of the AMC.

Similarly, there are a number of options for apportionment of voting rights at the board level of the AMC, including equal votes, votes based on size of the business, or votes based on size but capped at 50% to ensure that no majority operator is able to dictate terms to minority partners.

Shareholding and voting right preferences influence operators' preferences for an AMC model in similar ways, and voting rights is selected as an attribute for inclusion in the stated preference study.

5.4 Benefits of alliance

It is clear from discussion with operators that the potential benefits of alliance with area partners have not yet been examined in detail, with most operators focusing on the short-term aspects of meeting government requirements. To a large extent this reflects the fact that operators are not able to choose their partners, and many operators see the forced amalgamation as an exercise in limiting the costs of alliance rather than reaping the benefits. In practical terms, this means limiting the resources allocated to the preferred AMC model as much as possible.

When prompted, however, operators suggest a number of ways that an alliance could enhance efficiency and effectiveness, including use of common systems, standardization of policy and procedures and performance monitoring, and centralization of decision making and strategic planning, financial management, network planning and integration, marketing, procurement and human resource management. Interestingly, maintenance is not generally viewed as a function suited to central provision by an AMC, as duplication of maintenance services is not seen as costly when compared with the potential increases in dead running

time that would be the expected result of centralized maintenance. It is suggested that this view may change if the industry develops 'super-specialists' as a result of reform, possibly driven by operators selling off their contracted services and offering specialist support back to the sector. This strategy enables operators with substantial skills to offer to be removed from the uncertainties of contracts with government.

Another interesting point raised is that the amalgamated contracts that commenced in January 2005[10] are seen as containing incentives **not** to consolidate assets (i.e., if assets such as depots are being used to determine costs and hence subsidy, the value of potential efficiencies needs to be weighed against loss of subsidy).

Taking advantage of potential alliance benefits would involve transfer of resources (both human and financial) to the AMC. As transferred personnel would be likely to relinquish their roles in their original companies (taking with them some of the value of the business), the decision to integrate the AMC to this level may not be completely reversible and would not be taken lightly. Operators are divided over the extent to which integration should occur, with some advocating no integration (or limited only to government requirements) and others considering a more fully integrated alliance.

Two attributes reflecting the alliance benefits perceived by operators are included in the stated preference model. The first attribute details the extent to which operations of the partners are integrated (from not at all through to full integration covering all aspects of the business). This attribute indicates the influence of operators' expectations of the extent to which benefits can be obtained through alliance; along similar lines, the second attribute examines the extent to which management skills are transferred to a proposed AMC, reflecting the influence of operators' willingness to resource an AMC (in return for perceived benefits) on preference for an AMC model.

5.5 Relinquishing 'grandfather' rights

Operators view themselves as owning rights to service specific routes, and have an expectation that these rights will be maintained, traded or sold under the amalgamated contract regime. These historical rights are not recognized by government – rights are assigned to the area instead – and it is interesting to note that operators do not spontaneously discuss future rationalization of historical rights within their area.

When prompted, operators agree that an AMC will need to make changes to the status quo to take advantage of area-wide efficiencies, but are divided about how this should occur once the initial area contract has been signed. Rationalization is expected to result in route changes that disadvantage specific operators, and the maintenance of an equitable partnership will mean that some sort of compensation will be required, although one operator suggests that changes will be accepted as long as each partner's margins remain unchanged. Operators debate when (if at all) historical rights should be relinquished to the AMC, with some proposing that rights should be transferred from operators to the AMC immediately and others preferring to retain their rights for a period of time (most operators in the second category feel that this transfer will have to be made eventually).

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[10] As of February 5, 2005, only one operator (Connex) had signed their contract with an EBIT:costs margin built into the seven year contract of 6-7.5%. Other operators are not willing to accept such a low margin, arguing for 11-13% (Hensher 2005a).

An attribute is included in the stated preference model that differentiates between preferences for immediate and longer-term transfer of operators' historical rights to operate specific routes.

5.6 Managing area growth

Operators anticipate revenue and patronage growth based on changes in demography and government policy (a short-term example is fare standardization) and, to a lesser extent, alliance cooperation. As this growth will be attributable to the area, represented by the AMC, rather than to individual operators, distribution of revenue thus generated to area partners is an area of contention.

Options presented by operators for sharing revenue growth include: sharing on the basis of costs incurred, in terms of the number of bus kilometers provided by each company to achieve the growth; sharing in a way that maintains operator relativities in terms of size, measured by the transport task in terms of bus kilometers, passenger kilometers or bus numbers; sharing in a way that maintains relative profit margins of each operator; or sharing equally.

The way in which area growth is shared among operators is included as an attribute in the stated choice model.

5.7 Managing differences in operator performance

A major barrier to cooperation is the perception of operators that there are widely differing levels of performance within the bus service industry, and operators (both large and small) are quick to point out that size is not a reflection of efficiency. As operators within an area face similar constraints, operators expect that alliance partners' costs will converge over time.

In the mean time, operators are faced with a decision about how an AMC, which is paid by government at a single rate, should split this revenue among operators with differing operating costs. Suggestions include: paying operators an average of the operating costs within the contract area (forcing relatively high cost operators to reduce their costs to remain viable, and giving lower cost operators additional profit incentives); paying operators the highest operating cost within the contract area (covering all costs, but providing strong profit incentives); paying operators the costs of the area's best practice operator (as determined by the AMC – this could potentially be the highest cost operator when aspects other than cost, such as service quality, are considered); or paying operators according to their individual operating costs (with no incentive for cost convergence).

The way in which operators are paid by the AMC where operator costs differ is included as an attribute in the stated choice model.

5.8 Asset ownership

Ownership of assets (buses, depots etc.) is a recurrent theme of discussion, with operators expressing the view that the government's long-term desire is to acquire all assets from private operators as part of a strategy to eliminate any claim on spatial service provision other than an entitlement to operate a service on behalf of government. Operators are either for or against government ownership of assets, although even those operators strongly advocating government ownership are concerned that government will not pay a reasonable rate for assets (particularly those over 15 years old). Some operators view contract amalgamation as the first step towards government acquisition, and in the longer term operators anticipate re-branding of buses along area lines – an expensive exercise, with each bus costing about $6,000 to repaint. There is no indication that government will cover this impost.

Of more immediate concern to operators is the way that the fixed asset payment portion of operator revenue via the funding model is likely to be determined by government. Under the new model, operators are concerned that government will base support on a pre-agreed (low) rate of return on investment (ROI), and any additional ROI will be claimed by the government. Given the ongoing controversy on an acceptable ROI, this matter is emerging as a very serious one, threatening the commitment of operators to the new contracting regime. It is made worse by a claim on charter revenue that, although unrelated to the provisions of service and patronage under the new contracts, does use the assets funded by government in delivering contract services.

Some operators express the view that the sooner government can acquire all assets and have operators manage them for government, the quicker this would reduce risk as well as change the current focus on asset management (Hensher 2005a); others are anxious to retain ownership of buses, which are used to secure finance. Those operators advocating government ownership point to the success of similar regimes in Adelaide and Perth, which are very attractive financially to incumbent service providers (delivering some of the most attractive EBIT:cost margins in Australia).

To capture the influence of asset ownership views on AMC model choice, ownership is included as an attribute in the stated preference model.

5.9 Payment models

The payment model to be used by government to provide revenue to the AMCs has not yet been fully articulated, however operators anticipate that there will be a component based on AMC costs as well as an incentive/penalty system providing patronage growth and service quality incentives.

The basis for distribution of this revenue from the AMC to its constituent operators has not attracted much discussion to date. There is a strong feeling that the distribution should be linked to the government's payment model, when this becomes clear, to ensure transparency and fall in line with the revenue flows (given that government will collect all fares and return a shadow fare per passenger back to the operators). Distribution of

revenue relating to planned strategic corridors is expected to be more challenging, and options for doing this have not yet been considered.

Operators indicate that the bulk of payment from government will be based on operator costs, allowing for an acceptable ROI; incentive and penalty payments are expected to play a limited, and potentially distorting, role. For example, operators suggest that patronage incentives may result in optimization of Patronage Incentive Payments (PIPs), rather than patronage itself, as a result of PIP caps, while other operators feel that the service quality incentive is likely to be too challenging to earn, with too many hurdles to jump, and service quality incentives are not being factored into decision-making at present.

For some operators, growth of patronage may prove problematic in any case: some operators do not believe they can grow patronage; and where patronage growth is anticipated (e.g., the cited 12% increase projected by government) there may be problems due to an insufficient number of passengers per bus trip. Other operators are optimistic about patronage growth: views appear to be highly area-dependent.

Operators speculate about the likely nature of service quality incentives (SQIs) under the new payment model, suggesting that a single number (or rating) may be used to measure the service quality performance of AMCs. This model would make it very difficult, in the absence of operator-specific data collected within an AMC, for the AMC to determine where any problems are originating (i.e., which company is at fault).

To counter this problem, some operators are planning to measure their own performance, providing a way in which to split SQI payments within the company (sub-regional analysis). Such a model will have to be supported by the AMC and raises a substantial number of issues related to trust, commitment and responsibility. However, it is questionable whether all participating operators will be willing to concede that poor performance will mean a reduced incentive payment for that operator (or, even worse, a penalty payment from the operator to the AMC). Some operators indicate that there may be significant resistance to performance measurement within the alliance.

Distribution to operators of both cost-based and incentive payments, as well as arrangements for paying any penalties where required, has not been much discussed, with operators waiting for more detail about the payment model. Operators suggest that distribution could be based on operator costs or operator size (with no incentives for individual operators), or based on operator performance measured against a service level agreement with the AMC (incorporating incentives).

To capture the influence of these issues on preferences for an AMC model, three attributes are included in the stated preference model: the way in which base (cost related) revenue is distributed by the AMC to operators; the way in which incentive payments are distributed by the AMC to operators; and the way in which penalty payments are paid by operators to the AMC (to pass on to the government when required).

5.10 Summary

Interviews with operators suggest a number of attributes and attribute levels that are likely to influence operators' choice of a preferred model for cooperative partnership in the form of an AMC. The preferred model depends greatly on both the relative power of the operators in each area and perceived benefits and barriers to cooperative alliance.

Although only tentative steps have been taken to form an AMC in new contract areas, partnership alliances are seen as the inevitable result of current reforms to the bus services industry in NSW. Due to the uncertainty surrounding reform at present, partnership options are widely discussed and operators feel comfortable evaluating proposals that may provide partnership solutions in a variety of hypothetical circumstances.

6. The stated preference study

Stated preference (SP) is a methodological approach to studying choice behaviour. SP recognises that the revelation of preferences of operators should not be limited to choices made in real markets (referred to as revealed preference (RP) data). Rather, through the design of a preference experiment we can evaluate the operator's preferences for combinations of levels of attributes associated with specific business propositions which include the current and new arrangement options.

Importantly, SP models offer an enrichment strategy to study the preferences and choices of operators that are inadequately represented by RP data settings alone. We can 'stretch' the RP attribute levels to create greater variability in information than is typically observed in real market data and consequently add knowledge to our understanding of preference revelation and the role of such preferences in determining choices. This gives the analyst greater capability in applying a choice model outside of the limits imposed by the market data. The method is ideally suited to the current application where we are evaluating the preferences of business partners in the formation of a new business proposition, and where many of the issues are new to the industry and hence not observed in current practices.

There are two broad categories of SP methods: (i) an operator is asked to indicate his *preferences* among a set of combinations of attributes which define services or products. This judgemental task, usually seeks a response on one of two metric scales - a rank ordering or a rating scale; (ii) an operator is asked to *choose* one of the combinations of attributes. Information is not sought on the ordering or rating of each of the non-chosen combinations. This is often called a first-preference choice task.

In SP experiments, each combination of attributes can be defined as an *alternative or business proposition* in the sense of representing a product or service specification which may or may not be observed currently. It is feasible to vary both the combinations of attributes and levels as well as the subsets of mixes to be evaluated. This can be achieved by either designing varying numbers of combinations or asking the respondent to a priori eliminate any combinations which are not applicable before responding (soliciting criteria for non-applicability - see Louviere et al., 2000).

In practice, it is common in preference experiments to hold the number of alternative attribute mixes (or business propositions) constant and only vary the attribute levels. However, in choice experiments, it is common to vary the number of alternatives, while either holding the attribute levels associated with each alternative constant, or varying them, producing *varying choice sets*. Fixed choice set designs are also widely used.

The centrepiece of an SP study are the following elements:

1. The *identification of the set of attributes* which need to be considered as sources of influence on the choice from the set of business propositions.

2. *Selecting the measurement unit for each attribute.* In most cases the metric for an attribute is unambiguous; however there are situations where this requires consideration of alternative metrics.

3. The *specification of the number and magnitudes of attribute levels.* As a rule of thumb, one should be extremely cautious about choosing attribute levels which are well outside the range of both current experience *and* believability. Pivoting the levels around known experiences gives greater confidence to the outputs.

4. S*tatistical design* is where the attribute levels are combined into an experiment. A combination of attribute levels describes a business proposition, referred to in the literature as a *profile* or *treatment*. Business propositions are generated with the aid of statistical design theory. In a statistical experiment each attribute has levels, and it is these levels that are the input data required to construct a factorial design (i.e., combinations of attribute levels for all attributes in the design). In practice the full number of combinations is impracticable to evaluate and so a *fractional factorial design (ffd)* is constructed. The price one pays for making the experiment manageable is that some statistical efficiency is lost. In designing a fractional factorial experiment, the analyst has to assume that certain interaction effects among the attributes are not statistically significant. This is a very reasonable non-testable assumption for a large number of possible interactions, especially interactions of more than two attributes (e.g., three-way interactions), and indeed for many two-way interactions. If interactions are statistically significant, their effects in an *ffd* will be loaded onto the individual main effects, giving erroneous results. This is referred to as *confounding* main effects with interaction effects. The analyst has to be creative in selecting a limited number of two-way interactions which enable one to include up to that number of interactions to test for statistical significance.

5. The experiment designed in task 4 has to be translated into a set of *questions in the data collection phase.* The survey instrument can be administered in many ways such as a computer aided personal interview (CAPI), an internet survey (as used herein) or a paper and pencil exercise. Whatever the preferred collection strategy, the design must be translated from a set of orthogonal or near-orthogonal design-attribute levels into real information for operators to comprehend and respond. Where feasible, it is suggested that an operator be asked to both choose a business proposition and either rank or rate the full set of business propositions (or a subset derived from a prior question on applicability or non-applicability of particular propositions). The subset issue is particularly important where there are too many propositions to rank or rate, although it may be of interest in a choice response context to ascertain some additional information on relevant sets. If the request for ranking or rating responses may jeopardise the cooperation across the replications

of the experiment, it is more important to limit the task to the first preference choice.

6. The selection of an appropriate *estimation procedure* will be dependent on the metric of the response variable and the level of aggregation of the data for modelling. The mixed logits model is proposed herein.

6.1 Selecting the Attributes and Levels

The attributes of relevance in defining a number of alternative business propositions that have been identified from the interviews with operators are set out below in Table 1. To establish their relevance, we undertook a survey of operators attending the joint Bus Industry Confederation (BIC) and UITP Asia-Pacific Conference in Brisbane in October 2004. In this survey we asked operators to review a set of attributes and levels and to indicate which level on each of the attributes in Table 1 is most preferred (including an optional other level). 24 operators completed the survey, providing enough initial support for the attributes and levels in Table 1.

There are ten attributes of which eight have 4 levels and two have 2 levels, giving us a $8^4 2^2$ factorial design. We designed a series of business propositions, giving each operator two to consider in a scenario, and asking them to identify their most preferred business model. In addition we asked that "If I had the choice not to choose any of the above business models" would you still select the previously stated preference business model or select neither of the business models. This will be repeated a total of 14 times, varying the levels of the attributes for each business proposition. The business propositions are referred to as unlabelled propositions in that the mix of levels of attributes is nothing more than a bundle of attributes without a label.

These attributes were designed into the internet survey 'Forming Bus Alliances', with each participating bus operator asked to compare the two business propositions (referred to as business models) and to choose the most preferred. This was repeated a total of 14 times, giving us 14 observations on each operator's preferences for bundles of attributes. Figure 1 is an example of a stated preference screen.

Table 1: Candidate Attributes and Levels

1. *Voting rights*

    - Equal votes
    - Based on size of business (defined by bus numbers)
    - Based on size of business (defined by bus kilometres)
    - Based on size of business but capped (e.g. at 50%)

2. *Staffing*

    - Management skills transferred to AMC
    - Management skills retained by individual operators

3.   *Sharing day to day operations*

- None at all
- Limited (e.g. shared depots only to park/position buses)
- Extensive (e.g. shared maintenance of all buses)
- Substantial (e.g. all aspects of the business)

4.   *Route allocation post AMC*

- Retain historical rights to operate certain routes
- All rights transferred to AMC for reallocation as required

5.   *Sharing regional growth amongst operators*

- Equally shared
- Proportionately according to each operator's costs
- Proportionately according to each operator's number of buses
- According to profitability of each operator

6.   *Dealing with differing operator costs*

- Operators paid an average of the operating costs within the contract area
- Operators paid the highest operating cost within the contract area
- Operators paid according to best practice operating cost of operators in the contract area.
- Operators paid according to their individual operating costs

7.   *Ownership of assets*

- All Owned and operated by each operator
- All Owned by each operator, leased to AMC
- All Owned by AMC, leased to each operator
- All Owned by government and leased to AMC

8.   *Revenue distribution based on*

- Operator costs
- Operator size (bus numbers)
- Operator performance (based on a Service Level Agreement with AMC)
- Equal shares among operators

9.   *Incentive payment/bonus distribution:*

- Operator costs
- Operator size (bus numbers)
- Operator performance (based on a Service Level Agreement with AMC)
- Equal shares among operators

10.   *Penalty payment paid according to:*

- Operator costs
- Operator size (bus numbers)
- Operator performance (based on a Service Level Agreement with AMC)
- Equal shares among operators

Figure 1: An example of a stated preference screen

Additional questions were asked to identify which attributes in the SP experiments were ignored and the ranking of the attributes. Contextual questions sought information on the operator including years in the industry, size of current operations, geographical location, ownership status of business, alliance experience, the attributes of an ideal alliance, and responsibilities of each operator and the area management company.

7. Analysis and Findings of a Pilot Survey

A total of 19 operators completed the online pilot survey, yielding 266 observations for model estimation (i.e., 14 choice sets by 19 bus operators). The final model is given in Table 2. This is illustrative given the small sample size and the pilot nature of this initial phase of a larger study. There were only two statistically significant effects[11] – payments (where costs differ) based on best practice costs, and assets owned and operated by each operator within the AMC. For best practice costing, the distinction between metropolitan and non-metropolitan operator had an influence.

The two significant effects are defined by random parameters, suggesting that preference heterogeneity is relevant. A constrained triangular distribution[12] was selected as the preferred analytical distribution (from a number of other distributions assessed).

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[11] We have left the other attributes in Table 2 to illustrate the way in which each attribute level is assessed. With a larger sample we would expect to identify additional influences.

[12] For the triangular distribution, the density function looks like a tent: a peak in the centre and dropping off linearly on both sides of the centre. Let c be the centre and s the spread. The density starts at c-s, rises linearly to c, and then drops linearly to c+s. It is zero below c-s and above c+s. The mean and mode are c. The standard deviation is the spread divided by $\sqrt{6}$; hence the spread is the standard deviation times $\sqrt{6}$. The height of the tent at c is 1/s (such that each side of the tent has area s×(1/s)×(1/2)=1/2, and both sides have area 1/2+1/2=1, as required for a density). The slope is $1/s^2$. This constraint specification can be applied to any distribution. For example, for a triangular with mean=spread, the density starts at zero, rises linearly to the mean, and then declines to zero again at twice the mean. It is peaked, like one would expect. It is bounded below at zero, bounded above at a reasonable value that is estimated, and is symmetric such that the mean is easy to interpret. It is appealing for handling willingness to pay parameters. Also with ß (i)= ß + ß v(i), where v(i) has support from -1 to +1, it does not matter if ß

Operators have a strong positive preference for owning and operating their own assets within an AMC and for being paid on the basis of best practice costs where operator costs differ. Furthermore the preference heterogeneity is most marked, as shown by the distributions in Figures 2 and 3. For best practice costing, the preference level has been conditioned on whether the operator is metropolitan or not. The positive parameter estimate for the decomposition of the mean (i.e., 1.0074), suggests, all other influences remaining constant, that the marginal utility associated with best practice costing is higher for metro operators than for non-metro operators. This is incorporated in Figure 3. The range of marginal utilities varies from 0.623 to 0.844 for asset ownership, and from 0.355 to 1.383 for best practice costs. Hence the preference heterogeneity, while significant for both attributes, is much greater for best practice costing. The mean for each attribute is respectively 0.766 and 0.704, highlighting the potential for misleading inferences when reliance is on the mean of a distribution with a wide range of marginal utilities. The respective standard deviations are 0.059 and 0.476.

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is negative or positive. A negative coefficient on v(i) simply reverses all the signs of the draws, but does not change the interpretation.

Table 2: Illustrative Mixed Logit Model

All random parameters have a triangular distribution, 10,000 Halton draws

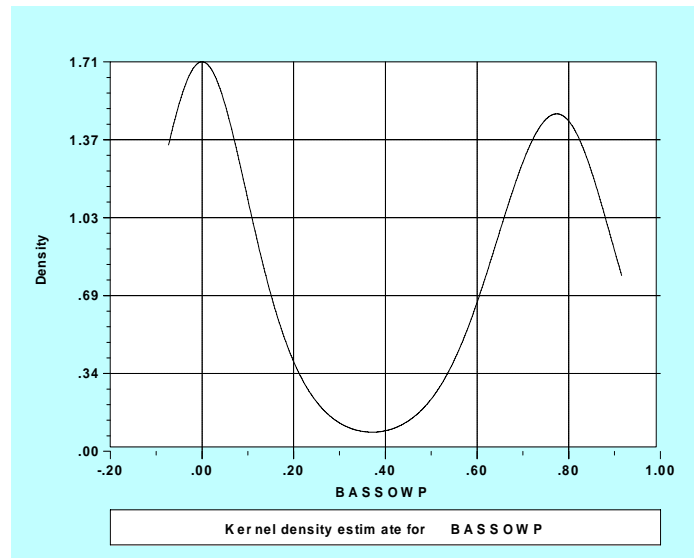|	Bus Alliances
Attribute	**Mixed Logit** *(Parameter (t stat))*
Mean Random Parameters	
Equal voting rights	-
Voting rights based on # buses	-
Voting rights based on bus kms.	-
Voting rights based on size but maximum of 50% of voting rights	-
Management skills transferred to AMC	-
No sharing of day to day operations	-
Limited sharing of day to day operations	-
Extensive sharing of day to day operations	-
Substantial sharing of day to day operations	-
Retain historical rights to operate certain routes	-
All route rights transferred to AMC	-
Regional growth equally shared amongst operators	-
Regional growth shared according to operator costs	-
Regional growth shared according to operator fleet size	-
Operators paid average of op costs within contract area	-
Operators paid highest of op costs within contract area	-
Operators paid best practice of op costs within contract area	0.3683 (1.70)
Assets owned and operated by each operator	0.80278 (2.42)
Assets owned by each operator and leased to AMC	-
Assets owned by AMC and leased to each operator	-
Revenue distributed based on operator costs	-
Revenue distributed based on operator fleet size	-
Revenue distributed based on operator performance	-
Bonus distributed based on operator costs	-
Bonus distributed based on operator fleet size	-
Bonus distributed based on operator performance	-
Penalty payments distributed based on operator costs	-
Penalty payments distributed based on operator fleet size	-
Penalty payments distributed based on operator performance	-
Fixed Parameters	
-	-
Standard deviation of Random Parameters	
Operators paid best practice of op costs within contract area	0.3683 (1.70)
Assets owned and operated by each operator	0.80278 (2.42)
Heterogeneity around the mean decomposition parameters	
Operators paid best practice of op costs within contract area *metropolitan operator (1,0)	1.0074 (2.02)
Heterogeneity around the mean decomposition parameters	
-	-
Heteroskedasticity decomposition parameters	
-	-
Model fits	
No Observations	266
LL(B)	-164.98
Pseudo R^2	0.05

Figure 2: Asset ownership preference profile
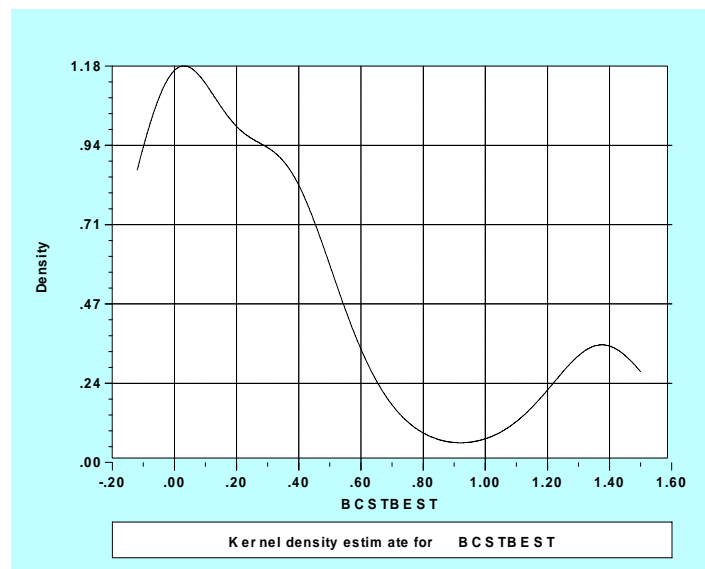
Figure 3: Best practice costing preference profile

One objective is to use the findings for each operator to establish the extent to which they would cooperate *if they were required* to work together under a single AMC. Despite the limited sample size in the pilot survey, we can take specific operators within the sample and illustrate how the evidence can be used to establish the potential to cooperate. Essentially the cooperative spectrum is based on matching of aggregate utility from specific business propositions. With only two statistically significant influences, the results, while limiting, do serve to demonstrate the value of the approach. Figure 4 profiles the sample distribution of total utility associated with each of the three business propositions relative to a base of having assets not owned and operated by each operator and zero for not using best practice costing. The indexation in Tot U ij refers to the preference for ownership and operation of assets by operator (i=1) and best practice costing (j=1).

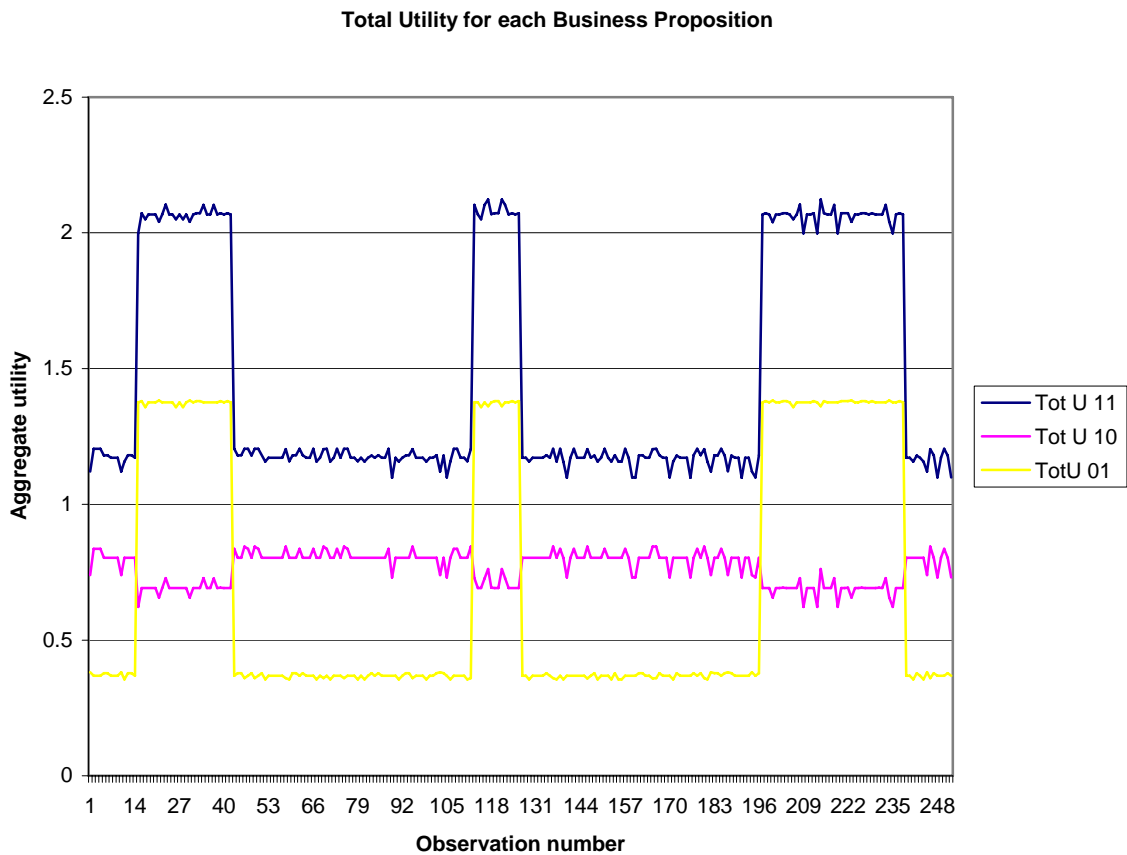**Total Utility for each Business Proposition**

Figure 4: Profile of aggregate utility for each AMC proposition

The utility profiles in Figure 4 would be fed into equation (2) and the power weights estimated on all members of a specific AMC setting. We have done this for the sample and run two models – a simple multinomial logit (MNL) with a fixed parameter for the power or cooperation weight and a mixed logit (ML) model in which the weight is a random parameter. We found that the cooperation weight (or lambda), treated as generic across all four AMC propositions, has a mean estimate of 0.529 (t-value =3.705) from the MNL model and a mean of 0.516 (t-value = 3.628) from the ML model. We used a constrained triangular distribution in which the standard deviation of the parameter is the same as the mean. The cooperation weight distribution is shown in Figure 5. Thus on average, the value of 0.5 suggests that any pair of parties appear to bring equal influence to the table (given the randomized pairwise matching we undertook herein to illustrate the types of useful outputs).

Of greater interest however is the cooperative strength on each of the four preference profiles in terms of best-practice cost and ownership and operation of assets. We find the following MNL and ML results (Table 5). There is clearly greater cooperation when both parties prefer to adopt best practice costing and well as maintain ownership and operations of ones' own assets; with least cooperation (albeit not statistically significant) when both prefer best practice costing, but disagree on asset ownership and operations. The MNL and ML results are similar, which might be expected given the size of the sample and the limited attribute influences.

Table 5: Cooperation (power) weights under alternative attribute preference profiles

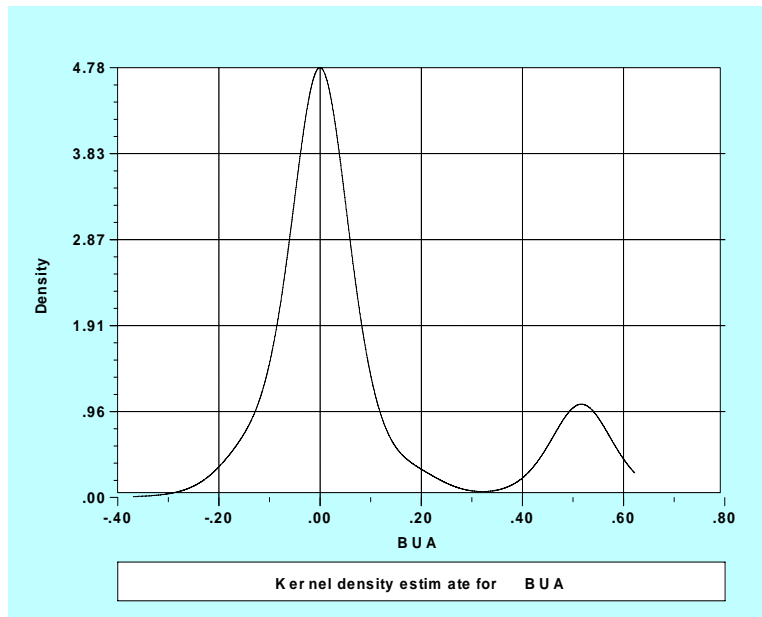| Assets owned/operated by operator	Best practice costing	MNL – fixed parameter	ML – random parameter
yes	Yes	0.587 (2.8)	0.587 (2.80)
yes	No	0.423 (1.6)	0.439 (1.58)
no	Yes	0.230 (0.86)	0.247 (0.89)
no	No	0.625 (3.15)	0.631 (3.07)

Figure 5: The cooperative (power) weight distribution

8. Conclusions

This paper offers a way forward in investigating what bus and coach operators prefer in any business proposition that involves partnering with other operators in the delivery of services. The findings, although based on a small pilot sample, have broad applicability and are not limited to a specific institutional setting.

Two aspects of contractual relationships between operators have been shown to be of especial importance in the establishment of AMCs. These are asset ownership and the basis of payment where partners' operating costs differ. Asset ownership is shown to matter in negotiations, with a very strong preference for operators who currently own their own assets to want to hold onto them in any new partnership. This may be seen as a mechanism to protect one's heritage in the industry, and until operators have experienced other regimes they lack the experience and will to risk a major divorce with their assets. In those Australian contexts where the assets are in government hands and made available to operators through service delivery contracts, as in Perth and Adelaide, those who have won these tenders have found a great deal of appeal in having no asset risk. Indeed the margins (defined by EBIT:revenue) are extremely attractive, in the 8-9% range, way above what one might normally expect when assets are owned by another party (Hensher 2005a).

Where the costs of potential alliance partners differ, operators have strong preference to be paid according to the costs of the best practice operator, providing incentives to all partners for cost convergence within the alliance region, and incorporating aspects of service quality into the payment model.

It is premature to speculate on the substantive findings, but we now have an appealing method to progress our inquiry into this important theme of establishing trusting partnerships between operators, and in more general terms, between operators and regulators.

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