RESTRUCTURING THE FORM OF CAR OWNERSHIP

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This paper is circulated for discussion purposes and its contents should be considered preliminary.

1. The Need for a New Form of Car Ownership

The problem of the motor car, especially in urban areas, is becoming more and more serious. The Buchanan Report summarises the urban traffic problem as :[1]

'jams, frustrations, parking difficulties, confusion, noise and accidents'.

The root cause of our difficulties undoubtedly lies in the rapid growth of car ownership and use and tables 1 and 2 show how the car has tended to supercede all other forms of transport

Table 1   Numbers of Vehicles Licensed in Great Britain

Year	Cars	Other Vehicles	All Vehicles	Number of Cars per Person
1957	4,187	3,299	7,486	0.083
1958	4,549	3,412	7,961	0.090
1959	4,966	3,700	8,666	0.098
1960	5,526	3,914	9,440	0.108
1961	5,979	3,987	9,966	0.116
1962	6,556	4,008	10,564	0.126
1963	7,375	4,071	11,446	0.141
1964	8,247	4,123	12,370	0.156
1965	8,917	4,023	12,940	0.168
1966	9,513	3,773	13,286	0.178

Figures in the first three columns are in thousands.

(Source: Highway Statistics 1966, H.M.S.O.)

Table 2   Estimated Passenger Mileage in Great Britain

Year	Private Transport	Buses and Coaches	Total by Road	Rail
1957	59.9	45.9	105.8	22.6
1958	72.9	43.4	116.3	22.1
1959	82.1	44.1	126.2	22.3
1960	88.9	43.9	132.8	21.8
1961	97.7	43.1	140.8	21.2
1962	103.7	42.4	146.1	19.7
1963	110.5	41.5	152.0	19.6
1964	125.5	40.3	165.8	19.9
1965	134.8	37.6	172.4	18.7
1966	145.1	36.3	181.4	18.5

Figures are in thousand millions.

(Source: Highway Statistics 1966 and British Railway Board Annual Reports and Accounts)

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1. 'Traffic in Towns'. H.M.S.O.. 1963. page 9.

The number of cars in use is growing at a compound rate of some 8% per annum and in the decade 1957 to 1966 the number of cars per person has more than doubled. What will happen to car ownership in this country in the future has been the subject of some controversy.[2] All writers are agreed that it will increase but nobody, for obvious reasons, can be sure of the saturation level. The general consensus is that we can at least expect to reach the current U.S.A. level of 0.40 cars per person by 1990 and Mogridge has suggested an ultimate saturation level of 0.66 cars per person. However, any prediction must be subject to a considerable amount of uncertainty. For example, it will depend on the policy adopted towards public transport and parking as well as the amount of congestion and the related aspect of the size of the investment programme in road improvements. In fact the main proposal of this paper is a scheme which could keep the saturation level well below 0.40 cars per person, while at the same time extending the use of the motor car.

It is not necessarily the increasing car ownership which is causing concern but the associated trend in car use. Passenger mileage by private car is highly correlated with the number of licensed cars and private transport, which to all intents and purposes means private cars, is rapidly becoming the dominant mode of transport. In 1957 private transport accounted for 56.6% of all road passenger miles and 46.6% of road and rail passenger miles. The corresponding figures in 1966 had increased to 80.0% and 72.6%. During the decade public transport has become entwined in a vicious circle in its attempt to remain profitable. The loss of passengers has been met by increasing fares and reductions in the level of service both of which lead to further reductions in the level of use. We can also be certain that, as car ownership increases, the use of public transport will continue to decline. A recent study by Schenker and Wilson on the use of public transport in the U.S.A. has quantified the impact of ever increasing car ownership. They summarise their most important conclusion in the following way:[3]

'The most striking relationship of the study emerges between automobile ownership and mass transit use. We originally started with eleven independent variables and defined the relationship between

2.   The most recent article dealing with this problem is by M.J.H. Mogridge, 'The Prediction of Car Ownership', Journal of Transport Economics and Policy, Vol 1, No. 1, January 1967, pp 52-74. This article contains a bibliography of U.K. work in this area.

3.   Schenker, E., and Wilson, J., 'The Use of Public Mass Transportation in the Major Metropolitan Areas of the United States', Land Economics, August 1967, pp 361-367.

each of these and mass transit ridership as well as their relationship to each other.   In the end it was shown that one of these eleven - automobile ownership - can be used to estimate current public transportation demand in large metropolitan areas with the equation : $T = 12.55 + 1.38X_8$.   This equation is capable of explaining nearly 90% of the public transit demand variation between the twenty three metropolitan areas studied.'

In the equation X_8 is the percentage of households with no car and the regression coefficient indicates that a one percent increase in non-car owners is associated with a 1.38% increase in the use of public transport.

The problem posed by increasing car ownership and use has been tackled by increased investment in new roads and road improvements and by traffic management schemes while, for the future, it looks as if rationing road space by road pricing will become important.   Increased investment has been spent mainly on motorways which only help the urban problem of congestion in so far as they by-pass towns.   Traffic management schemes cover a multitude of ways of increasing traffic flows and are primarily concerned with urban areas.   Under this heading must be included one way street systems, tidal flow schemes at linked traffic lights and parking and unloading restrictions.   Traffic management schemes are thought to have had some success in increasing traffic flows but a recent study by J.M. Thomson has questioned whether this is in fact the case.   Thomson was only concerned with Central London and one of his more important conclusions was :[4]

'We conclude this discussion, therefore, by reiterating with little qualification the proposition that the true capacity of the network has not increased, and has probably fallen, since the advent of traffic management in 1961'.

How is the future growth of traffic to be met?   There is obviously a limit to the increased flow of vehicles that can be accommodated on a given road network even given the most sophisticated traffic management schemes.   It also looks as if investment in roads is not going to match the increase in the number of cars.   A recent report from the Ministry of Transport comments :[5]

'We took as the basis for our study the assumption that there was no practical possibility of providing enough road space to carry a rapidly growing amount of traffic'.

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4.   Thomson, J.M., 'The Value of Traffic Management', Journal of Transport Economics and Policy, Vol. 11, No. 1, January 1968, p 15.

5.   'Better Use of Town Roads', Ministry of Transport, H.M.S.O., 1967 page 3.

The same study then proceeds to consider ways of rationing road space by means of various road pricing schemes. These schemes will slow down the decline in public transport, as will direct subsidies to public transport. However, the advantages of own-car usage are considerable and it may be that the shoring up of public transport will be a losing battle. In addition, the subsidisation of public transport is often viewed as an alternative to spending the money on better roads and better parking facilities. As the number of car owners steadily increases the democratic pressure shifts from support of public transport to support of better roads.

This paper contains a proposal for restructuring the form of car ownership which could reduce the rate of growth of cars. This involves a change in the pricing for the use of cars, basically a shift from marginal cost to average cost pricing. Before considering the scheme in detail it is necessary to consider the decision making situation of the car owner.

Before a consumer becomes a car owner several types of fixed costs must be undertaken. He must first become a driver and this is a process which is expensive, involving a considerable amount of time and money. He must also provide proper parking space for the vehicle, this usually involving the additional expense of a garage. The actual purchase of the vehicle is a second type of fixed cost and by far the most expensive. Because the outlay on the car is so large the other fixed costs in this second step are not sufficiently realised. These include car insurance, major repairs and upkeep. Some of these latter expenses, such as tyres, can properly be regarded as running costs. However, these costs are irregular and it is difficult for the car-owner to regard them as current running costs. It is likely that only petrol, and perhaps oil, costs are viewed by the car owner as the actual marginal or running cost of his car. The following data gives the fixed and variable costs for car ownership as estimated by the Automobile Association. It will be noticed that the table includes the cost of garaging but does not make any allowance for the fixed cost involved in learning to drive.

The table gives a breakdown of costs for three different engine sizes for an annual mileage of 10,000. This mileage is higher than the average, the estimate for 1966 from 'Highway Statistics' being 7,500 miles per car. Cars less than 1500 c.c. are now the major

Table 3   Fixed and Variable Costs for Car Ownership

Fixed Costs (pence per mile) Assuming annual mileage of 10,000 miles

	Engine Capacity (c.c.)		
	Up to 1,000	1001-1500	1501-2000
Car licence	0.600	0.600	0.600
Insurance	0.897	0.987	1.419
Driving licence	0.006	0.006	0.006
Depreciation	1.707	1.922	2.759
Interest on Capital	0.615	0.692	0.987
Garage	1.092	1.092	1.092
Subscription to AA	0.076	0.076	0.076
Fixed costs per mile	4.993	5.375	6.939

Variable Costs (pence per mile)

Petrol	1.783	2.184	2.816
Oil	0.093	0.143	0.156
Tyres	0.231	0.234	0.259
Servicing	0.193	0.223	0.233
Repairs and replacements	0.967	1.089	1.268
Variable costs per mile	3.267	3.873	4.732
Total cost per mile	8.260	9.248	11.671

Source : Automobile Association 'Schedule of Estimated Running Costs'

element in the car population accounting for 70% of the total in 1966.
Thirty percent of all cars were less than 1000 c.c. and 40% came in the
category 1001 - 1500 c.c.   This latter category is probably growing most
rapidly, 46% of new registrations in 1966 coming in this class.   This
being so the cost data for cars 1001 - 1500 c.c. will be considered as
representative of all car owners.   If petrol and oil are the only variable
costs considered by the driver then the marginal cost is 2.3 pence per
mile compared with an average cost of over nine pence per mile.   Total
annual expenditure for this car amounts to £385.   However, a three mile
trip by car results in an out-of-pocket cost of only seven pence - far
less than the public transport charge for the same journey.   As a good

economic maximiser the car owner will opt to use his car for almost
all journeys.

What we are saying above is that the decision on car use
is being made by comparing the marginal cost of car use, the
appropriate marginal cost being defined as out-of-pocket expense for
the trip, with the cost of making the same journey by public transport.
This latter cost will almost certainly be some form of average cost.
This, as Roger Sherman has pointed out, will lead to a bias in favour
of the car in transport choice.[6] Sherman, like all good economists,
was attracted by the idea of marginal cost pricing and he argues that
resource allocation will be improved if public transport prices on
this basis.   However, public transport is a decreasing cost industry
and marginal cost pricing by itself would lead to deficits.   To
eliminate the deficit Sherman proposes a 'club subscription' where
members share the fixed costs of public transport over a contracted
period of time.   Sherman points out the consequences of such a scheme :[7]

'If members who shared the fixed costs paid only marginal cost
for their usage of the service, a potential member could evaluate
the impact of his usage of public transport on the overall cost per
mile to him.   And he could thereupon choose between car and public
transport on equal terms, at approximate marginal cost'.

At first sight this seems a fine scheme but it is completely
non-operational.   The problem is to get car owners to subscribe to the
fixed costs of public transport.   But, given the very heavy fixed costs
of car use there is absolutely no incentive for a car owner to indulge in
further fixed cost expenditure.   Few car owners will join the Transport
Club.   The majority will always use their cars.   Does this mean that
resource allocation in the field of passenger transport cannot be
improved?   Our answer to this is an emphatic NO.

Considering public transport (pt) and private cars (pc) as the
only two relevant modes then, to approach the Paretian optimum, we would
like the price ratio equal to the ratio of marginal costs.   That is to
say

$$\frac{P_{pt}}{P_{pc}} = \frac{MC_{pt}}{MC_{pc}}$$

6.   Sherman, R., 'Club Subscriptions for Public Transport Passengers',
     Journal of Transport Economics and Policy, Vol. 1, No. 3, Sep 1967
     pp 237-242.

7.   Sherman, op.cit., page 238.

It is considered realistic to think of both of these marginal costs as constants, that is to say they do not vary greatly with the number of vehicle miles travelled. The current situation is that average cost pricing is appropriate for public transport because of the desire to break even and marginal cost for private car transport. That is to say

$$\frac{P_{pt}}{P_{pc}} = \frac{AC_{pt}}{MC_{pc}}$$

and given a decreasing cost public transport sector then $MC_{pt} < AC_{pt}$. Therefore the desired price ratio is less than the existing price ratio. That is

$$\frac{MC_{pt}}{MC_{pc}} < \frac{AC_{pt}}{MC_{pc}}$$

One point of importance is the decline in public transport use. Given that the demand curve for public transport is shifting to the left then AC_{pt} is rising through time and we are moving, perhaps rapidly, away from the desired position (this point will be considered in more detail below). However, suppose we make the price ratio equal to the ratio of average costs. That is

$$\frac{P_{pt}}{P_{pc}} = \frac{AC_{pt}}{AC_{pc}}$$

Now, as we have seen in table 3 the average cost of car use is in excess of the marginal cost, i.e. $AC_{pc} > MC_{pc}$. It therefore follows that

$$\frac{AC_{pt}}{AC_{pc}} < \frac{AC_{pt}}{MC_{pc}}$$

What we can say is that if we charge average cost for use of the car and not marginal cost then we will move in the right direction and remove some, or perhaps all, of the bias which exists in favour of the car in making a decision on transport choice.

Some figures may help to get the above discussion in perspective. The figures will be presented on the assumption that one individual is making a decision on the mode of transport for a particular journey, for example the journey to work. The current charge for buses is, on average,

3.50 pence per passenger mile as opposed to 2.33 pence per mile by car.[8]
The current situation can be approximated by :

$$\frac{P_{pt}}{P_{pc}} = \frac{AC_{pt}}{MC_{pc}} = \frac{3.50}{2.33} = 1.50$$

The marginal cost of bus transport is not known but a figure of
1.00 pence per passenger mile would seem reasonable. With this estimate
the ideal situation is then given by

$$\frac{P_{pt}}{P_{pc}} = \frac{MC_{pt}}{MC_{pc}} = \frac{1.00}{2.33} = 0.43$$

Thus it can be seen that the bias against public transport and
in favour of the private car is considerable. On the basis of the above
data the observed price ratio is 3.5 times larger than the desired price
ratio. We maintain that it is possible to approximate marginal cost
pricing by average cost pricing. Such a change will tend to decrease
the demand for car miles, and hence raise average cost, and increase the
demand for public transport with an associated fall in average cost.
With average cost pricing we may end up in the following situation :

$$\frac{P_{pt}}{P_{pc}} = \frac{AC_{pt}}{AC_{pc}} = \frac{3.20}{10.0} = 0.32$$

The current situation with a price ratio of 1.50 has been
transformed, on these figures, to one that has a slight bias in favour of
public transport. Certainly the price ratio under average cost pricing
is much closer to the desired ratio, given by marginal costs, than is the
current price ratio.

How have the ratios AC_{pt} over MC_{pc} and MC_{pt} over MC_{pc} been
changing through time? These ratios have been estimated for 1956 and
the results are most striking. Information supplied by Automobile
Association gives the petrol and oil cost for cars of 1001 - 1500 c.c.
as 2.26 pence per mile. The closeness of this 1956 figure with the
current figure is quite remarkable. Information supplied by Coventry
Corporation Transport Department gives the 1956 cost of bus transport
as 1.33 pence per passenger mile. Thus the 1956 observed price ratio

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8. This information of the cost of bus travel was very kindly supplied
   by Coventry Corporation Transport Department.

was :

$$\frac{P^{56}_{pt}}{P^{56}_{pc}} = \frac{AC^{56}_{pt}}{MC^{56}_{pc}} = \frac{1.33}{2.26} = 0.59$$

As the marginal cost of car transport appears to be almost unchanged between 1956 and the present day it will be assumed that the same is true for bus transport. This implies that the desired price ratio in 1956 was 0.43, the same as the current ratio of marginal costs. Thus the bias in favour of the car was considerably less in 1956, the observed ratio only being 1.37 times greater than the desired ratio. The important conclusion is that a rapid increase in this bias has taken place in a short time period and as long as present policy continues, the bias will get larger and larger.

The question most readers will be asking at this stage is 'why not advocate straight forward marginal cost pricing?' The answer lies in the fact that there is little or no chance of this ever being accepted politically. Trying to explain to the electorate why welfare was improved by deliberately running deficits on public transport is an exercise no politician would relish. Another factor is that setting prices equal to marginal costs may not be the optimum because of social costs associated with car use. Accident costs will be a large item in this category. Thus a price ratio where $\dfrac{P_{pt}}{P_{pc}} < \dfrac{MC_{pt}}{MC_{pc}}$ would be preferable because it confers an advantage on public transport at the expense of the private car. The figures in the above example do in fact give us such a situation.

In the second part of this paper we propose a scheme which, if adopted, could move us towards a more rational distribution within the transport sector. Unlike the proposal of Sherman we feel that our scheme, which involves moving towards a situation of average cost pricing for use of cars, is operational. The second part of the paper also contains an attempted quantification of the considerable resource savings that could be achieved by a re-allocation within the transport sector.

2. The Alternative Form of Car Ownership

An ideal "average cost" plan would provide the benefits of car ownership, preferably at lower cost, and reduce substantially the enormous social costs of present car ownership. Several schemes might qualify.

However, the one presented here is, we believe, worth testing in a real situation. Only actual tests can establish the reaction of people to new transport alternatives and evaluate its practicality, along with needed adaptations.

For purposes of exposition, imagine a new community transport centre, designed and built as an integral part of a new town, or as part of a large council flat development. The community garage and transport centre permits complete separation of vehicles from foot traffic, for example, by placing the garage underground, or at the boundary of the town. The intersection of the feeder connecting road from the garage with the trunk road is designed to provide easy entrance and exit for a heavy traffic flow and, hopefully, the connecting road network can absorb the additional traffic.

The community garage, operated by the local authority, by the local co-operative society, or by a private firm, would provide, on current ratios, approximately 180 to 200 motor vehicles for every 1000 inhabitants. The motor vehicle mix would vary with the needs and preferences of the community. Undoubtedly the age composition, income, family size, and transportation 'menu' of the inhabitants would influence the vehicle mix-which would change through time. Ideally, the community garage would be a major bus stop for heavy use of the local public transport system. The bus stop would be in comfortable, protected surroundings. In addition, the centre would provide garage services to those who prefer to own private cars, and could also offer special services, if needed, such as driving lessons. But the main purpose of the community garage, to begin with, will be to provide, at average cost rates, car rentals - thereby moving the present decision making bias in choice of transport away from individual cars and toward public transport. The transport centre would, however, rapidly add a new dimension to transport facilities. It would permit a 'social' approach to the solution of transport. Since many journeys have a common destination (work, shops, school, hospitals, railroad station, athletic events) the problem is to have a common origin to permit 'group' use of motor cars. The transport centre provides the common origin and, conversely, a common destination for the return trip. The centre would also provide an assortment of types of vehicles - cars, estate cars, limousines, minibuses, vans - all of which would be maintained in excellent condition. The rental rates would vary with the type of vehicle, the length of journey, the driving record of the operator, and the time period during which the vehicle was used.

The transport consumer would be able, under these circumstances, to choose between several types of journeys, each with a different average cost price. He could choose public transport. He could choose a car, estate car, minibus, or limousine and be driven by himself, a fellow passenger, or a centre chauffeur.

(a) Private Advantages and Disadvantages

The private advantages of such a scheme are many, the disadvantages few. With the increased choice of type of transport, all priced at their average cost, the transport consumer would have superior transportation at much reduced cost. First, he would save the investment costs needed to buy a motor car, insure it, and provide it with a garage and driveway. Second, he would not worry about the upkeep and safety of the vehicle. Third, he would have alternative means of transport as readily available as his motor car. Fourth, many of his trips would now be shared with his neighbours, lowering the trip and parking costs immensely. Fifth, additional cars would not have to be purchased for additional drivers in the family (wives, children, parents) - and it would avoid conflicts, in these cases, about who would have first claim on the car, or cars. Sixth, for non-drivers, especially older people who no longer can drive, the community transport centre would offer a considerable improvement over current service.

The main private disadvantage of such a scheme is the extra time spent walking to and from the garage. A related disadvantage is that a car will not be readily available for any unexpected trip, for example, a quick dash to the shops. Fortunately, the British public has not yet lost its familiarity with using its legs and, given good design of the residential area, it should be possible for all households to be not more than six or seven minutes walk from the community garage. Most people would undoubtedly consider the time lost and the extra inconvenience as disadvantages. There is however, an important counter-view. Medical opinion appears to be fairly unanimous that the recent rapid rise in deaths from heart disorders, both in the U.S.A. and the U.K., is caused by lack of exercise. Car owners get out of the habit of walking and use their cars for the shortest of journeys. Residents of a housing development with a community garage will have to indulge in the walking habit and as a result they should have a longer life expectancy.

The second private disadvantage in such a scheme is the inconvenience of not having a vehicle available at periods of extra high demand, such as during summer holidays and for certain weekends. Proper queuing and planning can alleviate much of this difficulty, but not all. The community garage management would have to estimate their absolute minimum requirements for vehicles to be left in the garage during these periods. Hopefully, people would be co-operative and try to schedule their holidays during non-peak periods, when rental rates would be lower, particularly if they did not have children of school age. But the more people who remain home during peak periods, the more vehicles are needed for their use. Additional incentives should be given to those remaining at home to use public transport. It is also possible that the garage could make arrangements with other rental car services, or car manufacturers or dealers, to augment their fleet during peak periods. After several seasons of experience, when the reactions of users have been noted, adjustments could be designed.

A third disadvantage might be the extra wear and tear that drivers might inflict on cars that they themselves do not own. The authors both feel that they are less careful of their own vehicles than they are of 'community' vehicles, but it is certainly possible that others behave differently. Only experience can show us which of these tendencies is more prevalant. The final disadvantage is the deprivation some would feel of a property and ownership symbol. Many of us are only too happy to be free of this symbol. But for those who want the car as a property symbol, there is no alternative but ownership.

(b) Social Advantages and Disadvantages

Without actual experience, it is difficult to estimate whether the cost of the community garage and road would be greater or less than the cost of individual garages and driveways, and streets for access to the garages. What is certain, is that the social amenities under the plan would soar and the social costs fall. First, the bias against public transport that is at present intertwined with car ownership would be reversed. Second, congestion on the road would be greatly decreased. Better use of public transport would help immediately. Equally important would be more efficient use of the garage rental vehicles. A previous survey estimated the average number of commuting riders per car by income

level to vary from 1.1 to 1.7.[9]   An overall estimate of 1.5 errs, if anything, on the high side.   If this average can be doubled to 3 people per vehicle, then the same number of passenger miles can be travelled with half the number of vehicles.   It is extremely unlikely that passengers per car can be increased appreciably without a new social organization, such as the transport centre, that creates a common origin within a residential area. Increases in the number of passengers per vehicle will also drastically reduce the number of parking spaces needed at shopping precincts, at factories, at railroad stations and at offices.   It is also likely that community garage facilities would help rationalize petrol distribution, vehicle repair capacity, and spare parts inventories.

It is in the use of the land that the greatest change will take place with the advent of the transport centre.   For the past two generations the motor car has taken over as the main force to mold and control the land use of our suburbs, the shape of our new towns, the changing form of our cities, and even the outlook of major landscapes. No longer is the city built or modified for people.   It is now built and modified for the motor car.   No longer is the house sited only for the family.   It is now sited primarily for easy access of the motor car. Only a major restructuring, like the community and transport centre, can return the land and the city and the homes to people - without foregoing the benefits of the motor car.   The separated garage frees the land area around the houses and flats for play area, for athletic pitches, for gardens, and for pasture and woodlands.   At the same time, the underground centre, or separated garage, keeps the motor car, and the other forms of transport, within a few minutes walk, preferably covered and protected from the weather, of all housing units.

Reduction in air pollution levels, noise levels, and accident rates are additional important social advantages that will result. Complete separation of vehicles from the ground level (of children pedestrians, and most life activities), will help change our living patterns in many ways.   Noise levels and accident rates should decline immediately.   Air pollution levels will decline with increases in average passenger load per vehicle and also with improvements in the maintenance and tuning of motors.   Car thefts and accidents to parked

9   The 1957 St. Louis study quoted in R.J. Smeed, 'Traffic Studies and Urban Congestion', Journal of Transport Economics and Policy, January 1968, pp 33-70.

cars should also decline.   Some increase in accidents might result
from drivers operating unfamiliar vehicles, but this should be offset
by the added caution and attention drivers usually give to 'strange'
cars, particularly if passengers are involved.

Still another social advantage of the community garage is that
it places the community in an adaptable position to take advantage of
new advances in transport.   Once a community, like Los Angeles, has
adjusted fully to individual ownership of motor cars, it is trapped.
The only 'practical' way to improve transport in Los Angeles is to
improve it for the owner-driver of the motor car.   The low population
density of the spreading suburbs makes all public transport uneconomic
and inefficient.   The out-of-town shopping centres, with their vast
expanses of 'free' parking, destroy the downtown and the core of the
cities.   Finally, the growth of the urban 'freeways' rearranges the
office and industrial employment locations until all functions of
society (from birth to death) become geared to the automobile.   Given
this type of spatially disoriented society, where both trip origins and
destinations are dispersed, only special kinds of technological advances
can be absorbed.   For example, a space-belt that propels people through
the air has already been built in prototype form.   Such an 'advance' is
more adaptable to Los Angeles than to London.   But most of the advanced
transport technology is oriented to moving large numbers of people in
densely populated urban centres.   These are also the advances that are
most likely to be applicable to British geography.   The community transport
type of organization could readily adapt to these new forms.   The car-owner
type of organization cannot.

At a more practical level, the community garage would permit a
far more efficient adoption of immediate advances in motor technology.
Fewer automobiles would be needed, than with individual ownership of
motor cars, but the rented vehicles would be used more intensively.
Instead of the car being driven, as at present, an average mileage per
year of about 7500 miles, each garage vehicle might be used for as much
as 50,000 miles a year.   This means that the average life of the motor
vehicle would be reduced from the 10 to 12 year level, where it is at
present, to the two to four year level.   Thus, the garage vehicles
would always be up-to-date with the latest advances in safety and
performance.   Far less capital would be invested in the motor car fleet,
but the fleet would be far more modern and would have a far higher
turnover.

Another crucial result of more intensive use of far fewer vehicles is the change in car-ownership ratios per capita. In the U.S.A. in 1966 the number of motor cars per capita was 0.39, and it was steadily rising. For all motor vehicles the ratio was 0.49. In the U.K. in 1966 the comparable ratios were 0.18 and 0.24. The 'saturation' levels for motor cars per capita have steadily been raised. Recent studies of high income families place the new saturation level at 0.66,[10] but there is no reason why even this level may not be exceeded. Many wealthy families find it helpful to have a different vehicle for different functions: a town car, a sports car, a land rover for heavy going, and a mini type car for running about. In the United States it is not uncommon for every adult in the family to have his own motor car, and more than one in five families are now multiple car owners. The community garage type of transport reorganization will obviate the necessity to follow this trend. The advantages of the motor car, and even a choice of motor cars, will be available with a per capita car ratio not too much higher than the present U.K. ratio of 0.18, and well below the U.S. ratio of 0.39.

(c) Overall Cost of Car Transport and Benefit from Community Garage

Before discussing the overall economic cost of motor transport to the economy, it is important to trace how the community garage scheme would affect low, as well as high and moderate income groups. From its beginning the motor car has been available to the high income families. For most of the wealthy, it has been a great boon and convenience, and a saving over earlier alternative forms of transport. For the lower income families, the motor car has only recently become available, through rising incomes, used car markets, hire-purchase arrangements, and through gradual changes in residential living patterns that permit car parking in low income residential areas. With the commendable drives for better safety standards and vehicle inspections, the cost of owning a vehicle is rising. The annual cost today for the operation of an averaged sized car over 10,000 miles is estimated by the AA at £385. This is clearly beyond the reach of most families with only one income earner, unless considerable sacrifices are made in other items of consumption. The consumers

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10   This saturation level applied to the U.K. means approximately a four fold increase in cars in the next 40 years. One might be tempted to ask, "Where can 40,000,000 cars fit in Britain?"

The Coventry commuters survey[11] permits a rough check to test, a priori, whether the variables considered in the community garage scheme are most important to transport consumers. The survey dealt only with commuters to work, and the factors that explain the choice between buses and private cars. For this journey the three most important variables are the time ratio (bus to car); the cost ratio (bus journey to car journey); and the level of car ownership. The community garage scheme deals directly with each of these variables. It will permit the transport consumer to choose the best combination of time and cost for each of his journeys; it will place public transport on a much more even basis with the car - both will be priced at their average cost levels, both will involve the same walk from house to garage (and back); and it will retard the rapid increase in car ownership.[12]

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11. F.R. Wilson, Journey to Work - Model Split, London, 1967.

12. In the Coventry survey some rather unusual coefficients were obtained for the time and cost ratios. This may be caused by the fact that the third variable, car ownership, is itself very much influenced by these two ratios. This aspect of the problem is not explored in the study.

Also of great interest to the community transport centre concept are the survey results concerned with objections to the use of public transport. Those who used buses were asked to specify the one inconvenience factor they most objected to in using public transport. Their replies were: (figures in percentages)

Bus stop too far from residence	23.6	Not certain of seat on bus	13.0
Too long to wait for bus	19.5	Smoking allowed on top deck	5.2
Having to transfer	17.1	Other factors	4.0
No shelter at bus stop	14.6	Having to walk upstairs on bus	1.1

Only available bus arrives too early at place of work 1.9%

Those using a car or van for journey to work were also asked for the one main reason for their choice.

Journey by bus takes too long	29.5	Use car/van for firm's business	11.2
Too long to wait for bus	15.5		
No bus service available	11.9	Use car/van during lunch hour or immediately after work	9.6
Journey would include transfer	11.8		
		Too far to walk to or from bus stop	8.5
		Buses uncomfortable	2.0

The community centre form of transport organization would take care of most of the objections raised against public transport, or accommodate them in the rental and passenger-sharing plans. It should be recognized, however, that 8.5% of the car drivers did object to the distance to the bus stop. In addition, those using their car for business, or during lunch, or after work, might well want to own their owncars, or use the firm's car, and the community garage could then accommodate their vehicles.

How much would the restructuring of road passenger service to community transport centres save (or cost) the economy? Estimates of the present cost of vehicle transportation are difficult to make. First, many costs are not included or separated out in national income accounting, for example, cars used for business or charged to expense, destruction of buildings or landscape to construct new roads and the many do-it-yourself services by the car owners. Second, the roads are also used by lorries, and thus some of these common costs should be shared. Third, many social costs such as air pollution, noise, non-insured illnesses and accidents, time lost through congestion and frustrations in driving are not measured. However, a 'foundation' estimate for those cost items that are available does give us something on which to build. And since this 'foundation' estimate appears to be consistent with the Consumer Expenditure Survey estimates, it provides a start.

Table 5   'Foundation' Estimate of Spending on Motor Cars Great Britain - 1966

(figures in pounds million)

Consumers' expenditure:

Motor cars and motor cycles, new and secondhand	773	
Running costs of motor vehicles	1,052	
Insurance (assume 1/3rd applies to cars)	91	
Hire Purchase costs	n.a.	
Garaging expenditures for motor cars	n.a.	
Share of AA, RAC expenditures, driving schools, etc.	n.a.	
Taxis, car rentals, etc.	n.a.	1,916

Public Expenditures:

Current and capital expenditures on roads and public lighting, local and central government	434	
Police expenditure (assume 1/3rd applies to cars)	91	
Garage space by Local Housing Authorities	n.a.	
National health services to automobile accident victims	n.a.	
Cars for government departments (defence, agriculture, etc.)	n.a.	
Other expenditures on cars (courts, prisons, etc.)	n.a.	525

Social Costs:

Air pollution	
Noise level increase	
Congestion costs	
Non-reimbursed accident damage, destruction of property values	
Amenity loss (landscape, animal losses, road drainage)	n.a.

Other Private Costs:

Capital construction costs for motor industry, garages petrol stations, pretoleum industry, tyre industry, etc.	n.a.
Motor cars used for business	n.a.

Less taxes on Expenditures:

Taxes on motor cars and motor cycles	(119)	
Taxes on running costs of motor vehicles	(385)	(504)
'Foundation' estimate for cost of motor cars		1,937

Source: National Income and Expenditures, 1967, H.M.S.O. n.a. indicates 'not available'.

With national income in 1966 coming to 29,578, the 'foundation' costs come to about $6\frac{1}{2}$% of national income. Judging from experience in the United States, where the comparable 'foundation' estimate is now running about 15% of national income, the $6\frac{1}{2}$% is likely to increase steadily, with the increase in per capita car ownership. In 1956, when motor cars per capita was slightly less than 0.08, compared to the present U.K. level of about 0.18, and the U.S.A. level of 0.39, the 'foundation' estimate was as follows:

Table 6   'Foundation' Estimate for Cost of Motor Cars Great Britain, 1956, millions of pounds

		%change 1956 - 1966
Consumers expenditures on motor cars and motor cycles	268	290%
Consumers expenditures on running costs of motor vehicles	273	385%
Insurance (1/3rd share)	43	212%
Public expenditures on roads and lighting	135	322%
Police expenditures (1/3rd share)	38	240%
Less taxes on motor cars and motor cycles	(57)	209%
Less taxes on running costs of motor vehicles	(93)	415%
Total 'foundation' estimate	607	319%

Source: National Income and Expenditures, 1967, H.M.S.O.

With a national income in 1956 of 16,840, the 'foundation' cost estimate for car expenditures comes to about $3\frac{1}{2}$%. The increase from $3\frac{1}{2}$ to $6\frac{1}{2}$% is consistent with the increases that have taken place in the U.S.A. It is obvious that the rapidly increasing proportion of our resources being devoted to motor cars will continue at this rate for some time to come, unless there is a drastic restructuring in the transport sector. The figures in the above table show the percent change of the individual items in the cost estimates. Although they are not corrected for price increases they portray the same steep rise in resources going into the auto transport section of the economy.

The restructuring suggested by the community garage scheme cannot
be 'costed' until one or more of these plans have actually been tried.
However it is clear that even on the basis of the 'foundation' estimates
(which are heavily biased in favour of the ownership-driver form) the
switch to the new scheme would save resources and slow the growing flood
of spending on the auto sector.   Some of the savings would be devoted to
increased spending on additional buses and minibuses, but the rate of
increase could, hopefully, start declining while the quality of the
transport would continue to increase - even more rapidly than in the past.

A successful community garage scheme would slow down slightly
the rate of increase of spending for motor cars and running costs.
Certainly the rate of increase in the cost of insurance would decline,
as would the rate of increase in public expenditures on roads, parking,
and police.   But it is the cost categories for which we have no data
where the truly massive savings would occur.   All hire purchase costs
would be saved.   Capital construction costs for petrol stations, parking,
and repair garages would become part of the investment in the centres.
Noise level increases, air pollution, congestion, and losses in amenities
would all be appreciably slowed, perhaps even reversed.   In addition,
with development of a co-ordinated fleet of minibuses and limousines
that have two-way radio communication, it is possible that a new
co-ordinated public transport system could evolve to supplement the
regular bus schedule routes.   These non-scheduled vehicles might be
called upon by a central dispatcher and might provide a degree of
flexibility which present public transport lacks.   Finally, it is
conceivable that the new scheme would also promote a new 'community'
outlook toward driving and toward transport.   Instead of promoting the
attitude that a motor car is a good place to release aggressions, a
'private' tank from which a male can 'prove' his manliness, and a 'sturdy
steed' over which one must exert domination, it is possible that the
community centre will emphasize the fact that the motor car is a fine
addition to our transportation newtork, and ought to be treated as just
that.

The plan proposed here has been made with the English 'new'town in
mind, but it is just as applicable to most English towns and, with
variation, to most English cities.   Where it simply will not do is in
the United States.   American cities have, with almost no exception,
become 'motor' cities - adapted to the owner-driver form of transport.

Vast rivers of motorways disgorge their traffic into oceans of parking
areas.   At their 'headwaters', the motorway rivers can be traced through
a vast stream network of subsidiary roads to their source, the vast
cemented driveways and garages (with houses attached).   It is now not
uncommon in Los Angeles to see a private garage with room for five or
six vehicles, much as an old stable had room for half-dozen horses.
The American city can no longer be adapted to a community garage scheme.
Their path is irreversible, and they have gone beyond the point of
return.   England has only just started on that path.   The motor car
can be made the servant of man, instead of man being the servant of
the motor car.   The community garage transport centre is one way this
can be accomplished.