ESCALATION FORMULAE IN RAIL FREIGHT PRICING CONTRACTS

Lorna HEIMAN
Research Officer
Costing & Budgeting Section
Marketing Branch
Victorian Railways

Max MICHELL
Manager
Costing & Budgeting Section
Marketing Branch
Victorian Railways

ABSTRACT: *Rapid escalation of rail costs in recent years has directed considerable attention to the need for frequent adjustment of freight rates.*

One outcome has been the acceptance, by both railway and client, of escalation formulae as a means of adjusting rates without constant renegotiation. Experience with these formulae in VicRail has revealed a number of problem areas, some technical and some philosophical, which have tended to diminish the intended impact of real rate maintenance. This paper has been written with the objective of clarifying the role and structure of escalation formulae so they might be properly used as a component of pricing practices.

The opinions expressed in this paper are those of the joint authors and do not necessarily represent those of the Victorian Railways or its management.

ESCALATION FORMULAE IN RAIL FREIGHT PRICING CONTRACTS

INTRODUCTION

The recent experience of most Australian Government rail systems has been one of difficulty in maintaining revenue levels in the face of rapid cost escalation. Some systems have looked for partial relief to the problem by adoption of escalation formulae to maintain real rates for particular traffics. However, the application of escalation formulae is not without problems, both philosophical and technical, and it is with a view to developing an appropriate context for escalation in rail freight pricing contracts that this paper has been written.

Rail freight pricing has been undergoing a fundamental change over the last two decades or so, from a system based on Government controlled tariff rate scales to a market based pricing system with prices being determined individually with regard to each traffic.(1)

In order to maintain the real value of rates determined in the market place it is necessary to renegotiate, at relatively frequent intervals, with a large number of individual clients; a process which is skill intensive and time consuming if it is to be done properly.

If the period between negotiations is widened (either by choice or as a result of inadequate resources on the part of the railway) the probability of losing ground, in terms of real revenue, becomes greater.(2)

One response to this problem has been to write freight rate/service agreements which include an escalation formula as a means of adjusting the rate at regular intervals using an "automatic" mutually agreeable mechanism. An escalation formula is simply a means of adjusting a rate at predetermined intervals by use of indices representative of the factors that both parties consider are relevant to the price adjustments. Appendix A illustrates a typical formula as used for rail freight.

The technical problems associated with escalation formulae are related to the formula structure, the selection of indices, the timing of adjustments and the nature of the rate/service agreement surrounding the formula. The philosophical problems are mainly concerned with the relationship that mechanistic price adjustment should have to a market based pricing system.

Our conclusions in regard to escalation are :

- an escalation formula can be useful in certain situations as a means to regularly adjust rates.
- an escalation formula cannot substitute for marketing, pricing and negotiating skills; rather it should be used to complement them.
- adequate provision should be available to revert to negotiation where an escalation formula causes significant over or under pricing with reference to the market.

---

1 The process is far from complete but has gained impetus with the actual or impending deregulation of road transport in most States.

2 This arises partly from the loss of revenue that would have been generated by increases at more frequent intervals and also the risk of not being able to sustain rate increases where the increase is relatively large.

an escalation formula which relies on cost indicators can provide a reasonably reliable and agreeable method of adjusting rates for a limited period (between proper market reviews) but should not be used continuously for long periods.

an escalation formula is just one of a series of pricing tools and should always be construed in the context of the corporate pricing objectives.

ESCALATION FORMULAE AND MARKET PRICING

There are two significant components which are of concern to an organisation engaging in market pricing. These are :-

(a) the price ceiling for the product/service in question, which will be determined by client perception of the alternative price/service combinations on offer (i.e. externally to supplier of product/service).

(b) the price floor for the product/service which is determined by reference to the organisations incremental/avoidable costs[3] (i.e. internally to provider of product/service),

This approach is a deliberately selfish organisational view of pricing; the external factors impinging on a pricing decision (e.g. welfare, environment etc.) are presumed to be the financial responsibility of the appropriate external body such that the sum of "fare box" revenues and "subsidies" will meet the above criteria.

Since the price is determined with reference to the market it is logical that any adjustments to the price should reflect market changes. In actual practice it is difficult to be precise about market conditions and even more difficult to pursue them with price adjustments. At best, price adjustments have to approximate market conditions, with periodic appraisals to ensure no significant adverse effects.

An escalation formula ideally should reflect market conditions if it is to adjust market based prices. However the difficulties of identifying and quantifying market forces for each traffic is a daunting task indeed, while the availability of indices specific enough to measure movements of those forces is very limited.[4]

In practical terms the orientation of an escalation formula cannot be to the market situation and therefore it should be directed at the other controlling factor in pricing - that of costs.

By adjusting price in line with cost movements the price floor is protected as long as the basic cost structure (particularly operating patterns) does not change. Experience suggests that for periods of 5 years or so (in some cases up to 10 years) a cost based

---

3 This is not to suggest that incremental and avoidable costs are indistinguishable but rather that they each have their place in price floor determination depending on the nature of the traffic being considered (i.e. additional traffic or existing traffic)

4 In actual fact if there is sufficient knowledge to identify and quantify market forces there is no need for a price adjustment formula - there is enough known to individually assess price adjustments without the help of a formula.

escalation of rail prices is a reasonably reliable process. At the end of that period a proper review of price should be undertaken, while adequate provision has to be available to allow any untoward effects to be adjusted during that period. Our basic philosophy has evolved along these lines with market based prices being adjusted by cost based escalation formulae at frequent intervals between more substantial market reviews.

The market factors, which are not measured by escalation, will be the determining factor when deciding when and for how long to use an escalation formula. Where the service is in a volatile market where rapid random fluctuations in price are required to pursue an objective of nett revenue maximisation, an escalation formula is clearly of limited value. However where the market is relatively stable over a period of time then escalation can have a useful role in determining price adjustments while in the situation of a reserve price (5) traffic, the use of an escalation formula is normally the most acceptable price adjustment mechanism from the point of view from both parties.

The decision in regard to use of an escalation formula will, in the end result, be made on the basis of risk minimisation by both parties.

In the case of the transport supplier some of the factors which will influence that risk assessment are as follows.

(a) is the traffic sufficiently stable and long term to justify use of an escalation formula (e.g. for a minimum of two years)?

(b) is the traffic in a competitive transport market?

(c) will the clients "commit" themselves by virtue of capital investment or the nature of their product to one mode for a period of time?

(d) is the traffic currently market priced or is it "underpriced?"(6)

(e) are future cost movements likely to mirror the desired future price changes?

(f) are future cost movements likely to be reflected by an acceptable set of indices (railway unit costs in recent years have tended to rise at a faster rate than "inflation")?

(g) is renegotiation of price at regular intervals likely to have revenue benefits or disbenefits compared to escalation?

---

5 Reserve price in this context relates to the situation where a traffic will only move by one mode (e.g. coal) if it moves at all; the decision being related to the cost of processing and transport from this location compared to substitute products from alternative locations.

6 Presumably if the traffic were "overpriced" it would not be subject to a freight rate/service agreement at that price.

(h) are there non price advantages or disadvantages of escalation compared to renegotiation?

In essence the decision as to use of an escalation should be related to the corporate nett revenue objectives, taking into account extraneous factors such as improved administrative efficiency, client relationships, etc. In the end result the use, or otherwise, of an escalation formula in a pricing contract must be a judgemental decision in the context of the whole contract.

DEFINITION OF AN ESCALATION FORMULA

Prior to discussing the composition of typical escalation formulae as they are incorporated in rail freight contracts, it is essential to define the term. A literature search has produced a limited range of useful references.(7)

In Stothoff's (1973) view an escalation clause enables the seller to adjust the current price, to reflect future changes in cost to the seller, of specific items directly or indirectly involved in the manufacturing of products or in the provision of services. The clause is also acceptable to the buyer for similar reasons. Stothoff (1973) also proposes that escalation formulae provide partial protection against inflation and the cost of capital investments.

According to Voss (1975) there are three main criteria for the formulation of successful price adjustment or variation formulae (as they are sometimes called).

(i) the formulae must be specific to the items in question and the indices adopted accurately reflect changes in the input costs of the items involved;

(ii) the indices appear to be accurate and are accepted by both parties;

(iii) the adjustments due to changing values are not passed on in full.(8)

In his work on the topic, Isaacs (1975) defines an escalation formula as consisting of certain important cost elements which are isolated and weighted according to their relative significance in the cost structure. A published index is then utilised to escalate each cost element over the contract period.

Escalation contracts are at the opposite extreme to those more or less based on fixed prices. According to Dolan (1981) contractual arrangements can be considered vehicles for risk management. No one type of contract is inherently better or worse than another, from either party's point of view.

7 Lack of knowledge of the appropriate range of key words was one of the problems encountered in the literature search. "Variation formula" is a term that only came to light in the original series of references and may, if fed back into the literature search process, have produced more references. Therefore our search cannot be considered to be exhaustive.

8 Opponents of escalation claim that indexing is inflationary, since it passes on all the cost increases and leaves no incentive for increased efficiency and productivity. Price adjustment clauses should therefore adjust for less than the full amount of cost changes, thus providing the seller with an incentive to reduce unit costs.

Whilst the majority of definitions propounded by the experts are based on product escalations and relate to the life of the contract, our paper is more concerned with the price escalation of a service between review dates. Hence we are attempting to present arguments for and against a different aspect of escalations than has been commonly reported.

In essence, an escalation formula can provide a manager with a pricing mechanism, whereby a price can be adjusted regularly (at mutually agreed intervals) so as to reflect changes in the major costs incurred in the provision of the service. They are especially useful during high or fluctuating periods of inflation and reduce the need to constantly renegotiate the rates.

ARGUMENTS FOR AND AGAINST ESCALATION FORMULAE.

Various arguments have been proposed in the literature advocating or condemning escalation formulae. However it is more appropriate to consider these arguments from the rail point of view, and also in respect to the use of a "standard" formula (the standard formula concept is discussed later in this paper).

Arguments For Escalation Formulae.

The most conspicuous advantages of an escalation formula are :-

(i) it can provide automatic price adjustments in line with cost movements; be they railway, competitors or community costs.

(ii) it can allow frequent price adjustment without time consuming renegotiation.

(iii) it may provide some predictability of rate adjustment for both parties (both in timing and quantitatively).

(iv) it may reduce client aggravation arising from frequent "price confrontation" situations with clients.

Arguments for a standard formula

(v) the principal argument for a standard basic escalation formula (complete with detailed specification of indices, accuracy of calculation, timing of adjustments etc.) is that it provides a controlled starting point for negotiations.

(vi) it can provide a basis for a standard measure of pricing performance on traffics that are not subject to a formula based adjustment process.

(vii) it would tend to minimise problems that arise with clients due to inadequate specification of the contract details relating to escalation.

(viii) specification of a standard formula would encourage the systematic review of existing formulae, particularly those in long term contracts which include fixed components or deficient indices.

Arguments Against Escalation Formula

The following are the chief disadvantages arising from escalation formulae from a rail point of view :-

(i) it can easily erode contribution [9] but can not improve it.

(ii) it focuses on the price (which is a function of market forces) rather than costs (which are a function of management control)

(iii) it can cause traffic to unknowingly move into a negative contribution in cases where base prices and/or the formulae are wrongly determined.

(iv) it can result in market oriented reviews of prices at relatively infrequent intervals.

(v) it cannot substitute for astute negotiation and price setting skills, yet will be less useful where those skills are present (since astute price setting skills will have advantages compared to a mechanistic formula based system).

(vi) if escalation knowingly moves the price away from the prevailing market price, one party to the agreement will feel aggrieved unless a remedy (renegotiation) is available.

Arguments against a standard formula

(vii) the major objection to a standard formula is on the grounds that each traffic is unique and requires specific consideration of any formula applying to it.

(viii) problems may arise with a standard formula when there is a delay in the availability of an index because it would affect a large number of traffics simultaneously.

STRUCTURAL AND OPERATIVE ASPECTS OF ESCALATION FORMULAE

If standards for alternative escalation formulae are to be developed, it is necessary to analyse the structure and effects of existing formulae.[10] Two different aspects are elaborated on in the ensuing section. Firstly, the structural aspects of escalation formulae are discussed and the second consideration relates to the operative aspects. Attention is directed to Appendix A for a typical formula which relates to the following discussion

---

9 Contribution is the excess of revenue over direct (specific) costs this excess being a "contribution" toward the various non specific costs of the system.

10 The emphasis in this paper is naturally toward VicRail, but the comments herein would generally relate to most rail freight pricing situations on other systems, except possibly major resource developments (in which Victoria is singularly lacking).

Structural Aspects of Escalation Formulae

Indices

The earlier VicRail agreements containing escalation formulae had indices for labour and material costs only. In recent times an additional index for fuel was included in order to more accurately reflect the major cost sectors associated with traffic movements.

The normal indices which have been adopted are :

(i) Labour - either Seasonally Adjusted Average Weekly Earnings per Employed Male Unit (ABS(a)).

or Weighted Average Minimum Weekly wage for adult males - Railway Services group - for Australia (ABS(b)).

(ii) Materials - Wholesale Price Index of Materials used in Building other than House Building (all groups index.) (ABS(c)).

(iii) Fuel - Rail diesel fuel price index certified by the responsible (rail) purchasing officer.

In certain contracts Australian indices for labour and materials have been adopted, whilst in others the Victorian indices have been included. Generally speaking, where traffic movements involve more than one State the Australian indices are used, while traffic which is entirely within Victoria (or rather the VicRail network) is normally escalated using Victorian indicators. However, this approach is not universally adopted for all of escalation contracts. To add to the lack of uniformity some contracts (in response to client requirements) use the labour index for the Railway services group - Average Minimum Weekly Wages for Australia, rather than the more commonly used Average Weekly Earnings Per Employed Male Unit index for Australia.

For ease of presentation and administration the tendency, at least in VicRail, has been to use community indicators which are readily available and can be regarded as unbiased by both parties. The actual choice of indicators is dictated by the particular circumstances surrounding the traffic and to some extent the customers own particular requirements.

Some aspects of the different indicators used are dealt with below.

Australian vs Victorian indices.

As an illustration of the long term effects on rates, from using different indices, the results of an exercise are presented below. The formula used is typical of the early escalation formulae used by VicRail.

$$R1 = R\left[\left(.79 \times \frac{WI}{W}\right) + \left(.21 \times \frac{MI}{M}\right)\right] \quad (11)$$

---

11 The formula used in this and subsequent examples is taken from actual agreements that applied at the time under discussion.

Where RI = new price.
R = base price.
WI = new labour index.
W = base labour index.
MI = new material index.
M = base material index. (12)

To gauge the differential effects on the rates using the same formula, but different indices, the exercise was undertaken for both Victorian and Australian indices over a period of 4 years, with adjustments at six monthly intervals starting from a nominal base of $10.00 per tonne.

The results are presented in Table 1.

TABLE 1
Comparison of Effect on Rates of Victorian & Australian Indices

Year	Month	Using Vic. Indices $	Using Aust. Indices $	Differential (review to review) Vic. %	Aust. %
1977	Oct. (base)	10.00	10.00	-	-
1978	Apr.	10.05	10.35	0.5%	3.5%
	Oct.	10.76	10.84	7.1%	4.7%
1979	Apr.	10.96	11.14	1.9%	2.8%
	Oct.	11.57	11.68	5.5%	4.8%
1980	Apr.	12.20	12.35	5.4%	5.7%
	Oct.	12.90	13.16	5.7%	6.6%
1981	Apr.	13.69	14.05	6.1%	6.8%
	Oct.	14.60	14.92	6.6%	6.2%
1982	Apr.	15.55	15.98	6.5%	7.1%
	Oct	16.95	17.35	9.0%	8.6%
Overall % change between 1977 & 1982 :-				69.5%	73.5%

From above it can be seen that over a period of time the nett differential effect on the revised rates using different indices is not particularly significant. The random short term fluctuations tend to balance out over a period of time while the long term differential is influenced by the "luck of the draw" in regard to the base period selected (e.g. if the data in Table 1 had been based on April 1978 the Victorian overall variance to October 1982 would have been 68.8% compared to 67.5% for Australia, reversing the relativity).

The choice between Australian or State indices will partly be a function of the traffic (intersystem rates would normally be escalated using Australian indices, since most rail systems would not accept indices that related to a different State) and partly a function of customer requirements.

12 In actual contracts these indices are properly defined in terms of exactly what they are, what period they relate to and their source along with any other information to restrict the possibility of interpretative difficulties.

Material indices

Similar arguments to those relating to labour indices can be applied to material indices except that there is a rather more limited choice. Railway material costs are typically fairly concentrated into a number of specific areas (e.g. rails, sleepers, stone ballast, construction steel, fuel etc.). There is no adequate indicator that would represent the combined effect of these costs and even if there were it would be highly susceptible to an atypical movement compared to competitive or community expectations.

The index normally used, Wholesale price index of materials used in building other than house building (all groups index) is considered to be a reasonable compromise for general material costs, with the particular exception of diesel fuel. Rail diesel fuel prices have risen quite dramatically in recent times and represent a growing proportion of the direct train operating costs. Between 1975/76 and 1979/80 locomotive diesel fuel price rose by 215% while automotive distillate only rose 126%.

In this instance the variation away from community costs is sufficiently great to have induced the development of an "in house" fuel index based on certification by the purchasing officer of the relative price movement over the period in question.

The impact of including a separate fuel component, even with a low weighting has been illustrated in Table 2 by taking a September 1977 base and escalating to September 1982 using an early three factor formula.

TABLE 2
Effect of Fuel Component on Rates

Formula type	Escalation Factor	Base Rate Sept. 1977 $	Escalated Rate Sept. 1982 $
(1) Without fuel	1.71902	10.00	17.19
(2) With fuel	1.95801	10.00	19.58

Formulae (1) $RI = R \times \left[(0.75 \times \frac{WI}{W}) + (0.25 \times \frac{MI}{M})\right]$ and

(2) $RI = R \times \left[(0.75 \times \frac{WI}{W}) + (0.20 \times \frac{MI}{M}) + (.05 \times \frac{FI}{F})\right]$

Where R, RI are rates, base and new.
W, WI are labour indices, base and new.
M, MI are material indices, base and new.
F, FI are fuel indices, base and new.

It is apparent from the above table that inclusion of a fuel component in escalation formulae will provide a more satisfactory reflection of railway cost movements, but of course may at the same time have a higher propensity to shift the price away from the market price.

Weightings

For the escalation formula to achieve its purpose it is essential to assign correct weightings to each index depending on the particular traffic concerned. The exact ratio should be guided by the costing information which identifies the proportions of each cost component, appropriate to that costing.

In most of the original agreements the 'normal' weighting for labour and materials was between the ratios of 70:30 and 80:20. The newer formulae tend to have an additional, (fuel) component included and the weightings are normally in the vicinity of 70:20:10 or 70:15:15 (for labour, materials and fuel respectively).

The following table depicts the effects of varying the weightings, such that different emphasis is placed on the fuel component; once again using Sept. 1977 and Sept. 1982 data.

TABLE 3.
Effect of Variation in Weighting of Indices

Cost Components' Weights			PRICE		
Wages (L)	Materials (N)	Fuel (R)	Existing $	Escalated $	Differential %
.75	.20	.05	10.00	18.95	89.5
.70	.20	.10	10.00	20.46	104.6
.70	.15	.15	10.00	22.01	120.1

The formula used in the exercise above was as follows :-

$$R82 = R77\left[(L \times \frac{W82}{W77}) + (N \times \frac{M82}{M77}) + (R \times \frac{F82}{F77}) \right]$$

From the table it is evident that significant variation in rates can arise from seemingly small changes in the weightings, which indicates that some importance should be placed on their determination.

In some escalation formulae a fixed component (P), has been included, normally on the basis of representing productivity gains that should be made by the railway or representing the capital recovery for past investment for the particular traffic.

The achievement of productivity gains is fairly difficult since many of the traffics with escalation contracts are already at the more efficient end of the operating spectrum (e.g. single commodity, bulk loads, block trains, etc.). The most likely areas for productivity gains are in those traffics which are by their nature unsuited to escalation formulae (e.g. passengers, less than wagonload freight). The effect of having a fixed component for productivity gains will be to diminish the contribution from the traffic if those productivity gains are not achieved.

Even worse is the case where a fixed component is supposed to represent the proportion of costs associated with capital recovery. Any traffic in which capital recovery or renewal is a factor (i.e. all but short term, existing asset traffics) needs to have the capital

cost component escalated along with the operating costs if the traffic is to continue as a viable activity. This arises since the pricing decision is related to future revenues and costs which includes the capital renewals and acquisitions at present values. The erosion of contribution arising from a fixed component in an escalation formula can be quite substantial over the life of a long term contract and the general attitude in VicRail now is to only accept a fixed component when the outcome is still likely to be better than by regular non escalated rate renegotiation.

Operative Aspects of Escalation Formulae

Outlined below are some of the problem areas which arise from the application of escalation formulae and suggestions for the most appropriate solutions are also mentioned.

Timing of indices

A properly specified escalation contract will include specific details of the dates the rate is to be reviewed (usually six monthly or annually) and the specific time period the indices are to be drawn from.

In theory at least, it is desirable to use the most recent indices, so as to reflect contemporary cost trends as closely as possible, particularly when the economy is somewhat volatile. In practice this policy works well provided the indices are reliably available in time to adjust the rate prior to the actual increase date. This point leads on to the problem of unavailability of indices in time for rate reviews.

Delay in availability of indices

From time to time ABS revise their statistical series in order to update the base reference year or to change the methodology for data collection. When the Wholesale Price Index of Materials was revised last year the transition occurred quite smoothly, however a subsequent revision in the survey method for the index, Average Weekly Earnings Per Employed Male Unit caused considerable delays to escalation of rates. The release of the revised index was 6 months late for the December quarter 1981 figure for Victoria and 3 months late for the March quarter 1982 figure for Australia.(13) Situations such as these have the effect of holding back the determination of an escalated price. Although the client is aware that a rate adjustment is in the offing it creates a significant administrative (and possibly cash flow) problem if prices are not adjusted from the nominated date.

Although these delays rarely occur, it is necessary to recognise their existence and provide some mechanism within the framework of the escalation agreement to handle the situation as it arises. If it has been established that the index will be unavailable for some considerable time beyond the rate review date, the preferred method of handling the delay is to estimate that index so that a temporary new rate can be calculated. This new rate

---

13 This is not intended to imply any criticism of the ABS, but rather to point out the unplanned problems that can arise with the best laid price escalation processes. The need, and validity, of revision of indices from time to time is unquestionably far more important than individual escalation problems

remains in force until the new index becomes available. At this stage a retrospective adjustment can be made to compensate for the under or overstated rate estimate.

A further problem can arise where indices are so changed as to be unusable in the context of the formula. Rare as this may be, it is suggested that such an eventuality should be allowed for and the solution be to provide for immediate renegotiation

Mathematical accuracy when using an escalation formula

In a number of instances, where no instructions have been specified in the agreement, confusion has arisen over the exact method of calculating the revised rate, the most common relating to the significant figures to be considered in the calculations

It is necessary to calculate the various factors in a formula with sufficient accuracy so that when the money value of the escalated price is arrived at there is no confusion as to which way it should be rounded.(14)

In practice it has been found that calculation to five decimal places on the dollar amounts (i.e three decimals on the cents) will provide an unambiguous price adjustment.

Timing of base indices

The structure of escalation formulae currently in use fall into two categories.

(i) There are those where the escalation is derived from the base rate and associated indices applying at the beginning of the contract. These indices and the base rate remain constant for the term of the contract.

(ii) The second type makes use of the current rate and indices as the base for the next escalation.

From experience it is apparent that the first method is the most efficient. It simplifies the calculation and administration of the rate adjustments by requiring only two or three new variables to be applied to the formula for each new rate calculation, thus minimising the margin for error. The mathematical effect of holding the base data constant is the same as changing the rate and indices at each escalation.

A STANDARD ESCALATION FORMULA

An escalation formula is one fairly specialised aspect of pricing which, from several years experience, is often misunderstood by those responsible for pricing administration. As a gesture toward simplification of the administrative task it is proposed that a "standard" escalation formula could provide a useful control measure and starting point for escalation contracts.

---

14 In theory there is no reason why a price under escalation should be rounded to the nearest cent (as is normally done in practice) but in VicRail at least the significance of a part cent is fairly small in total dollar terms and the administrative process is simplified by keeping to whole cent prices.

Adoption of a standard escalation formula would not only provide a controlled starting point for negotiations but also would establish a framework for a consistent uniform pricing methodology. If all escalation formulae are constructed from similar criteria it is much easier to compare and relate their respective effects on rates than if all the formulae were based on different criteria. However a standard formula should not be allowed to become the only formula; the normal sensitivity of markets and clients requires that some flexibility be available to negotiations.

From an administrative point of view there are advantages from having a standard basic formula which can be moulded to meet the requirements for individual traffics but which basically rely on a consistent set of indices for their application.

An example of a standard escalation formula is given in Appendix 'A', suitably annotated to indicate where and how various components can be modified to suit specific requirements It should be made clear that this is our interpretation of a sound working standard for an escalation formula based on current VicRail experience. Others may prefer alternative criteria to develop their own standard formula.

Criteria for Standard Escalation Formulae

Whilst it is not realistic to rely on one hard and fast escalation formula for all traffics, it is useful to establish a set of guidelines containing a number of standard criteria from which individual specific escalation formulae can be derived. These criteria are summarised below.

(i) Escalation formulae are of use, particularly during inflationary periods when the rate of escalation of costs of providing a service is uncertain and regular price negotiations are likely to be difficult and/or protracted.

(ii) Escalation formulae are appropriate for long term contracts with a client, where the price is initially set with reference to market conditions. Where "arbitrary" prices are involved (e.g. tariff rates determined by Governments) escalation is useful only as long as the arbitrary conditions remain and/or Governments are unwilling to make unpopular decisions on rates.

(iii) The components of the formula should include factors which reflect cost changes in general; which the Railway costs should also reflect if rail is to remain viable

(iv) The indices used to represent the various factors should be preferably independent, freely available, timely and relevant to the particular requirements of the traffic in question.

(v) The formula should escalate 100% of the rate (i.e. the weightings should sum to one) unless there are compelling marketing reasons not to.

(vi) The weightings for the components in the escalation formulae should be based on information derived from incremental costings of the traffic in question and also guided by estimates of the future differential changes in the chosen indicators. The ratios are likely to be in the range of 70:20:10 and 70:15:15 for labour, materials and fuel respectively.

(vii) Escalation formulae should form part of an agreement, extending from two to ten years, and should include provision for review after the first two years. This would allow both parties to discuss and adjust for any problem areas that may arise in the interim. Specific immediate review should be prescribed should the indices be modified by the compiler during the course of the contract.

(viii) The formula should be constructed to escalate from a base rate and associated indices, applicable at the start of the contract, and this base data should be specified in the contract.

(ix) To avoid mathematical ambiguity the formula should be calculated to seven decimal points and then rounded to five decimal points for the final variation factor. The new rate derived by multiplying the variation factor by the base rate, should be rounded to the nearest cent.

(x) The rates should be escalated at six month intervals, otherwise the base rate should be increased by approximately one quarter of the annual escalation rate to maintain revenue.

(xi) If there is an extended delay in the availability of the required indices, an estimate of the unavailable index should be arrived at and applied to the formula to establish an estimated new rate. A retrospective adjustment should then be made when the actual index is released.

(xii) Variations from the standard formula should be differentially evaluated and justified in terms of the pricing objectives associated with the particular traffic.

Escalation in the Context of a Pricing Agreement or Contract

Escalation formulae will almost always require a formal arrangement between client and service provided, since there are so many factors that require specification. Because of this it is important to ensure that the intent and expectations arising from using the formula are not proscribed by the language or words of the agreement. For instance where a review is allowed for, such as after the first two years of operation, it is necessary to allow for review of both rate and/or formula if the clause is to be effective. Agreements tend to be in the language of lawyers and this requires the person responsible for negotiating on price and escalation matters to be quite specific in regard to their intent before the agreement is written.

Although a price agreement can be for quite long periods (e.g. 15-20 years for clients who undertake substantial associated capital investment) an escalation formula should not be allowed to go beyond ten years (and preferrably less) before the rate and formula are both

compulsorily subject to review and renegotiation. This arises from the concept of a cost escalation within a market based pricing situation and reflects the concern that the rail system has (or should have) of a financially responsible objective.

APPENDIX A

STANDARD ESCALATION FORMULA

Increases or decreases in the special rate shall be computed by using the following formula :-

$$RI = R \times \left[\left(a \times \frac{WI}{W}\right) + \left(b \times \frac{MI}{M}\right) + \left(c \times \frac{FI}{F}\right) \right]$$

where :-

RI = The freight rate to be charged in the coming 6 months. Note 3

R = The freight rate applicable as at the date of commencement of the contract. Note 3.

a = Proportion of costs related to labour (decimal). Note 4.

b = Proportion of costs related to material (decimal).

c = Proportion of costs related to fuel (decimal).

and $a + b + c = 1$

WI = The Seasonally Adjusted Average Weekly Earnings per Employed Male Unit for Victoria in respect of that quarter as shown in Table 1 below, as first published by the Australian Bureau of Statistics in the publication "Monthly Review of Business Statistics." Note 5. Note 1.

W = The Seasonally Adjusted Average Weekly Earnings per Employed Male Unit for Victoria as described for WI above but in respect of the quarter relevant to the date of commencement of the contract. Note 1.

MI = The Wholesale Price Index of Materials used in Building other than House Building (all groups index) for Melbourne in respect of that month shown in Table 1 below, as first published by the Australian Bureau of Statistics in the publication "Monthly Review of Business Statistics." Note 5. Note 1

M = The Wholesale Price Index of Materials used in Building other than House Building (all groups index) for Melbourne as described for MI above, but in respect of the month relevant to the date of commencement of the contract. Note 1.

FI = Price Index of VicRail diesel locomotive fuel in respect of that date shown in Table 1 below, as certified by the Comptroller of Stores. Note 5.

F = Price Index of VicRail diesel locomotive fuel in respect of the date relevant to the beginning of the contract.

TABLE 1

Date New Freight to be applied from each year.	First Published Seasonally Adjusted Average Weekly Earnings in Victoria - Quarterly Index to be applied.	First Published Wholesale Price Index of Materials used in Building other than House Building (all Groups Index) in Melbourne - Monthly Index to be applied.	Price Index of VicRail diesel locomotive fuel as certified by Comptroller of Stores.	
1st April	Preceding December quarter.	Preceding December.	Preceding 31st December.	Note 2 Note 3
1st October	Preceding June quarter.	Preceding June.	Preceding 30th June	

The special rate(s) payable shall be adjusted, in respect of each six (6) monthly period during the currency of this Agreement.....

.....rates calculated in accordance with the formula set out above PROVIDED THAT the formula for adjustment and/or the rate(s) may be subject to renegotiation on three months notice from either party, after the expiration of two (2) years from the date of commencement of this Agreement. If the parties are unable to agree on the terms of the formula and/or the rate(s) to apply on and from the date of such renegotiation, the matter shall be referred to arbitration in accordance with the Arbitration Act 1958 of Victoria.

NOTES

(1) The "Victorian" and "Melbourne" indices may be replaced by "Australian" and "All Capitals."

(2) The time periods specified in Table 1 may be moved three months either way.

(3) The rate (RI) may be escalated annually but the base rate (R) should be increased to compensate.

(4) Any of the factors a, b, and c can be set at zero, providing the remaining factors still sum to unity.

(5) Different indices may be adopted to represent relevant cost factors.

APPENDIX B.

HISTORY OF INDICES - FIRST PUBLISHED

DATE	LABOUR INDICES					MATERIAL INDICES	
	1	2	3	4	5	6	7
1977 Sept.	205.70		204.60		135.72	81.0	80.5
Dec.	201.50		204.70		137.57	82.7	82.0
1978 March	212.40		213.00		139.45	83.7	83.2
June	218.10		215.00		141.38	85.2	84.8
Sept.	222.00		220.40		142.16	85.3	85.5
Dec.	222.00		221.00		147.31	87.1	87.0
1979 March	229.90		231.20		147.79	90.6	90.5
June	234.10		231.40		152.07	92.1	91.9
Sept.	239.70		238.10		152.10	95.6	95.5
Dec.	245.80		243.50		153.18	98.7	98.5
1980 March	250.80		250.90		160.38	103.2	103.3
June	258.60		258.70		162.85	106.4	106.4
Sept.	270.20		268.00		170.65	110.4	110.5
Dec.	275.60	251.33	277.70	264.82	170.67	111.2	111.6
1981 March	283.60	256.50	284.00	270.26	176.38	114.7	115.2
June	295.00	265.74	295.10	280.00	182.34	117.1	117.8
Sept.	303.70	272.00	301.10	286.60	182.42	119.4	120.6
Dec.	316.43	283.40	318.54	303.20	189.65	121.1	122.8
1982 March	338.54	303.20	332.51	316.50	193.06	127.4	129.8
June	345.46	309.40	345.33	328.70	210.80	131.4	133.8
Sept.	362.57	324.00	351.95	335.00	178.20	135.3	138.1

Key 1 Average Weekly Earnings Per Employed Male Unit-Victoria (old series).

2 Average Weekly Earnings Per Employed Male Unit-Victoria (new series).

3 Average Weekly Earnings Per Employed Male Unit-Australia (old series).

4 Average Weekly Earnings Per Employed Male Unit-Australia (new series).

5 Weighted Average Minimum Weekly Wages - Railway Services-Australia.

6 Wholesale Price Index of Materials Used in Building Other than Housebuilding - Melbourne.

7 Wholesale Price Index of Materials Used in Building Other than Housebuilding - Australia.

REFERENCES

ABS (a) "Seasonally Adjusted Average Weekly Earnings per Employed Male Unit" - catalogue No. 6301.0.

ABS (b) "Weighted Average Minimum Weekly Wage for Adult Males - Railway Services Group - for Australia - catalogue No. 6312.0

ABS (c) "Wholesale Price Index of Materials Used in Building Other Than House Building" - catalogue No. 6407.0.

Dolan, R.J. (1981) "Pricing Strategies that Adjust to Inflation" Industrial Marketing Management (USA), pp. 151-156.

Isaacs, P. (1975) "Construction and Contracting" Procurement (UK), pp. 14-21.

Stothoff, G.S. (1973) "Escalation Clauses - Are Escalating" Conference Board Record (USA), pp. 23-28.

Voss, C. (1975) "Development of Specific Indices for Measuring Inflation," Business Quarterly (Canada), pp. 51-56.