

## Abridgment

## Subjective Perception of Car Costs

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The costs involved in owning and using cars are very incompletely perceived by car owners, since they are frequently consciously or unconsciously repressed. In order to be able to empirically study this phenomenon more or less reliably, a very special methodological design is needed. In-depth interviews and interactive measurement methods, in particular, are especially promising to study the perception of car costs. By using these methods, it can be proved that there is a tendency to underestimate the out-of-pocket costs involved in using cars, a fact that has already been demonstrated in a number of studies. Simultaneously, it can be shown that the extent to which it is known what the expenditures are for other items in the car budget is even more limited. Furthermore, many car owners so thoroughly repress some of the costs involved in using their cars that they refuse to acknowledge certain items, even after they have been reminded of these categories of expenditure and admitted that they had forgotten these costs.

Since the energy crisis of 1974-1975, at the latest, when the price for gasoline was continuously rising, the question of the extent to which the costs involved in owning and running a car influenced mode choice was posed increasingly often (1). However, it quickly became clear that car owners are poorly informed about the actual costs involved in owning and using their cars. This has been demonstrated by a number of studies (2-4), which show that car owners not only frequently underestimate the amount they spend on their cars, but that they also tend to either ignore or minimize certain types of expenditures (e.g., for repairs, depreciation in car value, and parking fees). Often, only running costs were considered when calculating car budgets, i.e., the price paid for gasoline and oil, etc. But even when only these running costs were considered, they were frequently underestimated (5). Furthermore, a number of factors suggested that when operating expenses for cars increase, most car owners respond by trying to reduce their running costs (6) and that fixed expenditures for maintaining cars are less closely scrutinized.

This insight seemed to suggest that it might be advantageous to critically examine the perception of all expenditures related to ownership and use of cars. A study of this sort also seemed to be necessary because econometric-oriented planning models frequently focus mainly on out-of-pocket costs.

However, a study of the perception of the car budget is methodologically problematical (7). One of the reasons for this is the fact that actual expenditures are all too often repressed or minimized. Thus, a methodological design had to be used that could break through subjective barriers. It was also necessary to compare cost estimates with comparative data that were as objective as possible. Therefore, in the study presented here (8), special instruments were designed to examine a sample of 600 car drivers in the Federal Republic of Germany. The study was sponsored by the German Automobile Club (ADAC).

## METHODOLOGICAL DESIGN

Personal in-depth interviews had to be used in order to identify perceived car costs and determine objective car costs as precisely as possible. In these interviews, different methods were used to deal with various questions.

Questions pertaining to purchase and use of cars were posed directly. Since the study for the most part dealt with behavior that had occurred within

the last 12 months, it was assumed that answers to factual questions would be more or less precise since the recall period was not that long. (This naturally did not apply to questions likely to elicit emotional responses.)

However, during specific "critical" parts of the interview, it was necessary to ensure that the presence of the interviewer did not result in biased responses that could not be corrected later. This was done either by using scales or lists of various sorts so that the memories of the respondents would not be overly taxed when several responses were called for or by using questionnaires in which the respondents would note their answers in their own words, i.e., without the intervention of the interviewer. These instruments were used when individuals were asked to list the types of expenditures involved in the upkeep and use of their cars, responses that could easily be influenced by interaction with the interviewer.

Different categories of expenditure had to be standardized because so many different types of costs are involved in estimating the car budget. This was done by using sets of cards on which different items of expenditure were precisely defined and differentiated from other types of expenses. Since the order of the cards could be changed at will, it was possible either to arrange expenditures in the chronological order in which they had arisen or to list items in order of importance.

Projections, for alternative behavior, for instance, are always methodologically difficult to study. In other surveys, the Institute for Empirical Social Research had already developed instruments (interactive measurement methods) (9) in which individuals not only answered prepared questions but also participated in creating situations that were as realistic as possible.

In this study, these interactive measurement methods were applied by having the households play a car budget game. The respondents used chips to depict their monthly net incomes and to represent the amounts spent on precisely defined categories of expenditure. Four types of car expenditures were differentiated (developed and used by the ADAC):

1. Fixed costs (car taxes, insurance payments, inspection fees);
2. Costs for running the car (gasoline, oil, washing and polishing costs, etc.);
3. Repair costs and maintenance costs (oil change, repairs, etc.); and
4. Loss in value of car (car depreciation).

In its final form, the interview consisted of nine different parts:

1. Number of cars in household;
2. Number of kilometers driven per year;
3. Perception of car costs;
4. Controlled analysis of different items of expenditure;
5. Car purchase: (a) purchase of extras for car, (b) degree to which informed about insurance and manner in which decision made which car insurance to buy, (c) reasons for buying gasoline at particular station, (d) manner of dealing with repairs of different sorts, (e) degree to which informed about

the car market and manner in which decision made which car to buy, (f) degree to which one is informed about the depreciation of cars, and (g) car maintenance;

6. General attitudes toward informing oneself of different car-related expenditures;

7. Household game to measure sensitivity to increased car-related costs;

8. Sociodemography; and

9. Interviewer and interview.

The respondents estimated their car budgets in four different stages; in each successive stage, they had more information than in the preceding stage:

1. The respondents were asked to "spontaneously" estimate their car-related expenditures,

2. The respondents carefully considered whether their spontaneous estimate had really taken all different kinds of costs into account,

3. The interviewer used the card sets to remind the respondents of the various categories of expenditure, and

4. The household made its estimate by using any bills and receipts that might have been kept (it was forbidden to use such bills and receipts in the previous three stages).

The most important section of the final part of the interview was the use of the household game. This game was needed since it would not otherwise be possible for the interviewer to check and evaluate the accuracy of the responses. However, by using the game, the interviewer became familiar with the circumstances of the households and the attitudes of the respondents toward different questions pertaining to cost. Since it could be assumed that the respondents had gone through an intensive learning process in the different stages of the study, it was assumed that the final budget estimates would include all the different types of car expenses that were not being repressed, ignored, or rationalized. To a large extent, the interview situation used ensured that the results of measurement would be accurate. This would not have been so had conventional survey instruments been used.

#### ESTIMATING TOTAL CAR BUDGET

The monthly car expenditures for owning and using cars were grossly underestimated by the car drivers who were interviewed. Although two out of every three respondents claimed to have a good or very good knowledge of their car expenditures (Table 1) when estimating their car budgets, 56 percent of the respondents were forced to increase their total car budgets between the first and the last estimates. The final car budget estimate for every third respondent was more than 20 percent higher than the first, spontaneous estimate. Every fifth person was forced to increase the final estimate by 40 percent or more (Table 2). But a certain relationship between the degree to which a person is informed and his or her self-evaluation could be identified.

Although the value of almost all cars depreciates (with the exception of certain classics), only one-third of all the respondents spontaneously quoted this item as a part of the car budget. Since a person has to be somewhat familiar with economic thinking in order to realize that the value of a car depreciates each year, many car drivers forget this item. However, even after the respondents were reminded that their cars were worth less each year, 13 percent of the respondents had no idea whatever how much the value of their cars depreciated each

year. The average car budget is underestimated by about 30 percent per year due to the fact that car depreciation is often ignored.

The car budget as estimated by the respondents accounts for an average of 17 percent of the net income of the households interviewed. This is only slightly less than the households paid for rent (including heat, gas, electricity, telephone, and television fees) or groceries (excluding alcohol, cigarettes, etc.), for which the average household spent 21 percent of its monthly net income. A comparison of these figures with the figures quoted in government statistics (10) shows (with the exception of the car budget) that these figures are similar to the national statistics for Household Type 2 (four-person household with average income), which is most similar to the type of households included in the sample.

The car-related expenses, which were higher than those quoted in the government statistics, were a result of the methodological contents of the survey; in the government statistics, the proportion of the monthly net income spent on cars (about 14 percent) does not include depreciation of the cars but does include the purchase price.

On the other hand, the instruments used in this survey not only included the depreciation value of the cars (as far as possible) but also reminded the respondents of the different types of expenditures related to car use. As a result of these survey techniques, the respondents increased their estimates from an average of 300 German marks per month in their first estimates (14 percent of their monthly net income) to an average of 365 German marks per month (17 percent of their monthly net income); this latter figure is much more realistic than the first one. However, in fact, the average household included in the survey spent an average of 20 percent of its net monthly income on its car budget. This was caused not only by the fact that the depreciation value of the car was so frequently

Table 1. Precision of car budget estimate.

Precision of Estimate	Cost <sup>a</sup> (%)				
	Total	Fixed	Repair	Operating	Depreciation
Very precise	18	18	9	13	10
Rather precise	50	59	49	62	25
Less precise	27	17	28	18	13
Not precise	5	3	6	3	4
No response	-	3	8	4	13
Not exposed to this cost	-	-	-	-	34

<sup>a</sup>Base (B) = 600.

Table 2. Self-evaluation of precision of estimate.

Increase in Estimate (%)	Respondents by Type of Estimate (%)				
	All (B = 585)	Very Precise (B = 104)	Rather Precise (B = 299)	Less Precise (B = 157)	Not Precise (B = 25)
None	44	58	41	39	44
<20	21	18	21	23	16
20-40	14	9	15	18	8
40-60	8	5	8	10	8
60-100	9	7	9	7	13
>100	4	2	6	3	11
Avg	22	15	24	22	29

ignored but also by the fact that many were unwilling to acknowledge certain categories of expenditure. (The latter categories are dealt with later in this paper.)

ACCURACY OF ESTIMATES

The extent to which estimates for the total car budget and for different categories of expenses are considered to be accurate is an important factor in determining the subjective perception of car costs. As Table 1 shows, individuals are surer of what they spend on some items than on other items. Thus, although two out of every three car drivers believe that they can estimate what they spend on their entire car budgets accurately or very accurately, three out of every four car drivers believe that they can estimate their fixed costs and running costs accurately or very accurately. In regard to the rarer repair costs, there was much less confidence in the estimations, although even here, three out of five car drivers thought that their estimates were either accurate or very accurate. However, whenever possible, these subjective evaluations had to be compared with actual facts. One indication of whether these subjective evaluations were likely to be more or less objectively valid was whether or not the respondents kept a record of their expenses, i.e., an account of running costs and whether this was examined from time to time.

However, it is important to identify the reasons why a record of car expenditures is maintained if the control function of this record is to be evaluated. Thus, the fact that four out of every five keep their bills and receipts tells one nothing about the actual reasons why these documents are kept. When asked whether they saved their bills and receipts, 126 out of a sample base of 600 (21 percent) said that they did not. Out of the base of 600, 474 (79 percent) said that they did keep bills and receipts, as follows:

Type	Percent
All car expenditures	28
Specific expenditures	72
Fixed costs	88
Running costs	33
Other costs	88

Of the same size base, the following reasons for keeping bills and receipts were given:

Reason	No.	Responding	Percent
Own records	241		40
Internal Revenue Service	238		40
Reclamation	187		31
Insurance	152		25
Business	28		5
Other	49		8

When asked whether they kept an account of their car costs, 478 out of the base of 600 (80 percent) said that they did not. Out of the base of 600, 122 (20 percent) said that they did keep an account of their car costs for the following reasons:

Reason	Percent
All car expenditures	50
Specific expenditures	50
Fixed costs	70
Running costs	78
Other costs	77

Reasons given for keeping an account of car costs were as follows:

Reason	No.	Responding	Percent
Record of gasoline consumption	49		8
As personal record	46		8
Business	24		4
Other	20		3

Among those who kept their bills and receipts, a larger-than-average number either drove a great deal, owned a new car, used their cars predominantly for business purposes, or were self-employed; i.e., they were precisely those for whom car costs do not play a particularly large role and for whom saving bills and receipts is less for control purposes than for tax purposes.

The same applies to those who keep an account of their car expenditures. A relatively large number of those referred to above also keep a record of their car expenses. (Among those who use their cars primarily for business purposes, every third person keeps an account of his or her expenses.) However, an account of gasoline and oil expenses is usually kept for business purposes rather than for personal reasons. Only 8 percent of all car drivers (14 percent of the unemployed) keep a record of their car-related expenditures for personal reasons.

The car budget estimates used in the survey made it seem sensible to use only the first, spontaneous estimate and the final estimate. The in-between stages were primarily of methodological value; i.e., they were to help the respondent to calculate his or her actual car-related expenses. Estimation errors thus refer to the difference between the initial and the final estimate. Since it did not seem to make much sense to categorize errors in estimation in all too precisely differentiated subgroups, increases in expenditures were depicted only in intervals of 20 percent.

In the final estimate, the total car budget was an average of 22 percent higher than in the first, spontaneous estimate. However, for different groups, there are considerable differences between the first and the final estimate. This is especially apparent if one classifies people according to whether or not they are employed and what their occupations are. While those who are self-employed underestimate their expenditures by an average of only 16 percent and blue-collar workers underestimate their expenditures by only 13 percent, those who are unemployed underestimate their expenditures by an average of 29 percent (Table 3).

Since the first and final estimates differ so radically for different groups, it makes sense to use averages for purposes of comparison. While the first and the final estimates were the same for 44 percent of the respondents, every fifth car driver increased his or her first estimate by 40 percent or more. The difference between the first and final estimates was least pronounced for those who used their car predominantly for business purposes, those who drove new cars, and those who were self-employed (Table 3). These are precisely those who keep an account of their car expenses relatively frequently.

Although these accounts are rarely kept for personal reasons, keeping track of expenses causes one to have a (subjectively) more accurate record of expenditures. This is shown in Table 4. Only every second person who keeps an account of his or her expenses increases the estimate, and by an average of only 15 percent. Those who do not keep records of their expenditures increase their initial estimates by an average of 25 percent. The relationship between number of kilometers driven per year and the precision of the budget estimates is equally understandable (Table 4).

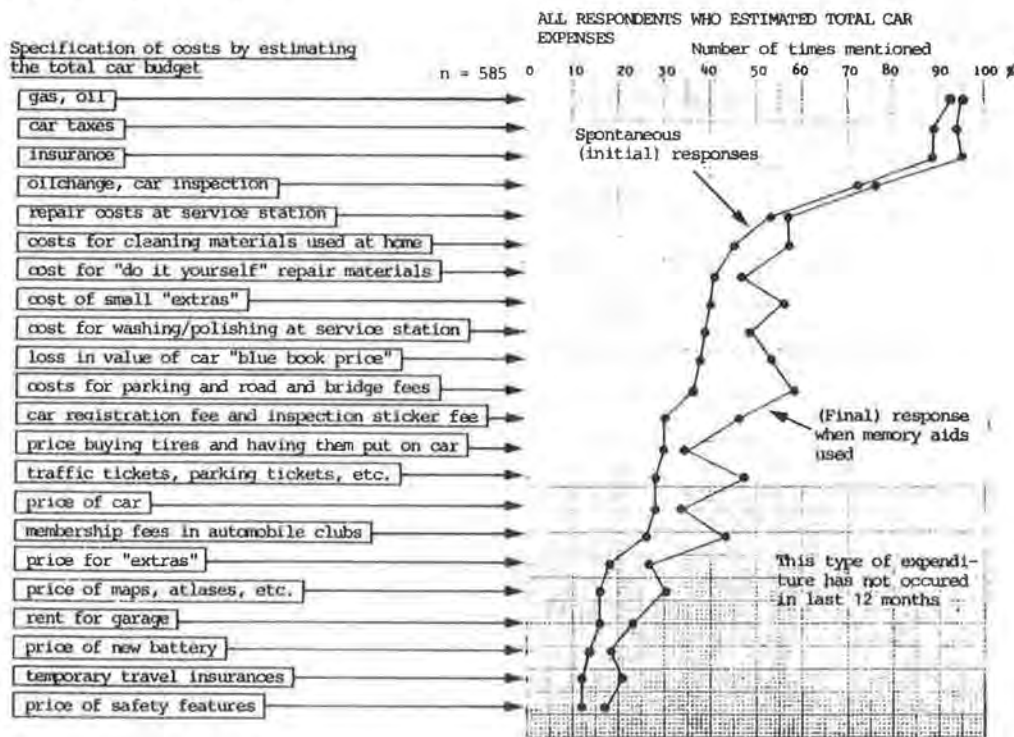
**Table 3. Effect of employment status and type and use of car on estimate of total car costs.**

Increase in Estimate (%)	Percent of Total Respondents (B = 585)	Employment Status (%)					Primary Use of Car (%)		Type of Car (%)	
		Unemployed (B = 63)	Blue-Collar Worker (B = 42)	White-Collar Worker (B = 287)	Civil Servant (B = 52)	Self-Employed (B = 111)	Business (B = 98)	Private (B = 487)	New (B = 246)	Used (B = 339)
None	44	28	45	45	41	52	53	42	50	40
<20	21	23	32	19	18	24	21	21	15	24
20-40	14	22	16	14	11	9	10	16	13	16
40-60	8	13	2	8	8	7	6	8	8	8
60-100	9	5	5	9	18	6	7	9	10	8
>100	4	9	-	5	4	2	3	4	4	4
Avg	22	29	13	22	28	16	17	23	20	22

**Table 4. Effect of keeping account of car costs and yearly mileage on estimated total car costs.**

Increase in Estimate (%)	Percent of Total Respondents (B = 585)	Account of Car Costs Kept (%) (B = 118)	Account of Car Costs Not Kept (%) (B = 467)	Mileage Driven per Year (%)		
				>20 000 km (B = 150)	10 000 to 20 000 km (B = 295)	<10 000 km (B = 140)
None	44	52	42	46	43	44
<20	21	21	21	26	21	16
20-40	14	12	14	12	14	16
40-60	8	10	8	4	8	12
60-100	9	4	10	10	7	8
>100	4	1	6	2	6	4
Avg	22	15	25	18	22	25

**Figure 1. Perception of car costs.**



**DIFFERENT PERCEPTIONS OF DIFFERENT TYPES OF EXPENSES**

Even more interesting than those categories of expenditure that were simply underestimated were those types of costs that were totally forgotten, repressed, or rationalized and the changes that resulted in the first and in the final estimates when people were reminded of these expenses. It

becomes clear how car costs are perceived when one notes the difference between those costs that occur spontaneously to respondents and those costs that the respondents totally ignored until they were reminded of them by the interviewer. Figure 1 shows the differences in the perception of various types of costs. Respondents have a fairly good idea of their out-of-pocket costs, of major expenses, and of running costs. Gasoline, tax, and insurance costs

are fairly well perceived, as are repair and maintenance costs. Ninety percent of the respondents who had had such expenses recalled them.

Larger purchases, such as tires, batteries, or the car itself, as well as minor expenses such as car washing and waxing costs, were somewhat more poorly perceived. Each fifth respondent had to be reminded of these expenses by the interviewer.

Expenditures for fees of various sorts were frequently repressed or forgotten. Each third respondent who had had to pay parking fees, parking tickets, speeding tickets, membership fees in automobile clubs, registration fees, or inspection fees had to be reminded of these items. These expenses were forgotten more quickly than expenditures that pertained directly to car use. This also applied to the purchase of such "extras" as slipcovers.

However, although it is perhaps understandable that the respondent could forget minor expenses, it is somewhat odd that every twentieth car owner had to be reminded of the cost of taxes and insurance for the car. (The remainder of this group had had these costs paid for by a third party.)

The proportion of these car owners can also be found in that group for whom there was no difference between the first and final estimates of the total car budget. This means that here too almost every twentieth respondent had to admit that a category of expenditure had been forgotten and yet refused to increase the estimate for the total car budget. In this group as a whole, the cost for specific items resulted in a 15 percent increase in costs, but this was not reflected in an increase in the total car budget, a particularly clear example of the subjective process of repressing certain types of car expenses.

To summarize, one can say that for the majority of car drivers, (a) specific types of car expenses are partly repressed, especially fees, extras, car depreciation, etc.; (b) even when respondents acknowledged that they had forgotten certain categories of expenditure, this did not necessarily induce them to increase the total car budget; and (c) even when the car budget was radically increased, not all categories of expenditure were taken into consideration.

Thus, almost all those who used cars showed that they were extremely poorly informed of the costs involved in using their cars. The problem is even greater than the above discussion would suggest.

**INFORMATION ON PRICES AND COST CONTROLS**

In the broadest sense of the term, only approximately every second car driver is price conscious, i.e., selects that product deemed to be less expensive. When the value of the product increases, the respondents do show a stronger tendency to do comparative shopping. When making minor purchases, only 14 percent of the respondents did comparative shopping and 11 percent were influenced by "tips," test results, or suggestions made by friends or acquaintances. However, when the purchase price of the product to be bought increased, 47 percent of the respondents did comparative shopping and 29 percent of the respondents were influenced by brand names. When buying tires or batteries, for instance, two out of every five respondents were influenced by tips or by test results (Table 5). However, when the respondents selected their insurance policies, price was not the most important factor considered. Every fifth respondent did not know how high insurance payments were and only approximately every third person kept track of price developments for the different insurance companies. Out of a base of 600, 80 percent knew what their

insurance payments were. The degree to which people keep informed about reports on insurance companies is as follows:

Degree	Percent
Not at all	63
Only for own company	8
For other companies also	28
No response	1

The insurance company was chosen because of the following reasons:

Reason	Percent
Accidental	29
Low costs	31
Large returns	7
Good benefits	14
Serious company	11
Suggestion	7
Acquaintances/friends work there	6
Other	6

As might be expected, the most comparative shopping was done and the most detailed scrutiny of information sources took place when it was decided to purchase a new car. Of the respondents, 44 percent decided where to buy their cars only after they had compared various offers. The other respondents either knew in advance where they would purchase their car or else selected their car more or less accidentally. This is obviously caused by the fact that most of those who wish to buy a car have some idea of what they are looking for--type of car, manufacturer, size, etc. Other respondents bought their cars where they did because they were regular customers at that dealer.

Although cost is relatively important when it is decided where to buy gasoline, it is not the only factor taken into consideration. However, one can assume that price has become more important in recent years as the price of gasoline has soared. Of a base of 600, 57 percent of the respondents regularly patronize the same gasoline station and 43

**Table 5. Purchase of equipment.**

Response	Type of Equipment		
	Tires, Batteries, Headlights, Headrests (%) (B = 261) <sup>a</sup>	Radio, Slipcovers, Fire Extinguisher, First Aid Kit (%) (B = 175)	Soap, Wax, Spark Plugs, Defrost Spray, Windshield Wiper Blades (%) (B = 443)
Shopped at given store, service station because			
Always go there	21	14	29
Close to home/work	8	5	16
Cheap	54	67	39
Other	15	11	12
No response	2	3	4
Comparative shopping			
Took place	46	47	14
Did not take place	53	51	86
No response	1	2	-
Influenced by brand			
No	59	65	82
Yes <sup>b</sup>	39	29	11
No response	2	6	7

<sup>a</sup> Respondents who had bought at least one article in this category themselves within the last 12 months.

<sup>b</sup> Influenced by specials, test results, suggestions, etc.

percent do not. Reasons for selecting a gasoline station are as follows:

Reason	Percent
Price	41
Near home	26
Good service	15
On way to shopping	3
Other	6
No response	21

Of 600 respondents, 80 percent knew gasoline prices exactly and 20 percent could not remember them. Respondents who inform themselves about gasoline prices in their communities do so with the following frequency:

Frequency	Percent
Regularly	13
Occasionally	18
Only in passing	36
Hardly ever	32

Nevertheless, the expenditures for operating the car account for only 40 percent of the costs involved in using cars. And the perception of other expenditures is even worse than that for operating costs, for instance, the perception of repair costs, which account for 19 percent of the car budget, and the perception of fixed costs, which account for 27 percent of the car budget. The depreciation in the value of the car, which accounts for an average of 14 percent of the yearly car budget, is usually either partly or totally repressed.

The assumption that radical increases in operating costs for cars would lead people to be more aware of car-related costs could not be justified in this study, with the exception of the purchase price of the cars.

Nevertheless, as inaccurate as the perception of the car budget might be, car-related costs are still comparatively well accounted for in the household budget in contrast to other categories of expenditure.

A detailed study (11) of total household budgets showed that there were even worse errors in the perception of the total expenditures for the household. In Munich, for instance, only 2 percent of all households kept a regular account of their expenditures and only every sixth household (18 percent) could precisely account for income and expenditures. Approximately every fourth household (23 percent) knew precisely what they spent for at

least some categories of items, whereas 38 percent of the households could more or less correctly reconstruct their household budgets--with some effort. Every fifth household (21 percent) could do no more than roughly estimate its expenditures, even with great effort.

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## A Decade of Change for Mass Transit

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The transit industry in the United States was transformed during the decade of the 1970s. This transformation consisted of changes in institutional structure; changes in the amount, type, and location of transit service; and changes in cost levels and in the means by which costs were financed. The purpose of this paper is to examine the nature and extent of these changes, with particular emphasis on changes in levels of service, costs, and financing. Variations in these trends among different transit systems are highlighted, and causes of the variations are analyzed by a range of statistical methods. Although the econometric results are not entirely conclusive, they suggest that various aspects of the current transit program may encourage cost escalation and thus hamper the effectiveness of government subsidies to transit.

The transit industry in the United States underwent a revolution during the decade of the 1970s. Unlike most other industries, however, the transit revolution resulted not from technological change but rather from shifts in public policy. The most important aspects of transit's transformation were changes in the institutional framework of the industry, accompanied by a broadening of the perceived objectives of transit; changes in the amount, type, and location of transit service; and changes in the