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Transit Subsidy Allocation Techniques

A Review

April 1983

NOTICE

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Transit Subsidy Allocation Techniques: A Review

Final Report
April 1983

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Prepared for
Office of Planning Assistance
Urban Mass Transportation Administration
U.S. Department of Transportation
Washington, D.C. 20590

In Cooperation with
Technology Sharing Program
Office of the Secretary of Transportation

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FOREWORD

The funding of public transportation is a complicated issue when funding is required from more than one political jurisdiction. A large number of procedures have been developed to address how subsidy costs should be apportioned to political jurisdictions that are served by the public transportation system. There is no consensus, however, about which procedures are the best and most equitable. Thus, the problem of selecting the "right" way to apportion the deficit to individual jurisdictions remains a subject of much debate in many urban areas.

A good understanding of the alternative procedures for subsidy allocation and the experience of local areas with these procedures could aid many areas in these discussions. To assist these areas, UMTA's Office of Planning Assistance sponsored the production of this report which summarizes the subsidy allocation procedures that have been used in areas where public transportation is funded by more than one jurisdiction. We believe that this report will be valuable to local areas in their efforts to select the "right" procedure.

Additional copies of this report are available from the National Technical Information Service (NTIS), Springfield, Virginia, 22161 at cost.

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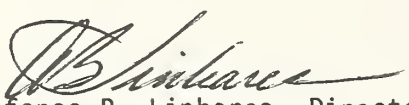

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Chapter I

INTRODUCTION

Almost every transit system today operates at a deficit. As these deficits have grown in recent years, transit systems have become increasingly dependent on local governments for funding. This dependence along with growing demands from other public services has placed strains on resources. Such circumstances have made local governments more watchful that their local resources are well invested.

The local funding of the deficit arising from transit services is often a particular problem in areas where the transit system provides service to more than one political jurisdiction. In these situations, local governments must determine the portion of the total deficit that each jurisdiction will pay. In some local areas, no attempt is made to match the subsidy a jurisdiction pays with the benefits it receives. Instead, the deficit is funded from regional taxes or general revenues and then allocated. In other local areas, the deficit is allocated among jurisdictions. An attempt is made in these areas to allocate the deficit in proportion to the benefits that each jurisdiction receives and the costs of providing the service to each jurisdiction. The major problem is the choice of a "fair" allocation method. This choice is difficult because of the inherent problems of defining "fair."

The purpose of this report is to describe the different approaches that have been used to address the subsidy allocation problem. The report is primarily descriptive because it is recognized that local funding decisions are political decisions and cannot be made solely on technical grounds.

To guide the study and provide input, a review panel of persons active in the transit industry was assembled to critique the report at its various stages of development. A list of panel members is shown in Exhibit 1.

Exhibit 1

REVIEW PANEL MEMBERS

Robert Buchanan.....Executive Director of Administration
American Public Transit Association

Wendell Cox.....Commissioner
Los Angeles County Transportation Commission

James Echols.....General Manager
Tidewater Transportation District Commission

Francis Francois.....Executive Director
American Association of State Highway
and Transportation Officials

Edward Madison.....Director, Service & Planning
Bi-State Development Agency

James H. Miller.....Director, Public Transportation Programs
Pennsylvania Transportation Institute, Pennsylvania
State University

George Wickstrom.....Manager of Technical Services
Metropolitan Washington Council of Governments

The major portion of this report is devoted to describing the different approaches used to directly allocate deficits to individual political jurisdictions. Two general approaches were identified in a review of current practice:

- the cost/revenue approach where revenue and cost is apportioned to individual transit routes. A deficit is computed for each route and portions of the route's deficits are assigned to individual jurisdictions.

- the system deficit approach where the deficit at the system level or some other high level of aggregation is computed and then allocated to jurisdictions based on selected criteria.

These approaches are shown in Exhibit 2. The two categories are somewhat arbitrary since no two allocation methods were found to be exactly alike.

While the report focuses primarily on methods, a number of transit systems were found which did not allocate the deficit among its constituent jurisdictions. These systems and their reasons for choosing not to allocate are discussed in a later chapter of the report.

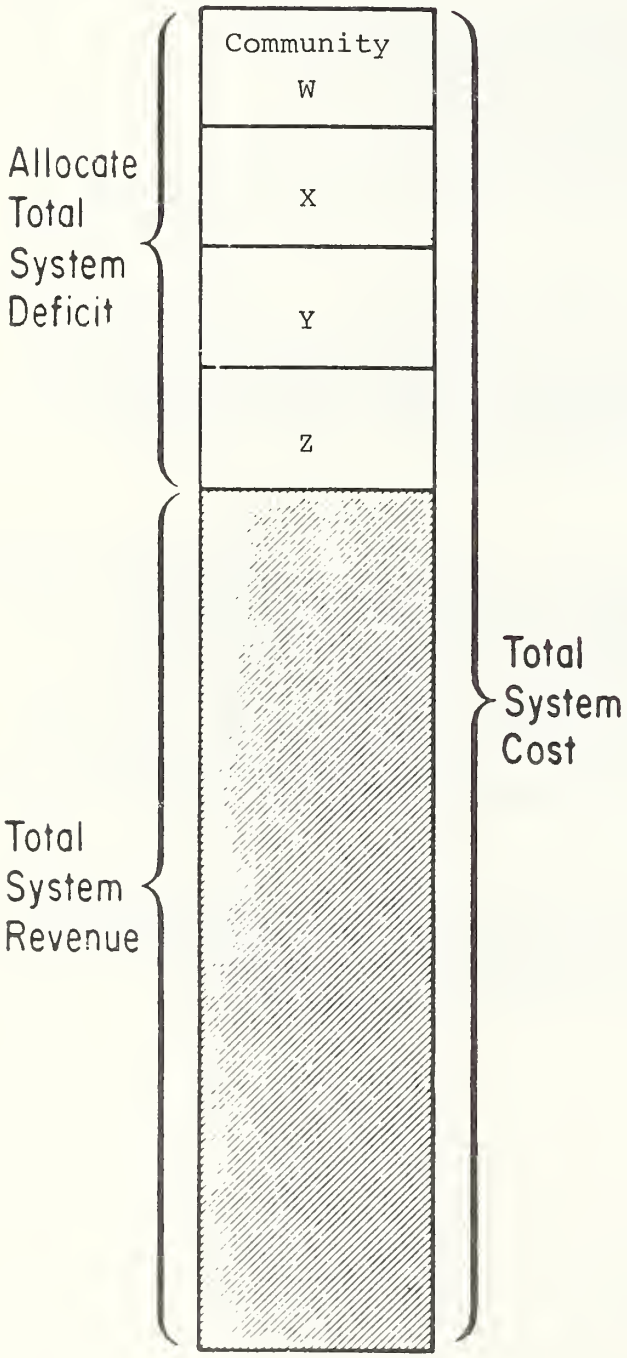
Report Organization

Including this introductory chapter, there are 5 chapters in this report. Chapter 2 describes the manner in which cost allocation and revenue allocation techniques are combined in the cost/revenue approach to subsidy allocation. Chapter 3 discusses a different approach, the allocation of the system-wide deficit among concerned jurisdictions. Chapter 4 provides a general comparison of the two approaches described in Chapters 2 and 3. The decision to allocate or not to allocate the deficit among the communities is described in Chapter 5.

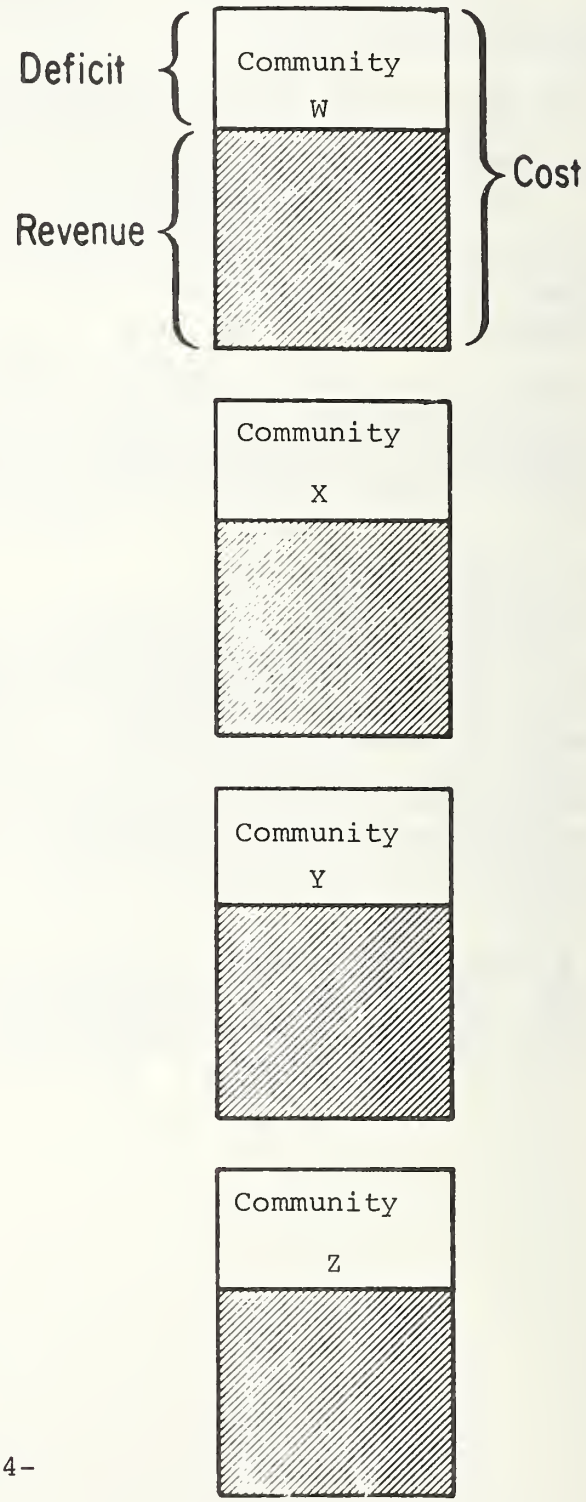
Although this report focuses primarily on the use of allocations methods, this is not an endorsement of the allocation approach to transit funding. A key question for all areas is to determine how to fund the transit deficit. Allocation is but one approach.

GENERAL ALLOCATION APPROACHES

DEFICIT APPROACH



COST/REVENUE APPROACH



Chapter 2

THE COST/REVENUE APPROACH TO SUBSIDY ALLOCATION

The cost/revenue approach to subsidy allocation involves allocating separately revenues and costs to each jurisdiction. This approach is based on the premise that the subsidy that each community pays should be based on the net cost of the service that is provided to it.

The general cost/revenue methodology is to calculate a deficit for each route. In situations where the route passes through more than one jurisdiction, the revenue and cost of the route must be allocated to each jurisdiction. Proceeding sections of this chapter describe current industry practice for allocating revenue and cost among individual routes and among segments of routes which serve more than one jurisdiction. The subsidy required from a community is determined by summing the allocated portions of the deficits from all routes passing through a jurisdiction and the deficits of all routes operating entirely within the jurisdiction.

Cost Concepts

Basically, transit systems are concerned with two categories of costs -- capital and operating. In the context of deficit allocation, the term cost is defined to include only operating costs and not capital costs. Capital costs refer to the expenses associated with long-term capital acquisitions such as buses and maintenance facilities. Essentially, capital items are used in the production of transit services but have a useful life extending more than a single year. Operating costs, such as labor, fuel, electricity, and the general manager's salary, cover the acquisition of goods and services that are consumed within a single year.

An important idea in cost allocation is the concept of direct costs. Direct costs are those costs which can be traced to specific transit services within a single jurisdiction. Operator's wages, fuel and tire costs are all examples of direct costs.

Indirect costs are those costs which cannot be traced directly to specific transit services within a single jurisdiction. Examples of indirect costs include electricity in the garages and offices, the salaries of administrative personnel and advertising costs.

The classification of costs as direct or indirect costs is not always simple and frequently depends on the business experience and judgment of the transit system. Thus, classification of some costs may vary from system to system. In some transit systems, for example, lubricants for transit vehicles are considered indirect costs. However, other systems classify lubricants as a direct cost because it is felt that their use has a strong relation to service mileage and thus service within a single jurisdiction.

The objective of cost allocation is to apportion the total costs of running the transit system among the jurisdictions which receive and benefit from the service. In the study of cost accounting, a major problem has always been the allocation of indirect costs. In cost allocation for the transit subsidy process, the allocation of indirect costs is also a problem.

For direct costs, the allocation process is relatively straightforward. The cost of a bus operator's labor may be apportioned among jurisdictions according to the percentage of time he spends in each jurisdiction. By a similar calculation, fuel cost could be allocated by mileage run in each jurisdiction.

In contrast, it is difficult to allocate indirect costs since there is no immediate "traceable" basis for apportionment. For example, it is not clear what the "traceable" basis is for apportioning the salary of the general manager of the transit system. Thus, the allocation of indirect costs is a policy decision since it depends on the judgment and agreement of the parties involved.

Cost Allocation Methods

In apportioning the cost of transit services to different jurisdictions using the cost revenue approach, it is necessary to have an allocation tool which can assign costs to individual routes and jurisdictions. Fully allocated cost models in various forms were found to be the favored technique for cost allocation. Many systems already use cost allocation models to evaluate the efficiency of individual bus routes.

The idea underlying cost allocation models is that the cost of a route is a function of a few resource variables. Vehicle miles, vehicle hours and peak vehicles are resources which are commonly used. The form of the cost allocation model is:

$$C = U_H\ (VH) + U_M\ (VM) + U_V\ (PV),$$

where:

C = cost of the route
U_H = unit cost per vehicle hour
VH = vehicle hours
U_M = unit cost per vehicle hour
VM = vehicle miles
U_V = unit cost per peak vehicle
PV = peak vehicles

Unit costs used in the model are calculated by:

- Assigning each expense line item in the transit systems chart of accounts to one or more of the selected resource variables.
- Summing the values assigned to each variable to obtain the overall cost assigned to that variable.
- Dividing the overall cost by the quantity of the variable used by the system to produce the unit cost of the variable.

The fully allocated approach assigns all system expenses to one or more of the chosen variables and eventually to each individual bus route. Thus, the total system cost is fully allocated to the routes and the sum of the costs of the individual routes will equal the total system cost. Direct and indirect costs are both handled in this manner and no distinction is drawn between them. They are both assigned to individual routes based on resource variables.

Data Required

The fully allocated approach requires two inputs. The first is a list of total system costs for each expense account during the analysis period, usually one year. The second is a list of resources consumed for each variable during the analysis period.

Model Development

The first step in development of the model is to select the resource variables. This step fixes the number of terms in the model's equation. The second step is to assign the expense accounts to the resources. The following discussion uses the model developed by the Dallas Transit System as an example of a fully allocated model.

The Dallas model is based on a selection of four resource variables -- vehicle miles, vehicle hours, peak vehicles and system revenue. Exhibit 3 shows the assignment of expenses used in the Dallas model. Most of the expense accounts were assigned to a single resource variable, but combination assignment schemes were used where it was felt that a more accurate model would result. For example, revenue vehicle operations were assigned to both vehicle miles and vehicle hours to reflect the fact that the cost of fuel, lubrication, tires, tubes, and taxes are related to the vehicle mileage while wages are related to vehicle hours.

The third step is to determine the unit costs for each variable. In Exhibit 4, the expenses assigned to each resource variable were summed to find the total system-wide cost associated with each variable. The system-wide cost totals for each variable are then

Exhibit 3
ALLOCATION OF EXPENSE ACCOUNTS
TO SERVICE VARIABLES

EXPENSE CLASSIFICATION	BASIS FOR ALLOCATION			
	Vehicle Miles	Vehicle Hours	Peak Vehicles	System Revenue
Operations:				
Transportation Admin.		100%		
Rev. Veh. Movement Control		100%		
Scheduling of Transit Oper.		100%		
Ticket & Fare Collect - Oper.				100%
Rev. Veh. Oper.-Scheduled	16%(1)	84%		
Maintenance:				
Admin. - Vehicles			100%	
Admin. - Facilities			100%	
Servicing Rev. Veh.			100%	
Inspection -Rev. Veh.	100%			
Maintenance -Rev.Veh.	100%			
Accident Repairs - Rev. Veh.	100%			
Vandalism Repairs - Rev. Veh.	100%			
Servicing & Fuel - Serv. Veh.				100%
Inspect. & Maint. - Serv. Veh.				100%
Rev. Veh. Movement Cont.			100%	
Fare Collect. & Count. Equip.			100%	
Passenger Stations			100%	
Opr. Stat. - B, G, & E.			100%	
Garage & Shop - B, G, & E.			100%	
Communication System			100%	
Gen. Adm. - Bldg, Grounds, & Equip.			100%	
Accident Repairs - Bldg., Grounds, & Equip.			100%	
Vandalism Repairs - Bldg., Grounds, & Equip.			100%	
General Administration:				
Ticket & Fare Collect. - Admin.				100%
System Security				100%
Personnel Admin.			100%	
Data Processing			100%	
Finance & Accounting			100%	
Purchasing & Stores			100%	
General Engineering			100%	
Office Management & Serv.			100%	
General Management			100%	

(1) Fuel, Lub., Tires, Tubes, & Taxes.

Exhibit 3 (continued)
ALLOCATION OF EXPENSE ACCOUNTS
TO SERVICE VARIABLES

EXPENSE CLASSIFICATION	BASIS FOR ALLOCATION			
	Vehicle Miles	Vehicle Hours	Peak Vehicles	System Revenue
General Administration: (Continued)				
Customer Serv. - Marketing				100%
Promotion				100%
Market Research				100%
Injuries & Damages				100%
Safety				100%
General Legal Services				100%
General Insurance			100%	
General Function			100%	
Other Expenses:				
Depreciation			100%	
Debt Service - Interest			100%	

Exhibit 4
SUMMATION OF ALLOCATION
EXPENSE ACCOUNT DOLLARS
Fiscal 1977 - 78

EXPENSE CLASSIFICATION	BASIS FOR ALLOCATION			
	Vehicle Miles	Vehicle Hours	Peak Vehicles	System Revenue
Operations:				
Transportation Admin.		$527,499		
Rev. Veh. Movement Control		577,255		
Scheduling of Transit Oper.		85,432		
Ticket & Fare Collect - Oper.				$44,473
Rev. Veh. Oper.-Scheduled	$1,769,483	8,675,287		
Maintenance:				
Admin. - Vehicles			$222,828	
Admin. - Facilities			25,540	
Servicing Rev. Veh.			430,298	
Inspection - Rev. Veh.	316,785			
Maintenance - Rev. Veh.	1,872,533			
Accident Repairs - Rev. Veh.	120,431			
Vandalism Repairs - Rev. Veh.	42,613			
Servicing & Fuel - Srv. Veh.				55,676
Inspect. & Maint. - Srv. Veh.				52,714
Rev. Veh. Movement Cont.			8	
Fare Collect. & Count. Equip			6,758	
Passenger Stations			35,117	
Oper. Stat. - B, G, & E.			135,069	
Garage & Shop - B, G, & E.			291,051	
Communication System			49,145	
Gen. Adm. - Bldg, Grounds, & Equip.			24,409	
Accident Repairs - Bldg., Grounds, & Equip.			4,795	
Vandalism Repairs - Bldg., Grounds, & Equip.			6	
General Administration:				
Ticket & Fare Collect. - Admin.				114,950
System Security				-
Personnel Admin.			216,002	
Data Processing			60,370	
Finance & Accounting			276,881	
Purchasing & Stores			161,072	
General Engineering			(15,452)	
Office Management & Serv.			122,609	
General Management			285,182	
Customer Serv. - Marketing				204,210
Promotion				126,659

Exhibit 4 (continued)
SUMMATION OF ALLOCATION
EXPENSE ACCOUNT DOLLARS
Fiscal 1977 - 78

EXPENSE CLASSIFICATION	BASIS FOR ALLOCATION			
	Vehicle Miles	Vehicle Hours	Peak Vehicles	System Revenue
General Administration: (Continued)				
Market Research				$116,375
Injuries & Damages				400,106
Safety				97,475
General Legal Services				4,083
General Insurance			$175,080	
General Function			760,297	
Other Expenses:				
Depreciation			1,293,553	
Debt Service - Interest			126,131	
TOTAL	$4,121,845	$9,865,473	$4,686,749	$1,216,721
TOTAL ALL		$19,890,788		

divided by the amount of the resource consumed by that variable. Exhibit 5 shows this calculation of unit costs for each resource variable. This step produced the following equation:

$$C = 0.3176764VM + 10.690259VH + 12,777.43PV + 0.1099943R$$

Where:

C = Cost of System Operation
VM = Vehicle Miles of Service
VH = Vehicle Hours of Service
PV = Peak Vehicle Needs
R = System Revenue

Variations

One common variation of the cost allocation model is to collect similar types of expense items and assign them as a group to the resource variables. The Kansas City Area Transportation Authority (KCATA) divides the cost of its transit operations into three categories -- Direct Labor, other Direct Costs and Indirect Costs. Direct Labor (operator wages) is assigned to platform hours and a unit labor rate per platform hour is calculated. Both other Direct Cost (fuel and tires) and Indirect Cost are assigned to bus miles. Thus a model of the following form is calculated:

$$C = U_P (PH) + U_M (VM)$$

Where:

C = Cost of the Service
U_P = Unit Cost per Platform Hour
PH = Platform Hours
U_M = Unit Cost per Mile
VM = Vehicle Miles

Bi State Development Agency in St. Louis uses a model similar to KCATA. In the Bi State Model, Direct Labor costs are assigned to platform hours and other Direct Cost are assigned to bus miles. The difference in the St. Louis model is in the treatment of Indirect Cost. These costs are assigned as a percentage of total direct costs (labor and other). Thus a model of the following form is calculated:

$$C = OH_f ((U_p . PH) + (U_V . VM))$$

Where:

C = Cost of the Service
U_p = Unit Cost per Platform Hour
PH = Platform Hours
U_V = Unit Cost per Vehicle Mile
VM = Vehicle Miles
$OH_f = 1.0 + \frac{\text{total indirect costs}}{\text{total direct costs}}$

Exhibit 5

CALCULATION OF UNIT COSTS
AND COST ALLOCATION FORMULA

Allocation Basis	Total Units	Total Cost Allocated	Percent of Total Cost	System Average Unit Cost
Vehicle Miles	12,974,982	4,121,845	20.72	0.3176764
Vehicle Hours	922,847	9,865,473	49.60	10.690259
Peak Vehicles	367	4,686,749	23.56	12,777.43
System Revenue	11,066,880	1,216,721	6.12	0.109943
TOTAL		19,890,788	100.00	

These variations are less complex than the general cost model such as the model used by Dallas. They also require somewhat less resources to calibrate. However, many analysts feel that these variations sacrifice some accuracy because model sensitivity is lost in the aggregation of line item costs. For example some other direct costs which under the general model would be assigned to vehicle hours are assigned to vehicle miles in the variations. Where routes vary widely in operating speed, their difference in assignment can lead to inaccuracy. The choice of methods is a management and transit board decision that must weigh the accuracy desired against the resources needed to develop and administer the chosen model.

REVENUE ALLOCATION

Revenue allocation is the other key ingredient in the cost revenue approach to the allocation of subsidies among jurisdictions. There are three general types of revenue that are received by a transit system. The first is passenger revenue which covers the fares that are paid by passengers either through the fare box or through the sale of transit passes. The second type is non-passenger revenue which is received for ancillary services such as advertising space on buses, rental revenue for terminal space and leases of system owned property. The final type of revenue is Federal and state subsidy funds which, in varying amounts, are received by most transit systems in the country.

The first three sections of this chapter describe the methods used to allocate the different types of revenue. The final section of the chapter provides local examples of the application of these techniques.

Passenger Revenue

There are two steps to allocating farebox revenue. The first step is to determine the amount of revenue that is collected on each route. Where registering fareboxes (i.e. fareboxes which keep a running total of the fares deposited) are in use, the boxes can be read for each bus to determine the revenue collected for each route. Where non-registering fareboxes are used, a revenue count is the primary method of determining route revenue. In a revenue count, the vault is pulled from buses and the cash is counted in such a manner that the revenue from each route can be determined. This is particularly cumbersome when buses are operated on more than one route. In these situations the vaults must be pulled when the buses change routes. Revenue counts are usually taken at several times during the year, and the results are averaged to compensate for seasonal influences.

The second step is to allocate the route revenue to the different jurisdictions on the route. Some type of passenger count is used for this purpose. The simplest method is a passenger boarding count where an observer rides the bus, counts the passengers as they get on, and

notes the bus stop or jurisdiction at which the passengers board. Another method is to take a headcount as the bus crosses jurisdictional boundaries. A more complex method is an on-board survey in which passengers are asked to fill out a questionnaire regarding their origin and destination.

The purpose of the passenger count is to determine the number of passengers boarding in each jurisdiction. The on-board survey provides additional information regarding the destination and jurisdiction of residence of each passenger. If an on-board survey is used, a question arises as to whether the revenue should be allocated to the jurisdiction where the passenger boarded, where he alighted, or where he lives. This is a policy decision which is made by the parties involved in designing the allocation formula. It was found that the most frequent choice in local areas is to allocate revenue based on boarding passengers. This choice allows the two jurisdictions involved to equally share the revenue since most passengers make roundtrips. Where the number of multijurisdictional routes is small, revenue is often allocated by the percentage of the total route miles in each jurisdiction.

Non-Passenger Revenue

Non-passenger revenue is usually apportioned among jurisdictions on the same basis as fare box revenue. Where non-passenger revenue is seen to be less traceable to operations, a second approach is to net these revenues against total operating cost, thus reducing the cost that must be allocated to jurisdictions. In this case, non-passenger revenue is being apportioned by whatever cost allocation technique is in use.

Federal and State Funds

Federal funds are usually allocated to the communities in a multi-jurisdictional area in a manner similar to section 5 operating funds, 50% population and 50% population density.

Methods for apportioning state funds are usually set out in the funding legislation or by local policy decision. They are therefore non-standard and unique to each area.

Revenue Allocation Examples

Seattle Metro provides a good example of fare allocation on a route-by-route basis. (Exhibit 6). Metro serves the city of Seattle and surrounding King County. It must allocate revenue on a small number of inter-jurisdictional routes between the city and county. Metro's scheduling department makes passenger counts of all routes. For inter-jurisdictional routes, these counts provide a basis for computing percentages of city riders, and those riding between jurisdictions. Route revenue counts are taken three times per year in February, March and October. From this information, a percentage split is developed to allocate revenue for the combined lines. The

METRO

	One-zone peak hour	Two-zone peak-hour	One-zone Off-peak	Two-zone Off-peak	VANS 24 Hours
Adults - 16 & older	.60	.90	.50	.75	.60
Youths - 5 through 15	.60	.60	.50	.50	.40
Senior Citizens & Disabled Riders w/ Metro Permit	.15.	.15	.15	.15	.10
Vashon	.60	.90 + ferry	.50	.75 + ferry	N/A
One-zone Regular Pass (including Vashon)	-	+.30	-	+.15	-
Two-zone Regular Pass (including Vashon)	No additional fare required				
One-zone Off-Peak Pass (including Vashon)	+.10	+.40	-	+.25	+.10
Two-zone Off-Peak Pass	-	+.15	-	-	-
Reduced Fare Pass (Monthly/Annual only) (including Vashon)	No additional fare required				

- Passes

Monthly	$23.00	$34.50	$19.00	$28.50
(Vashon)	($43.40)	($54.90)	($39.40)	($48.40)
Annual	$253.00	$379.50	$209.00	$313.50

- Ticket Books $18.00 Peak Fares $10.00 Off-peak Fares

Note: Seattle is one zone; rest of King County is one zone. The zone line is the city limits of Seattle.

Van Service one-hour pass (transfer) is a 2 zone transfer for use on any regular service (both peak and off-peak)

Vashon passes include ferry cost; no annual pass available.

number of city riders is multiplied by the average city fare and the number of King County riders is multiplied by the average county fare. The percentage of inter-jurisdictional riders is applied to the remaining revenue to allocate it between the city and the county. Average fares are used in the calculation because Metro has peak and off-peak fares for city, county and inter-jurisdictional riders and the route revenue counts do not distinguish revenue collected between peak and off-peak hours.

Pass revenue is accounted for in the following manner:

- Senior Citizen Passes -- passes for the elderly are split on the basis of a special count of senior citizens paid fares.

- Monthly Passes -- an assumption is made that most passes are two zone passes which are purchased by residents of the county for commuting purposes. It is assumed that 10% of one-zone passes are purchased in the county and 10% of two-zone passes are purchased in the city. These assumptions are based on special counts of pass use.

- School Pass Revenue -- this revenue source is allocated entirely to the city.

In total, these procedures allow Seattle Metro to allocate revenue between the city and King County.

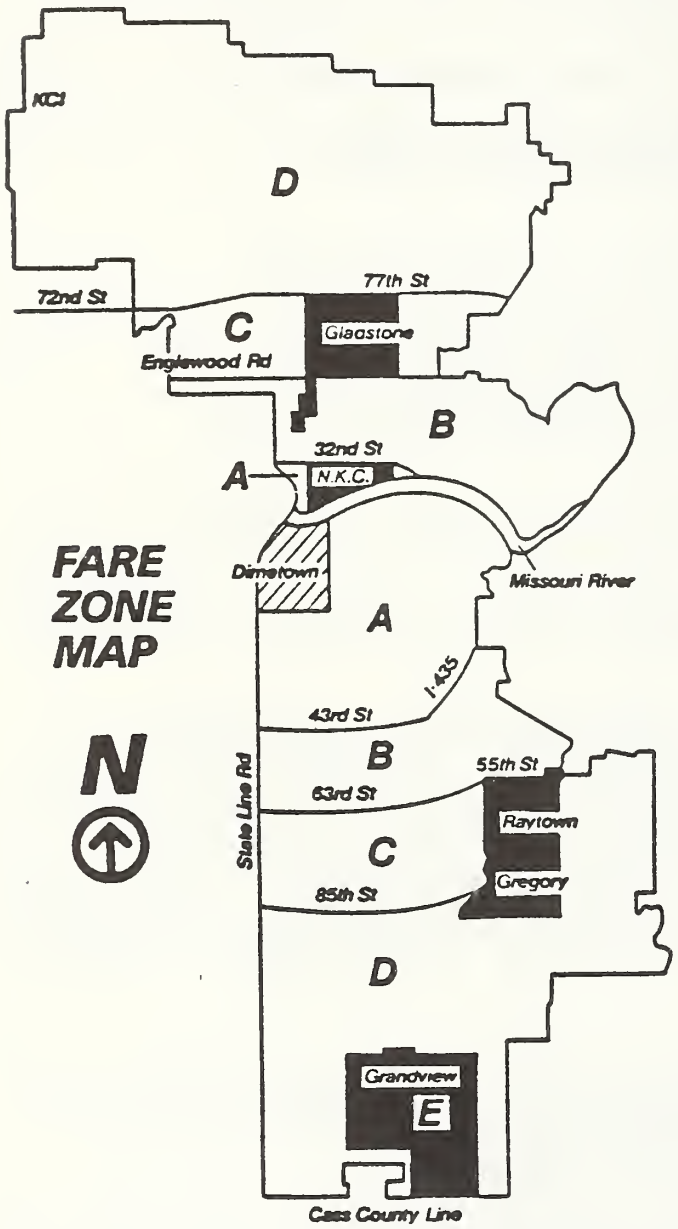
In contrast to Seattle Metro, the Kansas City Area Transit Authority (KCATA), which serves ten different local jurisdictions in the metropolitan area, faces a much different situation. The revenue allocation is complicated by an extensive zone fare structure which rings the city with five concentric fare areas and a reduced fare downtown service which is called "dimetown." (Exhibit 7). There are also "peak hour" fares, an express surcharge, elderly and handicapped fares, youth fares and a selection of monthly passes which correspond to different fare levels related to the zone fare structure. (Exhibit 8).

The fares to suburban communities are set by each community. The base fare for the system is forty cents for regular service and fifty cents for express service. Any excess over these amounts is considered a "surcharge" imposed by the community.

Revenue allocation is an issue only for suburban multi-jurisdictional bus routes which by-and-large run to and from Kansas city. KCATA routinely counts revenue by route, so that special line revenue counts are seldom necessary. Passenger counts are required to establish passenger inter-community and intra-community volume. KCATA conducts a passenger on-off study for each line on an annual basis.

Exhibit 7

KANSAS CITY ZONE FARES



RUSH HOUR WEEKDAY: 6-9 AM & 3-6 PM

BASIC FARE	NO. OF ZONE LINES CROSSED 1	2	3	4	TOTAL FARE
50¢	+10¢				60¢
50¢		+20¢			70¢
50¢			+30¢		80¢
50¢				+40¢	90¢

EXPRESS SURCHARGE: 10¢

ALL OTHER TIMES

BASIC FARE	NO. OF ZONE LINES CROSSED 1	2	3	4	TOTAL FARE
40¢	+10¢				50¢
40¢		+20¢			60¢
40¢			+30¢		70¢
40¢				+40¢	80¢

REDUCED FARE:* CHILD, YOUTH, SENIOR CITIZENS, HANDICAPPED—HALF OF FULL-FARE.

*WITH PROPER METRO REDUCED FARECARD.

Exhibit 8

KCATA SUBURBAN FARES

Jurisdiction	Trips within suburban jurisdiction	Trips to/from Kansas City, Mo. or intermediate jurisdiction	
		local service	express service
	$	$	$
Contributing communities			
Blue Springs, Mo.	0.40	na	1.50
Gladstone, Mo.	0.70	0.70	0.80
Independence, Mo.	0.60/0.70	0.70	1.00
Johnson County, Ks.	na	1.00	1.00
Kansas City, Ks.	0.70	0.70	na
Lee's Summit, Mo.	0.40	1.00	1.50
Liberty, Mo.	na	na	1.25
North Kansas City, Mo.	0.10	zf	na
Raytown, Mo.	na	1.00	1.00

The allocation of revenue for inter-jurisdictional trips proceeds as follows (Exhibit 9):

- Surcharge Revenue -- each community receives the portion of the route revenue which is due to the surcharge imposed by the community.

- Intra-community Revenues -- subtracting surcharge revenue from total route revenue leaves the revenue from base fares. Base fare revenue is divided by total line patronage to compute an average base fare. The average base fare is multiplied by the number of intra-community riders (from the on-off count) to allocate the revenue from intra-community; trips.

- Inter-community Revenue -- when route surcharge and intra-community revenues are subtracted from total route revenues, the remaining revenue is for inter-community passengers. This revenue is allocated to the jurisdictions in proprotion to the vehicle miles operated in each jurisdiction through which the route passes.

Exhibit 9

KCATA REVENUE ALLOCATION

Passenger Revenue Allocation to Community X:

Surcharge revenues	S_x
Intracommunity revenues	Q_x ((R - S) / Q)
Intercommunity revenues	$m_x Q_i$ ((R - S) / Q)

Total revenues $R_x = S_x + (Q_x + m_x Q_i)$ ((R-S) / Q)

Where:

S_x = Surcharge revenue in a jurisdiction on a given line

Q_x = Trips in a jurisdiction on a given line

R = Total revenue in a jurisdiction

S = Total surcharge revenue in a jurisdiction

Q = Total trips in a jurisdiction

M_{sys} = Total system mileage

M_x = Total mileage for a jurisdiction

m = M_x/M_{sys}

Q_i = interjurisdictional trips on a given line

Chapter 3

THE SYSTEM DEFICIT APPROACH TO SUBSIDY ALLOCATION

A second approach to subsidy allocation is system deficit allocation. In this approach, the deficit is computed on a system-wide basis and then allocated to various jurisdictions based on some commonly agreed upon criteria.

This approach represents a simplification of the cost/revenue approach. The premise of the two approaches is the same: to allocate the subsidies among the jurisdiction in proportion to the costs and revenues of incurred by the services. The difference in the system deficit approach, however, is that a less complex method is used for allocation. It is assumed that a "fair" allocation can be made among jurisdictions with a small number of allocate variables and little route specific data collection and analysis.

The key decision in the system deficit approach is the selection of the allocation variables. For bus systems, variables such as vehicle miles, population, property values are used. (Exhibit 10).

Often the allocation formula uses more than one variable. For example, the formula for the Des Moines Metropolitan Transit Authority allocates deficits equally on the basis of a jurisdictions share of the vehicle miles and property assessment in the area.

In larger areas, the formula can be more complex, such as the formula used in the St. Louis Area. The Bi-State Development Agency Transit System serves the city of St. Louis and St. Louis County in Missouri and three counties in Illinois. The Missouri portion of the Bi-State deficit is allocated between the City of St. Louis and St. Louis County on a "two for one" basis. The city contributes the maximum of transportation funds it has available and the county pays twice that amount. There is little unfunded deficit because the amount of service delivered was predicated on the deficit funding available. This allocation process was developed in a political environment as a solution to a difficult funding problem. This method, as well as the other allocation methods previously described represent the local determination of a "fair" allocation method.

For rail service, the system deficit approach is often used. In Boston and Philadelphia, the cost attributed to heavy rail and commuter rail services are aggregated as are the revenues. The system-wide deficit resulting from the rail service is then allocated to the concerned communities using various techniques.

In the Philadelphia area, the major commuter rail lines serve the city and the counties of Bucks, Chester, Delaware and Montgomery. The rail deficit allocation formula is:

Exhibit 10

BUS SERVICE ALLOCATION FACTORS

City/Transit System	Basis of Allocation
Des Moines/MTA 5 cities	50% from the proportion of assessed property evaluation; 50% from the proportion of budgeted vehicle miles
New Orleans/MTA 2 parishes (counties)	50% percentage of population; 50% vehicle miles
Chicago/RTA Chicago, Cook County and 5 suburban counties	Percentage of route miles
Philadelphia/SEPTA city transit division city and 2 counties	99.8% to city of Philadelphia 0.1 % to Bucks County 0.1 % to Chester County Negotiated historical agreement

Philadelphia	70.0%
Bucks	5.9%
Chester	4.3%
Delaware	8.8%
Montgomery	11.0%
Total	100.0%

This is a historical agreement which was developed by representatives of the local jurisdictions. The formula has not changed in recent years.

In Boston, the deficit of all categories of rail service is aggregated and allocated as follows:

- 75% of the deficit is allocated to the 79 cities and towns of the service area based on their respective proportion of commuters compared with the total number of commuters in the service area. Commuter statistics are drawn from national census data.

- 25% of the deficit is allocated only to cities and towns which actually have rail and rapid transit stations. The allocation is based on the respective proportion of boarding passengers at each station compared with the total number of boarding passengers in the MBTA area. The statistics are derived from a boarding count.

The rationale to this allocation scheme suggests that all cities and towns should share the deficit because their residents would use rail and rapid transit stations in adjoining communities if none were locally available. Those communities with stations benefit more directly so they are allocated more of the burden.

Additional factors are used in allocating the system deficit (Exhibit 11). These include factors such as relative population, passengers, and passenger miles.

Exhibit 11

RAIL SERVICE ALLOCATION FACTORS

City/Transit System	Basis of Allocation
Boston/MBTA 79 cities and town (Rail)	75% to all cities and towns based on percentage of commuters. Source: U.S. Census Data
	25% to cities and towns with rail and rapid transit stops based on a percentage of a passenger boarding count
Washington, D.C. Metro Rail (8 cities and counties)	33-1/3% based on number of stations in the jurisdiction
	33-1/3% percent of population
	33-1/3% proportion of riders living in a jurisdiction as determined by passenger survey
Chicago/RTA (Chicago, Cook County and 5 suburban counties)	50% proportion of daily passenger miles
	40% proportion of 24-hour passenger boardings
	10% proportion of one-way route miles

Chapter 4

COMPARISON OF ALLOCATION APPROACHES

This chapter describes some of the advantages and disadvantages of the cost revenue and the system deficit approaches. The choice of an allocation method is in the final analysis a policy decision that jurisdictions should make based on their circumstances and resources.

Advantages of the Cost/Revenue Approach

The cost/revenue approach is perceived to be more accurate than the system deficit approach, because it can better discern and reflect cost and revenue differences among jurisdictions. It allows flexibility in handling complicated fare structures and it can be made to reflect zone and peak period differentials. It accounts for jurisdictional differences in ridership patterns, and consequently provides incentives to jurisdictions to increase ridership and reduce unnecessary service.

Disadvantages of the Cost/Revenue Approach

It is more complex than the system deficit approach and more difficult to develop and administer. It requires accurate detailed information as an input. Data, particularly revenue data, is often unavailable.

Advantages of the System Deficit Approach

The concept is simple to understand and easy to administer. Allocation factors such as population or property valuation data are normally available.

Disadvantages of the System Deficit Approach

It does not recognize differences in cost and revenue or in ridership patterns for various jurisdictions. It offers no strong incentive to a jurisdiction to reduce deficits.

Chapter 5

THE SUBSIDY ALLOCATION DECISION

An important decision for a transit system which serves more than one jurisdiction is the determination of the subsidy that each jurisdiction will be aked to pay. While this report deals with subsidy allocation techniques, it is not meant as an endorsement of allocation techniques as a means for resolving this issue. There are a number of transit systems which do not use allocation formulas (see Appendix A for a sample listing).

American urban areas are characterized by multiple municipal and county jurisdictions. Routinely, no attempt is made to allocate the costs of regional programs such as highway construction and air pollution to those jurisdictions. Some urban areas view the provision of transit service as such a regional program, recognizing that transit trips are not constrained by the jurisdictional boundary within urban areas. The non-allocation decision on transit can result from a perception that transit is a part of a complex set of public issues that cannot be effectively addressed in the face of jurisdictional preoccupation. By not allocating the subsidy, the region permits transit agencies to structure service in line with demand. This reduces the likelihood of overcrowding developing in high patronage servies, thereby reducing pressure for new public revenues for transit.

Although it serves several surrounding counties, Pittsburgh's transit system is entirely funded by Allegheny County general funds. This decision not to allocate any costs of the transit system to the other counties is a long-standing policy of the Allegheny County government. Their position is that efficient provision of transit services in these counties benefits the residents of Allegheny County.

In other areas, transit funding is collected on a regional basis. This makes it easier to consider the entire metropolitan area as one entity. With regional funding less distinctions are made between constituent or component jurisdictions. However, when funds are limited one must still consider the distribution of transit benefit to insure that each receives equal or equivalent benefit from the arrangement.

A major factor in the decision to allocate or not to allocate is the political climate of the concerned jurisdictions. Where the political climate is cooperative opportunities for a regional solution to the provision of transit are more likely to exist. It is also appears beneficial if the needs and the resources are approximately equal for each jurisdiction. For example, in the case of Minneapolis-St. Paul, the two cities have a long history of cooperation on many matters which has sustained their political relations through many different problems. The two cities are closely related economically and have a shared air transportation system as well as a shared bus system.

While the solutions undertaken are not applicable to all cases, it must be stressed that the decision not to allocate but to fund the deficit by regional tax is an important alternate. As boundary definitions become less clear in major metropolitan areas, jurisdictions may find that the decision to take a regional approach is more attractive.

Appendix A

FUNDING METHODS AND RATIONALES IN CITIES
WITHOUT DEFICIT ALLOCATION

State Funded

Hartford - New Haven - Stamford

These cities share a transit system that is entirely funded by the state of Connecticut. The transit authority turns over all farebox revenue to the state. The state authority in turn funds the system in accordance with the mandated budget which has been negotiated with the state legislature. Operating within the constraints of transit dedicated funds and the level of state funding available, the authority receives its total operating funds from this central source.

Newark

The state of New Jersey funds a central transit authority which has service delivery responsibility for the entire state both rural and urban. This agency performs as both funding source and as operator of all systems within jurisdiction.

Systems That Serve One Basic Jurisdiction

Indianapolis

The basic service area of Indianapolis is Marion County. The county supports transit service through a property tax of 4¢ per $100 of valuation. These tax levies are frozen and the only increase in the level of funding available is through an increase in the valuation of properties. These guidelines were developed by the state tax board and transit budgets are filed with this board on an annual basis.

Houston

Currently, The Houston Transit System serves only Harris County and is supported on a county-wide basis. A proposed system of heavy rail which would extend into suburban jurisdictions is in the developmental stage. This will greatly impact the transit financial situation in Houston in the near future.

Memphis

The city of Memphis is provided with transit services by Shelby County and the city/county government has primary fiscal responsibility for the provision of this service. As the county and city are synonomous in this case no problems arise. Transit is funded entirely from general revenues. A budget is presented to the city

council/county government and is funded as revenues permit. Service levels which are largely geared to the central business district and one outlying work site are adjusted to fit the available funding levels.

Cincinnati

Cincinnati serves only the city and a few metropolitan portions of Hamilton county in which Cincinnati is situated. A three-tenth of one percent earnings tax on all persons working in the city of Cincinnati is collected through employers and set aside for transit service. Local funds provide forty percent of the transit budget while state funds provide six percent.

Baltimore

This system serves three constituent jurisdictions -- Baltimore City and County, and Anne Arundel County. Under legislative mandate dating from July 1, 1982, operating revenues must cover 50% of operating costs. The balance of these costs are derived from federal, state and local sources. No attempt is made to allocate any portion of the deficit to either of the jurisdictions served.

Denver

The Denver system serves the City and County of Denver, Boulder and Jefferson Counties and portions of three other counties. This revenue is derived from farebos, federal subsidy assistance, a revenue bond issue, a one-half percent sales tax and a two and one-half miles property tax. No effort is made to allocate any portion of the deficit or to use any portion of the local subsidy to offset specific service delivery. Funds are aggregated on an overall basis and used to support system-wide service levels.

Atlanta

Although Atlanta has a fairly complex transit system with both heavy rail and bus components and serves three jurisdictions, the city of Atlanta, suburban Fulton County and DeKalb Count;y, the transit system has chosen not to specifically allocate any portion of the deficit to the individual jurisdictions. The system is locally funded by a one percent sales tax collected in all three jurisdictions which is used to support 50% of the operating costs of the system.

Miami

Miami -- Dade County employs a county subsidy drawn from the general funds. Although the system serves several jurisdictions, there is no allocation of subsidy or deficit to any of the constituent municipalities.

Pittsburgh

This system serves the City of Pittsburgh, Allegheny County and parts of three other counties. The system is supported by all jurisdications and no attempt is made to allocate any portion of the deficit amongst these constituent jurisdictions.

Portland

This system serves three Oregon counties and one Washington county. No attempt is made to allocate the deficit amongst these jurisdictions.

St. Paul - Minneapolis

This system serves the Twin Cities metropolitan area. Although rigorous performance standards are state mandated, no attempt is made to allocate any specific deficit to the constituent jurisdictions.

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