

**ECONOMIC EFFICIENCY IN TRANSIT SERVICE CONTRACTS:  
THE ROLE OF CONTRACT STRUCTURE**

by

Rick David Halvorsen

Submitted to the Department of Civil Engineering  
in Partial Fulfillment of the  
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Master of Science in Transportation

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**ABSTRACT**

The financial status of the U. S. transit industry has deteriorated over the past decade and one of the current ideas for addressing this problem is to increase the role played by the private sector. Examining this idea raises two principal questions: what role, if any, should the private sector play and, if it plays any role, how can the government act to maximize the net benefits to society. This thesis addresses this second question, specifically examining how the structure of contracts for the purchase of urban public transit services affects the benefits received by society and the contractor.

This thesis utilizes three methods to examine contract structures. First, it reviews contract economics, a field of economics which studies situations of asymmetric information, and discusses both the potential applicability and limitations of contract economics in the transit service contracting context.

Second, the thesis describes a survey of types of contracts presently used in transit service contracting, tabulates the results of the survey, and analyzes what information the survey provides about the economic effect of different contract provisions.

Third, the thesis describes three in depth case studies of transit agencies which utilize service contracting. This section describes the contracts used by each agency and the relationships between the contractors and each agency.

The thesis concludes with a presentation of some general guidelines for transit service contracting, including with respect to the relationship between the agency and the contractor, the design of the the contracting process, and the design of the service contract.

Thesis Supervisor: Nigel H. M. Wilson  
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## **1. INTRODUCTION**

A current hot topic in both political debate and transportation research is the role that the private sector should play in the provision of services traditionally provided by the government. This issue breaks down into two principal questions: what role, if any, should the private sector play and, if it plays any role, how can the government act to maximize the net benefits to society. This thesis addresses this second question, specifically examining how the structure of contracts for the purchase of urban public transit services affects the benefits received by society and the contractor.

### **1.1 TRANSIT SERVICE CONTRACTING**

In the past decade there has been increasing attention paid to the role the private sector could play in helping to improve the performance of the United States's urban public transportation industry. This interest stems from disillusionment with the ability of the publicly owned transit monopolies to provide needed services efficiently and effectively. While a massive infusion of operating assistance over the past two decades has preserved transit as an alternative to the auto for many trips in medium and large metropolitan areas, there is now general acceptance that there are large efficiency losses in this approach, and that there is a need to think creatively about alternatives.

Many of the strategies being considered involve increasing the private sector's participation in the public transportation system, principally in terms of financing, service operation and providing supporting functions (Teal, 1987). The avowed objectives of these strategies are to decrease the public cost of transit and/or to increase its effectiveness. While all these strategies may be valuable, depending on the local situation, those involving service operation (i.e. transit service contracting) are generally believed to have the greatest potential to improve, in a fundamental way, the condition of the transit industry. Service operation by the private sector is aimed at providing services similar to those operated by a public authority, but at a lower cost, or of a higher quality, or both. The services themselves may be of a conventional fixed route, fixed schedule type, or be innovative.

Although there is also potential for increase in unsubsidized private transit operations, subsidized, contracted service is likely to be the dominant form of private sector service involvement in the U.S., at least for the foreseeable future. There are several reasons for this:

- the current "farebox" recovery ratio is approximately 40% (APTA, 1991) which implies that revenue at current fare levels would still generally fall below costs, even with the most optimistic reduction in operating costs through private sector service provision;

- the significant fare increases necessary to sustain self-supporting transit would face both public and political opposition;
- the public, government, and the transit industry all recognize that there are strong social, economic, efficiency and equity arguments supporting some level of subsidization for the great majority of transit services.

Consequently, an appropriate focus of attempts to increase the role of the private sector in direct transit service provision is subsidized contracted services. Realizing the potential of contracting out, in 1984 UMTA enunciated a policy to encourage privatization of public transit in an effort to stabilize, and hopefully improve, the current situation. This policy, based on the premise that the present system of providing service through a public monopoly should be changed, and the private sector should be involved more directly in the operation of public transportation systems, has been adopted by several transit authorities, resulting in an increase in the number of contracted services nation-wide.

However, there is little inherent about private sector operation which guarantees greater efficiency than public sector operation; rather it is the existence of effective competition which will spur any operator (public or private) to improve performance to preserve its market position and/or increase its profits. The key then for transit agencies is to



administer the contracting process, and use a contract structure, that takes advantage of the potential for competition in the private sector and allows the transit agency to capture the benefits of competition.

## **1.2 THESIS STATEMENT**

The thesis of this research is that a transit agency can increase the efficiency of contracted services by the use of appropriately structured contracts. To investigate this thesis, contracted public transit services offered in many cities will be surveyed to determine the range of contract terms in use and their frequency. A major focus of the analysis will be paratransit service. In addition, contracted paratransit services in three cities will be examined in depth. Both the survey and the in depth case studies will examine the structure of the contract and its relationship to the cost efficiency of the service offered.

## **1.3 ORGANIZATION OF THE THESIS**

Chapter 2 reviews the prior research dealing with transit service contracting, including the historical perspective on transit service contracting, the reasons for contracting, and the present status of contracting in the United States. Chapter 3 presents some additional background information describing the types of services that can be contracted by transit agencies and the basic types of provisions that are generally found in transit service contracts. Chapter 4

describes the economic theory of contract structure, including the applications and limitations of this theory, and describes the anticipated results of the research. Chapter 5 presents the survey of contracted paratransit services that was performed, tabulates the survey results and compares the results of the survey with both the prior research and the results anticipated from economic theory. Chapter 6 presents in depth case studies of three selected cities and compares them with prior research and the anticipated results. Chapter 7 summarizes the results of the research and presents suggestions for further extensions of this work.

## **2. TRANSIT SERVICE CONTRACTING**

This chapter reviews the prior research dealing with transit service contracting. It includes a historical perspective on transit service contracting, a discussion of the reasons for contracting and a review of the present scope of transit contracting in the United States.

### **2.1 A HISTORICAL PERSPECTIVE ON TRANSIT SERVICE CONTRACTING**

Originally, urban mass transportation in this country was entirely owned and operated by small, intensely competitive, private companies. However, during the late 1800's and early 1900's the strongest companies in each city bought out weaker companies and eventually monopolies appeared in many cities, which were subject to many different levels of regulation (Black, 1991). Direct public involvement in urban mass transportation enterprises originally resulted from two principal causes. The first cause was that public entities could more easily make the massive capital investments required to construct the subways and other major infrastructure projects that were initiated starting in 1912 (Black, 1991). The second principal cause was the many scandals during the early 1900's involving private transit companies which were exposed by crusading journalists. However, this second cause tended to inspire tighter regulation of the private firms, rather than public operation of transit (Black,1991).

During the 1950's, there was a massive boom in suburban tract housing, aided in large part by the GI Bill, and a simultaneous precipitous fall in transit ridership. Over the next decade, this resulted in the failure of many private firms, and in many cities either public operation of transit or public subsidies for the private operators.

The move to public operation of transit was accelerated in 1964 when Congress passed the Urban Mass Transportation Act. This Act created the Urban Mass Transportation Administration (UMTA), now the Federal Transit Administration (FTA), and provided funds to help localities buy failing private companies. A decade later, UMTA also began to contribute to funding public transit operating deficits. This led to the situation in 1989 of approximately 60% of the transit systems in US cities, representing 95% of the vehicle-miles and passenger trips, being provided by public monopolies, with nearly sixty percent (60%) of their revenues being provided by public subsidies (UMTA, 1990).

Together with the move to publicly operated and subsidized transit service has come a substantial escalation in transit costs. Over the period from 1980-1990 public transit costs (per mile) increased at above the rate of inflation while private bus industry costs increased at less than the rate of inflation (Bureau of the Census, 1992).

## **2.2 RECENT RESEARCH ON TRANSIT COSTS AND THE RATIONALE FOR TRANSIT SERVICE CONTRACTING**

Considerable research has been performed during the last decade on the causes of the increase in public transit costs and on ways that these costs might be controlled. A number of researchers have concluded that the primary reason for the increase in costs is that public funding of transit by several levels of government has resulted in neither the transit agency nor any single level of government being confronted with the full impact of transit cost escalation, and therefore the need to control these costs (Love, 1991; Talley 1991).

A major portion of the increase in transit costs over the last 25 years is due to increased labor costs (Black, 1991). More than 95 percent of public transit systems in the country have unions (Black, 1991) and over 95% of the transit labor force is unionized. For comparison just 16.4% of the United States' labor force were union members in 1989 (Bureau of Census, 1992). The power of these labor unions is reflected in the pay of unionized transit drivers, which is as much as double that of drivers in the unionized private sector. Transit workers also usually receive premium payments for unattractive assignments and are often guaranteed a minimum amount of pay, in many cases eight hours worth, for any day they must report to work, regardless of the amount of time actually spent working (Black, 1991).

Several researchers have studied the problems of high

costs and deficits and the various methods that have been used to try to bring them under control. Talley (1991) provides an excellent summary of the various methods of promoting cost improvements in the provision of transit services. Talley concludes that if market forces are the most effective means of promoting cost efficiency, then direct deregulation with the sale of public transit firms to the private sector would be expected to result in better cost efficiency than indirect deregulation, contracting out of service, transit performance evaluation or the use of alternative resources and alternative services. Furthermore, the effectiveness of the latter methods will depend on the incentive for public transit managers to implement, or cooperate with, them and the effectiveness of the implementation. However, Talley does not consider the social benefits that may result from continuing public involvement in the management of transit operations.

Other researchers argue that contracting for transit services, using incentive contracts, offers the best chance for reducing transit costs and/or improving service at the minimum cost (Mundle, 1984). Their position is that the incentive contract takes advantage of the driving force in business, the profit motive, in order to motivate the contractor to provide superior performance. Their proposal is that the transit agency should first define, in a clear and concise manner, the desired results, then select performance indicators that can be used to evaluate the contractor's

performance and finally determine a payment program related to these performance indicators. This viewpoint is superficially appealing, but the situation is actually very much more complex, as will be explained in Chapter 3.

### **2.3 THE PRESENT STATUS OF TRANSIT SERVICE CONTRACTING** **IN THE US**

In 1985, the Institute of Transportation Studies at the University of California, Irvine, conducted a nationwide survey to obtain data on the use of service contracting and the characteristics of contracted service (Teal, 1987). The survey attempted to contact every public transit provider in the 50 states and obtained responses from 732 out of 982 systems identified and contacted. Information on an additional 132 systems was obtained from UMTA Section 15 data and state departments of transportation. The following information was sought from each transportation authority:

- which types of transit services (e.g., fixed-route, demand-responsive) were provided and whether or not these services were contracted;
- aggregate operating statistics for all the agencies transit services;
- operating statistics for each contracted service;
- sources of funding;
- vehicle ownership for contracted services;
- the nature of the contractor selection process (e.g.,

competitive bidding, negotiation) and the length of the contract.

Respondents were asked to supply 1983-84 operating statistics whenever possible, although some supplied 1984-85 information.

Some of the most important findings of this survey were:

- approximately 35% of all responding public agencies contracted for at least a portion of their services. Municipalities that contracted typically did so for all their transit service, whereas most contracting by transit agencies was for only a portion of their total system.

- system size had a strong influence on service contracting. Small public transportation systems (those with 50 or fewer vehicles) were less likely to contract for service than larger systems. However, most service contracting by larger systems was for only a small portion of their service, whereas the bulk of contracting by small systems was for their entire transit service. These small systems are typically so small that it makes most sense either to operate the entire service in-house or to contract for all service.

- demand responsive transit services (both elderly and handicapped service and general public service) were the most likely to be contracted, both as a percentage of all contracted services and as a percentage of contract service for each service type. Contracts for demand responsive transit represented 58% of all service contracting and more than one-third (34%) of all demand responsive transit services



were contracted. Approximately 24% of all-day fixed route services and commuter services were contracted to private operators. Overall, approximately 29% of all separate transit services provided by the agencies included in the sample were contracted to private operators.

- about 50% of all vehicles used in contracted services were owned by the private operators providing the service. Contractor ownership was most prevalent when the contractor provided commuter or demand responsive services.

The survey revealed that transit service contracting is already an established practice among the nation's smaller public transit systems, and is widely used for specialized services among large transit systems. However, because service contracting is concentrated among small systems, or used for small services when employed by large systems, it represents only a small fraction of the nation's transit operating expenditures and service miles.

The Teal report also developed cost models for transit agency and private operator costs and then utilized these models to estimate the potential long-run and short-run cost savings, or increases, that could result from increased use of contracting by 22 specific systems and by all US transit agencies. The authors estimated that if each of the medium and large systems analyzed contracted 20% of its operations, they would have average long-term cost savings on the contracted services of 23.4%. This estimate is consistent

with several other studies (Cox, 1984; Morlok and Viton, 1985). The Teal report further estimated that if all transit agencies with over 100 buses contracted 20% of their bus service to private operators, assuming that all agencies had average savings, the aggregate cost savings would be approximately 4% of the total operating cost for the entire bus transit industry<sup>1</sup>.

There has been very little change in the overall role of service contracting since this survey. Tables 2.1 and 2.2, abstracted from the UMTA Section 15 summary reports, show the amount of service contracting by service type over the past six years. These tables indicate that most demand responsive services are provided through contracting, but that there is little other use of contracting. However, there has been a substantial growth of purchased demand responsive transit and a slow, but steady, growth of purchased motor bus service. The considerable year-to-year variation in the amount of Ferry Boat, Commuter Rail and Vanpool transportation that is purchased is due to the small number of agencies that engage in these types of operations.

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<sup>1</sup> This estimate of cost savings did not assume any improvement in the cost efficiency of the retained transit services, and therefore is a conservative estimate of the savings.

**TABLE 2.1: Purchased Transportation as a Share of Transit Operating Expenses<sup>2</sup>**

	1985	1986	1987	1988	1989	1990
All Modes	4.2%	3.7%	4.0%	5.1%	5.6%	6.0%
Motor Bus	2.6%	2.5%	3.3%	3.9%	4.2%	4.5%
Rail Rapid	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ferry Boat	0.7%	NA	3.1%	2.8%	14.4%	NA
Commuter Rail	16.6%	7.0%	4.3%	9.5%	8.8%	12.3%
Vanpool	0.1%	NA	3.5%	9.3%	0.8%	NA
Demand Response	50.1%	53.5%	56.1%	59.7%	55.4%	58.6%

**TABLE 2.2: Unlinked Passenger Trips - Directly Provided and Purchased**

	1987	1988	1989	1990
All Modes - Direct	7,787	7,729	8,004	7,853
- Purchased	79	83	95	112
Motor Bus - Direct	4,748	4,747	4,780	4,813
- Purchased	48	47	58	74
Commuter Rail - Direct	302	314	319	319
- Purchased	9	11	10	9
Demand Response - Direct	10	11	13	14
- Purchased	20	23	24	26

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<sup>2</sup> Purchased transportation includes transit services provided under contract to public agencies by private carriers and/or other public agencies.

### **3. CONTRACT STRUCTURE**

This chapter discusses the types of services that may be contracted by a transit agency and the basic types of provisions that are generally included in a transit service contract: compensation, performance standards, and provision and maintenance of vehicles. Neither this chapter nor this thesis will examine the details of the contract provisions related to enforcement of the contract, such as provisions on the amount of notice that must be given of a breach of contract prior to contract termination or whether the courts or arbitration will be used to resolve disputes. Instead, I will in general assume that enforcement is effective.

#### **3.1 TYPES OF CONTRACTED SERVICES**

Contracted transit services can be divided into two types: fixed route and demand responsive. Fixed route services operate on a schedule over a predefined route with boardings and alightings occurring at specific, predetermined locations. Demand responsive ("Paratransit") services operate in response to passenger demand, generally picking up passengers at any point within the service area, and dropping them off at any other point (i.e. there are no restrictions on boarding or alighting locations within the service area). Passengers must generally request service in advance to allow vehicles to be scheduled. Demand responsive services are often designed for, and limited to, the elderly and/or

disabled. There are two basic varieties of demand responsive services:

a) dedicated services, which involve the operation of vehicles that are exclusively committed to the demand responsive services.

b) market based services, which involve transportation of passengers on services that already exist in the marketplace serving other market segments, and therefore are not exclusive<sup>3</sup>.

### **3.2 METHODS OF COMPENSATION**

There are two basic ways that a contract can be structured with respect to how a contractor is paid, cost-plus and fixed-price. Cost-plus is traditionally the most commonly used contracting arrangement for government services. The contractor is awarded a set fee to cover overhead and profit and reimbursed for all authorized costs incurred regardless of the service outcome. Frequently such contracts include a cost ceiling limiting the total amount of costs that will be reimbursed or the total amount that will be paid to the contractor. In some cases the contract does not require the contractor to continue to provide service once the cost ceiling has been reached. These contracts may also be structured so that the contractor is reimbursed for all costs

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<sup>3</sup> For example, a transit authority might contract with a taxicab company to provide service to passengers under certain circumstances, paying part or all of the passengers' fares.

and then paid an additional percentage of costs in place of the fixed fee. The key elements of cost-plus contracts are that the contractor cannot suffer a loss from the contract except under exceptional circumstances and that the transit agency has limited control over the cost of the contracted service.

Fixed-price contracts involve the quotation of a certain price for providing a given amount of service over a specific contract length. The contractor's profit is one element of this fixed price. If the contractor can trim costs these savings represent additional profit. However, if costs rise, the contractor has no right to receive additional funds and may suffer a loss. There are two basic types of fixed price contracts: those based on the service supplied and those based on the service consumed.

Contracts based on the service supplied involve fixing a price for a given amount of service or per vehicle hour, vehicle mile, etc. The public agency generally specifies an expected scope of service that permits the bidders to estimate the amount of service required. This type of contract is used in the great majority of demand responsive services and involves little risk for either the public agency or the contractor. The private contractor can safely assume a certain revenue stream based upon a certain service level, while the public agency can readily budget for, and control, contract expense. As a general rule, supply based contracts

offer the best degree of cost control for the transit sponsor.

Contracts based on the service consumed are often referred to as "demand-based" and typically involve the quotation of a price per passenger. These contracts are used most frequently in demand responsive services where the user has a choice between several different service providers. Demand-based contracts are more risky for both the transit sponsor and the contractors. Transit agencies need to make special efforts to maintain the overall cost of service within the budget, since a large unexpected increase in customer demand could financially obligate the public agency beyond its budget. Contractors find it more difficult to predict the number of system users than, for example, to estimate the number of miles or hours a service might require, such as under a service supplied contract.

### **3.3 PERFORMANCE STANDARDS**

Most service contracts include some performance standards and generally some means of enforcing these standards. These may be incorporated in both fixed fee and cost-plus contracts for any type of service. Common performance standards are:

**a) ridership:** This may be total ridership or ridership per some measure of service supplied, for example vehicle mile, vehicle hour, or vehicle trip.

**b) on-time performance:** A trip is usually defined to be "on-time" if it is not early, and is not late by more than a

specified amount (typically 5 minutes), at any designated stop. Many public agencies require that the contractor achieve a predetermined level of on-time performance (usually from 90 to 95 percent).

**c) trip completion:** This is the percentage, or number, of scheduled trips during a specified time period that were completed, whether or not on time. The required rate of trip completion always exceeds the required rate of on-time performance and generally is set at 98 percent or greater.

**d) service quality:** This can incorporate a great many elements, some of which cannot be easily measured, such as cleanliness of the vehicles and behavior of the contractor's employees.

**e) record keeping and reporting:** Virtually all contracts require that adequate records be kept by the contractor and that certain information be reported to the transit agency.

**f) safety:** Most contracts include safety standards related to both operation and maintenance (Cox and Love, 1991).

These performance standards are generally enforced through the use of incentive and/or penalty provisions. The fundamental principal of these provisions is that the profit motive is the driving force in business. A contractor's motivation is assumed to increase with the presence of provisions through which additional profit can be made or which can reduce its profit. Incentive and penalty provisions are supposed to ensure that outstanding performance is



rewarded with higher revenue (and hence profit), and poor performance by lower revenue. The actual effect of incentives and penalties on contractor behavior will depend on a large number of factors as will be discussed at length in Chapter 4.

Incentive and penalty provisions can be grouped into four types based on how the potential for profit is intended to be affected. The first type is the most commonly used method, direct increases or reductions in revenue. In order for a financial incentive to work, the amount in question must be high enough to make an impression on the contractor. However, if an incentive or penalty is too high, it can lead the contractor to engage in political lobbying in an effort to obtain the incentive or avoid the penalty. Very high penalties can also result in a contractor going bankrupt. Contractors are also likely to raise their initial bids to compensate for the perceived risk of incurring the penalty.

A second type of incentive or penalty is reputational. Virtually all contractors are interested in having a good working relationship with the government agency administering the contracts and many contractors are also either operating under contracts elsewhere in the world, or hoping to do so in the future. A good working relationship enables both the government agency and the contractor to reduce the resources that need to be applied to dealing with each other and to monitoring the service. It also enables the contractor to use this operation as a reference in its efforts to retain and/or

win other contracts. If the working relationship is poor, and especially if the government agency has reason to doubt the accuracy of the reports made by the contractor, the government agency may be able both to make operating the contract difficult for the contractor and to discourage other agencies from dealing with the contractor. This type of incentive and penalty can be included in a contract by (a) providing the administering agency with the power to investigate and conduct detailed audits of the contractor, which may only be used if the agency has reason to believe that the contractor is not filing accurate reports, and (b) specifically authorizing the administering agency to make public reports on the performance of the contractor.

The third type of penalty and incentive relates to the length of the contract. This generally occurs in either of two ways. First, many contracts include provisions authorizing the administering agency to terminate the contract under specified conditions. However, terminating a contract is itself a very difficult action to take, especially if the administering agency does not have the ability either to take over the service immediately itself or to appoint another contractor on an interim basis. These potential problems include poor service by the contractor during the period between notice of termination and actual termination leading to a reduction in ridership, poor maintenance of equipment and facilities during this period, legal and political challenges

to the validity of the termination, and failure of the contractor to turn over all important information. Because of the ability of the contractor to cause these problems, termination is not as potent a weapon for the administering agency as it might first appear.

The other way that the term of the contract can be used in incentive and penalty clauses is by explicitly basing the decision of whether the contract will be renegotiated with the same contractor or rebid, on the performance of the contractor.

The fourth and final type of incentive and penalty provision are ones that are designed to affect individual employees of the contractor. This would include the agency having the right to bar specific employees from working on the contracted activities. This type of provision is difficult to include in a contract and may result in liability problems because of the amount of power the transit agency has over the actions of the individual employees. However, under some circumstances such provisions can be used as part of the penalties for repeatedly providing inaccurate information to the transit agency or for attempting to influence regulators, inspectors or auditors improperly.

What are referred to in this thesis, and in the literature, as penalty clauses are referred to in contracts as liquidated damage clauses. Liquidated damage clauses are defined in US law as an agreement by the parties to a contract

as to the harm suffered by one of the parties to the contract when the other party violates specific provisions of the contract. They are considered appropriate only when the harm cannot be measured easily and the amount provided in the clause is a reasonable estimate of the harm. For example, it is very hard to measure the harm suffered by a transit agency if fewer trips are completed than are required by the contract. Penalty clauses, on the other hand, are defined in US law as a contract provision requiring a party to pay an excessive amount if they violate the contract, and generally are not enforced by US courts.

#### **3.4 EQUIPMENT AND FACILITY PROVISION AND MAINTENANCE**

Another key element in the structure of a contract is the determination of which party provides and maintains the equipment and facilities required to provide the contracted service. Requiring that a contractor provide and maintain all of the required equipment and facilities will increase the contractor's expenses and restrict the number of firms capable of bidding for the contract. However, the contractor will also have a greater incentive to maintain the equipment and facilities properly. If the transit agency provides all, or most, of the equipment and facilities it will enable more firms to bid for the contract, increasing competition, but it will also reduce the incentive to maintain the equipment and facilities properly.

## **4. THE ECONOMICS OF CONTRACTING**

This chapter summarizes the field of contract economics, including a review of research applicable to transit service contracting, and discusses both the potential applicability and limitations of contract economics in the transit service contracting context.

### **4.1 CONTRACT ECONOMICS**

Contract economics is a relatively new field of economics that deals with situations of asymmetric information. These are situations in which (1) at least one party to a transaction possesses, at some time, important information that another party does not possess or (2) important information cannot be verified by an impartial third party, such as a court. What happens in either of these situations is that the agreement between the parties is limited to those matters that will be known to both parties and can be verified by an impartial third party. Contract economics examines two closely related aspects of this situation. First, how can the party which lacks, or will lack, important information (referred to as the principal) (a) create a mechanism, in the form of a contract, and (b) behave, such that a party with the traits desired by the principal (referred to as the agent) (i) wants to enter into the contract, and (ii) then wants to behave in the manner desired by the principal. Second, what are the effects on other parties of the actions of the

principal and agent. An important point is that all parties are assumed to act to maximize their own interests, regardless of the effect on other parties.

This field has concentrated on long-term contracts where there is a cost to both parties in terminating the contract, either because of a specific contract provision or because the parties have made investments whose value is lower outside the contract relationship. These investments can be in physical capital or in training of employees. Because of this cost, regardless of the amount of competition before the contract is executed, one or both parties will have some degree of power over the other party once the contract is signed.

Contract economics is mainly concerned with two problems, commonly referred to as *adverse selection* and *moral hazard*. Adverse selection refers to the situation in which one of the parties starts with information unknown to the second party but which relates to the benefits or risks that entering into a contract will have to the parties. For example, a company entering into a contract generally has knowledge about its abilities that is unknown to the other party to the contract, but which affects the expected value of the contract to both parties.

Moral hazard refers to the problem in which both parties start out with equal information, but one person does not later get full information about either the relevant actions of the other person (referred to as the hidden action problem)

or the circumstances surrounding these actions (referred to as the hidden information problem). The contractor or employee supplying unobservable effort is the prototypical hidden action case, while the expert manager making observable decisions, but for unobservable reasons, is an example of a hidden information case.

It is vital to remember that incentive and penalty schemes can be effective only if the agent understands how his choice of actions will affect his expected net benefit. If an incentive scheme is based on a factor that is totally out of the agent's control, it can not be expected to affect the agent's performance. For example, if a contract for the provision of a commuter rail service includes an incentive provision based on the cleanliness of the stations, which are cleaned by the transit agency, there will probably be no change in the contractor's behavior although the contractor may demand higher payments to compensate for the risk of being assessed this penalty. On the other hand, special care needs to be taken if an incentive scheme is based on a factor that a contractor can affect through more than one type of action. For example, an incentive provision based on the number of complaints about service quality reported to the transit agency could encourage a contractor to improve service, but also to make it more difficult for passengers to make complaints about service quality.

The standard model for designing an incentive contract,

as it is discussed in the transportation literature, is described as a method for affecting the agent's behavior by rewarding, or punishing, the agent based on whether specific service standards are met. Designing the contract is a sequential process in which the first step is to identify desirable performance by the contractor, often in terms of unobservable quantities, then to find indicators to provide information about this performance, and finally to devise a set of payments based on the performance as shown by these indicators.

Utilizing the ideas of contract economics involves designing a contract based on simultaneously considering four factors: (1) the objectives of the principal, (2) the objectives of the agent, (3) the cost to the agent of each of its possible actions and (4) the parties' understanding about what can be measured, and verified, in terms of an outcome. The objective is to create a contract that will cause an agent to behave in the manner that provides the greatest benefit to the principal, net of the costs of the contract.

The principal differences between the two approaches to designing contracts is that contract economics explicitly considers the net benefit to the principal, the net benefit to the contractor, and the verifiability of the outcome. Utilizing the theory of contract economics provides an opportunity to increase the principal's net benefit and reduce substantially the problems of monitoring the contractor's



performance and of enforcing the contract provisions.

#### **4.2 THE CONTRACTING PROCESS**

Contract economics makes several assumptions about the nature of the environment in which the parties enter into a contract. The first assumption is that there is a single principal who drafts and offers the contract and a number of parties competing to be awarded the contract. The importance of this assumption is that it limits the negotiating power of the parties competing to win the contract, allowing the principal a free hand in designing the contract and insuring that the agent will settle for a contract that results in the agent obtaining his or her reservation level of utility. Therefore, in order for contract economics to be useful in finding an optimal contract in a real world situation, the principal offering the contract must insure that a substantial number of potential agents will be interested in competing for the contract.

A second major assumption of contract economics is that the party offering the contract must understand the potential contractors' objectives and cost and utility functions. Otherwise, as illustrated in the example cited previously about complaints, a contractor may find an unanticipated way to comply with a contract that results in reduced benefits to the principal. As will be discussed later in this thesis, it will rarely (if ever) be true in the real world that either

party fully understands any other party's objectives and cost and utility functions. Generally however, each party will be able to make reasonably good assumptions as to the factors that are likely to affect the other parties' behavior.

#### 4.3 MORAL HAZARD

Most of the analysis of contract design to solve moral hazard problems is based on the assumption that the parties at some initial time design a Pareto optimal<sup>4</sup> long-term contract. The design of the Pareto optimal contract proceeds by maximizing one party's utility<sup>5</sup> subject to the other party, or parties, receiving a minimum, or reservation<sup>6</sup>, level of expected utility. It is important to note that the analytical core of contract theory is optimization of one party's interest, subject to the other party receiving enough benefit so that he or she is willing to agree to the contract. In the following discussion it will be assumed that the objective is to maximize the utility of the principal, the party that is designing the contract.

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<sup>4</sup> A Pareto optimal situation or contract is one in which no party can be made better off without another party being made worse off.

<sup>5</sup> Utility, in economics, is a generalized measure of the degree to which a person, company, or government, achieves its objectives. For companies, utility is generally considered to be directly related to the profit the company generates.

<sup>6</sup> This reservation level is the highest amount of utility that the party could obtain from entering into a contract with some party other than the one proposing this contract.

The basic contract design problem for a principal faced with a moral hazard issue has been formulated (Hart, 1987) as follows: There is a set of actions  $A$  available to an agent, with a generic element of this set denoted by  $\alpha$ . There is a set of possible outcomes  $X$  with a specific outcome denoted by  $x$ . The selection of an action  $\alpha$  by the agent determines the probability of each possible outcome occurring. An outcome  $x$  includes a payoff to the principal of  $\pi$ . The distribution of  $x$  (and  $\pi$ ) resulting from the selection of an action  $\alpha$  is denoted by  $f(x/\alpha)$ . The principal can observe and verify the outcome  $x$ , but cannot verify the action by the agent so the contract cannot be based on it. The contract consists of a set of payments by the principal to the agent based on the specific outcome that is observed, denoted by  $s(x)$ . The principal is assumed to value money according to the utility function  $v(m)$  and the agent according to the utility function  $u(m)$ . The agent also incurs a cost, in the form of a reduction in utility, from taking action  $\alpha$  which is denoted by  $c(\alpha)$ . For simplicity the agent's utility is assumed to be independent of his wealth so that his total utility is  $u(s(x)) - c(\alpha)$ . The principal's utility is  $v(\pi - s(x))$ <sup>7</sup>. The principal's problem then is to find a set of payments to the agent for every possible outcome which will result in the agent taking the action that maximizes the principal's

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<sup>7</sup> The principal is assumed to receive utility from maximizing its profit and from no other source.

expected utility. Utilizing the above notation this can be expressed as the principal offering a contract  $s(x)$  which causes the agent to take the action  $\alpha$  which maximizes the principal's expected utility:

$$\int v(\pi - s(x)) f(x|\alpha) dx$$

subject to :

$$\int u(s(x)) f(x|\alpha) dx - c(\alpha) \geq u^* \quad (1)$$

$$\int u(s(x)) f(x|\alpha) dx - c(\alpha) \geq \int u(s(x)) f(x|\alpha') dx - c(\alpha') \quad (2)$$

where  $u^*$  is the agent's reservation level of utility and  $\alpha'$  is all of the agents' possible actions other than  $\alpha$ .

Condition (1) states the restriction that the agent will only enter into the contract if his expected net utility from taking action  $\alpha$  is at least equal to his reservation level of utility. Condition (2) states the requirement that the agent's expected net level of utility from choosing action  $\alpha$  must be greater than or equal to his expected net level of utility from choosing any other action.

In theory, this contract design problem can be solved through a two step process. The first step consists of finding the lowest cost contract that will cause the agent to take each specific action. The second step consists of selecting the contract, and resulting action by the agent, that will result in the highest utility to the principal.

The simplest case is if the agent is not averse to risk, which means that the agent receives the same utility from receiving a lottery of potential payments and the expected

value of the lottery. In this case, the principal can design the contract so that it is equivalent to the principal selling the venture to the agent, who as the new sole proprietor now chooses the optimal action in his own best interest. For example, such a contract could require the agent to pay a flat fee to the principal equal to the expected income from the venture while the agent receives the actual income from, and incurs the actual costs of, the venture. If an agent is averse to risk, he or she would prefer to be paid a guaranteed wage and will demand to be compensated for bearing any uncertainty with respect to the outcome. However, the guaranteed wage provides no incentive for the agent to perform as desired by the principal. Therefore the principal is forced to balance his cost of not giving the agent a strong enough incentive to do what he wants, and the additional compensation that the agent will demand for facing risk.

Another simple case is if there is a set of outcomes, one of which may occur whenever the agent chooses any action other than that desired by the principal, but that will never occur if the agent chooses the action desired by the principal. In theory, the principal can assign an extreme penalty to these outcomes, such as shooting the agent, so that the agent will never choose any action that might result in the penalty being incurred. This is agreeable to the agent since he knows that he will never be subject to this penalty as long as he performs the action desired by the principal.

More generally, the difficulty of the problem is directly related to the number of the agent's possible actions, the number of possible outcomes, and the degree to which different actions give different potential results. When there is a very limited choice of actions, an optimal contract can normally be computed with the above formulation. However, when there are many options, the above formulation can lead to a monstrously complex contract, full of state-specific payoffs that respond to the slightest changes in the information content of the outcome  $x$ .

In the real world incentive schemes do show variety, but not to the degree predicted by the basic theory of contract economics, (Hart, 1987). Linear or piece-wise linear schemes, such as piece-work contracts and stock options, are used frequently and across a large range of environments. The prevalence of these relatively simple incentive schemes can partly be explained by the costs of writing and enforcing intricate contracts. However, a more fundamental reason is that incentive schemes need to perform well across a wide range of circumstances. The more options the agent has, the more poorly an intricate incentive scheme will perform (Hart, 1987).

#### **4.4 ADVERSE SELECTION**

Adverse selection is a problem that can arise because of asymmetries in the information the parties possess at the time

they enter into a contract. The basic idea for resolving this problem is to offer either: (i) a single contract to a group of competitors that is designed so that only people of the type that the principal is interested in will expect that they can make a sufficient profit, and therefore these people will be the only ones to bid for the contract, or (ii) a menu of contracts designed so that people will disclose the needed information about themselves when they select the contract in which they are interested. The basic contract design problem for a principal faced with an adverse selection issue can be formulated in much the same way as for a moral hazard issue: There are a set of at least  $n$  potential agents, and each agent is characterized by a type, or ability level, which is denoted by  $\phi$ . There is a set of possible outcomes  $X$  with a specific outcome denoted by  $x$ . The nature of each potential agent  $\phi$  determines the probability of each possible outcome occurring. An outcome  $x$  includes a payoff to the principal of  $\pi$ . The distribution of  $x$  (and  $\pi$ ) resulting from contracting with a potential agent  $\phi$  is denoted by  $g(x/\phi)$ . The principal cannot initially identify the type of each agent, although each agent does know its own type. The principal can observe and control the actions of all agents so there is no moral hazard issue. The principal can also observe and verify the outcome  $x$ . The principal will offer  $n$  contracts, one for each agent it intends to hire, although some or all of the contracts can be identical. Each contract consists of a set

of payments by the principal to the agent based on the specific outcome that is observed, and is denoted by  $s_1(x)$  to  $s_n(x)$ . The principal is assumed to value money according to the utility function  $v(m)$  and all of the potential agents according to the utility function  $u(m)$ . Each agent also incurs a cost, in the form of a reduction in utility from taking the actions required under the contract which is denoted by  $c(\phi)$ . For simplicity the agent's utility is assumed to be independent of his wealth so that his total utility is  $u(s(x)) - c(\phi)$ . The principal's utility is  $v(\pi - s(x))^8$ .

The principal's problem then is to find a set of contracts, each consisting of a set of payments to any agent accepting the contract for every possible outcome, which will result in every potential agent taking the action that maximizes the principal's expected utility. If there are more potential agents than the principal desires to employ, the principal will want the excess agents to choose not to accept any contract offered by the principal.

Utilizing the above notation this can be expressed as the principal offering a set of contracts  $s_1(x) \dots s_n(x)$  so that each agent the principal desires to hire enters into a contract which, considering the agent's type  $\phi$ , maximizes the principal's expected utility:

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<sup>8</sup> The principal is assumed to receive utility from maximizing its profit and from no other source.



$$\int_{\Sigma_{\phi-1,n}} v(\pi - s_{\phi}(x)) g(x|\phi) dx$$

subject to :

$$\int u(s_{\phi}(x)) f(x|\phi) dx - c(\phi) \geq u^* \quad (1)$$

$$\int u(s_{\phi}(x)) f(x|\phi) dx - c(\phi) \geq \int u(s_{\phi'}(x)) f(x|\phi) dx - c(\phi) \quad (2)$$

where  $u^*$  is the agent's reservation level of utility,  $s_{\phi}(x)$  is the contract designed for type  $\phi$  and  $s_{\phi'}(x)$  is all contracts other than the one designed for type  $\phi$ .

Condition (1) states the restriction that each agent the principal desires to hire must prefer entering into the contract designed by the principal for his type over his options not related to this principal. This condition only applies to the agents that the principal wishes to hire. Condition (2) states the requirement that each agent's expected net level of utility from entering into the contract designed for his type must be higher than the agent's expected net level of utility from choosing any of other contract offered by this principal.

If the principal is only seeking one agent the problem is simplified because the principal offers only one contract for one agent. The two conditions then just require that the contract be such that the desired type of agent be willing to enter into the contract and that no other type of agent be willing to enter into the contract.

If a principal is seeking more than one agent, the problem becomes much more difficult. For example, assume that a principal's objective is to contract with the two lowest

cost producers of a good or service and it invites all potential producers to submit a bid with their cost of production. The selected producers will receive identical contracts except that they will receive the amount each bid as compensation. Faced with this situation, the lowest cost producer generally will have no incentive to show the principal that it can produce for any lower cost than the just better than the third lowest cost producer. By bidding at that cost, the lowest cost producer will still obtain one of the contracts and the difference in the bid and actual costs will be additional profit for it. In order to get the lowest cost producer to state its cost of production accurately, the principal will need to offer it a different contract which provides a greater net benefit to the lowest cost producer than it receives by imitating a less efficient producer. The basic result is that if a principal is seeking more than one agent it will need to provide a menu of contracts designed so that the agent or agents will identify themselves by choosing the contracts that provide them with the greatest net benefit. However, in order to provide the most desired agent or agents with an incentive to identify themselves, the principal generally will need to provide additional compensation to these agents.

The primary real world difficulty with using the above method to solve situations of adverse selection is similar to the difficulty discussed above for the moral hazard problem.

There are many potential agents, each with a large array of potential behaviors. The principal can only estimate the characteristics that he desires and attempt to make a contract that is an approximate solution to the problem.

It is also important to remember that if a contract is drafted to appeal to only a narrow range of potential contractors, that the agency can destroy the primary source of benefit from the contracting process, the competition between bidders to obtain the contract.

Again, as in moral hazard situations, it is vital for a principal not only to design an optimal contract but also to ensure that the potential agents learn about the contract accurately and believe that the principal is committed to entering into the contract as written. If the contract is not accurately communicated to the potential agents, they will not respond in the desired manner. If the agents do not believe that the principal is committed to entering into the contract as written, the potential agents will generally not act in the same manner that they would if they believed the principal was committed to entering into the contract. If they did act in the same manner, this would provide the principal with a cheap method of obtaining information about the type, or abilities, of the potential agents. Instead, most agents can be expected to try to act to convince the principal that he needs to pay higher compensation to agents. For example, an agent could overestimate its costs, expecting that all other agents will

do the same, and hoping that the principal will agree to pay compensation based on the inaccurate higher costs.

It is also important in dealing with adverse selection situations for the principal to insure that potential agents are bound by their responses. For example, principals need to insure that potential agents do not under-estimate their costs, or over estimate their abilities, when seeking a contract, with the expectation that the contract will be renegotiated to provide for additional compensation to the agent.

#### **4.5 THE ECONOMICS OF OBTAINING INFORMATION**

In general, there is a cost associated with a principal providing virtually any information to a potential contractor or obtaining virtually any information about either a potential contractor or the performance of a contractor. This cost can vary considerably with the type of information and the required level of detail and accuracy. When there is a cost to obtaining the information, the issue is whether the value of the information is greater than its cost. In contract economics, information is considered to be valuable if both the principal and the agent can be made strictly better off with a contract that uses the information than with a contract that does not use the information, ignoring in this calculation the cost of acquiring the information (Holmstrom, 1979).

The easiest information to disburse and obtain is often referred to as "cheap talk". This type of information includes public announcements by a principal about a contract that it intends to offer and actions by potential agents to publicize their reputations. This information is not directly targeted to any particular person and is generally spread through the news media or by casual conversations by people in a particular industry so that the cost of obtaining it is virtually zero. Its actual value is difficult to measure, especially because its accuracy is unknown, but its low cost can make it quite cost effective, especially in resolving issues of adverse selection.

Reputation is an example of "cheap talk", since the cost of learning a person's reputation is generally low. Reputation is often valuable information since it is a signal of the agent's ability and past effort. Obtaining a good reputation generally has a cost to an agent in the form of high effort, but it generally will also give the agent the ability to demand a greater payment because the expected value of the agent is higher than that of an agent with a lower reputation.

One of the methods of obtaining information that is advocated by many researchers is the use of contests (Holmstrom, 1982). Contests are defined as any compensation scheme in which a principal that uses several agents bases their compensation on their relative performance. The

compensation can be based on an ordinal or cardinal ranking of the agents. Examples of contests include situations where a company (1) awards a prize to the salesman with the highest sales, (2) allocates a bonus pool among its salesmen based on the percentage of total sales that each generated, and (3) penalizes the salesman with the lowest sales by not giving him a raise for the next year. Contests can be valuable if the performance of all agents is affected by some common outside factors. For example, if all salesmen for a company are affected in a similar manner by general economic conditions and the existence of competing products. The stronger the correlation is between how the factors affect different agents, the more the agent's compensation will be based solely on their relative ability and effort, thereby also reducing the risks faced by each agent. Contests can increase the incentives for agents, especially to encourage them to abandon their natural risk aversion and adopt "riskier" and more profitable courses of action, since they are rewarded for outperforming other agents (Nalebuff, 1983).

There are two principal problems associated with the use of contests. First, in every contest one (or more) of the agents are penalized, either because they were unlucky or because another agent worked harder. There is a risk that these agents could become demoralized and reduce their efforts, thus continuing to lose. This can create a social problem, the creation of a group of people, generally the

least able, who no longer put effort into their work, and can also destroy much of the effectiveness of the contest because all agents know in advance that some agents will expend only a low level of effort. Second, in many cases it is difficult to prevent "collusion" between the agents, where "collusion" is defined as any cooperative effort by a group of agents to circumvent the principal's intent in creating the contest. Examples of collusion include all agents agreeing to expend only a low level of effort in their work or agreeing that only one person will work hard during each period. If the agents are able to "collude" this also destroys much, if not all, of the effectiveness of the contest.

Related to contests is the idea of a "yardstick competition". In a yardstick competition the compensation of an agent is based on how the agent's performance compares with that of another agent, who may or may not have the same principal. There is also no necessity for the second agent to be compensated according to the same scheme. Like all contests, this is useful only if the performance of each agent is a function of that agent's ability and effort and of external factors, and there exists some correlation between how the external factors affect the two agents. The stronger the correlation is between how the factors affect the two agents, the more the agent's compensation will be based solely on their individual ability and effort. This idea is reflected in the common use of dual sourcing, despite the

possible loss of economies of scale. Note however, that yardstick competitions are also vulnerable to "collusion" by the agents.

#### 4.6 LIMITATIONS OF CONTRACT ECONOMICS

There are many limitations to applying contract economics in real world situations. One of the most important is in situations in which the principal has more than one task or objective for the agent. The reason for this is that incentive contracts affect not only the total amount and quality of effort made by an agent, but also the allocation of that effort among these various tasks. If the agent's performance on one or more of the tasks cannot be measured, the value of the agent's total performance can be reduced by providing an incentive for some of the agent's tasks.

One example of this problem that has been in the news recently is incentive contracts for teachers. Teachers are generally assumed to be teaching both basic skills, which can be assessed through standardized tests, and a range of skills related to creative thinking and communication, which are not tested by standardized tests. The problem is that providing teachers with a contract rewarding them based on their students' performance on standardized tests would motivate them to teach basic skills better, and would cause them to reallocate effort to teaching basic skills and away from teaching other skills. Depending on how the teachers'



employer values the two skills, this could result in either a reduction or an increase in the employer's utility.

A related basic problem is that most principals have difficulty in defining their own utility function, especially the tradeoffs between costs and benefits, and therefore in defining exactly what it wants the contractor to do. This is certainly true in the transit field where it is difficult to evaluate tradeoffs between different measures of service quality.

Another important limitation is that the parties both need to have the same information about the objectives of at least the agent and preferably both parties and the costs of the possible actions by the agent. If the parties do not have the same information, incentives that are thought to have one effect by the principal may have a different effect on the agent. It is crucial for the principal to understand the costs to the agent of his potential actions, since an incentive provision will encourage the agent to engage in the minimum cost action that will fulfill the incentive provision.

Finally, contract economics often relies on (1) intricate mechanisms requiring the parties to be able to calculate expected utility under every possible future state of the world and distinguish minute changes in expected utility, and (2) use of extreme sanctions under some conditions. In practice, parties are not able to calculate their expected utility precisely but instead rely on estimates. Furthermore,

truly extreme sanctions, such as death or slavery, cannot be included in contracts and even monetary penalties are limited by the initial wealth of the parties and bankruptcy laws.

#### **4.7 APPLICATIONS TO TRANSIT SERVICE CONTRACTING**

At present, contract economics can not be used to design an optimal contract in transit service contracting for two principal reasons. First, transit agencies will typically have multiple objectives, which are often not clearly articulated, for contracting. These multiple objectives will generally include minimizing the cost, or deficit, of the service and insuring a good service quality. Because many aspects of service quality cannot easily be measured and the transit agency rarely has any explicit means of weighing the value of meeting each objective, it is impossible to formulate the transit agency's utility function. Without a utility function for the transit agency, it is impossible to use the optimization method described in Section 4.3 to compute an optimal contract.

Second, contractors almost always will have a very rich set of alternative actions to choose from in operating under a contract. Modelling this range of options and attempting to compute the optimum actions by the contractor, much less the optimum set of payments to cause the contractor to take these actions, would be a computational nightmare.

Third, contractors will generally have multiple

objectives, so that calculating their utility functions will be difficult or impossible, and will rarely be willing to disclose either their precise objectives or their precise costs since possession of this information by a competitor would result in a competitive disadvantage.

However, a great deal of insight into the design of the contracting process, the contract, and specifically the incentive and penalty provisions, can be drawn from this field of study. First, in order to obtain the maximum benefit from contracting, it is necessary for the transit agency to obtain the participation of a substantial number of potential contractors. Without this, the transit agency loses much of its power to determine the terms of the contract and obtain the benefits of competition.

Second, a substantial effort must be made to understand the objectives, and costs, of the potential contractors. Aside from considerations of reputation, contractors will generally provide service of a lower quality at a higher cost than they would if the agency had perfect information about the contractor's utility and costs (Laffont and Tirole, 1986). The better the transit agency understands these, the better it can draft a contract that will result in the contractor behaving as desired. The transit agency should also pay special attention to noncash objectives of the potential contractors, especially objectives related to its reputation, in order to improve the contractor's performance and reduce

the agency's costs.

Third, if a contractor is at all averse to risk, it will demand higher compensation if it is forced to bear any of the risk, and the higher the risk, the higher the compensation. The optimal contract will then involve the agency bearing more of the risk, by reimbursing more of the contractor's costs, as the contractor becomes more risk averse and/or the contract becomes more risky (Laffont and Tirole, 1986).

Fourth, if a contractor must make an unobservable, or uncontractible, technological choice between reducing fixed costs or variable costs the contractor will be biased toward lower fixed costs and higher variable costs, especially if the agency reimburses some or all of the contractor's variable costs (Laffont and Tirole, 1986).

Fifth, if a contract is to include any incentive or penalty provisions, careful attention must be paid to insuring that the contractor does not overallocate its resources to those tasks to which the incentive or penalty provisions apply. For example, in any sort of flat fee contract where the transit agency provides the vehicles, care must be taken to insure that the contractor does not save money by cutting preventive maintenance, which would result in a long-term cost to the transit agency outside the contract (Holmstrom and Milgrom, 1990).

If these insights are correct, and assuming that the overwhelming objective of a private contractor is maximizing

its long-term financial well-being, the contract provisions discussed above would be expected to have the following types of effects.

a. Compensation provisions: Cost-plus contracts provide no direct financial incentive for controlling costs<sup>9</sup>. Increased costs could arise from efforts to improve service, efforts to maximize employee satisfaction, efforts to minimize the probability of accidents or waste. The first three of these causes can often result in political support from riders, politicians and/or labor for the contractor to continue to provide service under the contract, increasing the chance for the contractor to continue to profit from the service in the future. Therefore, a contractor operating under a cost-plus contract might be expected to pay higher wages or provide additional benefits to its employees, offer expanded or higher quality service and/or perform more maintenance than would be the case if the contractor was operating under a different type of contract. Note that a cost-plus contract in which the contractor's profit is a percentage of the costs paid under the contract would provide an additional incentive for the contractor to increase the costs of the service. The contractor's costs are generally fairly easy to verify so the monitoring and administration costs of the contract would

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<sup>9</sup> If the transit agency only reimburses the exact amount of costs set forth in the contractor's bid, regardless of actual costs, and the contract cannot be amended easily to reimburse higher actual costs, the contract should be treated as a fixed fee contract rather than a cost plus contract.

typically be low. Note that an indirect financial incentive to control costs is provided since the contractor generally must be the low bidder (having the lowest estimated total costs) and exceeding the estimate will generally adversely affect the contractor's ability to obtain contracts from this, or possibly other, transit agencies in the future.

Fixed price contracts provide a clear and direct incentive for the contractor to minimize costs, since any amount not paid as costs becomes part of the contractor's profits. However, only by having multiple companies bidding, and awarding the contract to the low bidder, can the transit agency obtain the benefits of the reduced costs. If the compensation is based only on the amount of service provided, it provides no direct incentive for the contractor to provide a high quality service, since high quality service generally costs more and would therefore reduce the contractor's profit. However, if the compensation is based on the amount of service consumed, the contractor has an incentive to provide high quality service in order to maximize ridership and therefore income. The amount of service provided by a contractor is often easy to verify, especially if the contractor provides a shuttle or loop service. The amount of service consumed is generally much more difficult to verify since it requires measurement of the number of passengers and/or passenger-miles. With any type of fixed fee contract the contractor may demand higher payments as compensation for bearing additional

risk.

b. Performance standards, incentives and penalties: Since these are generally provisions designed to guide a specific portion of the contractor's behavior, they always create a risk that they will cause a contractor to apply too little effort to another portion of its contractual responsibilities. Depending on the magnitude of the incentive or penalty and the elasticity of ridership, ridership standards may encourage contractors to provide higher quality service and to improve marketing of the service, increasing total costs, provided that the contract is long enough that the contractor will anticipate receiving additional revenue as a result of the additional riders. However, since many of the factors governing ridership are not solely under the control of the contractor, generally including fares, schedules, and regional economic conditions, the contractor can be expected to demand a higher price if it may be penalized for reductions in ridership, in order to compensate it for the additional risk.

On-time performance, trip completion, cleanliness and other service quality standards will generally have the same effect as ridership standards and tend to increase both service quality and cost. In addition, use of any of these service quality standards will tend to concentrate the contractor's attention on the specific aspects of service quality that are incorporated in these standards, and away from difficult to measure aspects such as operator behavior,

which may be of equal (or greater) importance. In addition, use of service quality standards can lead to substantial difficulties in measuring and verifying compliance. However, service quality standards are the principal method that an agency has to influence the contractor's current behavior and insure that service quality is satisfactory. Other methods, such as threatening to terminate the relationship or reporting to affect the contractor's reputation, tend to be too broad and are useful primarily when there are major problems with the contractor's performance.

Maintenance incentives, penalties and standards have very different levels of importance depending on which entity provides the vehicles, as discussed below. In either case, maintenance standards can be used to help insure satisfactory service quality and safety by requiring that all equipment works and by reducing the risk of breakdowns and accidents. If these standards require specific actions by the contractor, such as preventive maintenance every 3,000 miles, they will add to the contractor's cost but will not increase its risk.

Safety incentives, penalties and standards, such as numbers of roadcalls and accidents, may help improve service quality by insuring that the contractor pays sufficient attention to safety. Like maintenance standards, these will generally be more important if the vehicles are owned by the agency. These standards can also be very important if the agency insures the contractor against some or all of the costs



associated with accidents, such as lawsuits by injured passengers.

Record keeping and reporting standards will generally have two principal effects. First, they focus contractor attention on providing the transit agency with the desired information. Second, they provide the contractor with guidelines as to the areas in which the transit agency is interested and will focus the contractor's attention on avoiding problems in those areas. For example, if the contractor is required to make regular reports on on-time performance, even if there is no explicit standard for on-time performance, the contractor will want the reports never to show a substantial reduction in performance. Of course, if the transit agency relies solely on the contractor for information about the contractor's performance, the contractor will have an incentive to provide information showing that it is doing a better job than it actually is doing. Therefore, the transit agency will need to establish a credible system for monitoring the accuracy of the contractor's reports, to provide the contractor with an incentive to report accurately. In order to minimize the cost of the monitoring program and ensure accurate reporting, the agency should only require the contractor to provide reports that are important to the agency, provide the contractor with enough time to prepare accurate reports and impose significant penalties for inaccurate reports.

c. Providing and maintaining equipment and facilities: If the contractor has the responsibility for providing and maintaining all of the equipment and facilities, and these assets are either usable for other purposes or will, if properly maintained, have a significant value at the termination of the contract, the contractor will have an incentive to maintain these assets in the most cost effective manner possible. However, since most of these assets are extremely expensive, forcing the contractor to purchase them at the beginning of the contract is likely to reduce the number of entities that are interested in, and able to enter into, the contract, potentially reducing the benefit from using private contractors. Furthermore, if some (or all) of the assets have little (or no) value outside the contract, such as specialized vehicles for a paratransit service, the contractor may not be willing to enter into a contract unless it is compensated for the risk of having worthless equipment left on its hands at the termination of the contract. The longer the term of the contract, the more the equipment will depreciate over the term of the contract and the lower the risk to the contractor.

If the transit agency provides the equipment and facilities for use by the contractor, the contractor will often have an incentive to reduce its expenses by minimizing maintenance of this equipment and the facilities. This would be especially true with a fixed fee contract and less so with

a cost-plus contract.

If the parties enter into a long term contract, the agency leases the vehicles to the contractor, and the contractor is responsible for replacing equipment that is damaged due to inadequate maintenance or accidents, the contractor will tend to provide an adequate level of maintenance, at least during the early years of the contract when it would anticipate facing the consequences of inadequate maintenance.

d. Term of contract: Both transit agencies and contractors receive a benefit from long term contracts because it minimizes the cost to them of re-awarding the contracts. Long term contracts also increase the risk to both parties because of the increased possibilities of something unexpected happening that substantially affects the costs and benefits of the contract to the parties. Long term contracts also give the transit agency the ability to base the contractor's compensation partially on its average performance. This can benefit both parties since if matters beyond the contractor's control that affect how its performance is perceived by the transit agency are not perfectly correlated from year to year, these factors will have less impact on the average than in any single year.

#### **4.8 SUMMARY OF EFFECTS OF CONTRACT STRUCTURE ON TRANSIT SERVICE CONTRACTS**

Based on the foregoing, it is possible to draw some conclusions about how different contract provisions will interact, how they would be expected to affect the behavior of transit service contractors, and how they should ideally be used in a transit service contract.

1. Incentive and penalty provisions, other than those related to economic efficiency, will generally cause a greater increase in effort in a cost-plus contract than if the same provisions were included in a fixed fee contract. This is because the costs of complying with the provisions are passed on to the transit agency so that the incentive or penalty is reflected directly in the profitability of the contract. Therefore, for incentives and penalties to have the same effect on the contractor, the incentives and penalties need to be larger in a fixed fee contract than in a cost-plus contract.

Similarly, there may be a greater need for service quality and maintenance related incentive and penalty provisions in fixed fee contracts because the fixed fee contract provides an implicit incentive to reduce costs by reducing service quality and maintenance.

2. All incentive and penalty provisions provide a risk of directing an excessive amount of the contractor's resources to areas that are subject to the provision and away from other

important areas, reducing the net benefit of the contract to the transit agency. The more specific, and the greater the size of, the incentive or penalty provisions, the greater the risk of such redirection. Short term contracts may also increase the risk of such redirection, especially redirection from areas such as preventive maintenance, since the contractor is less likely to suffer adversely from the redirection. Use of incentives and penalties related to ridership will tend to reduce the risk of such redirection by encouraging a contractor to provide safe, good quality, service, provided that the contract has a long enough duration that the contractor would expect to feel the effects of its actions on ridership.

3. Sharing the revenue from the service with the contractor is one method of providing a ridership-based incentive/penalty. This type of provision can have several benefits. First, it will encourage the contractor to be diligent about collecting all revenue. Second, it may also cause a contractor to balance short term cost reductions that could result from lowering maintenance or service quality against the potential for a reduction in revenue during the remainder of the contract term. This second benefit will only be significant if the term of the contract is long enough that the contractor, and not just the transit agency, will expect to receive a benefit from the increased revenue. In addition, if the contractor receives only a portion of the passenger

revenues, its internal valuation of this future revenue will be lower. Therefore, incentives and penalties related to ridership will generally provide the greatest benefit in contracts where the parties anticipate a long term relationship. In shorter contracts, the agency will generally need to place greater reliance on specific service quality incentives, penalties and standards.

4. Useful information about the performance of a contractor can be obtained from comparing its performance with other contractors, whether or not they are employed by the same transit agency, as long as there is some correlation between the factors affecting the contractors. Useful information can also be obtained by comparing the performance over time of a single contractor.

5. The origin of the benefits of contracting is the competition between potential contractors to be awarded the contract. Only by insuring that there will be substantial competition for its contract can an agency obtain these benefits.

6. Transit agencies have several different types of incentives and penalties available for use in a contracting situation. Transit agencies need both to be clear about their own objectives and to obtain good information on the objectives of the transit contractor in order to select and structure incentives and penalties most effectively. Holding meetings with potential contractors prior to requesting bids

offers an opportunity for transit agencies to obtain some of this information.

7. All actions by a contractor involve some sort of cost, whether financial, such as material costs, labor costs and/or capital costs, or involving additional management effort. If a contract contains no incentives or penalties, either explicit or implicit, a contractor will take the course of action that will result in the lowest net cost, or highest net gain, to it. Especially with a fixed price contract this can result in the contractor providing a level of service that just barely makes it not worthwhile for the agency to terminate the contract and sue the contractor. With a cost-plus contract this can result in a contractor not exerting effort to control costs, since all of the costs are paid by the transit agency.

8. Termination of a contract always involves a cost to the transit agency. The significance of this cost depends on the amount of effort, money and other assets that the agency has invested in the relationship with the contractor, the cost of obtaining a substitute contractor, and the potential losses during the time between notice of cancellation of the contract and complete replacement of the contractor. Because of these costs, transit agencies should attempt to use a contract that will cause a contractor to operate as desired by the agency and not rely on a threat of terminating the contract to coerce the contractor into operating as desired.

9. There are two major ways that a transit agency can reduce the losses that may result from a contractor's actions between notice of cancellation of the contract and complete replacement of the contractor. One way is by contracting with more than one entity to provide the service, or portions of the service. This allows the transit agency to replace an unsatisfactory contractor much more rapidly. The second way is by including substantial incentive and penalty provisions in the contract which would continue to apply, and therefore probably affect the contractor's behavior, during the period between cancellation and replacement.

10. The more risk involved in a contract, the larger the premium that a contractor will demand. If the risk is related to the costs of operating the service, this risk can often be reduced by the agency providing more information about the service to be contracted and the cost of any similar services in the region. For this reason agencies should generally hold conferences to allow potential bidders the opportunity to ask for additional information prior to requesting bids for the service.

An agency can also structure a contract to reduce the risk faced by the contractor, such as by lowering the contractor's fixed costs or by agreeing to reimburse all or a portion of the contractor's costs. If the contractor is risk averse, the agency should concentrate on relieving the contractor of risk over which the contractor has little or no



control, such as the demand for the contracted service or capital expenses that must be amortized over the unknown length of the contract. This will provide the maximum benefit to the contractor and can be done through a contract that provides the contractor with fixed compensation plus adjustments in case there is a change in the service provided to cover the changes in the variable costs of providing the service. By leaving the contractor responsible for the difference between the estimated and actual costs, the agency provides the contractor with an incentive to control these costs. This suggests that this type of contract would generally provide the greatest benefit to the transit agency in terms of minimizing costs, and to the contractor in terms of minimizing risk.

One way that fixed costs could be lowered would be by the agency leasing the required vehicles to the contractor for the term of the contract and any extensions. Such a lease could require the contractor to return the vehicles in good condition and properly maintained in order to provide the contractor with an incentive to properly maintain the vehicles. Agencies must remember that by designing a contract to reduce the risk faced by a contractor the agency will also reduce the contractor's incentive to minimize its costs.

## **5. SURVEY ON CONTRACT STRUCTURE**

This chapter describes the structure and methodology used for a survey of types of contracts presently used in transit service contracting, tabulates the results of the survey, and analyzes what information the survey provides about the economic effect of different contract provisions.

### **5.1 STRUCTURE AND METHODOLOGY OF SURVEY**

During December 1991 and January 1992, a questionnaire was mailed to the approximately 500 United States transit agencies which report information to the United States government under Section 15, and 135 of these agencies responded. The questionnaire asked if the agency contracted for any transit service and, if so, for information on the service and the structure of the contract. A copy of this survey is included in this thesis as Appendix A.

There were three primary purposes to the survey. First, I hoped to assemble a set of data describing the amount of service contracting that is presently ongoing and the frequency with which different types of contract provisions are used. Second, I wanted data from which to try and estimate how different contract provisions actually affect the cost of a contracted transit service. Third, I wanted to identify a set of transit agencies that used different forms of contracts so as to study how the contractors used by these agencies were affected by the different contracts that they

faced.

The survey was divided into two principal sections. The first section requested general information on the agency, including its total budget and the types of transportation services that it offered directly and through a contractor. The second section requested detailed information on each bus, paratransit and commuter rail service that the agency offered through a contractor. This second section was itself divided into six subsections. The first subsection asked for an identification of the contractor and whether it was a government agency, a private business, or another type of entity. A substantial number of responses identified the contractor as "other", most of which were non-profit corporations or charitable organizations. The second subsection requested the responder to identify the type of service being contracted and whether the vehicles used were dedicated to this service.

The third subsection asked for financial information about the contracted service including both the amount paid to the contractor and the amount spent by the agency for monitoring and administration. The survey did not specifically ask which entity received the revenue from the service or the amount of this revenue so this was asked during follow-up communications. Also, in many agencies there was no specific organization or budget for monitoring or administering contracts. These duties were assigned to

personnel with other responsibilities and no allocation was made of either their time or the expenses.

The fourth subsection asked the agency to describe the contract governing the contracted service, including how the contractor was compensated and identifying any performance standards, incentive and penalty provisions. Unfortunately in preparing the survey I had underestimated the creativity of the people drafting the contracts. Many of the agencies were unable to classify the compensation provisions or the standards, incentive and penalty provisions in the manner set out in the survey. This resulted in calls to the agencies for clarification and review of many of the contracts being used by the agencies.

The final two subsections of the survey requested data for the calculation of a set of performance statistics for each of the services offered by the responding transit agencies. The first of these two subsections asked for information on the amount that the contractor spent on several different areas including vehicle operations, maintenance and capital expenses and what the agency spent on monitoring the contractor. The last subsection asked for information on ridership, vehicle miles and vehicle hours, as well as on the type of vehicle used and characteristics of the service. Almost all of the transit agencies responding did not collect the requested information on the costs of the contractor and many agencies did not collect some of the requested

information on the service provided and consumed. This resulted in substantial difficulties in comparing the performance of different contractors.

## **5.2 SURVEY RESPONSES**

In this and several following sections a series of tables are presented which summarize the results of the survey described above. Wherever possible there is a short analysis of how the results compare with the results of the 1985 survey by Teal and other prior research. It should be noted at the outset that this survey had a markedly different objective from the Teal survey. The Teal survey researched the extent and characteristics of transit service contracting, seeking responses from virtually every agency in the United States that provided or purchased transit services. This survey, on the other hand, was designed to identify and obtain information from a substantial cross section of transit agencies that contracted for transit service in order to analyze the effect of contract structure.

Tables 5.1 and 5.2 summarize the responses to this survey and the differences between the respondents to this survey and the Teal survey.

**TABLE 5.1: Type of Transit Provider Responding**

	MIT Survey		Teal	
	Number	Percent	Number	Percent
Independent Authority:	60	44	255	31
City:	56	41	410	50
County:	8	6	111	13
Other:	11	8	48	6
Total Responses Received:	135	100	856	100

**TABLE 5.2: Size of Transit Provider Responding**

	MIT Survey		Teal	
	Number	Percent	Number	Percent
1-50 Vehicles:	81	60	717	84
51 Or More Vehicles:	54	40	139	16
Total Responses Received:	135	100	856	100

Assuming that the Teal report provides a fairly accurate characterization of the size and number of current transit providers, these two tables show that in the current survey a significantly higher response rate was obtained from independent transit authorities than from cities and counties. Furthermore, a significantly higher response rate was also obtained from large transportation agencies, with 51 or more vehicles, than from small transportation agencies.

The differences between the respondents to this survey and the Teal survey are the result of two factors. First, the current survey contacted only those agencies that file reports with the federal government under Section 15. Agencies that did not receive any funding from the federal government or that received funding only under Section 16(b)2, a special program for rural transit agencies were not contacted. Second, a majority of the agencies contacted did not respond to the survey. Since we do not know how well the responding agencies represent the entire universe of transit agencies, it

is impossible to state, even probabilistically, how closely the results from this survey reflect the entire universe of transit agencies. A common method of dealing with this problem is to examine subsections of the population being studied. For this reason, the following analyses will generally state overall results and then results by type and size of transit agency.

The increased representation of large transit agencies and independent transit authorities in the current survey would be expected to result in a greater percentage of transit agencies utilizing contracting, but only for some of the transit services they provide. Furthermore, since these agencies are specialists in transit they might have a better understanding of their own utility and the costs of the service, and therefore be more likely to use fixed fee contracts with incentive and penalty provisions.

### **5.3 PREVALENCE OF CONTRACTING**

Table 5.3 summarizes the types of services for which contracting is used by the transit agencies responding to the survey.

**TABLE 5.3: Contracting by Service Type**

	Number	Percent
Fixed Route Contracting Only:	7	5
Paratransit Contracting Only:	53	39
Fixed Route and Paratransit Contracting:	19	14
Paratransit and Other Contracting:	2	1
No Service Contracting	54	40
Total Responses Received:	135	100

This table shows that over 90% of the respondents

utilizing contracting used it to provide paratransit service. Most (72%) of the agencies contracting for paratransit service did not contract for any other transit service. Teal did not, in his report, provide information on how frequently agencies used both fixed route and paratransit contracting, so no direct comparison can be made of the information in Table 5.3.

Table 5.4 shows the percentages of transit agencies which offer either fixed route bus or paratransit that provide it through contracting and the comparable percentages from the Teal report.

**TABLE 5.4: Frequency of Contracting**

	Fixed Route Bus		Paratransit	
	Survey	Teal	Survey	Teal
Direct Only:	76%	77%	33%	65%
Direct and Contracted:	11%	3%	15%	3%
Contracted Only:	14%	20%	53%	31%

Table 5.4 does show several interesting differences between the results of this survey and the 1985 Teal survey. First, both surveys report an almost identical percentage of fixed route bus service being provided directly by the transit agency. However, the Teal survey reported a far greater percentage of agencies providing such service solely through a contractor and a far lower percentage providing service both directly and through a contractor.

The current survey also indicated a much higher use of contracting for the provision of paratransit service than was indicated in Teal's survey. To help determine whether the results are due to changes in the use of contracting or differences in respondents to the two surveys, Tables 5.5 and



5.6 show the percentages of different types and sizes of transit agencies providing all, some or none of their total transit services through contracting as found by this survey and the 1985 Teal survey. The numbers printed in bold indicate that differences between the two survey results are significant at the 95% confidence level, assuming no bias in the current survey.

**TABLE 5.5: Frequency of Contracting by Type of Agency**

	All	Some	None	N
Independent Authority				
Survey	10.0%	<b>48.3%</b>	<b>42.7%</b>	60
Teal	12.9%	<b>20.4%</b>	<b>66.7%</b>	255
City				
Survey	21.4%	<b>39.3%</b>	<b>39.3%</b>	56
Teal	30.5%	<b>5.4%</b>	<b>64.1%</b>	410
County				
Survey	<b>50.0%</b>	25.0%	<b>25.0%</b>	8
Teal	<b>20.7%</b>	12.6%	<b>66.7%</b>	111
Other				
Survey	27.3%	<b>27.3%</b>	45.4%	11
Teal	37.5%	<b>6.3%</b>	56.3%	48

**TABLE 5.6: Frequency of Contracting by Size of Agency**

	All	Some	None	N
1 - 50 Vehicles				
Survey	23.5%	<b>27.2%</b>	<b>49.4%</b>	81
Teal	27.1%	<b>6.2%</b>	<b>66.7%</b>	717
51 or more Vehicles				
Survey	11.1%	<b>63.0%</b>	<b>25.9%</b>	54
Teal	9.3%	<b>37.2%</b>	<b>53.5%</b>	139

Tables 5.5 and 5.6 show that for virtually every type and every size of agency surveyed significantly fewer agencies do not use contracting at all, and significantly more use a mix of contracting and direct operation compared with Teal's survey results. This is not surprising considering the increased use of contracting in the United States shown by Tables 2.1 and 2.2. However, another possible explanation is

that since this survey was primarily about the structure of contracts, there may have been a higher response rate from transit agencies that utilize contracted transit service than from those that do not. Based on the available information it is impossible to tell exactly how much of the difference is accounted for by bias in the response rate and how much reflects a real increase in the use of contracting.

A comparison of the percentages of agencies utilizing contracting for some and all of their services does provide some insight into the increase in contracting. Independent authorities, cities and other agencies of all sizes show a significant increase in the percentage of agencies contracting for some of their service. Only counties show a significant change in the percentage of agencies contracting for all of their transit services. If the change in use of contracting were due solely to non-response bias, the changes in the percentages of agencies providing some or all of their service through contracting should be very similar. The different changes in the percentages of systems providing all and some of their services through contracting are consistent with the growth in the use of contracting in paratransit services shown in Tables 2.1 and 2.2, especially the use of contracted paratransit service by agencies that previously provided all services directly.

#### **5.4 CONTRACTING PROCESS**

This section summarizes the methods used to select each winning contractor and, when competitive, the total number of bids obtained from potential contractors. A competitive process includes any process in which the transit agency requests bids for providing the service from several potential contractors, regardless of the number of bids actually received.

Table 5.7 shows the process used to select each contractor, classified by the type of contractor winning the contract. Since the table is based on the total number of contracts reported by responding agencies, the total is higher than the total number of agencies using contractors. Teal's results are again included for comparison purposes.

**TABLE 5.7: Basis for Selection**

	Total	Fixed Route Bus Comp.	Non-Comp.	Paratransit Comp.	Non-Comp.
For-Profit Companies:	86	19	2	62	3
Non-Profit Companies:	23	0	1	14	8
Government Agencies:	10	1	1	3	5
Total:	119	20	4	79	16
		(83%)	(17%)	(83%)	(17%)
Teal's Survey:	288	63	55	91	79
		(53%)	(47%)	(54%)	(46%)

This table shows a marked difference from Teal's statistics on the contractor selection process. Teal found that in only a bare majority of both paratransit and fixed route bus service contracts was the contractor selected through a competitive bidding process compared to well over 80% of each type of service in this survey. These differences are significant at a 95% confidence level, again assuming no

effect from bias. Teal also found that for 19% of the paratransit services and 24% of the fixed route bus services the contractor was selected through a negotiation process while the remaining contractors had previous contracts renewed. In the above table all of these are listed as non-competitive, since Teal states that there is a strong implication that the renewals were negotiated and not competitively bid. The table strongly suggests that there has been an increase in the use of competitive contracting. Since competition for the contract is the basis for cost savings associated with service contracting, this would be very positive for improving the overall effectiveness of the agencies utilizing service contracting.

Table 5.7 also shows that for-profit companies obtain over 80% of the contracts that were competitively bid but only about 25% of those that were not competitively bid. The high percentage of competitively bid contracts won by for-profit contractors may indicate that for-profit companies are able, or willing, to operate at lower costs than other organizations, or that they are in some other way are more desirable as contractors. However, it could also be that government agencies rarely bid on transit service contracts and that they win a large percentage of the ones that they do bid on. In order to examine this issue properly, it would be necessary to identify all of the unsuccessful bidders for these service contracts and examine the comparative success

rates of for-profit companies and government agencies. It would also be necessary to obtain accurate information about why the successful bidder was chosen.

The low number of non-competitive contracts obtained by for-profit companies is not surprising given that most states require governmental and quasi-governmental bodies to use competitive bidding except under special circumstances. The objective of this law is to reduce the risk of impropriety in the awarding of contracts. One extremely common exception to the competitive bidding requirement allows these bodies to contract for services from other governmental bodies. The for-profit companies contracted other than through competitive bidding occurred in the following ways. One agency provides a fixed passenger subsidy and allows any interested entity to carry passengers, however the passenger selects the carrier. Two agencies combine a bidding process with community review to select a contractor. The remaining agencies merely formalized prior informal relationships with the companies that became the contractors.

Table 5.8 summarizes the number of bids obtained by agencies utilizing a competitive award process. For perspective on these numbers a comparison can be made with London and Argentina. London Transport is currently contracting 38 per cent of its bus network to 28 different entities. It obtains an average of five bids for each route contracted (London Transport Annual Report 1991/1992).

Argentina is contracting the entire Buenos Aires commuter rail and subway network in five segments. Bidders are required to be consortia composed of both domestic entities and foreign companies experienced in operating commuter railroads or subways. The consortiums are also required to have extremely large financial resources and must post substantial bonds. Argentina has obtained either three or four bids for each segment of the network. The experience of London Transport, Argentina and some US cities raises a question about why some US cities obtain only one or two bids for contracted service.

**TABLE 5.8: Number of Bids for Competitive Award**

	Fixed Route Bus			Paratransit		
	N	Range	Median	N	Range	Median
For-Profit Companies:	19	1-8	4	62	1-35	3
Non-Profit Companies:	0	-	-	14	1-5	1
Government Agencies:	1	4	4	3	1-3	2

Previous research has not examined the bidding process of transit service contracting. Since the cost savings of transit service contracting are primarily based on competition for the contract, this would appear to be an area in need of additional research.

## **5.5 COMPENSATION PROVISIONS**

Table 5.9 summarizes the types of compensation provisions used for all contracted transit services based on the type of selection process used (competitive or non-competitive) and the type of contractor (private, non-profit or government agency).

**TABLE 5.9: Methods of Compensation Used in Transit Service Contracts**

	Competitive	Non-Competitive
For-Profit Companies:		
Cost-Plus <sup>10</sup>	12	2
Fixed Per Unit Supplied <sup>11</sup>	54	1
Fixed Per Unit Consumed <sup>12</sup>	15	2
Total	81	5
Non-Profit Companies:		
Cost-Plus	0	2
Fixed Per Unit Supplied	9	4
Fixed Per Unit Consumed	4	2
Other <sup>13</sup>	1	1
Total	14	9
Governments:		
Cost-Plus	1	0
Fixed Per Unit Supplied	2	1
Fixed Per Unit Consumed	1	3
Other	0	2
Total	4	6

Previous research has stated that cost-plus contracts are the most common form of service contracts (Mundle, 1984) while other researchers have argued that both transit agencies and contractors would often be better off by using fixed fee contracts (Mundle, 1984). Table 5.9 indicates that contracts providing for a fixed fee per unit of service provided are currently the most common basis for transit service contracts.

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<sup>10</sup> This category also includes contracts where the contractor only received reimbursement of its costs and no additional fee.

<sup>11</sup> Fixed per unit supplied means the compensation is based on the contractor providing an agreed amount of service for a set fee.

<sup>12</sup> Fixed per unit consumed means the compensation is based on the amount of service used, including per passenger fees.

<sup>13</sup> This includes contracts where the compensation is a percentage of taxes collected in an area or where the agency only provides specific assets, such as a vehicle and office space, and/or services, such as maintenance.

This is not surprising since this type of contract was identified in Chapter 4 as the best arrangement for most transit agencies and contractors, although the magnitude of the move toward fixed fee contracts is somewhat surprising. One possible reason is that cost-plus contracts may be used more frequently by cities, towns and independent authorities that contract for all their transit service, a group that other data indicates may have had a lower response rate to this survey. A second reason may be that cost-plus contracts are more common when the parties have little or no information on the details of operating a service or its costs, such as when a service is being initiated. As information is gathered on operating the service it may be easier for the parties to estimate the costs of operating it in the future and therefore to negotiate a fixed fee contract.

Another interesting point from the survey is that 11 out of the 17 contracts with for-profit companies with compensation based on a fixed fee per unit of service consumed are with taxi companies. In 10 out of these 11 contracts the taxi companies use their regular vehicles to provide the paratransit service in addition to their normal taxi service, making the service a fairly easy expansion of the service they offer.

The table also shows that when contractors are selected through a competitive process, for-profit companies are the contractors under 92% of the cost-plus contracts, 83% of the



fixed fee per unit of service supplied contracts and only 75% of the fixed fee per unit of service consumed contracts. This raises an issue of whether for-profit companies may be less likely to bid on contracts in which the compensation is based on a fixed fee per unit of service consumed, possibly because of the additional risk involved. This is examined in Table 5.10 which summarizes the number of bids by type of compensation provision for all transit service contracts.

**TABLE 5.10: Number of Bids by Type of Compensation**

	N	Range	Median
Cost-Plus:	13	1-11	3.5
Fixed Fee/Supplied:	65	1-17	3
Fixed Fee/Consumed:	20	1-6	1

Table 5.10 shows a significant reduction in the number of bids received when the compensation is fixed fee per service consumed compared to either cost-plus or fixed fee per service provided. This is consistent with the theory that many contractors avoid contracts where the compensation is based on the service consumed. However, this result could also be explained if the agencies that are proposing this type of contract are less effective at marketing the contract to potential contractors.

## **5.6 USE OF INCENTIVE AND PENALTY PROVISIONS**

Table 5.11 summarizes how often incentive and penalty provisions were included in contracts and under how many contracts cash incentives were paid to the contractor or cash penalties were imposed on the contractor. Separate categories

are provided based on the type of service provided and the type of contractor. None of the three contracts for fixed route bus service with non-profit organizations or governments included any incentive or penalty provisions.

**TABLE 5.11: Use of Incentive and Penalty Provisions by Type of Contractor**

	Incentives		Penalties	
	Number	Exercised <sup>14</sup>	Number	
<b>Exercised</b>				
<b>Fixed Route Bus:</b>				
<b>For-Profit Companies (21):</b>				
Any	7	5	13	5
Ridership	2	2	0	0
Service Quality	6	3	13	5
Economic Efficiency	1	1	0	0
Maintenance/Safety	5	4	10	5
Reporting	0	0	3	2
<b>Paratransit:</b>				
<b>For-Profit Companies (65):</b>				
Any	11	7	26	6
Ridership	3	2	5	1
Service Quality	5	2	22	4
Economic Efficiency	2	1	6	1
Maintenance/Safety	5	3	14	3
Reporting	3	2	12	3
<b>Non-Profit Companies (22):</b>				
Any	2	0	2	0
Ridership	0	0	0	0
Service Quality	1	0	2	0
Economic Efficiency	1	0	0	0
Maintenance/Safety	1	0	1	0
Reporting	0	0	1	0
<b>Governments (8):</b>				
Any	1	0	1	0
Ridership	0	0	0	0
Service Quality	1	0	0	0
Economic Efficiency	1	0	0	0
Maintenance/Safety	1	0	0	0
Reporting	0	0	1	0

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<sup>14</sup> The term Exercised means contracts under which the transit agency actually paid incentives to a contractor or required the contractor to pay a penalty.

Table 5.11 shows several interesting points about the use of incentive and penalty clauses. First, both incentives and penalties are more common in contracts with for-profit contractors for fixed route bus service than they are in contracts for paratransit service. This indicates that when transit agencies are dealing with a fixed route bus operation, they generally may be more certain what they want from the contractor and how to measure the contractor's performance. Therefore, they would be more likely to specify specific standards, and associated incentives and penalties, in a fixed route contract.

Second, penalty clauses are more frequently included in contracts with for-profit companies (39 out of 86) than are incentives (18 out of 86). This indicates that agencies may tend to be subject to fairly strict budget constraints for contracted service and/or may find it difficult to justify paying what could be characterized as extra profit for the contractor for just doing the job properly. Penalty clauses would be easier for an agency to include in a contract since they do not directly increase the agency's budget and can easily be justified as punishment for a contractor doing a bad job. It should be noted that penalties may increase the contractor's risk, causing the contractor to demand higher compensation and therefore result in an increase in the overall cost of the contract. Interestingly, incentive provisions are just as common as penalty provisions in

contracts with non-profit companies and governments.

Third, penalties are more common<sup>15</sup> and both penalties and incentives are more commonly enforced when the contractor is a for-profit company than when it is a non-profit company or government. Over 44% of the contracts with for-profit companies contained penalty provisions while only about 9% of the contracts with non-profit companies or governments contained penalty provisions. This indicates that penalty provisions may be seen as more effective and/or more needed in contracts with for-profit companies. Furthermore, out of the contracts with for-profit companies, in almost 24% of the contracts containing penalty provisions penalties were assessed against the contractor, and in almost 53% of the contracts containing incentive provisions incentives were paid to the contractor. In contrast, in none of the contracts with non-profit companies or governments were either incentive or penalty provisions enforced.

Fourth, in contracts with for-profit companies, incentives were enforced much more commonly than were penalties. Furthermore, in several cases only very small penalties were imposed, for example under one contract calling for base payments to the contractor of over \$3 million, \$619 of penalties were assessed. This data does not explain

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<sup>15</sup> Incentives were also more common in contracts with for-profit companies than in contracts with governments and non-profit companies. However the difference was not statistically significant.

whether the small size of the penalties is due to the penalties being triggered only by unlikely events, insufficient data collection to prove that the penalty applied, or political concerns which could make imposition of penalties difficult.

Some of this difference may be because contractors will demand payment of incentives if they are due, while penalties are only paid if the agency collects the data required to prove that the penalty applies and takes the initiative of demanding payment. Contracts with non-profit and government contractors were as likely as contracts with for-profit contractors to include incentive provisions, but were less likely to include penalty provisions. Furthermore, no payment was made under the incentive and penalty provisions of any of the contracts with non-profit or government contractor.

Fifth, the most common types of penalty or incentive provision are related to service quality and maintenance/safety. This indicates that many transit agencies are concerned that contractors may not be as interested in service quality, maintenance and safety as the agency would like them to be. As discussed above, contractors may be less interested in service quality than the transit agency unless the contractor has a financial interest in increasing the ridership of the service or the reputation of the contractor is tied to the service quality. Contractors may also be less interested in maintenance if the vehicles are provided by the

transit agency. Contractors may be less interested in safety if the agency bears the cost of insurance and the agency's name, not the contractor's, is associated with the service.

Table 5.11 raises the issue of why penalties and incentives are enforced in some contracts and not in others. In order to explore this issue, Tables 5.12, 5.13 and 5.14 examine whether the frequency of using and enforcing incentives and penalties varies with the characteristics of the transit agency.

**TABLE 5.12: Use and Enforcement of Incentive and Penalty Provisions by Size and Type of Transit Agency**

	Incentives		Penalties	
	Number Exercised		Number Exercised	
Total Number of Vehicles Controlled by Agency				
Fixed Route Bus:				
Over 50 vehicles (11)	4	3	8	4
50 or fewer vehicles (10)	3	2	5	2
Paratransit:				
Over 50 vehicles (49)	9	5	20	6
50 or fewer vehicles (46)	5	2	9	0
Type of Transit Agency				
Fixed Route Bus:				
City (9)	4	4	5	2
County (1)	1	0	0	0
Independent Authority (9)	3	1	7	3
Other (2)	0	0	1	1
Paratransit:				
City (36)	3	1	11	0
County (7)	1	0	1	0
Independent Authority (47)	9	5	15	5
Other (5)	1	1	1	1

Table 5.12 is limited by the small sample size of some of the categories, however it does illustrate several points. With regard to paratransit systems, incentives and penalties were included approximately twice as often by large agencies

than by small agencies and penalties were enforced more often by large systems and by independent authorities. This indicates that use, and enforcement, of incentive and penalty clauses may be related to the agencies experience with operating and managing transit and paratransit. In contrast, no significant pattern is evident with regard to fixed route bus systems. This may indicate that knowledge about how a bus system should perform is more widespread than similar knowledge about paratransit systems. Agencies may therefore be more willing to use contractual mechanisms to control contracts with regard to fixed route bus systems and may desire more detailed, hands on, control with regard to paratransit systems.

**TABLE 5.13: Use and Enforcement of Incentive and Penalty Provisions by Number of Bids on Contract**

	Incentives Number Exercised		Penalties Number Exercised	
<b>Fixed Route Bus:</b>				
Non Competitive (5)	1	1	1	1
One (3)	0	0	3	1
Two (1)	1	0	0	0
Three (4)	0	0	1	1
Four (2)	1	0	2	0
Five (2)	2	1	2	1
Six or more (4)	2	2	4	2
<b>Paratransit:</b>				
Non Competitive (7)	0	0	1	0
One (22)	2	0	3	0
Two (19)	1	1	3	1
Three (19)	0	0	5	0
Four (12)	4	1	8	1
Five (7)	3	2	2	1
Six or more (9)	4	3	7	3

Table 5.13 also shows that, for all contracts, incentives and penalties are included more frequently when there are four

or more bids. For paratransit contracts, incentives and penalties are also enforced more frequently when there are four or more bids. This is especially true with regard to the enforcement of penalties in paratransit contracts. Only one of twelve contracts containing penalties was enforced when the transit agency received three or fewer bids compared to five of seventeen contracts when the transit agency received four or more bids. A possible explanation for this behavior may be that when the agency has only a single contractor and had only a few bids for the contract, that it believes that enforcing penalty provisions may damage the relationship between it and the contractor and result in the contractor actually providing poorer service.

**TABLE 5.14: Use and Enforcement of Incentive and Penalty Provisions in Paratransit Contracts by Number of Paratransit Providers**

Total Number of Paratransit Providers	Incentives Number Exercised		Penalties Number Exercised	
Two or more (55)	6	5	17	5
One (40)	8	2	12	1

Table 5.14 shows that while the number of entities providing paratransit service has no significant impact on whether incentive and penalty provisions are included in a contract, both incentives and penalties are more frequently enforced when there is more than one provider of paratransit services. A possible reason for this is that a transit agency with multiple providers can replace one of them more easily than a transit agency can replace a single provider and thus



is less concerned that enforcing a contract may damage the relationship between the agency and the contractor.

Another interesting issue is the frequency with which incentive and penalty provisions are combined with different types of compensation provisions in paratransit contracts.

**TABLE 5.15: Use of Either Incentives and Penalties with Compensation Provisions in Paratransit Contracts**

	Fixed Fee per Unit Supplied	Fixed Fee per Unit Consumed	Cost-Plus
Ridership	4 (7.0%)	0 (0.0%)	3 (25.0%)
Service Quality	21 (36.8%)	5 (25.0%)	3 (25.0%)
Economic Efficiency	7 (12.2%)	1 (5.0%)	1 (8.3%)
Safety/ Maintenance	14 (24.6%)	1 (5.0%)	3 (25.0%)
Reporting	11 (19.3%)	3 (15.0%)	2 (16.7%)
Total Contracts	57	20	12

Table 5.15 shows the frequency with which different types of incentive or penalty provision were utilized in paratransit contracts under each principal type of compensation provision. An interesting and unexpected observation is that there is no significant difference in how often incentives and penalties related to economic efficiency occurred in each type of contract. Because fixed fee contracts are for specific limited amounts, and cost-plus contracts do not have specific limitations, it would have been expected that more cost-plus contracts would include incentives and penalties related to economic efficiency.

Incentives and penalties related to service quality are, as expected, used more frequently in fixed fee per service supplied contracts than in other types of contracts. As stated earlier, in these contracts the contractor has an

incentive to reduce costs, potentially through reducing service quality. In cost-plus contracts there is no incentive to reduce costs and in fixed fee per unit consumed contracts there is an incentive to encourage people to use the service, potentially through providing high service quality.

Finally, incentives and penalties related to ridership were never used in fixed fee per unit consumed contracts. This is reasonable since the compensation provision provides a direct ridership based incentive.

### **5.7 OWNERSHIP OF VEHICLES**

Table 5.16 shows the range, mean and median number of bids received for fixed route bus and paratransit contracts when the contractor or the agency provide the vehicles.

**TABLE 5.16: Number of Bids by Entity Providing Vehicles<sup>16</sup>**

	N	Range	Median
Fixed Route Bus			
Agency:	12	1-8	5
Contractor:	9	1-6	3
Paratransit			
Agency:	25	1-8	4
Contractor <sup>17</sup> :	45	1-11	2.5

Table 5.16 shows an interesting increase in the number of bids received, when contracting for either fixed route bus or paratransit, when the agency provides the vehicles compared to

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<sup>16</sup> This table excludes contracts which require both parties to provide some of the vehicles.

<sup>17</sup> The numbers given in this line exclude one program involving a user side subsidy program with multiple providers. A total of 35 bids were received which would raise the median number of bids to 3.

when the contractor is required to provide the vehicles. This is consistent with expectations that requiring contractors to provide vehicles will reduce the number of contractors able or willing to bid on the contract.

Table 5.17 summarizes the length of the transit service contracts by type of compensation, cost-plus, fixed fee per service provided and fixed fee per service consumed, and type of contractor winning the contract. This table excludes contracts that do not include a specific length but are instead renewed automatically until one of the parties acts to terminate the contract<sup>18</sup>.

**TABLE 5.17: Length of Transit Service Contracts<sup>19</sup>**

	Cost-Plus		Fixed/Provided		Fixed/Consumed	
	N	Median	N	Median	N	Median
For-Profit:	14	3.0	44	3.0	18	1.75
Non-Profit:	1	1.0	13	1.0	4	2.0
Government:	1	1.0	8	1.0	1	1.0

Table 5.17 shows that current transit service contracts are short term, averaging 3 years or less. The longest contract reported in the survey was for 6 years. Since the average lifespan of a car or bus is considerably greater than these contract terms, contractors required to purchase vehicles that are not suitable for other uses may need to amortize the cost of these vehicles over a short period of time. This would indicate that contracts in which the agency

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<sup>18</sup> Seven of the negotiated contracts and one of the competitively bid contracts lack an explicit term.

<sup>19</sup> This table excludes all contracts that do not contain an explicit contract length.

owns the vehicles may have lower overall costs as well as a greater number of bidders.

Table 5.18 shows the frequency with which the contractor and the agency own the vehicles used in paratransit service and the use of maintenance based incentives and penalties.

**TABLE 5.18: Ownership of Vehicles in Paratransit Contracts**

Maint. Incentive/Penalty	Contractor	Both	Agency
Included	4	0	14
Not Included	57	4	16
Total Vehicle Ownership	61 (64%)	4 (4%)	30 (32%)
Teal's Survey	98 (58%)	8 (5%)	64 (37%)

Table 5.18 shows no statistically significant change in which entity owns the vehicles used in paratransit service from the percentages found in Teal's survey with most contracts still requiring the contractor to provide the vehicles. Table 5.16 and 5.17 suggest that many agencies should consider changing this and providing the vehicles. Table 5.18 also shows that maintenance and incentive penalties are included most frequently when the agency provides the vehicles. This is consistent with expectations since a contractor generally has less of an interest in providing good care for the agency's property than it has in providing good care for its own property.

## **5.8 ECONOMETRIC ANALYSIS**

One of the objectives of the survey was to obtain sufficient information to model how the operating, maintenance, capital and administrative costs of a contracted transit service varied with the structure of the contract.

The idea was to construct separate models of how each of these costs varies with the structure of the contract. This would allow a detailed analysis of how each cost varied with changes in contract structure and by summing these costs the effect of contract structure on the total cost of a contracted transit service could be evaluated. Each cost model would be based on a single performance variable such as vehicle hours or vehicle miles with dummy variables reflecting the existence of various types of contract provisions.

This model would basically be a type of cost allocation model, with operating costs based on vehicle hours, maintenance costs on vehicle miles, administrative costs on the number of passengers, and capital costs based on the number, and type, of vehicles used. Cost allocation models have the widest acceptance in the transit industry as a method of estimating route costs and are especially useful for estimating the costs of proposed service changes (Fielding, 1987).

Considerable differences were expected between the paratransit and fixed route bus services, especially with regard to the number of operating personnel required, the number of passengers carried per hour, the amount of maintenance required per vehicle, and the amount of administration and scheduling staff, making it advisable to base the econometric analysis on a single type of service. Considerable differences also exist between the operating

costs of commuter express bus services and local bus services making comparisons of these types of service difficult. Since 95 of the survey responses dealt with contracted paratransit services and only 24 responses dealt with all types of fixed route bus services, I chose to analyze paratransit services.

The first difficulty encountered was a lack of detailed data. Only ten of the transit agencies contracting for paratransit service provided detailed data identifying the contractors' operating, maintenance, capital and administrative costs, and three of these did not have available either good estimates of the number of agency personnel involved in administering and monitoring the contract or did not have data on the contractor's vehicle miles. Additional transit agencies were contacted to try to obtain additional data, but only two additional agencies were willing and able to provide the detailed data requested. This was too small a data set to allow estimation of the planned models, rendering it impossible to perform the desired detailed analysis of the effect of contract structure.

The fallback position was to simplify the model so that it no longer required the transit agency to provide detailed information on the contractor's costs. This model would be limited to analyzing how total operating and maintenance costs vary as a function of some characteristics of the service area, the amount of service provided, and the structure of the contract. While this model is limited, it should be noted

that a similar single-variable model was utilized by Teal to predict private operator costs for all-day fixed route service without a high peak to base ratio. The only differences are that Teal's additional variables were the size of the contracted service and the size of the agency while my model utilized variables reflecting the structure of the contract. The model is described in greater detail in section 5.8.1 and the results of the analysis are described in section 5.8.2.

### **5.8.1 Description of the Cost Model**

Total operating, maintenance and administrative costs per revenue vehicle hour and per revenue vehicle mile were estimated as a function of a constant, the consumer price index in the region, and dummy variables indicating the type of compensation provision in the contract, the type of entity acting as the contractor, the ownership of the vehicles, the presence or absence of five types of incentive/penalty provisions, the contracting method, the number of bidders for the contract and the amount of monitoring effort by the agency. The incentive/penalty provisions were the following: Ridership, Service Quality, Economic Efficiency, Maintenance, and Reporting.

Revenue vehicle hours of service was chosen as the principal measure of output for two reasons. First, operator wages is the largest single expense for most paratransit services, and this expense is related directly to the amount

of time the vehicles are operating. Second, while the cost per passenger is probably the most interesting measure of efficiency for transit agencies, it is affected by the geography of the service area, the spatial distribution of origins and destinations and the effectiveness of the schedulers. Therefore, cost per revenue vehicle hour is the measure of efficiency that can most readily be compared between different transit operations. Cost per revenue vehicle mile was used as a secondary measure because of its common use as a measure of efficiency in transit operations. National averages for both of these measures are available which can provide a partial reality check for the results of the model.

The consumer price index was used to adjust for the different costs of living in different parts of the US which would be expected to be directly reflected in the unit costs of the service.

No prior expectation existed as to the effect of the type of entity acting as the contractor. On one hand, private, for-profit companies may be driven by the profit motive to have lower costs. On the other hand, the profit motive will also generally drive these companies to charge the highest possible price in order to maximize their profit.

Incentive and penalty provisions, except for economic efficiency, were expected to increase the costs of the contracted service since they would generally provide



contractors with an incentive to exert additional effort, and funds, in an area and may also increase the risk faced by the contractor. Additional dummy variables were added to reflect whether or not the incentives and penalties in the contract were enforced, since lack of enforcement would be expected to reduce their effect.

Use of fixed price contracts was expected to result in lower operating and maintenance costs than any other type of compensation provision and cost-plus contracts were expected to result in the highest operating and maintenance costs. All of these factors were expected to result in fairly consistent percentage increases or decreases in the unit costs of service.

Two forms were used for the model. The first was a log form where the coefficient of each dummy variable would give the percentage increase or decrease from the base cost resulting from the presence of the factor indicated by the variable. The second model was a simple additive model where the coefficient of each dummy variable represented an increase or decrease in the unit cost of the service.

### **5.8.2 Description and Analysis of Results**

The modelling process did not produce any useful, statistically significant, results. A review of the data from the 40 contracts showed that 4 of the systems had extremely high costs per vehicle hour, ranging from \$120 to \$480 per

vehicle hour. The data on these contracts could not be confirmed and was therefore eliminated from the modelling process. However, even after eliminating this data, no useful, statistically significant results were obtained.

This lack of useful results was not unexpected, considering that there were several major problems faced in this modelling process. First, there are many differences between the systems that were not reflected in the model. These include the characteristics of the system, such as whether it provides service to the general public or only to elderly and handicapped people, the number of days and hours of service provided, and the population density. The differences also include the relationship between the contractor and the transit agency. These differences, especially the relationship and any informal agreements between the contractor and the transit agency, may be more significant than the terms contained in the formal written contract.

Second, some of the data received from the systems was not as accurate as desired. Some of this was because the agency did not need the data to be highly accurate. For example, agencies that compensate the contractor based upon one measure, such as hours of service provided, may only need an approximate value for the number of miles of service provided. Also most agencies do not keep an accurate record of the total management resources expended with regard to a

contract.

Third, as a result of agencies lacking data or providing apparently inaccurate data, the data set was very small compared to the number of variables, consisting of only 36 observations. This can lead to extremely well fitting models, where the fit is entirely an artifact of the specific data used.

Fourth, it was difficult to account for the impact of vehicle ownership. The impact of vehicle ownership depends not only on who owns the vehicles but also the term of the contract, the nature of each vehicle, including its adaptability to other uses, and whether the contractor operates other systems where it might use the vehicles. Some of this impact is reflected directly in the amount contractors must charge under a contract to cover their costs and some of the impact is reflected in the number of bids for the contract.

Finally, the analysis did not measure the size of the incentive and penalty provisions with respect to the size of the contract. The reason that incentive and penalty provisions were not statistically significant may be because they were too small to affect the behavior of the contractors, and therefore the cost of the contracts.

These observations suggest that case studies may be the best method of analyzing the effects of contract structure. Case studies allow the analysis of most of the above factors,

especially the analysis of the relationship between the contractor and the transit agency. Case studies therefore allow an analysis of how the parties actual agreement, which may be informal, affects the cost of the contract and the contractor's performance.

## **6. CASE STUDIES**

In order to obtain a better understanding of how contract provisions interact and affect the performance of contractors, in depth case studies were performed of three transit agencies. These agencies were selected primarily to represent a range of different contracts, including compensation provisions, and the use and enforcement of incentive and penalty provisions. The principal interest was in discovering how each of the agencies chose to utilize the penalties and incentives included in their contracts. This chapter describes (in order) each of the three transit agencies, the environment in which they operate, the contracts utilized by each agency, and the behavior of their contractors. The final section of this chapter summarizes the case studies and compares the results with the predictions of contract economics.

### **6.1 CITY OF REDONDO BEACH, CALIFORNIA**

**6.1.1 The Service Area** The service contracted by the city of Redondo Beach provides service to the cities of Redondo Beach and Hermosa Beach, located in Los Angeles County in Southern California. The service is a general public demand responsive service and is the sole public transit in the region. Redondo Beach contains 60,156 people and covers just over 16 square kilometers. The median household income in the city is \$51,913 with 5.6% of the population living below the poverty

level. The labor force consists of 41,792 people, 81.2% of the residents age 16 and above, 40,378 of whom are employed (96.6%). Some 21.8% of these people are employed in executive, administrative or managerial occupations and another 20.3% are employed in professional specialties. Over 95% of households have at least one car. Most people (83.4%) drive to work alone, while 8.2% commute in carpools, and 1.4% use public transportation. The city contains 3,591 residents age 16 or older with mobility limitations, comprising 4.7% of the population between the ages of 16 and 64 and 32.3% of the population over the age of 64.

Hermosa Beach contains 18,219 people and covers just over 3.7 square kilometers, plus an additional 11.5 square kilometers of water. The median household income in the city is \$54,497 with 5.5% of the population living below the poverty level. The labor force consists of 14,090 people, 85.4% of the residents age 16 and above, 13,826 of whom are employed (96.1%). Some 26.0% of these people are employed in executive, administrative or managerial occupations and another 25.8% are employed in professional specialties. Over 95% of households have at least one car. Most people (83.5%) drive to work alone, while 7.2% commute in carpools, and 1.1% use public transportation. The city contains 274 residents age 16 or older with mobility limitations, comprising 0.7% of the population between the ages of 16 and 64 and 1.6% of the population over the age of 64.

**6.1.2 Description and History of the Contract** In 1985, the City of Redondo Beach started a competitive bidding process for a curb-to-curb transit service serving senior citizens, the disabled and the general public of Redondo Beach and specific areas around it. This was to be a new service, as well as the only transit service in the region. Three companies bid for the contract. Since then, the contract has been rebid on several occasions although the same company has won it each time. The same basic contract continues to be used, except that the compensation and liquidated damages sections have been modified as described below. The contract was drafted and is administered by an office of two administrators and one secretary. Other city offices provide assistance during the drafting, review and bidding of the contract.

The original contract provided that the contractor would be compensated at a fixed rate per vehicle hour of service provided by the contractor. The city estimated the number of hours of service that would be required, but did not guarantee that those hours would be requested or paid for. The contract was for a three year period, but provided that the hourly rate and the service plan would be adjusted annually. The annual increase in the hourly rate was limited to the increase in the Los Angeles - Long Beach area CPI, except that extraordinary increase in insurance and fuel costs would be considered separately.

After two years the city and the contractor agreed to modify the compensation arrangement since the hours of service were substantially less than had been estimated and, as a result, the contractor was losing money on the contract. The city felt that renegotiation would be in its best interest in order to avoid forcing the contractor to reduce maintenance or service quality in order to cut its costs. The modified contract provides for the contractor to be paid a fixed monthly fee to cover its fixed costs, including staff wages, vehicles, supervision expenses, some general administration and insurance, plus a fee per vehicle service hour to cover operator wages, maintenance wages, fuel, parts, and some general administration costs. In 1991, the payments to the contractor totalled over \$680,000.

All fares are collected in locked fareboxes and deposited in the city's bank account. The amount of fares collected is reported to the city monthly.

The contractor has always been responsible for providing the vehicles used in the service, which are 12-passenger vans. The city provides maintenance equipment and facilities, a dispatching office, parking facilities, and marketing for the contractor at no cost.

The contractor has been required to obtain comprehensive general liability and property damage insurance in amounts of not less than \$15 million for injury or death to any one person and \$100,000 for property damage. Collision and



comprehensive vehicular liability insurance are also required with similar limits. Prior to commencing work under the contract, the contractor was also required to post a surety bond or irrevocable letter of credit equivalent to 25% of the total annual cost of the contract to guarantee the contractor's performance.

The contract has always contained detailed liquidated damages clauses. Each time the service plan is adjusted or the contract is rebid, the liquidated damages clauses are modified to reflect the current concerns of the transit agency and the funding agencies, generally by simply adding new damage clauses. The current contract includes liquidated damage clauses for:

1. Failure of operator to wear proper uniform - \$20
2. Failure to achieve 30 minute response time on 90% of immediate service calls, measured on a monthly basis - \$250
3. Failure to arrive within 25 minute window on 90% of calls, measured on a monthly basis - \$250
4. Receipt of 10 or more legitimate complaints per month - \$50
5. Failure to complete any report data - \$150
6. Vehicle not available for service - \$100
7. Failure to clean vehicles twice weekly - \$50
8. Failure to have new employee fingerprinted - \$50
9. Failure to file accident report within 24 hours - \$50
10. Failure to achieve 5 passengers per hour as calculated under LACTC Subregional Incentive Program - \$1500/month
11. Failure to provide required staff - \$50
12. Failure of executive staff to attend transit meetings - \$25
13. Failure to obtain licenses and vehicle inspections - \$100
14. Failure to conduct preventive maintenance every 3,000 miles - \$50
15. Failure to collect data separately for within and outside Redondo Beach - \$1000
16. Failure to achieve average 5 passengers per hour as calculated under LACTC Transit Performance Measure Program - \$500

17. Failure to assign staff specified in proposal - \$250

The contractor is required to provide the transit agency with the following reports:

Daily - bank deposits, service logs and trip sheets;  
Monthly - invoices, operational reports and improvement reports;  
Quarterly - quarterly summary reports;  
Annual - annual report and summary operation assessment.

The monthly improvement reports are evaluations by the contractor of whether improvement can be made in a specific aspect of the service, such as safety, maintenance, productivity, etc. The agency provides the contractor with a schedule of topics to be evaluated.

The transit agency has the right to terminate the contract for non-compliance upon 30 days notice, or lesser notice if public health and safety are at risk. The determination of non-compliance is made by the city. In the event of termination, the contractor is entitled only to compensation for services actually performed and at the rate specified in the contract.

On the whole, this appears to be a good contract for both the contractor and the transit agency. The compensation provisions, as modified, provide the contractor with an incentive to minimize costs, while still protecting the contractor from the risk of changes in the amount of service to be provided. The contractor is obligated to provide the vehicles, however it is assured of sufficient income to cover the monthly costs of the vehicles, and several of the other

fixed costs are being paid by the city, such as office rent and maintenance facilities. The insurance clause provides the contractor with a strong incentive to operate safely and the termination provision gives the transit agency the ability to act fairly quickly to replace the contractor in the event that the contractor's performance becomes unacceptable. Finally, the second and third liquidated damages provisions, which are extremely difficult to monitor, allow the city to base the determination of compliance on either a one-day sample or a combination of sample days during each month, at the discretion of the city. Allowing the city to use sampling enables it to monitor the contractor's performance in these areas at a much lower cost than if it was required to monitor performance for an entire month.

The principal concern with the contract, looking at it from a contract economics viewpoint, is that there seem to be a large number of small penalties. The liquidated damages section is the only place in the contract where service standards or measures are described, however the penalties are so small compared to the total value of the contract that financially they are not likely to have a substantial effect on the behavior of the contractor. They may have an impact on the contractor if it is believed by the contractor that violation of the liquidated damages provisions will result in it losing the contract in the future.

### **6.1.3 Operation and Administration of the Contracted Services**

The investigation of how the contracted system actually operates proved very interesting. The transit administrators report that they, and the general public, are very happy with the service. They also feel that while the drivers employed by the contractor are interested in, and willing to, provide high quality service, the contractor itself is less interested than they are in providing high quality service. Looking at the contract, the city's feeling are not surprising, since the contract includes no meaningful incentives or penalties which could serve to align the contractor's interests with the city's.

Because of the different interests, the transit administrators believe that the only way to insure good service is for city employees to monitor and work with the contractor, and its employees, continuously. As a result, an employee of the transit office would call or visit the contractor's office every day and would observe the vehicles in the field while they were performing other duties. All complaints were filed with the transit office. City employees would also meet with the contractor's drivers, and other personnel, to make sure that they knew what the city wanted and had the feeling that the city was interested in how well they do their jobs. However, the city does not have an organized, statistically-based, program to monitor the performance of the contractor.

One of the most interesting points is that in the entire history of this service, not a single penalty has been imposed against the contractor, and that only once has imposition of a penalty been seriously threatened. The reason for this is that the city sees the penalty provisions as (1) providing guidance to the contractor about the city's current concerns and (2) providing the city with a tool to use in negotiating with the contractor. These negotiations are used to insure that the contractor provides good service under the contract and also to convince the contractor to provide some service or benefit, such as additional employee training, that is not required by the contract. The city uses this tool primarily by implicitly threatening to stop being a "nice guy" and to start enforcing the penalties if the contractor is not cooperative. This means that the contractor probably does not consider the penalty provisions written in the contract to be the ones that actually govern its behavior.

The city also held a strong belief that if the liquidated damage provisions were enforced, or if the city expressly threatened to hurt the contractor's reputation, that the relationship with the contractor would turn adversarial and the quality of the service provided would drop dramatically. One previous member of the transit administration stated that the time to start assessing penalties was when you wanted to get rid of the contractor.

**6.1.4 Evaluation** Redondo Beach, if it is at all typical of how other transit agencies operate, helps explain why so few penalty provisions are enforced and why incentive and penalty clauses often seem to have no significant effect. The clauses are largely ignored by the transit agency, and therefore probably by the contractor. The behavior of the city is curious because the feeling was expressed that contractors are only interested in profit. It would seem likely that the city would want to use the contractor's interest in profit to guide its behavior. However Redondo Beach is a small transit agency, responsible for only 12 vehicles, with all transit operations contracted under a single contract. Under these circumstances, as discussed in Section 5.2 (d), the city could feel that it lacks the power to enforce penalty provisions because of the potential effect on the city if the contractor responded by reducing the quality of service or terminating service.

Efficiency and effectiveness statistics for Redondo Beach's paratransit service are: \$10.16 per passenger, \$3.47 per vehicle mile, and \$53.20 per vehicle hour. These are somewhat higher than the national averages of: \$9.69 per passenger, \$2.27 per vehicle mile, and \$31.66 per vehicle hour. At least some of this difference is probably due to the fact that Redondo Beach requires its contractors to provide vehicles, however this difference also raises an issue of whether Redondo Beach's operations could be improved.

## **6.2 SUN LINE TRANSIT AGENCY**

**6.2.1 The Service Area** Sun Line Transit Agency operates in the Coachella Valley in southern California, including the city of Palm Springs. Sun Line operates a fixed route bus service in much of the area and contracts for a single demand responsive service. The service area contains a population of approximately 230,000 in an area of over 1,000 square kilometers. The median household income in the city is approximately \$32,420 with almost 12% of the population living below the poverty level. The labor force consists of 65% of the residents age 16 and above, 93% of whom are employed. Some 16% of these people are employed in service occupations and another 14% are employed in professional specialties. Over 94% of households have at least one car. Most people (69%) drive to work alone, while almost 15% commute in carpools, and almost 2% use public transportation. The city contains approximately 7,000 residents age 16 or older with mobility limitations, comprising 2% of the population between the ages of 16 and 64 and 11% of the population over the age of 64.

**6.2.2 Description and History of the Contract** Prior to 1991, Sun Line provided paratransit service to its service area through four contractors, each responsible for a separate service area. All four of the contractors were private non-profit entities that had been providing this service for

between 5 and 10 years. These four contracts had been poorly supervised by the transit agency, as a result of which each of the contractors had started imposing their own rules for rider eligibility and different standards of service quality. There were also continual problems when riders needed to transfer between different carriers. As a result of dissatisfaction with the existing situation, the transit agency decided to consolidate the service under a single operator. This contract was bid on and signed in 1991 and continues currently.

The new contract was for a single provider because the agency felt that if they divided the contract it would be too small to interest major companies with the resources to perform as desired. Five companies bid for the contract. The agency selected the contractor because it offered a competitive price and (1) was willing to be responsive to requests relating to data collection and operations and (2) was willing to become involved in and supportive of the community. For example, the contractor provides some service to charities in the region without charge. Two types of service are provided under the contract. First, the contractor provides normal demand-responsive paratransit service to the elderly and handicapped population of the region. Second, the contractor provides a door-to-door scheduled service for social service organizations. These organizations contract with Sun Line to transport people to



senior centers, adult day care centers and similar facilities and Sun Line includes this in the paratransit contract.

The contract provides for the contractor to be paid on a cost plus 10% basis. There is a fixed maximum amount which may be paid the contractor in return for which the contractor is obligated to provide a set number of service hours. If the contractor provides fewer service hours the maximum payment to the contractor is reduced by a set amount per service hour.

The contract is for a base period of three years with the possibility of extension for 2 additional years. All fares are the property of the transit agency and must be deposited in the agency's account at least weekly.

The contractor is obligated to provide the transit agency with a limited number of monthly reports as follows:

1. All information required under Section 15 and state and local rules, including service hours, miles, passengers, passenger travel time, passenger-miles, farebox revenues, accidents and roadcalls.
2. Labor and fringe benefits charged to Sun Line.
3. Expenses for materials charged to Sun Line.
4. Missed trips, service requests refused, employee training and turnover, and complaints and compliments.

All vehicles are provided by the transit agency, although five of the vehicles are currently being leased by the agency from the contractor. The contractor is responsible for preventive and minor maintenance on the vehicles with major maintenance the responsibility of the transit agency or contracted by them with third parties.

The contract provides specific standards for the contractor's operation in several areas including:

1. Equipment in maintenance area.
2. Preventive maintenance program.
3. Driver training.
4. Telephone information service.
5. Uniforms and appearance of drivers.
6. Driver work rules.

The contract also includes several other performance and productivity standards including:

1. Average pick-up within 10 minutes of promised time.
2. Return trip pick-up within 30 minutes of promised time.
3. Average trip time not to exceed 20 minutes.
4. Preventable accidents less than one per 60,000 miles.
5. Vehicle breakdowns less than one per 10,000 miles.
6. Passengers per RVM shall not be below 0.40.
7. Passengers per RVH shall not be below 3.0 for demand responsive.
8. Passengers per RVH shall not be below 4.0 for subscription service.
9. RVH per employee shall not fall below 15,000.
10. Vehicles per maintenance employee shall not be below 8.0.
11. Farebox recovery rate of 10% for Demand Response service.

Incentives and penalties are also included in the contract as follows:

1. Over 97.5% of pickups in 15-minute window: +\$0.01 per VM.  
Under 95% of pickups in 15-minute window: -\$0.01 per VM.
2. Failure to pick up rider for cause within control of contractor: \$100.
3. In-vehicle ride time of over 1 hour for demand-responsive or 1.5 hours for subscription riders: \$25.
4. Over 10,500 miles between road calls: +\$0.01 per VM.  
Under 10,000 miles between road calls: -\$0.01 per VM.
5. Over 70,000 miles between accidents: +\$0.01 per VM.  
Under 60,000 miles between accidents: -\$0.01 per VM.
6. Failure to achieve satisfactory rating in annual California Highway Patrol Safety Compliance Report: \$500.
7. Any preventive maintenance not complete within 300 miles of scheduled interval: \$250.
8. Non-compliance with vehicle appearance rules: \$25.
9. Non-compliance with reporting requirements: \$250 for first infraction and \$500 for subsequent infractions.
10. Non-compliance with uniform requirements: \$10.

These penalties range from the insignificant, \$10 for uniform infractions, to the fairly substantial, \$500 for failing the

safety inspection.

All complaints are supposed to be made to the transit agency, which then investigates and reports back to the complaining party. Sun Line also inspects the contractor's records and maintenance operations and has observers ride the service without the contractor's knowledge to observe the contractor's service directly.

From a contract economics point of view the contract seems to be fairly well designed. The incentives and penalties vary with the importance of the subject matter, however all of the incentives and penalties appear to be too small to affect the contractor significantly. The incentives, penalties and service standards also do not appear to take into account the difficulty of monitoring matters such as on-time performance in a cost effective manner.

### **6.2.3 Operation and Administration of the Contracted Service**

Sun Line is very happy with the contracted service and its relationship with the contractor. No survey has been done of the public using the service, but it provides approximately 6,000 trips per month and the agency receives an average of 4 complaints and 2 compliments per month. The transit agency recognizes that some of the public may be reluctant to complain about service upon which they rely heavily and does attempt to monitor the passenger's opinions through conversations with the social service organizations and an

Advisory Board.

Although some problems did occur shortly after the contractor started operations, they were primarily the result of problems with the vehicles provided by the transit agency. As these vehicles have been replaced with newer vehicles almost all of the problems have disappeared.

This agency, like Redondo Beach, has never enforced any penalty provisions against its contractor. The contractor has also never billed it for any incentives, although both parties recognize that the contractor exceeds the required on-time performance. The administrator stated both the agency and the contractor are principally concerned with working together to provide good service and that there is an unwritten rule that as long as things are amicable no incentives or penalties will be paid. The penalties and incentives are seen as incentives to cooperate, because of the potential both parties have to make life difficult for the other party.

#### **6.2.4 Evaluation**

Sun Line, like Redondo Beach, includes incentives and penalties in the contract but does not utilize them to affect the contractor's behavior. An interesting difference between Sun Line and Redondo Beach is that Sun Line believes that the contractor shares its objectives or providing a good service to the community, and the contractor shows this through providing free service to charities and participating in

community meetings about the service. Redondo Beach felt that the contractor did not share its objectives and that it needed to monitor the contractor closely. As a result, Sun Line uses less than one full time employee worth of time monitoring and administering a contract worth over \$700,000, while Redondo Beach uses three people to monitor and administer its contract worth less than \$600,000.

Sun Line's costs are: \$8.39 per passenger, \$2.10 per vehicle mile, and \$27.40 per vehicle hour. These costs are below the national averages and significantly lower than those of Redondo Beach. 17% lower cost per passenger, 39% lower cost per vehicle mile, and 49% lower cost per vehicle hour. Some difference in costs is due to the fact that Redondo Beach requires the contractor to provide the vehicles whereas Sun Line provides the vehicles for their service. Therefore, the cost of vehicles is included in the contract cost for Redondo Beach and not for Sun Line. However these costs may also indicate that Sun Line's approach of working closely with a contractor may be somewhat more efficient.

Sun Line also emphasizes the need to obtain a substantial number of bidders for the contract. By designing the contract to be a sufficient size, and agreeing to provide the vehicles, Sun Line obtained five bidders for the contract. This allowed it to select a bidder that would not only provide the service at a reasonable cost but also work with the agency to provide good service quality.

## **6.3 MASSACHUSETTS BAY TRANSPORTATION ADMINISTRATION**

**6.3.1 The Service Area** The Massachusetts Bay Transportation Authority has a membership of 78 cities and towns and serves an additional 52 cities and towns, all in eastern Massachusetts. The total service area covers approximately 6,000 square kilometers and has a population of 4,052,220. The median household income is approximately \$40,000 with 8.3% of the population living below the poverty level. Approximately 70% of the residents aged 16 and above are members of the labor force, 94% of which are employed. Over 85% of households have at least one car. Most people (65.8%) drive to work alone, while 9.8% commute in carpools, and 14.2% use public transportation. Approximately 1.9% residents aged 16 to 64 have mobility limitations, as do 15.1% of the population over the age of 64.

The area ranges from cities and towns fairly similar to Redondo Beach to cities like Chelsea which has a median income of \$25,144 with 24.1% of the population living below the poverty line. The residents of Chelsea are comparatively transit dependent, with 36.3% of households not owning a car and 23.4% of the journeys to work made by public transportation.

**6.3.2 History of the Contracted Service** The Massachusetts Executive Office of Transportation and Construction (EOTC) commenced providing paratransit service for elderly and

handicapped riders in 1983 after receiving requests from elderly and handicapped groups. After a short period this service was made the responsibility of the MBTA, the regional transit agency. This service was operated by THEM, Inc., a nonprofit community-based organization, under a negotiated contract with first the EOTC and then the MBTA. Service was initially provided to a small portion of Boston and two of its inner suburbs. The service area was focused around the Longwood medical area, which contains several hospitals. The contract included detailed requirements for the contractor's operation and provided the agency with the ability to monitor and correct the details of the contractor's operation. Shortly after the service was made the responsibility of the MBTA, the labor union representing drivers at the MBTA objected to the service on the grounds that the contract was not "arm's length" because MBTA's control was so detailed that it was the "employer" of the drivers. They argued that therefore the drivers should belong to the union. The MBTA and THEM responded by modifying the contract to establish an "arm's length" relationship, reducing the MBTA's control over the contractor's operations. All subsequent contracts have continued to be "arm's length" transactions.

Since the service provided by THEM was very satisfactory to both the MBTA and the riders in the area, the MBTA expanded the service area several times until in 1986 it was responsible for virtually all paratransit service in the core

portion of the district, Boston and its 14 nearest suburbs. In 1986 and 1987 the MBTA also hired other contractors to operate paratransit service in two more distant suburban regions. A major reason for the expansion was that the MBTA believed that this was a transit service it could offer at a reasonable cost to the cities and towns which lacked significant transit service.

The rapid expansion of THEM's service caused THEM to have difficulty in managing the service and resulted in a significant reduction in service quality and in the THEM's relationship with the MBTA. The MBTA also wanted to establish a pattern of regularly rebidding contracts to insure competitive contracts. As a result, the MBTA decided to place the contract for the core area out for bids in Spring, 1988.

TMSI won the contract for operating the core area commencing July 1, 1988. TMSI planned to operate as a brokerage, retaining all responsibility for managing and scheduling service while subcontracting the actual carrying of passengers to other companies. Significant problems occurred during the change in contractors from THEM to TMSI. First, many of the drivers employed by THEM chose not to work for TMSI's subcontractors. This resulted in the subcontractors' drivers needing to learn their areas of operation and the riders having to deal with new drivers. TMSI also changed the method of scheduling service and one subcontractor hired a poor manager for its operations. As a result of these



factors, there were many problems with service quality after TMSI took over the service. In the fall, the MBTA decided to replace TMSI and replaced the broker with three contractors, two of whom had been TMSI's subcontractors. By the time TMSI's contract was terminated in December 1988, most of the service problems had been resolved.

**6.3.3 Description of the Contracted Service** As of April 1993, the MBTA provides paratransit service through seven independent contractors covering an area of five zones:

- the Core Service Area which consists of 15 cities and towns and dominates the service;
- the North Satellite Area;
- the Northwest Satellite Area;
- the South Satellite Area;
- the West Satellite Area.

Each satellite area is served by a single contractor who may subcontract for a portion of the service. The Core Area is served by three contractors, each one of them responsible for a different section. Originally trips were supposed to both originate and terminate in the same service area, although limited transfers and between area trips were allowed. Currently the MBTA is moving to a system where customers will perceive no boundaries between the service areas.

All of the contracts are similar in structure, although they are not identical (differences exist in the compensation

method, each contractor's authority and responsibility, and the provision of equipment). The following will concentrate on the MBTA's contract with the largest of the three contractors in the Core Area and include comments on how the other contracts differ.

The largest contract is with a major national paratransit contractor. Other contracts are with three for-profit companies, including a school bus operator, and three non-profit organizations.

Each contract is for a period of one year and states that it can be extended for an additional year with the agreement of both parties. This has been interpreted to mean that there is no limit on the number of renewals, although the contract can only be renewed for one year at a time. However, the MBTA believes strongly in competitive selection and has therefore adopted a policy requiring all contracts to be rebid on a regular basis. The MBTA has the right to terminate the agreement with ten days written notice upon determination that the contractor knowingly provided inaccurate or false information. The MBTA may also cancel the contract, without cause, upon thirty days written notice, to the contractor. These provisions are consistent throughout all of the contracts.

The largest contract requires the MBTA to provide all of the vehicles. Each of the other contracts requires both the MBTA and the contractor to provide some of the vehicles, with the agency providing anywhere between 18% and 85% of the

vehicles.

All contracts provide that the contractor will be responsible for taking calls from riders and scheduling trips.

All of the contracts provide for the contractor to be paid on a "modified fixed fee schedule." This schedule provides for the contractor to receive a monthly fee and a fee based on service provided. The monthly fee is calculated in different ways in each contract but is intended to compensate the contractor for fixed costs and overhead related to providing the service. The fee for service provided is generally a fixed fee per service hour (in some cases varying by type of vehicle used) plus a set rate for reimbursement of subcontractors. However, some contracts also provide a flat rate per passenger trip or a per mile rate for certain passenger trips. Each contract also specifies a maximum amount of compensation that will be paid to the contractor during the term of the contract.

Each contract includes two service standards:

1. Passengers are to be picked up within ten (10) minutes of the scheduled pick-up time under normal operating conditions. Notification must be given by the contractor (or the subcontractor) to the customer in the event of unavoidable delays.
2. No passenger is to be kept on board a vehicle for more than sixty (60) minutes unless the factors influencing ride time are beyond the control of the contractor (or the

subcontractor), or if the ride time on the most direct route would be above thirty (30) minutes; in the last case, the actual ride time shall not exceed twice the time required on the most direct route.

Each contract also includes a set of performance incentives. In five of the contracts, the only performance incentives are for missed trips and accidents. The penalty is generally in the range of \$20 - \$25 per missed trip, although in one contract it increases as the number of missed trips in a month increases. Several of the contracts also include an incentive of up to \$500 if there are no missed trips for a period of one to three months. The penalty for accidents is generally \$50 - \$100 per at-fault accident, although one contract again provides for higher penalties as the number of accidents in a month increases. Bonuses of up to \$500 are paid if there are no accidents for a period of one to three months.

Two of the seven contracts include an additional performance incentive based on the number of passenger trips completed per service hour. Penalties of up to \$1000 per month and incentives of up to \$2000 per month can be paid under this provision. In both of these contracts the compensation provision is simply a monthly fee plus a fee per hour of service provided.

The smallest of the seven contracts is for just under \$500,000 per year and the largest for over \$4,500,000 per

year. In comparison to the total compensation under the contract these incentives and penalties potentially may be of significance to the smaller operators, but are unlikely to be of significance to the larger operators.

The MBTA requires each of the contractors to make the following reports:

Weekly:

1. Passenger trips
  - \* requested, completed, not completed
  - \* by type of patron
  - \* by town of residence
  - \* not available
  - \* cancellations
  - \* no-shows
  - \* carried on MBTA vehicles
  - \* carried on non-MBTA vehicles
  - \* trips missed and late
  - \* transfer trips
  - \* transfer trips by town of residence
  
2. Operations data
  - MBTA vehicles
    - \* Total available vehicle hours
    - \* Total revenue vehicle hours
    - \* Total non-revenue vehicle hours
    - \* Total vehicle miles (broken out by deadhead miles and revenue miles)
    - \* THE RIDE passenger - service miles
    - \* THE RIDE passenger - service hours
    - \* All accidents.

For non-Authority owned vehicles (if applicable):

- \* Total number of vehicles available for service
- \* Total vehicle hours available
- \* Total vehicles hours used
- \* Number of THE RIDE passenger trips

Monthly:

1. Summary of all weekly reports.
2. Summary of the total number of tickets collected together with copies of the driver's logs and a section on major problems and recommendations.
3. "Statement of Operations and Costs" which details by cost category the amount billed for the previous month.

Special:

1. Any and all additional statistics and documents necessary to comply with section 15 of the Urban Mass Transportation Act of 1964 as amended.
2. Written notification at such time as compensation expended to date equals seventy-five percent (75%) of the contract cost ceiling. (Contracts for fiscal year 1994 will require contractors to notify the MBTA when compensation equals 25%, 50% and 75% of the contract cost ceiling in order to remind contractors to monitor their budgets continuously.)
3. Daily notification of all passenger complaints received.

**6.3.4 Operation of the Contracted Services** The approach of the MBTA is different than the other two transit agencies. It considers service quality and the relationship between the agency and the contractor as important factors but also expects the contractors to abide by the contracts, paying incentives and collecting penalties. The origin of the approach is that affecting the contractor's income makes the contractor pay attention to the incentive and penalty clauses. The MBTA is primarily interested in monitoring: safety, passenger trips completed and on-time performance, service hours per month (to monitor the variable costs incurred by the contractor), and missed trips per month (to monitor the incentive payments made to the contractor and/or to impose the appropriate penalties). The MBTA conducts unannounced visits to each contractor's premises (garage) 5-6 times annually. During these visits, it examines and verifies the schedule (first and last pick-up) for each vehicle and the total number of trips scheduled for that day. It also performs physical audits to check the condition of the vehicles and the garage

facilities.

Passenger complaints can be filed with the contractor or the MBTA. Complaints are characterized as of a specific type<sup>20</sup> and the contractor is asked to respond to each complaint either to the Authority, or to the customer, or to both. The MBTA received a total of 676 complaints about service in 1990 during which it carried over 325,000 passengers and 209 complaints in 1991 during which it carried over 400,000 passengers.

The MBTA's objective is to monitor contractors' performance so that all incentive and penalty clauses can be strictly enforced. The MBTA also considers the incentives and penalties very important with regard to contract renewal. The MBTA is not required to re-bid the contracts every fiscal year, so the ultimate incentive that each contractor has is to satisfy the Authority with its overall performance so that it will be given the opportunity to renew its contract; if the Authority is not satisfied with the specific contractor during this period of one year, it may decide not to renegotiate the contract, or even to terminate it before the expiration date. Part of the reason that the MBTA has seven contractors is that it wants to be able to replace a contractor if its performance is unsatisfactory without the need to wait a long time to find a suitable replacement contractor.

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<sup>20</sup> MBTA has ten (10) different complaint categories, including promptness of pick-up/drop-off and scheduling problem.

One other advantage to the MBTA of having multiple contractors is that if one contractor makes a valuable innovation, the other contractors are encouraged to follow suit. Informal comparisons are also made to see if a contractor's performance is significantly above or below that of other contractors. However, compensation is in no way tied to comparisons between contractors.

**6.3.5 Evaluation** It is interesting to note that the original paratransit contract called for the agency to monitor and supervise the contractor in the same basic manner as is used by Redondo Beach: detailed "hands on" supervision. This method of supervision was abandoned for an "arm's length" relationship after a transit worker union argued that the service was being operated essentially in the same manner as a directly operated service and therefore that the service should be operated by union members. If this behavior is typical of transit unions representing workers at large transit agencies, this may be part of the reason that these agencies cannot work as closely with contractors and rely more upon "arm's length" relationships and strict enforcement of the contracts.

Table 6.1 lists the efficiency and effectiveness statistics for each of the MBTA paratransit contracts showing whether the contractor is a for profit or non-profit company.



**TABLE 6.1: Efficiency and Effectiveness of MBTA Paratransit Contracts<sup>21</sup>**

Type of Contractor	Cost per Passenger	Cost per RVM	Cost per RVH
For-profit	\$25.86	\$3.23	\$41.80
For-profit	\$22.62	\$2.43	\$36.10
For-profit	\$26.07	\$3.93	\$43.52
For-profit	\$18.29	\$4.85	NA
Non-profit	\$19.82	\$4.29	\$82.53
Non-profit	\$21.77	\$1.81	\$24.87
Non-profit	\$19.93	\$3.08	\$30.43

A comparison of these costs with the national averages and the costs of Redondo Beach and Sun Line shows that all MBTA contracts have a substantially higher cost per passenger than either the national average or the other system whereas the cost per vehicle hour and vehicle mile are much more comparable. This indicates that Redondo Beach and Sun Line are probably carrying more passengers per hour and per mile than do the MBTA contractors. A partial explanation for this is that Sun Line provides services to local social service agencies carrying groups of passengers with a common origin or destination. In the Boston metropolitan area local social service agencies tend to either provide their own transportation or contract directly with carriers.

Sun Line's costs of \$2.10 per vehicle mile and \$27.40 per vehicle hour are substantially lower than the costs of most of the MBTA contractors. Some of this difference probably results from the higher cost of living in the Boston

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<sup>21</sup> Some of the contractors provided incomplete or questionable information on revenue vehicle miles and revenue vehicle hours with regard to services where they were compensated on a per passenger basis.

metropolitan area. Some of this difference may also result from the MBTA requiring most of its contractors to provide some of the vehicles. However, it is not clear what portion of the cost difference results from either the higher cost of living or the contractors having to provide vehicles.

The rate of complaints per passenger received by the MBTA in 1991 is very comparable to the rate received by Sun Line. The MBTA's staff of approximately six full time equivalent employees to monitor and administer their seven contracts and roughly 400,000 passenger trips is also close to Sun Line's staff of just under one person to monitor one contract and approximately 70,000 passenger trips per year.

A comparison between the MBTA and the other agencies also illustrates how having multiple contractors may be both a benefit and a disadvantage. The benefit comes from being able to compare the performance of the contractors and from having a contractor available to replace another contractor that is performing unsatisfactorily. The disadvantage comes from having to maintain an "arm's length" relationship with every contractor to avoid appearing to favor any of the contractors. This may make it more difficult to work closely with a contractor to provide good service and resolve problems. The possible advantages of working closely with contractors are described in current logistics literature and numerous recent new articles which discuss the many major companies that are reducing the number of their suppliers to concentrate on

building tight working relationships with their remaining contractors. These advantages can include improvements in quality and significant reductions in costs.

#### **6.4 CONCLUSIONS**

A comparison between these three systems indicates that the transit agency's approach to dealing with contractors may be more important than the actual design of the contract. The three systems utilize different compensation provisions, although all three utilize incentive and penalty provisions. The two systems that have only a single contractor do not enforce the incentive and penalty provisions under informal understandings with the contractor. Redondo Beach believes that the transit agency and contractor have different objectives, and that the best way to insure that the contractor's operations achieve the agency's objectives is by monitoring and controlling these operations closely. Sun Line oriented its contracting process to find a contractor whose objectives were to make a profit by achieving the agency's objectives, and they believe that they succeeded in doing this. The result is that they have a contractor that they believe shares their objectives and therefore they do not need to monitor it as closely.

The MBTA has contracts with several different paratransit and transit providers and enforces the incentive and penalty provisions in all of its contracts. Its approach is to

utilize contracts, including incentive and penalty provisions, to align the contractor's objectives with the agency's objectives.

Some of the explanation for the different approaches lies in the circumstances of each of the transit agencies. The MBTA's approach to its first paratransit contract was very similar to the approach used by Redondo Beach. Opposition from the MBTA's labor union forced it to modify its approach and create a more arm's length relationship between it and its contractors. Having multiple contractors also makes it more difficult to have a close relationship with the contractors. This effect has been described in numerous recent news articles discussing the changes in corporate procurement.

On the other hand, Redondo Beach and Sun Line believe that they do not have large enough systems to make it economical to have multiple contractors. Sun Line did previously operate with four contractors but found that it did not have the resources to monitor that many contractors and administer such a complex system.

This indicates that large systems, especially those with active unions opposed to transit service contracting, may have difficulty in taking an approach involving a close relationship with a contractor. In these situations, contract economics may provide good guidelines for the transit systems, since it is based on the assumption that the parties do not have a close relationship and that each party wishes to

advance its own interests.

The MBTA utilizes several of the methods suggested by contract economics. First, it utilizes multiple contractors. This provides it with an opportunity to compare the performance of the contractors. This also provides the MBTA with the ability to replace an unsatisfactory contractor quickly and at low cost in terms of service disruption.

Second, it recognizes that contract extensions can be a substantial incentive to a contractor. Each of the contracts provides for extensions if the MBTA is satisfied with the contractor's performance.

Third, the contracts provide for compensation based on a "modified fixed fee". These contracts pay the contractor an allowance for overhead plus a fee based on service provided. This type of contract reduces the contractor's risk of suffering losses due to changes in demand or in the amount of service provided and therefore the premium that the contractor charges for assuming the risk.

Sun Line's approach to transit service contracting is very similar to the approach used increasingly frequently by corporations in their procurement. This approach is to form a close alliance with one, or at most a very few, providers that are willing to adopt serving your customers as their principal objective. This approach basically utilizes a single incentive, continuation of the good relationship between the parties. This type of contract has not been

analyzed in the past by contract economics and is a good subject for future research.

Redondo Beach has adopted an approach very similar to that of Sun Line, utilizing a single contractor. However, a comparison between the two systems illustrates the importance of the contracting process. Sun Line oriented its contracting process to find a good contractor that would share its objectives and obtained five bidders. Redondo Beach placed apparently less emphasis on the contracting process, such as by structuring the contract to require the contractor to provide the vehicles, and obtained only three bidders. Redondo Beach is much less satisfied with their relationship with their contractor and believe that the contractor does not share their objectives.

Therefore, the principal rule from contract economics that appears to apply to all transit service contracting is that regardless of the approach that the agency will take in dealing with its contractor, it is important for the agency to maximize the number of bidders for the contract. This allows the agency to select either the lowest cost bidder, if the agency intends to control the contractor's behavior through the contract, or the bidder that is most willing to work cooperatively with the agency, if that is what it desires.

## **7. SUMMARY OF RESULTS AND RESEARCH EXTENSIONS**

There is a general belief that publicly owned transit monopolies are facing serious problems and are in need of improving the efficiency and effectiveness of their services. While a massive infusion of operating assistance over the past two decades has preserved transit as an alternative to the auto for many trips in medium and large metropolitan areas, there is now general acceptance that there are large efficiency losses in this approach, and that there is a need to think creatively about alternatives. In the past decade there has been increasing attention paid to the role the private sector could play in helping to improve the performance of the United States's urban public transportation industry.

If the private sector plays a role in the urban public transportation industry, that role will be described by the contract between the private companies and the public sector. The research presented in this paper investigated the relationship between the design of transit service contracts, and of the contracting processes, and the economic efficiency of the service provided. The investigation consisted of three parts: a review of contract economics, a survey of industry practice, and three in-depth case studies.

### **7.1 CONTRACT ECONOMICS**

Contract economics provides some guidelines on how to

design contracts, considering how different contract provisions interact and how they would be expected to affect the behavior of transit service contractors.

1. Where possible, contracts should be based on simultaneously considering four factors: (1) the objectives of the transit agency, (2) the objectives of the contractor, (3) the cost to the contractor of each of its possible actions, and (4) the parties' understanding about what can be measured, and verified, in terms of an outcome.

2. Incentive and penalty provisions, other than those related to economic efficiency, will generally cause a greater increase in effort in a cost-plus contract than if the same provisions were included in a fixed fee contract. There may also be a greater need for service quality and maintenance related incentive and penalty provisions in fixed fee contracts.

3. All incentive and penalty provisions provide a risk of directing an excessive amount of the contractor's resources to areas that are subject to the provision and away from other important areas, reducing the net benefit of the contract to the transit agency. The more specific, and the greater the size of, the incentive or penalty provisions, the greater the risk of such redirection. Short term contracts may also increase the risk of such redirection, especially redirection from areas such as preventive maintenance, since the contractor is less likely to suffer adversely from the



redirection.

4. Use of incentives and penalties related to ridership will tend to reduce the risk of such redirection by encouraging a contractor to provide safe, good quality, service, provided that the contract has a long enough duration that the contractor would expect to feel the effects of its actions on ridership. Sharing the revenue from the service with the contractor is one method of providing a ridership-based incentive/penalty. This type of provision can also encourage the contractor to be diligent about collecting all revenue.

5. Transit agencies have several different types of incentives and penalties available for use in a contracting situation. Transit agencies need both to be clear about their own objectives and to obtain good information on the objectives of the transit contractor in order to select and structure incentives and penalties most effectively. Holding meetings with potential contractors prior to requesting bids offers an opportunity for transit agencies to obtain some of this information.

6. Incentive and penalty provisions will only be effective in the contractor understands how his choice of actions will affect its expected net benefit. Therefore, these provisions must be based on factors that reflect the contractor's choice of actions. In addition, meetings should be held with contractors to insure that they understand the purpose and effect of the incentive and penalty provisions. Transit

agencies also need to take special care if the contract includes provisions based on a factor that the contractor can affect through more than one kind of action, since the contractor will choose the action that results in its highest expected net benefit, not necessarily the action most desired by the transit agency.

8. Useful information about the performance of a contractor can be obtained from comparing its performance with other contractors, whether or not they are employed by the same transit agency, as long as there is some correlation between the factors affecting the contractors. Useful information can also be obtained by comparing the performance over time of a single contractor.

9. The origin of the benefits of contracting is the competition between potential contractors to be awarded the contract. Only by insuring that there will be substantial competition for its contract can an agency obtain these benefits.

10. All actions by a contractor involve some sort of cost, whether financial, such as material costs, labor costs and/or capital costs, or involving additional management effort. If a contract contains no incentives or penalties, either explicit or implicit, a contractor will take the course of action that will result in the lowest net cost, or highest net gain, to it. Especially with a fixed price contract this can result in the contractor providing a level of service that

just barely makes it not worthwhile for the agency to terminate the contract and sue the contractor. With a cost-plus contract this can result in a contractor not exerting effort to control costs, since all of the costs are paid by the transit agency.

11. Termination of a contract always involves a cost to the transit agency. The significance of this cost depends on the amount of effort, money and other assets that the agency has invested in the relationship with the contractor, the cost of obtaining a substitute contractor, and the potential losses during the time between notice of cancellation of the contract and complete replacement of the contractor. Because of these costs, transit agencies should attempt to use a contract that will cause a contractor to operate as desired by the agency and not rely on a threat of terminating the contract to coerce the contractor into operating as desired.

12. There are two major ways that a transit agency can reduce the losses that may result from a contractor's actions between notice of cancellation of the contract and complete replacement of the contractor. One way is by contracting with more than one entity to provide the service, or portions of the service. This allows the transit agency to replace an unsatisfactory contractor much more rapidly. The second way is by including substantial incentive and penalty provisions in the contract which would continue to apply, and therefore probably affect the contractor's behavior, during the period

between cancellation and replacement.

13. The more risk involved in a contract, the larger the premium that a contractor will demand. If the risk is related to the costs of operating the service, this risk can often be reduced by the agency providing more information about the service to be contracted and the cost of any similar services in the region. For this reason agencies should generally hold conferences to allow potential bidders the opportunity to ask for additional information prior to requesting bids for the service. Transit agencies should also structure a contract to reduce unnecessary risk faced by the contractor, especially risk over which the contractor has little or no control.

## **7.2 SURVEY RESULTS**

The survey was sent only to agencies filing reports with the federal government under Section 15 and the response rate from these agencies was approximately 27%. Since we do not know how well the responding agencies represent the entire universe of transit agencies, it is impossible to state how closely the results from this survey reflect the entire universe of transit agencies. However, the following survey results do provide some insight into what may be occurring in the transit industry.

1. The survey indicated a substantial increase in the number of transit agencies, of all types and sizes, that utilize contracting for some of their transportation services. Much

of this increase may come from agencies that previously provided only fixed route bus service and which have added contracted paratransit service.

2. The survey suggested that there has been a substantial increase in the use of competitive selection processes. Since competition for the contract is the basis for costs savings associated with service contracting, this would be very positive for improving the overall effectiveness of the agencies utilizing service contracting.

3. Transit agencies that used competitive selection processes obtained a median of three bids and many agencies obtained only one or two bids. This can be compared to London Transport which has obtained an average of five bids for each route it contracts and Argentina which has obtained either three or four bids for each commuter rail segment it contracts. Since the costs savings of transit service contracting are primarily based on competition for the contract, this indicates that it may be possible to improve the contracting processes of many agencies.

4. Most compensation provisions were based on a fixed fee per unit of service supplied. This is consistent with the contract economics analysis which indicated that this type of contract is the best arrangement for most transit agencies and contractors.

5. When the contract was based on a fixed fee per unit of service consumed the median number of bids was one, compared

to a median of three bids when the contract was based either on a fixed fee per unit of service supplied or cost-plus. This indicates that contractors may be less likely to bid on contracts based on a fixed fee per unit of service consumed.

6. Both incentives and penalties were more common in contracts with for-profit contractors for fixed route bus service than they were in contracts for paratransit service. This indicates that when transit agencies are dealing with a fixed route bus operation, they generally may be more certain what they want from the contractor and how to measure the contractor's performance. Therefore, they would be more likely to specify specific standards, and associated incentives and penalties, in a fixed route contract.

7. Penalty clauses are more frequently included in contracts with for-profit companies (39 out of 86) than are incentives (18 out of 86). This indicates that agencies may tend to be subject to fairly strict budget constraints for contracted service and/or may find it difficult to justify paying what could be characterized as extra profit for the contractor for just doing the job properly. Penalty clauses would be easier for an agency to include in a contract since they do not directly increase the agency's budget and can easily be justified as punishment for a contractor doing a bad job. It should be noted that penalties may increase the contractor's risk, causing the contractor to demand higher compensation and therefore result in an increase in the overall cost of the

contract.

8. Penalties were more common and both penalties and incentives were more commonly enforced when the contractor is a for-profit company than when it is a non-profit company or government. This indicates that penalty provisions may be seen as more effective and/or more needed in contracts with for-profit companies. In contrast, in none of the contracts with non-profit companies or governments were either incentive or penalty provisions enforced.

9. In contracts with for-profit companies, incentives were enforced much more commonly than were penalties. Furthermore, in several cases only very small penalties were imposed. Some of this difference may be because contractors will demand payment of incentives if they are due, while penalties are only paid if the agency collects the data required to prove that the penalty applies and takes the initiative of demanding payment.

10. The most common types of penalty or incentive provision were related to service quality and maintenance/safety. This indicates that many transit agencies are concerned that contractors may not be as interested in service quality, maintenance and safety as the agency would like them to be.

11. With regard to paratransit systems, incentives and penalties were included approximately twice as often by large agencies than by small agencies and penalties were enforced more often by large systems and by independent authorities.

This indicates that use, and enforcement, of incentive and penalty clauses may be related to the agency's experience with operating and managing transit and paratransit. In contrast, no significant pattern is evident with regard to fixed route bus systems. This may indicate that knowledge about how a bus system should perform is more widespread than similar knowledge about paratransit systems. Agencies may therefore be more willing to use contractual mechanisms to control contracts with regard to fixed route bus systems and may desire more detailed, hands on, control with regard to paratransit systems.

12. Incentives and penalties were included more frequently when there are four or more bids. For paratransit contracts, incentives and penalties were also enforced more frequently when there are four or more bids. A possible explanation for this behavior may be that when the agency has only a single contractor and had only a few bids for the contract, that it believes that enforcing penalty provisions may damage the relationship between it and the contractor and result in the contractor actually providing poorer service.

13. Both incentives and penalties are more frequently enforced when there is more than one provider of paratransit services. A possible reason for this is that a transit agency with multiple providers can replace one of them more easily than a transit agency can replace a single provider and thus is less concerned that enforcing a contract may damage the



relationship between the agency and the contractor.

14. There was no significant difference in how often incentives and penalties related to economic efficiency occurred in each type of contract. Because fixed fee contracts are for specific limited amounts, and cost-plus contracts do not have specific limitations, it would have been expected that more cost-plus contracts would include incentives and penalties related to economic efficiency.

15. Incentives and penalties related to service quality were, as expected, used more frequently in fixed fee per service supplied contracts than in other types of contracts. As stated earlier, in these contracts the contractor has an incentive to reduce costs, potentially through reducing service quality.

16. Agencies received an increased number of bids, when contracting for either fixed route bus or paratransit, when the agency provided the vehicles compared to when the contractor is required to provide the vehicles. This is consistent with expectations that requiring contractors to provide vehicles will reduce the number of contractors able or willing to bid on the contract.

17. Maintenance and incentive penalties were included most frequently when the agency provides the vehicles. This is consistent with expectations since a contractor generally has less of an interest in providing good care for the agency's property than it has in providing good care for its own

property.

### **7.3 CASE STUDY RESULTS**

The case studies indicate that the transit agency's approach to dealing with contractors may be more important than the actual design of the contract. There were differences in the contracts used by the three systems, although all three utilized incentive and penalty provisions. However, the greatest differences between the agencies was in their approach to transit service contracting. The case studies illustrated three basic approaches which can be utilized by transit agencies. Each approach has different advantages and can be utilized under different circumstances. The first approach is basically that analyzed by contract economics: the transit agency utilizes a contract, and the contractor's objective of obtaining a profit, to affect the contractor's behavior. The second approach is similar to that utilized currently in some corporate procurement: locate a contractor that is interested in forming a long term relationship with the transit agency and is therefore willing to take the agency's objectives as its own. The third approach is to rely on close, "hands on" supervision of the contractor's operations.

Regardless of the approach that the transit agency decides to use, the contracting process appears to be a major factor in determining whether the agency successfully obtains

its objectives. Obtaining competition for the contract allows the agency to select an appropriate contractor, either a good quality, low cost contractor, or one that will make the best long term partner, or one that will cooperate with the agency's supervision. The study indicates that contract design can significantly affect the number of companies that bids for the contract and this should be an important consideration in designing the contract.

Some of the explanation for the different approaches lies in the circumstances of each of the transit agencies. The MBTA's approach to its first paratransit contract was very similar to the approach used by Redondo Beach. Opposition from the MBTA's labor union forced it to modify its approach and create a more arm's length relationship between it and its contractors. Having multiple contractors also makes it more difficult to have a close relationship with the contractors. This effect has been described in numerous recent news articles discussing the changes in corporate procurement.

On the other hand, Redondo Beach and Sun Line believe that they do not have large enough systems to make it economical to have multiple contractors. Sun Line did previously operate with four contractors but found that it did not have the resources to monitor that many contractors and administer such a complex system.

This indicates that large systems, especially those with active unions opposed to transit service contracting, may have

difficulty in taking an approach involving a close relationship with a contractor. In these situations, contract economics may provide good guidelines for the transit systems, since it is based on the assumption that the parties do not have a close relationship and that each party wishes to advance its own interests.

Smaller agencies, that cannot operate a multiple contractor system, should consider an approach similar to that used by Sun Line, which is very similar to that used increasingly frequently in corporate procurement. This approach is to form a close alliance with one, or at most a very few, providers that are willing to adopt serving your customers as their principal objective. This approach basically utilizes a single incentive, continuation of the good relationship between the parties. However, these agencies do need to be careful to avoid becoming captive to their contractor because of high costs to the agency of terminating its relationship with the contractor.

#### **7.4 RESEARCH EXTENSIONS**

This thesis focused on the evaluation of contract structure and economic efficiency. Since the survey had only a 27% response rate, an obvious area for further research would be a more complete study to determine whether the survey responses actually reflect the entire universe of transit agencies.

The scope of the research can also be expanded in several ways. First, the economic analysis and the survey concentrated on the written contracts. The case studies showed that transit agencies and contractors will often have unwritten agreements that may clarify or modify the written contract. The effect of these unwritten agreements was not included in the analysis and including them would result in a more comprehensive analysis.

Second, this research showed that the some contract provisions appear to affect the number of contractors bidding on the contract. It would be valuable to survey contractors to examine how they calculate their bids and consider factors such as the type of compensation provision and the ownership of vehicles.

Third, the number of bidders for a contract is a key factor in determining whether the transit agency will obtain a satisfactory contractor and comparisons with other countries indicates that most transit agencies could obtain more bidders. Therefore, a study of how the contracting process affect the amount of competition for the contract could provide important information about how agencies can obtain a satisfactory contractor and lower the costs of providing service.

A final area of research is to study how agencies can utilize a close working relationship with a contractor to have it provide high quality service at an acceptable cost. There

is considerable research currently being conducted on close intercompany relationships in corporate procurement and logistics, however this research does not address the special problems, such as an appearance of impropriety, that can result from close relationships between government agencies and private businesses.

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**APPENDIX I**

**SECTION ONE:**

**General Information:**

1. Name of Responding Agency: \_\_\_\_\_
2. Name of Contact Person: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
3. Data given pertains to the Agency fiscal year ending:  
\_\_\_\_\_

**Services Provided:**

4. Please mark each type of transportation service that your agency either provides directly or purchases. If all or any portion of the service is purchased, please indicate the number of different contracts utilized to provide the indicated service:

	Directly	Contracted
Fixed Route Bus		
Local Service	_____	_____
Express Service	_____	_____
Paratransit	_____	_____
Other (please specify)		
_____	_____	_____
_____	_____	_____

**SECTION TWO - BUS AND PARATRANSIT CONTRACTED SERVICES:**

Please complete a separate questionnaire for each substantially different contract that you have for the purchase of bus or paratransit services. One extra copy of this section is provided, if you need more copies please photocopy this section.

**General Information:**

1. Name of Responding Agency: \_\_\_\_\_

2. Name of Contractor: \_\_\_\_\_

Number of contractors, if more than one contractor operates under the same type of contract and is included together in this response: \_\_\_\_\_

3. Is the contractor (check one):  
a government agency \_\_\_\_\_ a private business \_\_\_\_\_  
other (please specify) \_\_\_\_\_

**Type of Service:**

4. Type of Transportation Service Contracted:

Fixed Route Bus

Local Service \_\_\_\_\_

Express Service \_\_\_\_\_

Paratransit \_\_\_\_\_

Other (please describe) \_\_\_\_\_

\_\_\_\_\_

5. If the service operates on a fixed route is it:  
 Single Origin and Single Destination \_\_\_\_\_  
 Single Route, Single Destination \_\_\_\_\_  
 Single Route, Multiple Destination \_\_\_\_\_  
 Multiple Route Service \_\_\_\_\_
6. Are the vehicles used in this service:  
 Utilized Solely To Provide This Service \_\_\_\_\_  
 Also Used By The Contractor To Provide Other Services  
 (including services not purchased by your agency) \_\_\_\_\_

**Contracting Process:**

7. Was this service contract awarded as a result of a competitive bidding process. Yes \_\_\_\_\_ No \_\_\_\_\_
8. If the answer to the preceding question was no, please describe the process used to select the contractor.
- \_\_\_\_\_
- \_\_\_\_\_

9. If a competitive bidding process was used, how many different contractors submitted bids. \_\_\_\_\_
10. If this contract was awarded through a competitive bidding process, when was this process held. \_\_\_\_\_

**Contract Structure:**

11. How is the contractor's compensation calculated:  
 Fixed-Fee \_\_\_\_\_ Reimbursement of Costs Plus a Fee \_\_\_\_\_  
 Other (please describe) \_\_\_\_\_

12. Starting date of the contract: \_\_\_\_\_
13. Termination date of the contract: \_\_\_\_\_
14. Does the contract automatically extend until one of the parties terminates it? Yes \_\_\_\_ No \_\_\_\_
15. Does either party have any options to extend the contract without the other party's consent? Yes \_\_\_\_ No \_\_\_\_
16. Who owns each of the following:

	Agency	Contractor
Vehicles (list the number provided)	_____	_____
Maintenance equipment and facilities	_____	_____

17. Does the contract include any incentive or penalty provisions related to any of the following:

	Incentive	Penalty
Ridership	_____	_____
Trips Completed or On-time	_____	_____
Service Quality	_____	_____
Economic Efficiency	_____	_____
Passenger Complaints	_____	_____
Vehicle Maintenance	_____	_____
Number and/or Severity of Accidents	_____	_____
Number and/or Cause of Roadcalls	_____	_____
Accuracy and Completeness of Reports	_____	_____

**Financial Information for two most recent fiscal years:**

18. Size of Contract:

Base (amount paid by your agency to the contractor excluding bonuses, incentives and penalties): \_\_\_\_\_

Bonus/Incentive Payments: \_\_\_\_\_

Penalties: \_\_\_\_\_

19. What is the total amount of expenses of the contractor in each of the following categories, using Section 15 definitions, including any revenues from the contracted service that are retained by the contractor:

Vehicle Operations: \_\_\_\_\_

Vehicle Maintenance: \_\_\_\_\_

Non-Vehicle Maintenance: \_\_\_\_\_

General Administration: \_\_\_\_\_

Vehicle Acquisition: \_\_\_\_\_

Other Capital Expenditures: \_\_\_\_\_

20. What is the total amount of Agency funds (in Dollars) and personnel (in full time equivalent employees) allocated to:

(a) Administration (including contract negotiation, review and preparation of budgets, and auditing of contractor financial records): \$ \_\_\_\_\_ FTEs \_\_\_\_\_

(b) Monitoring (including passenger counts, responding to passenger complaints, auditing of the contractor's non-financial records, and inspections of the contractor's vehicles and operations): \$ \_\_\_\_\_ FTEs \_\_\_\_\_

**Operational Statistics:**

- 21. Unlinked Passenger Trips: \_\_\_\_\_
- 22. Total Vehicle Miles: \_\_\_\_\_
- 23. Vehicle Revenue Hours: \_\_\_\_\_
- 24. Total Vehicle Hours: \_\_\_\_\_
- 25. Average Vehicle Size (Seats): \_\_\_\_\_
- 26. Vehicles Operated in Maximum Service: \_\_\_\_\_
- 27. Number Of Days Per Week In Operation: \_\_\_\_\_
- 28. Number Of Hours Per Weekday in Operation: \_\_\_\_\_