FAMILY EXPENDITURE SURVEY DATA AND THEIR REFERENCE TO TRANSPORT PLANNING

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ABSTRACT: An assessment of family expenditure survey data from
             the standpoint of transport planning and evaluation.
             The primary emphasis is on recently available Australian
             data, although comparisons are also made with overseas
             data where these are available. Issues covered include
             the following: basic organisational features of family
             expenditure surveys; general limitations in using this
             source of data; the practical value of family
             expenditure data in the appraisal of transport needs
             and demands; complementary sources of data and/or
             refinements to family expenditure surveys which are
             needed for transport planning purposes; and key
             research areas which are left untouched by family
             expenditure surveys.

1. INTRODUCTION

While special purpose surveys are clearly needed in transport planning, much can also be gained from analyses of other sources. Few data bases are perfect, particularly so when the data are not collected specifically for the planning task at hand. But frequently existing data are overlooked without assessment of their relevance in planning. The recent initiation of family expenditure surveys in Australia provides an additional source which has yet to be fully exploited. Family expenditure surveys yield a wealth of information on consumer finances and expenditures, and thereby provide - or at least offer the potential of providing - valuable insights into many of the basic constraints influencing transport provision and use. This paper is presented as an initial step towards establishing the practical value of family expenditure survey data in Australian transport planning. The primary objective is to outline the way in which these data may be employed in the appraisal of transport needs and demands. The existing survey data are also considered in the light of possible links with complementary sources of data and/or refinements to the collection and publication of the family expenditure survey data themselves.

The discussion which follows is presented in four major sections. Section 2 provides background information on family expenditure surveys, including basic organisational features and general limitations in using this source of data. The remaining sections are all concerned specifically with the relevance of family expenditure survey data to transport planning. Section 3 focusses on some relevant observations based on a preliminary analysis of recent family expenditure survey data. Section 4 takes this to greater depth by specifying possible extensions to the analysis and their associated data requirements, while section 5 examines key research areas which are left untouched by the analyses presented.

2. FAMILY EXPENDITURE SURVEYS

The purpose of family expenditure surveys is to 'quantify' all the main dimensions of finances and expenditures of the personal or household sector. Family expenditure surveys are essentially 'picturesque' surveys (Prais and Houthakker 1961), attempting to provide a comprehensive picture of the broad pattern of consumer finances and expenditure, and its inter-relationship with economic, social, demographic and other household characteristics. They differ principally from 'analytic' surveys like the Poverty Inquiry (Australia. Commission of Inquiry into Poverty 1975) in their breadth of coverage. Notwithstanding, family expenditure surveys are typically confined to families living in private dwellings in large *urban* areas and thus statements on the generality of the results must be made with some caution.

The substantive content of this paper is drawn largely from three recent surveys conducted in Australia's major urban areas, although comparisons are also made with overseas findings where these are available. The three Australian surveys in question were conducted during 1963-5, 1966-8 and 1974-5. At least one earlier survey has been conducted in Australia, although only on a very small scale. For instance, Houthakker (1957) makes reference to a survey of 450 Queenslanders conducted as early as 1939-40. But for the most part, family expenditure surveys are a fairly recent innovation in Australia by comparison with their overseas counterparts. Both the 1963-5 and the 1966-8 surveys were conducted by private investigators, and the 1974-5 survey marked the first

involvement of the Australian Bureau of Statistics in the collection of household expenditure data on a national scale. The Bureau is currently undertaking another survey in Australia as a follow-up to the 1974-5 survey, thus holding some promise that family expenditure survey data will be made available on a regular basis in the future.

The three Australian surveys differ considerably in scale and areal coverage. The 1963-5 survey covers only 126 households in the Sydney Metropolitan Area, whereas the two more recent surveys are based on a nation-wide sample. The 1966-8 survey contains information on approximately 5500 Australian families drawn from a range of urban communities, while the 1974-5 survey furnishes information on 9095 families located solely in the six State capitals and Canberra. The 1963-5 survey was originally conceived as a pilot study to lay the foundations for the first nation-wide survey conducted in 1966-8, but the results of the pilot study have nonetheless been extensively documented (see Edwards, Gates, Craig and The Survey Research Centre 1966; Edwards, Gates and Drane 1966). Despite its small sample size the 1963-5 survey provides valuable insight into some important aspects about which information has proven more difficult to obtain from the larger surveys. In this regard, however, it must be stressed that analysis of the 1966-8 and 1974-5 surveys has so far been confined to published accounts of the data. The original data tapes for the 1966-8 have only recently come to hand, and for the purposes of the present study it has been necessary to rely principally upon the references made to the data in other sources [specially Podder (1971)]. Information relating to the 1974-5 survey is drawn from the preliminary results released by the Australian Bureau of Statistics (1976*a*, 1976*b*).

Some key concepts, definitions and methods employed in the surveys are briefly outlined below, followed by some general limitations in using the survey data. The Australian surveys are broadly similar in design to family expenditure surveys which have been conducted in many overseas countries. Thus while the discussion which follows is tailored to the Australian surveys for which data are currently available, the comments also have wider applicability. Further details on these aspects may be found in several other sources (see Australia. Bureau of Statistics 1976*a*; Edwards *et al.* 1966; Edwards *et al.* 1967; Edwards, Gates and Layton 1964; Kemsley 1969; Prais and Houthakker 1961; Redpath, Powell and Kingaby 1972).

2.1 CONCEPTS, DEFINITIONS AND METHODS

The basic survey unit is the 'household'. The surveys do, however, differ slightly in their definition of the household unit. In the 1974-5 survey a 'household' is defined in the same manner as for the national census: namely, a group of persons living together and having common housekeeping arrangements. This also conforms with the definition adopted in most transport surveys [see for example, Wilbur Smith and Associates (1969)]. The definition adopted in both the 1963-5 and the 1966-8 surveys is basically similar, except that a person boarding with a family is considered to form a separate household. In the present paper the words 'household' and 'family' are used interchangeably, although strictly speaking the household is a wider social unit than the family: in formal terms the latter is defined as a group of individuals belonging to the same household and related by blood, marriage or adoption (Edwards, Gates and Layton 1973).

Expenditure is defined as all payments made by household members aged 15 years or more for goods and services for private use. Basically the estimates represent payments net of receipts. For example, estimates of expenditure on motor vehicles include purchases of new and secondhand goods,

less insurance claims and sales by persons of secondhand goods. Nevertheless, since total outlay and receipts are recorded in the basic data, transfer payments can be recovered. Unpublished tables of detailed expenditure patterns have been compiled by the Australian Bureau of Statistics (1976*b*) for the 1974-5 survey, but the statistics are preliminary and subject to revision. It is highly desirable for transport planning purposes that tabulations of this type are made available in published form in the future.

In general, expenditure details are collected on the basis of payments made during the survey reference period rather than on the basis of goods and services 'acquired' or 'consumed'. The reference period adopted is varied to suit the time cycle of the respective expenditure items. For example, in the 1974-5 survey the reference period was set equal to two weeks for most expenditure items, but was extended to three months in the case of medical expenses and to 12 months for consumer durables (such as motor vehicles).

The primary methods of data collection are personal interviews, which may or may not be supplemented with personal diaries containing records of payments. Personal interviews furnish the required information on expenditure items which occur infrequently (such as car purchase) as well as information on the background characteristics of the household (including its social, demo-graphic and economic profile). Details of expenditures on frequently purchased items may also be obtained by personal interview, or alternatively by the diary method. The 1963-5 and 1966-8 surveys relied primarily on the recall method for the collection of expenditure data: the relevant household members were asked for details of expenditure incurred during specific periods (one week for regularly purchased items, longer for expenditure on items with a longer time cycle). In the 1974-5 survey, however, information on the regular spending patterns of Australian families was obtained by providing every eligible member of participating households with a diary for the purpose of recording all payments made over a two-week period. In each survey the expenditure data were collected over a whole year, although any one household was only involved for the period required to furnish the relevant details (two weeks in the case of the latter survey).

Information on income is also only collected for those household members aged 15 years or more, and is defined as gross income from all sources before taxation and other deductions are made. By explicitly incorporating all persons above the school leaving age, family expenditure surveys are likely to provide a more accurate estimate of total household income than is obtained by other survey approaches. Furthermore, the definition of income adopted in family expenditure surveys is a very comprehensive one. The coverage is not limited to taxable or even cash income, and it includes such non-taxable sources like money scholarships, child endowment, etc. Nevertheless, there are some non-pecuniary benefits which are not encompassed by the survey definition. One example which is of particular relevance to transport planning is the cash value of travel concessions available to old age pensioners. It should also be noted that windfall gains, gifts, profits from the sale of assets, receipt of maturing insurance policies, loans, repayment of loans and savings are not included in income as defined for the survey. This fact has some rather interesting implications which are taken up in greater detail later. The main components of income are:

(a) wages and salaries (including income-in-kind received from an employer);

(b) income derived from self-employment (including wages and income-in-kind taken from the business);

(c) Government social service benefits;

(d) income from investments (including interest, dividends, royalties and rent); and

(e) other regular income (including educational grants and scholarships received in cash, benefits received from an overseas government, income received for professional advice outside the normal job situation, superannuation, worker's compensation, alimony or maintenance, and any other allowances regularly received).

As with details on expenditure, there is no common time reference period for which income components are collected. Income from regular payments like pensions, wages and salaries is based on a current rate concept (pay received last time), but income from investments and self-employment is collected for the most recent period of 12 months for which information is available (Australia. Bureau of Statistics 1976*a*).

2.2 LIMITATIONS IN USING FAMILY EXPENDITURE SURVEY DATA

As with most surveys, certain limitations are inherent in the data. To begin with biases arise through lack of response by some households. In the 1974-5 Australian survey almost 28 per cent of households selected for the survey could not be contacted, were unable to fully participate, or were otherwise non-respondent. Although this non-response rate compares quite favourably by comparison with some overseas surveys (see Redpath *et al.* 1972), systematic biases may arise if some types of households are more likely to co-operate than others. Prais and Houthakker (1961) suggest that 'expansive and extroverted' households, overcautious households and educated households are likely to be over-represented in the responding sample, while Kemsley (1969) provides evidence which suggests that the response rate is below average for households in the higher ranges of income and for households without children. The Australian Bureau of Statistics (1976*a*) has attempted to minimise this problem in the 1974-5 survey by developing an estimation procedure to represent non-respondent households (by using data for responding households which were judged to be similar for certain characteristics).

British experience pinpoints a problem of 'downward bias' in employment earnings as reported in family expenditure surveys. This may be due to a higher non-response rate in the upper ranges of income than in the lower (Kemsley 1969). But probably more important is the current rate (or on spot) method of estimating average weekly earnings employed in family expenditure surveys, since with rising money incomes this will tend to impart a slight downward bias to current income as compared with actual income (Redpath *et al.* 1972). In addition, the very method of selecting the sample means that the extremes of the income distribution are probably under-represented (Prais and Houthakker 1961). The surveys are based on samples of private dwellings which include houses, home units, flats, caravans and other structures used as private places of residence. Establishments such as hotels, boarding houses and institutions (old-age homes, hospitals, prisons, etc.) are defined as special dwellings outside the scope of family expenditure surveys; but the inhabitants of such institutions tend to be drawn from the polar extremes of the economic scale. Furthermore, higher income families are usually under-represented in this type of survey because of sampling errors. This is especially true if the sample size is small (Morgan 1962; Podder 1971).

As well as biases in selection and response there are a number of biases which may occur in the process of obtaining and recording the information These include survey suggestion, end-period effect, lying and ignorance (Prais and Houthakker 1961). Bias due to survey suggestion arises when the very process of recording payments causes respondents to modify their expenditure because they feel they are spending too much or too little on certain items. Thus expenditure in the second week may be influenced by expenditure in the first week of the survey period. Alternatively, the respondent may postpone certain exceptional expenditures until the survey is completed in an endeavour to provide the interviewer with a 'representative' week's expenditure. The 'end-period effect' reflects the tendency to include expenditures incurred just before the beginning of the survey; it is probably most marked in the case of exceptional expenditures which would otherwise have a zero entry, thus tending to over-estimate expenditure on such items. Misrepresentation may also be a source of bias among some consumers, especially for specific items. Rich households may tend to understate their frivolous expenditure while poor households may tend to overstate their expenditure on necessity goods (Prais and Houthakker 1961). Often, too, it is found by cross-checking with other statistics (such as production and sales data or excise statistics) that expenditure on tobacco and alcohol is frequently understated (see Australia. Bureau of Statistics 1976a). Ignorance is yet another source of inaccuracy, and results from the difficulty of remembering the precise expenditure details when recording payments in the diary or responding to the interview schedule (Prais and Houthakker 1961). Misrepresentation and ignorance may equally apply in the recording of details on income. For instance, people may forget the exact amounts taken out in the form of taxation and other compulsory payments, or they may deliberately conceal income from property and other sources (Podder 1971).

Certain other limitations of the data reflect deficiencies in survey design. Temporal discrepancies in the data arise, first, because households are approached at different points of time during the 12 months survey period, and second, because expenditure on data items are obtained for varying time reference periods. Changes in money values and relative prices of goods and services may complicate interpretation of the results for certain purposes, especially in times of high inflation and changing government policies with respect to taxes and tariffs. Similarly, large wage movements may result in two households with similar characteristics being classified into different income groups simply because of differences in their respective survey collection dates. In the 1966-8 survey there is a further problem in that the various centres were surveyed sequentially rather than continuously over the 12 months period, and thus seasonal variations may be correlated with capital city.

There are, of course, other problems which result from the omission of certain details in the survey. These aspects are best discussed in connection with more specific issues which follow. But one general limitation results from insufficient information on the quantities of commodities purchased by families, thus making it difficult to analyse variations in the quality of commodities consumed.

From this brief overview of the general characteristics of family expenditure survey data the discussion now turns to assess their value specifically from a transport planning perspective. This is tackled in several stages, but as a point of departure the next section examines the way in which a preliminary analysis of household consumption patterns assists an appraisal of transport demands.
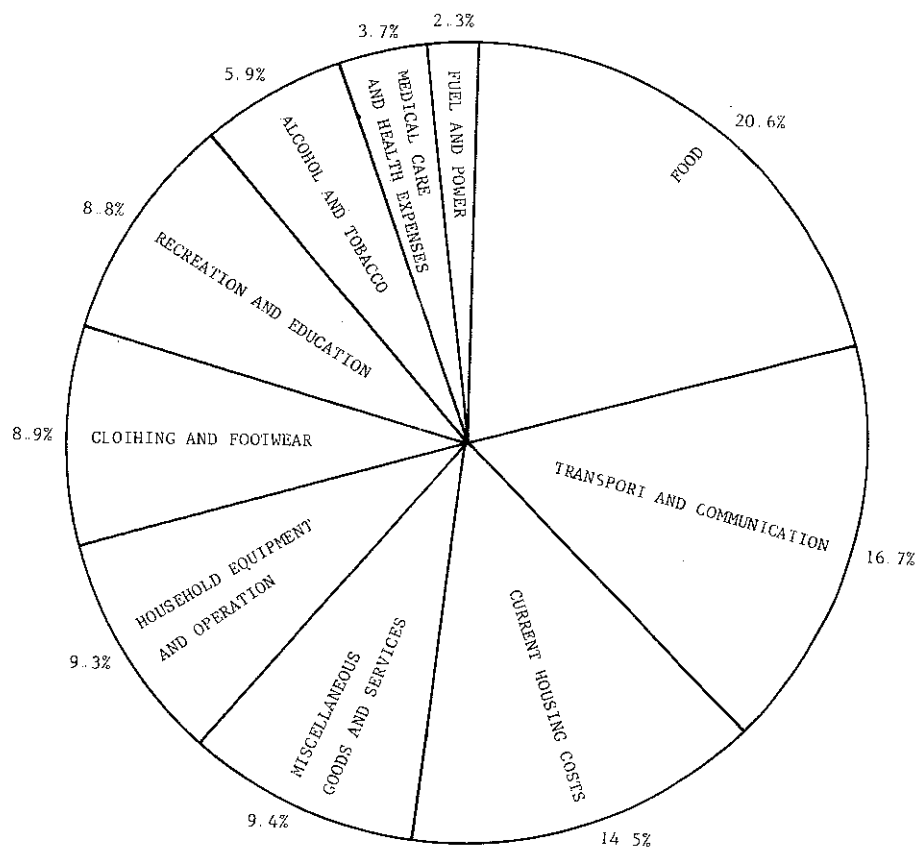
Fig 1 - Household expenditure 1974-75
          Distribution between broad groups of expenditure

SOURCE: Australia.   Bureau of Statistics (1976a).

3. HOUSEHOLD CONSUMPTION EXPENDITURES AND THEIR REFERENCE TO TRANSPORT PLANNING

Even a fairly cursory examination of household consumption patterns is of considerable value to transport planning. Amongst other things, family expenditure surveys provide a numerate picture of the importance of each consumption item in the family budget. In so doing, the surveys enable us to 'quantify' the importance of transport vis-a-vis other household commitments, and to establish the manner in which this varies across population groups, space and time. This yields insights into the structure of household consumption expenditures which is of value in forecasting transport demands and in evaluating the social impact of transport and transport-related changes.

3.1 TRANSPORT'S BUDGET SHARE

The importance of transport in modern society is intuitively obvious to all. But just *how important* is transport in relation to other elements in our daily lives? Figure 1 illustrates the percentage breakdown of total expenditure by Australian families in 1974-5 for ten broad commodity groups. A comprehensive definition of these commodity groups is given in the Appendix. Food is the single largest expenditure item in the family budget, and accounts for slightly more than one-fifth of total household expenditure. But transport is also a substantial element in the family budget. Transport expenditure represents the net private costs associated with travel and transportation, except those costs incurred while on holidays. The latter are included in the category termed 'miscellaneous goods and services'. Figure 1 shows that transport and communication together account for 16.7 per cent of total household expenditure, representing the second largest category of expenditure, after food. Only a small proportion of expenditure is in fact devoted to communication, and the outlay on transport alone (15.5 per cent) exceeds current housing costs (14.5 per cent). The remaining commodity groups account for less than 10 per cent of total household expenditure, varying from 9.4 per cent for miscellaneous goods and services to 2.3 per cent for fuel and power.

Overall it can be seen that a large proportion of expenditure is taken up with achieving a basic level of subsistence: slightly more than 46 per cent of total household expenditure, is devoted to what may be termed shelter, food and clothing (comprising current housing costs, fuel and power, food, clothing and footwear), and this rises to 63 per cent when the transport and communication component is included. Admittedly some expenditure in these categories may be devoted to 'luxury' items (for example, fur coats or imported cars), but even allowing for this, committed expenditure clearly forms a substantial proportion of the total.

The key transport elements are portrayed in Table I. This presents expenditure on various aspects of transportation as percentages of total household expenditure and total transport expenditure, respectively. The basic pattern is clear: almost 90 per cent of all transport costs incurred by Australian families is related to private transport of one form or another. The major expenditure items are car purchase, petrol and general running expenses of one form or another. Conversely, only a low budget share is allocated to the various modes of public transportation. Consumption patterns thus underline the primary importance of the car in providing mobility for Australian families; they also provide some insight into the cost structure of private motoring. For instance, it can be seen that the fixed costs of vehicle ownership are almost equal in importance (43.1 per cent) to petrol and other running costs (46.2 per cent). Clearly this should be borne in mind when

TABLE I

DISTRIBUTION OF HOUSEHOLD EXPENDITURE ON TRANSPORT
IN AUSTRALIAN CITIES, 1974-5

Item	As a % of total household expenditure	As a % of total transport expenditure	
Car purchase	4.50	29.05	
Other vehicle	0.36	2.26	
(a) Motorcycle	(0.14)*	(0.91)	
(b) Caravan	(0.13)	(0.86)	43.1 / 89.3
(c) Trailer	(0.02)	(0.12)	
(d) Bicycle	(0.06)	(0.37)	
Vehicle registration & insurance	1.82	11.77	
Petrol	3.09	20.00	46.2
Other running expenses	4.05	26.17	
Rail fares	0.42	2.72	
Bus/tram	0.56	3.62	10.7
Other public transport	0.67	4.36	

* ( ) indicates component values

SOURCE: Derived from statistics compiled by the Australian Bureau of
Statistics (1976*b*).

the implications of rising fuel costs are being considered. The price
elasticity of response to fuel price changes is strongly diluted by the weight
of fixed costs which (unlike fuel costs at present) tend to follow inflation
closely (Lane 1977).

3.2 VARIATIONS IN HOUSEHOLD CONSUMPTION EXPENDITURES

The aggregate picture conceals significant variations in expenditure patterns
which have important implications for transport planning. Variations in
consumption expenditure across population groups, space, and time are especially
relevant to planning, both for predicting transport demands and for developing
an evaluative framework. The primary emphasis in the present paper is placed
on the effect of *income* on household consumption expenditures, although
reference is also made to variations over space and time where appropriate.

The Effect of Income

The relevance of household income in influencing consumption behaviour is
documented extensively in the economic and transport literature. Budget
constraints imposed by consumer finances not only limit total consumption but
also outlays for specific items, including transportation (see Harvey 1967;
Oi and Shuldiner 1962; Schoon 1973). The effect of income may be estimated
using either cross-sectional or longitudinal data. Essentially these are
complementary data sources: time series analysis is most suited to the
estimation of aggregate demand relations which are needed for forecasting
transport demands, whereas cross-sectional analyses tend to be of greater value
in providing an evaluative framework for transport and planning purposes.
Cross-sectional data not only permit finer disaggregation of commodity groupings
but also provide the opportunity to incorporate household characteristics
- other than income - which influence consumption expenditures. In each case
the ability to cross-check estimates obtained from cross-sectional and
longitudinal data sources is highly desirable. The critical considerations in
the development of an evaluative framework are the variations in consumption
patterns over population groups of various categories, and the *stability* of
these relationships over space and time. The effect of income on cross-section
differences in consumption patterns will be examined before questions of
stability. Subsequently, the focus shifts to the value of these estimates
in establishing an evaluative framework and in forecasting travel demands.

Measurement of Household Income

The relationship between household income and expenditure on a particular
commodity is generally termed the Engel curve (Houthakker 1957). The estimation
of Engel curves raises many problems, not least of which is the measurement of
household income. There are several difficulties in using household income as
measured by family expenditure surveys. Some of these are specific to the
Australian data while others apply to family expenditure surveys in general.

It is generally accepted that net income rather than gross income is
the relevant variable in estimating demand relations (Podder 1971). But how
should net income be defined? The Australian Bureau of Statistics (1976*a*)
defines a category termed 'other payments' comprising income tax together with
other items which are conventional forms of personal saving (such as life
insurance premiums or superannuation contributions) or which involve the
purchase of assets (such as deposits towards or an outright purchase of
property). It is somewhat debatable whether *all* of these components - and

TABLE II

AVERAGE WEEKLY HOUSEHOLD EXPENDITURE AS A PERCENTAGE OF
AVERAGE WEEKLY HOUSEHOLD INCOME, 1974-5
(per cent)

	Average weekly household income						
	Under $80	$80 and under $140	$140 and under $200	$200 and under $260	$260 and under $340	$340 or more	All households
'Expenditure' as a percentage of 'income'	130.4	99.8	85.1	74.5	69.1	61.9	76.2
'Expenditure' plus 'other payments' as a percentage of 'income'	130.9	117.4	103.8	94.4	89.4	84.8	95.9
Number of households	1348	1591	1978	1755	1324	1099	9095

SOURCE: Australia. Bureau of Statistics (1976*a*), p x.

especially the latter - should be deducted from gross income in deriving a measure of disposable income. But the published information to date does not provide for disaggregation of the 'other payments' category. The latter is broken down into its component parts for Australian families overall in un-published tabulations (Australia. Bureau of Statistics 1976b), but this information is not yet available for families in each capital city individually. But even if it were possible to estimate an appropriate and consistent measure of net income from existing sources of data for the 1974-5 survey, there are other problems in using such a measure.

A major problem which is common to most cross-section analyses of family expenditure survey data is illustrated by comparing expenditure and income across the income range. Table II shows that families on lower incomes spend more on average than they earn, while the reverse occurs for families on higher incomes. 'Overspending' by lower income groups is especially pronounced when the category termed 'other payments' is added to 'expenditure'. A large part of the explanation for these discrepancies lies in the way in which income is defined, since savings and certain other sources noted earlier are not included in income as defined for the surveys. Income varies considerably throughout the life-cycle, and households may spend more than they earn during a period of low income for any one of a number of reasons. This may be in anticipation of higher future incomes, or because the period of low income is abnormal (such as a loss in business operations for one year), or because they are living off savings. Whatever the reason, it is clear that income is not synonymous with disposable monetary resources.

While at least some of the deficit for low income groups is made up from savings and other sources, there are other factors as well which may contribute to the discrepancies. Errors of recording are probably also significant, with some families understating their incomes, or overstating their expenditure, or both (Podder 1971; Prais and Houthakker 1961). A further difficulty in attempting to compare average income and expenditure derives from the absence of a common reference period for the collection of both income and expenditure data.

Total household expenditure is generally held to be a better indicator of the economic position of families, especially those on low incomes. In line with many other studies, 'household income' is replaced by 'total household expenditure' as the base for comparing consumption patterns in this paper. The use of total household expenditure as an approximation to household income raises further problems of its own. In particular, this has important implications for the estimation of demand relations using mathematical models (see Liviatan 1961; Podder 1971), and for the comparison of consumption patterns over time. These technical difficulties will not be pursued here. Rather, the discussion turns to examine variations in consumption patterns with household income.

Expenditure by Income Groups

As Fig 2 shows, expenditure on each of the broad commodity groups increases in absolute terms with increases in household expenditure (and likewise, household income). But the rate of increase in spending varies considerably among the commodity groups; hence their relative importance varies across the income range. To take two clearcut examples, current housing costs exceed transporta-tion expenditure in the two lowest income-brackets, while recreation and education represent the fourth highest expenditure item for the highest income-bracket (compared with seventh place over all income groups). These changes in
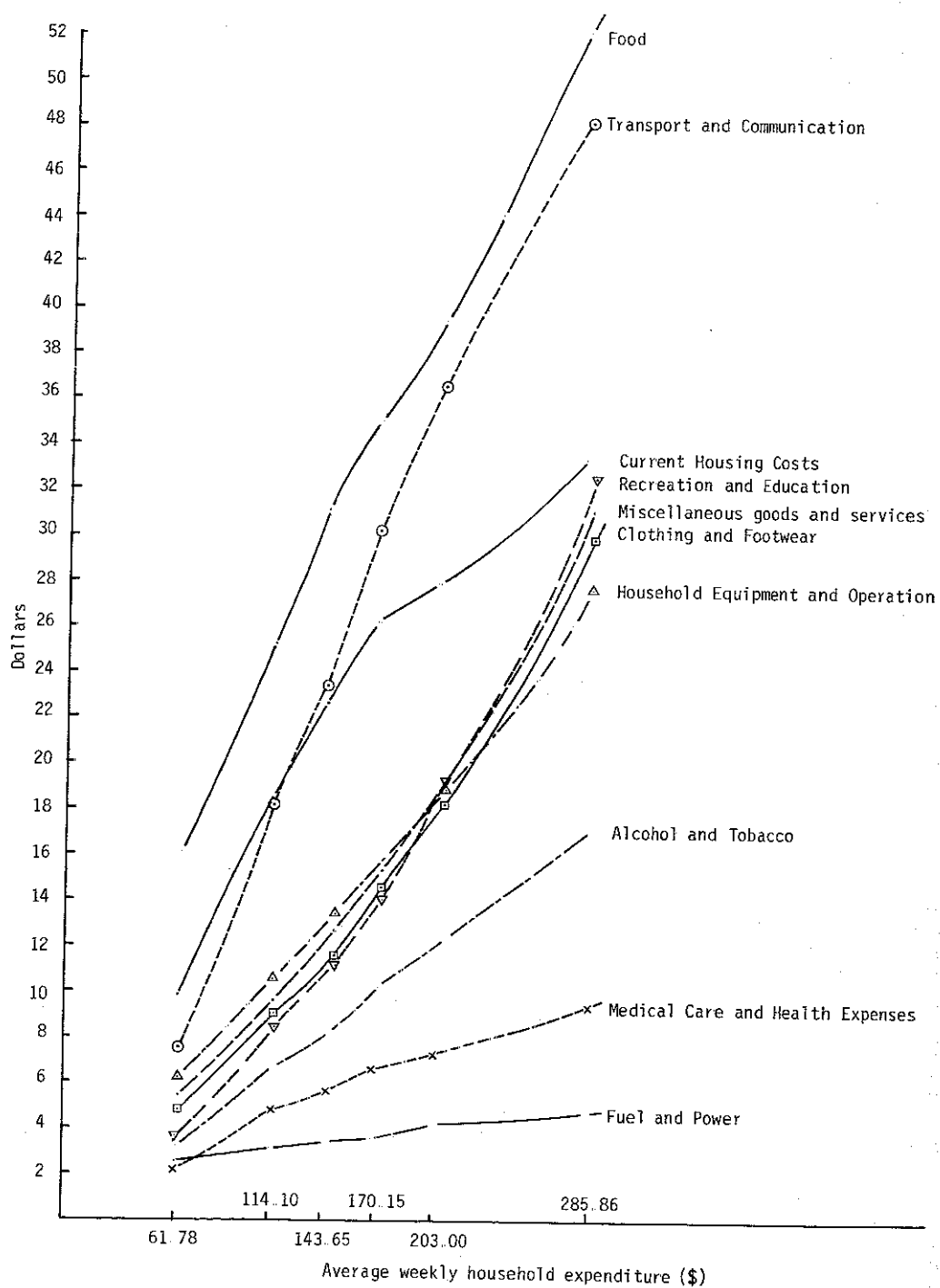
Fig 2 - Housing expenditure on broad commodity groups by average
weekly total household expenditure, Australia, 1974-5

SOURCE: Derived from Australia. Bureau of Statistics (1976*a*).

the relative importance of consumption items are demonstrated more clearly in Table III which indicates the composition of a typical family's budget at each income level. This is obtained simply by expressing the expenditure on different items as a percentage of the total household expenditure of families in each income bracket.

It will be seen by comparing the budget allocations across the income range that certain commodities represent relatively less significant items in the family budget as household income rises, while others assume greater relative importance. Transport clearly falls into the latter category: transport is a major expenditure item for all income groups but it becomes increasingly important at higher income levels. The proportion of consumption expenditure devoted to transport (as shown in parentheses in Table III) varies from 10.1 per cent in the lowest income range to 16.8 per cent in the second highest income bracket, declining slightly to 15.8 per cent for those on the highest incomes. The largest proportionate increase occurs between those on the lowest incomes and those earning between $200-$260 per week, which is the first income group to record above average levels of transport expenditure. Thus, the trend towards an increasing budget allocation to transport as household income rises is broken only by the highest income class. A possible explanation for this proportionate decrease in expenditure by those on the highest incomes is presented later, but for the present we simply note that a similar pattern has been observed in both Britain and America (see Oi and Shuldiner 1962; and Schoon 1973).

Although our primary interest is in the demand for transport, this should be seen in the context of demands for other consumption items. Commodities compete for their share in the family budget and an increase in the budget share for one or more items necessarily implies a decrease in the relative importance of other items. Furthermore, mobility is basically a derived demand. Consequently, at least part of the increase in the budget share allocated to transport may be due to increasing demands for non-homebased consumption activities. In this regard, the marked increase in the budget share devoted to recreation and education would seem to be especially significant. So, too, is the proportionate decrease observed for food, current housing costs and fuel and power.

Are some transport components relatively more important for some groups than others? Table IV presents the expenditure on each component of transportation and communication as a percentage of total expenditure for each income group. The individual components are also grouped by way of an intermediate classification which distinguishes between travel-dependent and travel-independent costs of private transport; all public transport; and communication. The distinction between travel-independent and travel-dependent costs was originally developed by Harvey (1967) and seeks to differentiate between costs which must be paid for whether the vehicle sits in the garage or is on the road and costs which vary more in accordance with vehicle usage. In reality, the distinction is not quite as simple as depicted in Table IV since some maintenance is necessary for a vehicle not in use, and drivers' licence fees are included in the category of 'other running expenses of vehicles'. But generally speaking the distinction is valid, and is essentially no more than a distinction between marginal and average cost apportionments.

On *a priori* grounds it may be argued that travel-dependent expenditure will more accurately reflect differences in travel consumption among income groups than travel-independent expenditure. Yet, as Table IV shows, these two categories are in remarkably close agreement. This is also illustrated

TABLE III

EXPENDITURE ON COMMODITY GROUPS AS A PERCENTAGE OF TOTAL EXPENDITURE, BY WEEKLY HOUSEHOLD INCOME, 1974-75
(per cent)

Commodity Group	Average weekly household income						
	Under $80	$80 and under $140	$140 and under $200	$200 and under $260	$260 and under $340	$340 or more	All households
Current housing costs	16.0	16.2	15.8	15.4	13.7	11.7	14.5
Fuel and power	4.0	2.7	2.4	2.1	2.1	1.7	2.3
Food	26.0	22.4	21.6	20.5	19.6	18.2	20.6
Alcohol and tobacco	5.1	5.9	5.7	6.0	6.0	6.9	5.9
Clothing and footwear	8.0	7.9	8.2	8.6	8.9	10.4	8.8
Household equipment and operation	10.0	9.0	9.5	8.8	9.3	9.7	9.3
Medical care and health expenses	3.6	4.2	4.0	3.8	3.6	3.2	3.7
Transport and communication (Transport)	12.5 (10.1)*	15.9 (14.5)	16.3 (15.1)	17.7 (16.5)	17.9 (16.8)	16.8 (15.8)	16.7 (15.5)
Recreation and education	5.8	7.5	7.8	8.2	9.4	11.3	8.8
Miscellaneous goods and services	9.0	8.3	8.6	9.0	9.6	10.9	9.4

* ( ) indicates partial percentages

SOURCE: Australia. Bureau of Statistics (1976a), p x.

TABLE IV

EXPENDITURE ON COMMODITY GROUPS AS A PERCENTAGE OF TOTAL EXPENDITURE,
BY WEEKLY HOUSEHOLD INCOME, AUSTRALIA, 1974-75

Commodity Group	Average weekly household income						
	Under $80	$ 80 - 140	$ 140 - 200	$ 200 - 260	$ 260 - 340	$ 340 +	All households
TRANSPORT & COMMUNICATION	12.51	15.92	16.35	17.68	17.90	16.82	16.74
TRAVEL INDEPENDENT	4.65	6.17	6.58	7.03	7.14	6.85	6.67
Car	2.69	3.93	4.46	4.81	4.90	4.70	4.50
Other vehicle	0.39	0.50	0.40	0.36	0.30	0.41	0.23
Motorcycle	0.05	0.23	0.08	0.15	0.16	0.15	0.14
Caravan	0.26	0.17	0.10	0.12	0.09	0.18	0.13
Trailer	0.03	0.00	0.01	0.02	0.01	0.04	0.02
Bicycle	0.05	0.10	0.06	0.08	0.03	0.04	0.06
Vehicle registration & insurance	1.57	1.74	1.88	1.86	1.94	1.75	1.82
TRAVEL DEPENDENT	4.10	6.30	7.03	7.67	7.95	7.24	7.14
Petrol	2.09	2.90	3.20	3.38	3.22	2.99	3.09
Other running expenses	2.01	3.40	3.83	4.29	4.73	4.25	4.05
PUBLIC TRANSPORT	1.34	2.01	1.45	1.71	2.28	1.68	1.66
Rail fares	0.18	0.38	0.39	0.47	0.53	0.41	0.42
Bus/tram	0.60	0.70	0.52	0.58	0.59	0.47	0.56
Other Public Transport	0.57	0.93	0.54	0.66	0.54	0.80	0.67
Postal/Telephone	2.43	1.45	1.29	1.15	1.15	1.05	1.27
TRANSPORT	10.08	14.48	15.06	16.53	16.75	15.77	15.47

—— indicates the highest value(s) for each commodity group

SOURCE: Derived from statistics supplied by the Australian Bureau of Statistics (1976b).

graphically in Fig 3. There is a slightly lower degree of variation across the income range in the budget share for travel-independent expenditure than for travel-dependent expenditure: travel-independent expenditure is the larger component of the two for those on the lowest incomes while travel-dependent expenditure is slightly higher for all other income groups. This reflects the relatively high fixed costs of vehicle ownership, irrespective of income. Nevertheless, both travel-dependent and travel-independent expenditures follow the same general pattern as total expenditure on transport, and little appears to be gained by differentiating between them. At a finer level of aggregation, however, important differences can be discerned. As Table IV shows, each of the general categories conceals considerable variation between the individual components of expenditure.

'Purchase of other' vehicles differs from the overall pattern, being relatively more important for those having average weekly incomes of $80 to $140. The latter is especially true of motorcycles and bicycles, while caravans and trailers show a different pattern again with greater relative concentration at both extremes of the income range. Petrol takes the biggest slice out of the weekly budget for households in the $200-$260 income range; while other running expenses (drivers' licence, tyres and tubes, spare parts and accessories, vehicle service, crash repair and other vehicle charges) vary more closely in accordance with the overall pattern of expenditure on transport.

Public transport differs from the overall pattern, with relatively high expenditures being incurred by both the second-lowest and the second-highest income categories. Buses, trams, and other forms of public transport (including taxis, air, water transport and freight) are of greater relative importance to the $80-$140 income group, while the largest proportionate expenditure on trains is made by the $260-$340 income group. The relatively high proportion of expenditure devoted to 'other public transport and freight' by the highest income-bracket is made up of significant expenditures on taxis and freight, but principally on air fares. It should be remembered, however, that all expenditure on public transport fares (as with all transportation outlays) excludes holiday expenditure. Finally, expenditure on communication portrays a very different picture in that it represents a less significant portion of the family budget as household income rises. Clearly, the overriding importance of the car as an element of transport and communication for Australian families masks important patterns of variation among the other components. Variations among income groups in their overall expenditure on transport largely reflect variations in both fixed cost and variable outlays on the family car.

When interpreting these results it should be noted that increases in household income and expenditure are closely associated with differences in household composition. They may also be associated - though less strongly - with other variables like relative location within cities, but this has yet to be demonstrated by available data. Both the average number of persons per household and the number of persons working per household increase with increasing household income: the average number of persons working per household increases from 0.18 in the under $80 income group to 2.56 in the $340 or more income group; the average number of persons per household shows a corresponding increase from 1.71 to 4.06. These differences reflect the greater number of elderly and retired persons in lower-income households and the greater number of children in higher-income households. Consequently, at least some of the difference in transport expenditure between low and high income households can be explained by differences in the actual number of persons per household and in their demographic and employment characteristics. Table V indicates that the differences between income groups in levels of expenditure (both in total, and for transport and communication) decrease considerably when expressed
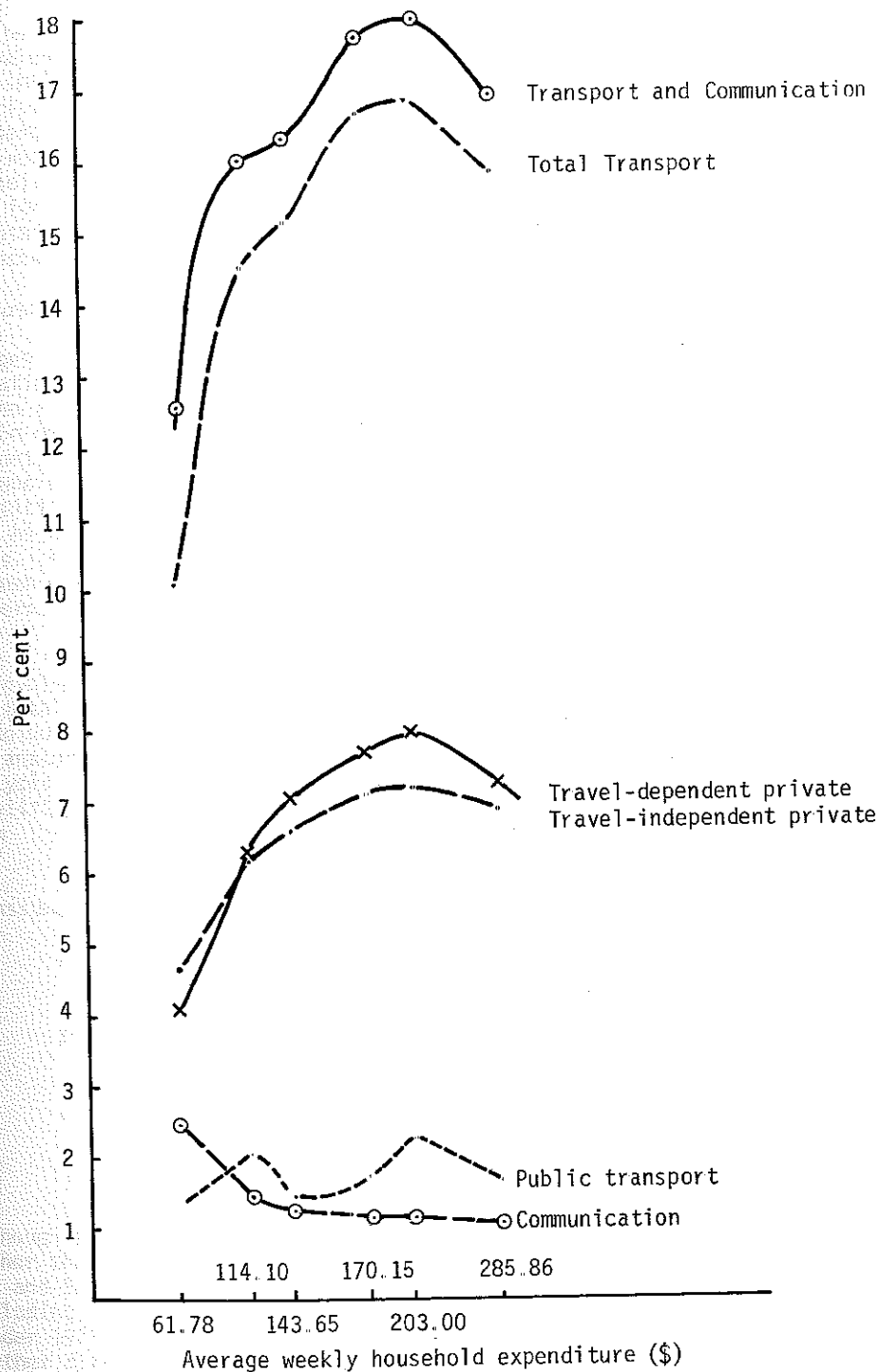
Fig 3 - Percentage of total household expenditure devoted to various components of transport and communication, by income groups, Australia, 1974-5

TABLE V

COMPARISON OF ABSOLUTE AND PER CAPITA LEVELS OF TOTAL HOUSEHOLD EXPENDITURE AND EXPENDITURE ON TRANSPORT AND COMMUNICATION, BY AVERAGE HOUSEHOLD INCOME

Average Weekly Income	Total household Expenditure per week	Transport & Communication Expenditure per week	Per capita Expenditure	Per capita Transport & Communication Expenditure
< 80	61.75	7.73	36.11	4.52
80 - 140	114.06	18.17	43.20	6.88
140 - 200	143.62	23.48	44.33	7.25
200 - 260	170.10	30.08	50.03	8.85
260 - 340	202.96	36.34	56.69	10.15
340 +	285.89	48.09	70.42	11.84
ALL	157.01	26.29	50.98	8.54

SOURCE: Extracted and/or derived from Australia. Bureau of Statistics (1976*a*).

on a per capita basis. Yet, it is unrealistic to treat every individual as equivalent in his expenditure needs. For instance, it is well established that small children consume less than adults and that the elderly generate fewer motorised travel demands due to declining physical health and a reduced frequency of work trips. Moreover, some costs (such as car purchase) are incurred on a household basis and thus it is not really valid to treat expenditure as a homogeneous function of household size. No adjustments are made for differences in household composition at this stage, although it should be noted that not all of the differences in expenditure patterns are attributable to income.

Measurement of Income Elasticity

Changes in the structure of the family budget with household income reflect variations in the rate of change in demand for different goods as household income rises. The responsiveness of the demand for any good to shifts in income may be measured by its 'income elasticity'. This is defined as the ratio of a proportionate change in expenditure on a good to the proportionate change in household income which induces it, all prices remaining unchanged. Income elasticities represent a more precise means of describing Engel curves, albeit at a higher level of abstraction, than simple graphical and tabular presentations. Measures of income elasticity not only permit more rigorous comparisons between consumption items, but also facilitate comparison of expenditure patterns occurring in different places and at different points in time.

The estimation of income elasticities is far from a trivial matter. It involves a whole series of decisions regarding the choice between income and total expenditure as the primary explanatory variable, the analytical technique, the functional form to be fitted, the number of non-economic explanatory variables to be considered, and the level of aggregation of the analysis. While none of these decisions can be taken lightly, an extremely simplified approach is adopted here for illustrative purposes. The functional form

$$\log Y_i = a + b \log X_i + u$$

is assumed, where

Y_i = average expenditure on the commodity in question by the ith income class (here i runs from 1 to 6)

X_i = average total household expenditure by the ith income class

u = a random error term

a and b = constants estimated here by simple regression.

This method of analysis follows closely in the wake of other studies, although some differences do exist. Some studies have chosen family income rather than total household expenditure as the primary explanatory variable (Oi and Shuldiner 1962; Harvey 1967). Others have attempted refinements by including family size as an additional explanatory variable (Houthakker 1957; Podder 1971) or by using a different analytical technique (Podder 1971). Further differences may be found in the level of aggregation of the analyses. The implications of these differences in estimation procedures are elaborated where appropriate in the discussion which follows.

TABLE VI

ESTIMATED INCOME ELASTICITIES FOR VARIOUS COMMODITIES,
AUSTRALIA, 1974-5

Expenditure Category	Income Elasticity	R^2
BROAD GROUPINGS:		
Current housing costs	0.808	0.969
Fuel and power	0.447	0.972
Food	0.767	0.999
Alcohol and tobacco	1.105	0.998
Clothing and footwear	1.164	0.991
Household equipment and operation	0.976	0.993
Medical care and health expenses	0.934	0.971
Transport and communication	1.216	0.989
Recreation and education	1.415	0.997
Miscellaneous goods and services	1.125	0.986
TRANSPORT AND COMMUNICATION COMPONENTS:		
Travel-independent private	1.275	0.989
Car purchase	1.395	0.983
Other vehicle	0.916	0.793
Vehicle registration and insurance	1.097	0.991
Travel-dependent private	1.410	0.976
Petrol	1.259	0.974
Other running expenses	1.537	0.976
Public Transport	1.184	0.930
Rail fares	1.612	0.943
Bus/tram	0.850	0.945
Other public transport	1.084	0.867
Total Transport	1.315	0.983
Communication	0.447	0.872

SOURCE: Derived from Australia. Bureau of Statistics (1976*a*; 1976*b*).

Providing this relationship holds, the parameter b represents a measure of the income elasticity of demand for the particular commodity in question. This parameter has a relatively straightforward interpretation: it expresses the percentage change in expenditure on a commodity that accompanies a one per cent rise in household income (or total expenditure). Income elasticity of demand for a good may be negative in which case the commodity is distinguished as an *inferior* good; such a situation would arise if the absolute level of expenditure on a good declines as household income increases. An income elasticity of demand which is positive but less than unity describes the situation where expenditure on a commodity increases in absolute terms but nonetheless declines in relative importance as household income rises; such a good is specified to be a *necessary* good. Finally, a positive income elasticity which is greater than unity describes a situation where expenditure on a commodity increases in both absolute and relative terms as household income rises; and accordingly is distinguished as a *luxury* good. The elasticities calculated in this way are strictly elasticities with respect to total expenditure; however, such elasticities are referred to briefly (though inaccurately) as 'income' elasticities in the present paper. Since the elasticity of total expenditure with respect to income is normally less than one, income elasticities are normally smaller than elasticities with respect to total expenditure. Prais and Houthakker (1961) suggest on the basis of their results that the income elasticities may be estimated by reducing the expenditure elasticities by about one-tenth.

Table VI presents measures of income elasticity based on the 1974-5 Australian survey data. Elasticities have been calculated for each of the ten broad commodity groups as well as the finer categories of transport and communication expenditure. The R^2 values obtained in the regressions are reasonably good, even allowing for the effects of grouped data and logarithmic transformations. The findings basically reinforce the impressions gained from earlier tabulations. None of the items is an 'inferior' good in the technical sense, but the rate of increase in spending with increased income varies considerably. The income elasticities for food, housing and fuel and power are well below one; those for household equipment and medical care are close to unity, although a little below it; while the elasticities are greater than unity for all other commodities, including transport. Most components of transport expenditure are 'luxury' items in the technical sense defined here, including the bulk of public transport services. In fact, rail services have the highest income elasticity of demand of all key transport elements, at least insofar as these preliminary analyses suggest*. Buses and trams and the purchase of vehicles other than cars are the only categories of transport expenditure with income elasticities less than unity. The lowest elasticity is, however, observed for communication by post and telephone.

The measures of income elasticity presented here should be treated with some caution. There are several reasons why biases in the estimates may occur:

(a) The substitution of household income with total household expenditure means that errors in the dependent and the determining variable are interdependent, thus violating one of the assumptions of least squares regression (Liviatan 1961; Podder 1971).

(b) Each income group receives equal weight in the analysis, irrespective of the number of households represented in the group average.

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* No doubt this reflects the importance of rail transport for the journey to work, especially to the CBD. The CBD draws workers from all sectors of the city, but the largest number by far are white collar workers, including a greater proportion on high incomes (see for example Wilbur Smith and Associates 1969).

(c) The use of grouped data also makes it difficult to include more than
one explanatory variable; yet biased elasticities will be obtained if
the primary explanatory variable is correlated with other variables
which could be regarded as explanatory (Podder 1971).

(d) The double-logarithmic function implies a constant elasticity across
the income range; although this has been found to give a fairly good
description for most commodities, other functional forms should ideally
be fitted and compared.

(e) The basic data are preliminary estimates and are subject to revision,
while sampling errors may be particularly high for the finer commodity
groupings, such as the individual components of transportation
expenditure (Australia. Bureau of Statistics 1976*b*).

But in spite of these limitations, the income elasticities presented
in this paper provide an approximate measure of the responsiveness of expenditure
to shifts in income. Provided the estimates are not interpreted too literally,
they provide a reasonable basis for making broad comparisons with results
obtained in other studies. Notwithstanding, the difficulties in undertaking
any kind of comparison between the results of different surveys cannot be
emphasised too strongly. The definition of commodities and commodity groups
can vary widely from survey to survey, both within the same country and between
countries. In addition the estimation procedures employed in the studies are
often markedly different. Further problems arise when attempting to draw
international comparisons since the real income and the commodity price
structure may vary considerably between countries. Consequently the results of
any kind of comparison must be regarded as tentative at best.

The findings presented here are broadly consistent with those of other
surveys conducted in widely differing places and points and time. Most
previous studies have confirmed commodities such as food and housing as
'necessary' goods, and clothing, transport and miscellaneous goods and services
as 'luxury' goods. And, due to their generality, the findings for food and
housing have come to be known as Engel's law and Schwabbe's law, respectively
(Houthakker 1957).

Houthakker (1957) embarked on a massive international comparison of
consumption patterns and found that the elasticities with respect to total
expenditure are remarkably similar, though not identical. He concluded that

'if no data on the expenditure of a country are available at
all, one would not be very far astray by putting the partial
elasticity with respect to total expenditure at 0.6 for food,
1.2 for clothing, 0.8 for housing and 1.6 for all other items
combined'.

The estimates are partial in the sense that Houthakker (1957) controlled for
differences in family size in deriving the income elasticities. Estimates of
a similar order were also derived for the 1966-8 Australian data by Podder
(1971).

Comparisons for transport expenditure come primarily from Podder's
(1971) analysis and American studies conducted by Oi and Shuldiner (1962) and
Harvey (1967). The income elasticities derived in these studies are reproduced
in Table VII, together with brief descriptions of the definitions and
estimation procedures used to derive them. It should be noted that Podder
(1971) went to considerable lengths to obtain more refined estimates of income
elasticity, but only his simple model is considered here since it accords more
closely with the other approaches. Even so, the differences between Podder's
(1971) sophisticated and simple estimation procedures rarely exceed 20 per cent

TABLE VII

COMPARISON OF ESTIMATED INCOME ELASTICITIES OF DEMAND FOR
TRANSPORT EXPENDITURE OBTAINED IN OTHER STUDIES

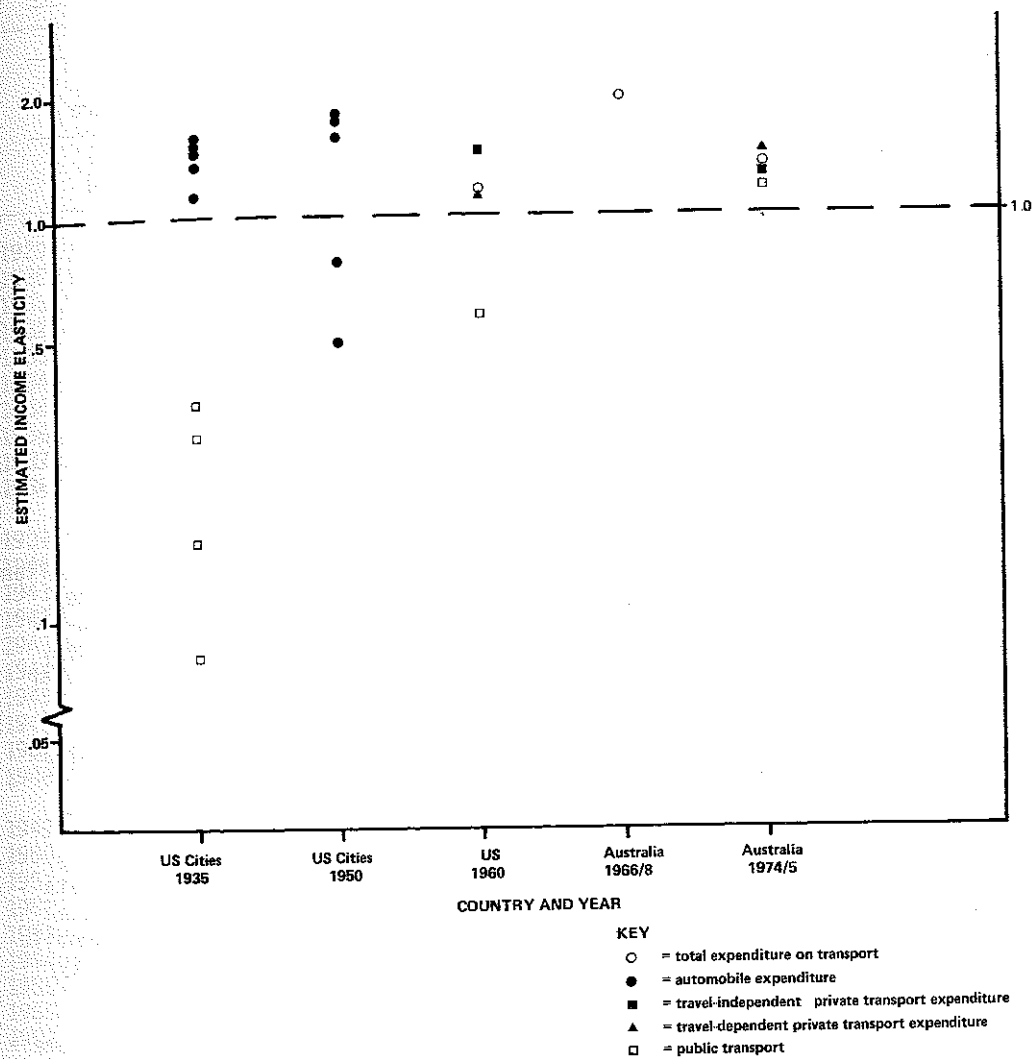| Location	Date	Author(s)	Expenditure Category	Independent Variable	Estimation Procedure	Income Elasticity	R^2
U.S. Cities	1935	Oi and Shuldiner 1962	Transit expenditure	Money income	double logarithmic function fitted to grouped data using least squares regression		
Atlanta						0.157	0.1076
Chicago						0.349	0.7403
Omaha						0.282	0.3643
Portland						0.080	0.1328
Atlanta	1935	"	Auto expenditure	"	"	1.438	0.7964
Chicago						1.599	0.8778
Omaha						1.341	0.9813
Portland						1.138	0.9542
Providence						1.504	0.8387
Atlanta	1950	"	"	"	"	1.746	0.9631
Chicago						0.786	0.7014
Omaha						1.790	0.8883
Portland						1.585	0.9143
Providence						0.493	0.5166
U.S. Urban Families	1960 -61	Harvey 1967	Total transport	Money income after taxes	"	1.135	0.9518
			Travel-independent auto			1.467	0.9326
			Travel-dependent auto			1.102	0.9059
			Transit			0.569	0.7554
Australian Urban Families	1966 -68	Podder 1971	Fares and motor vehicle expenses (other than initial purchase cost)	Total household expenditure	double logarithmic function fitted by least squares to ungrouped data	1.980	0.613

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The estimates in Table VII are in broad agreement with those derived earlier for the 1974-5 Australian survey data. But there are also some very interesting differences both between Table VI and Table VII, and within Table VII itself. The most striking contrast is between the income elasticities for public transport in the U.S and Australia. Low income groups spend proportionately more of their income on public transport in the U.S. than do high income groups, while the reverse appears to be the case in Australia, at least for certain public transportation modes. The estimates for automobile expenditure in Table VII are all above unity, with the exception of two American cities in 1950. But even so the estimates vary quite widely. Podder's (1971) estimate is considerably higher than the others in the same table and also those presented earlier for the 1974-5 survey. However, it is impossible to tell whether these differences reflect true differences, or merely differences in the estimation procedures (in particular, those of ungrouped versus grouped data) and in the expenditure classifications adopted in the various studies.

The findings from Harvey's (1967) study are of considerable interest since his expenditure classification comes closest to the one adopted in this paper. It must be emphasised, however, that the definitions are not entirely comparable: Harvey's (1967) distinction between travel-dependent and travel-independent outlays relates only to automobile expenditure, whereas for the Australian estimates it also applies to other types of vehicles. These and other differences in the estimation procedures are probably not sufficient to account for the differences in the estimates obtained for the two countries: travel-independent expenditure appears to be more responsive to shifts in income than travel-dependent expenditure in the U.S., whereas the reverse was found to be the case in Australia. Admittedly the absolute differences in the elasticities are not great. But the evidence does seem to suggest that the response to specific components of transportation will vary from country to country, and that consistency in the estimates of income elasticity can be achieved only at a fairly broad level.

The wide apparent variations in income elasticities are better appreciated from Fig 4, when the 0.5 to 2.0 range is clearly established: even Podder's (1971) more precise estimation procedures make little difference to this order of magnitude display. However, given the difficulties in making comparisons between different studies, a more satisfactory basis for assessing the stability of the income effect would seem to be to compare the results for different places covered by the same survey; or, where continuity and compatibility of survey definitions prevail, to cross-check estimates derived from cross-sectional and longitudinal data for a single country.

Evidence on the first point is contained in Table VIII. Income elasticities for the three major expenditure categories and all other expenditure combined are calculated as before and presented for each of the six State capitals and Canberra.* Clearly the elasticities are very similar over all of Australia's major cities. Food shows the highest degree of homogeneity, while each of the other major categories show some minor variations. A similar degree of homogeneity in income elasticities at the regional level, has also been observed by Podder (1971) and Oi and Shuldiner (1962) in their studies of Australian and American cities, respectively.

* Details for the finer expenditure categories have not yet been released by the Australian Bureau of Statistics for the individual capital cities.

KEY

○ = total expenditure on transport
● = automobile expenditure
■ = travel-independent private transport expenditure
▲ = travel-dependent private transport expenditure
□ = public transport

SOURCE: Refer to Table VI and Table VII

Fig. 4 - Income elasticities for transport expenditure compared on a logarithmic scale.

TABLE VIII

ESTIMATED INCOME ELASTICITIES FOR BROAD EXPENDITURE
CATEGORIES IN AUSTRALIAN CITIES, 1974-75

	Category of Expenditure			
	Current Housing Costs	Transport and Communication	Food	All Other Expenditure
Sydney	0.860	1.244	0.770	1.083
Melbourne	0.800	1.190	0.782	1.094
Brisbane	0.705	1.376	0.744	1.094
Adelaide	0.798	1.102	0.723	1.132
Perth	0.607	1.184	0.734	1.137
Hobart	0.611	1.187	0.751	1.127
Canberra	0.841	1.384	0.690	1.050

SOURCE: Derived from Australia. Bureau of Statistics (1976a).

Evidence on the second point cannot at present be derived from Australian family expenditure surveys. Time series analysis requires continuity in the data and continued compatibility in survey definitions and design. Unfortunately, neither of these conditions is as yet fulfilled by Australian sources. Documentation of the coding procedures adopted for the 1966-8 survey has so far proved difficult to obtain: what evidence is available suggests that any compatibility with the 1974-5 survey could only be achieved for very broad categories of expenditure. The value of time series analysis in the Australian context is also limited by the short time span covered by the local data sources. However, some evidence is available from overseas studies. Oi and Shuldiner (1962) have undertaken an historical analysis of consumption expenditures in the U.S. for housing, automobile and public transport outlays. With one major exception the income elasticities derived from time series data were found to be consistent with estimates obtained from cross-sectional data. The major discrepancy occurred in the estimated income elasticity for automobile expenditures using post-war data, and was attributed to the high co-linearity between income growth and time progression over this period (see Table IX).

Oi and Shuldiner's (1962) findings tend to confirm the effect of income on consumption behaviour as stable over time. Their findings also highlight the limitations of cross-section analyses for forecasting changes in consumption expenditures: specifically, the increase in transport expenditure over time exceeds the growth which could have been anticipated by changes in income alone.* This is consistent with Tanner's (1962, 1965, 1974) results where only half of the recent historical growth of car ownership in Great Britain could be

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* Most of this trend is largely ascribable to the rapid growth of automobile expenditures; since, if anything, the relative importance of other transportation has declined through time (see Table IX).

TABLE IX

INCOME, CONSUMPTION, AND EXPENDITURE ON AUTOMOBILE, LOCAL TRANSPORTATION AND HOUSING IN THE UNITED STATES OF AMERICA, 1929-57

	Per Capita Disposable Income in Constant 1954 Dollars, X	Total Personal Consumption Exp. in Current Dollars (millions)	As Percentage of total consumption outlays		
			Auto Exp. Y_1	Local Transportation Exp. Y_2	Housing Exp. Y_3
1929	1,107	78,952	7.55	1.41	14.50
1930	1,023	70,968	6.57	1.48	15.52
1931	978	61,333	6.11	1.50	16.74
1932	838	49,306	5.95	1.59	18.26
1933	812	46,392	6.54	1.55	16.99
1934	863	51,894	6.91	1.47	14.60
1935	942	56,289	7.49	1.40	13.57
1936	1,052	62,616	7.91	1.35	12.68
1937	1,082	67,259	7.86	1.29	12.54
1938	1,015	64,641	6.89	1.30	13.63
1939	1,093	67,578	7.59	1.30	13.34
1940	1,159	71,881	8.17	1.26	12.98
1941	1,313	81,875	8.59	1.19	12.27
1942	1,465	89,748	3.99	1.44	12.06
1943	1,503	100,541	2.84	1.64	11.27
1944	1,546	109,833	2.77	1.57	10.82
1945	1,513	121,699	3.28	1.43	10.19
1946	1,485	146,617	6.14	1.33	9.28
1947	1,395	165,409	7.45	1.21	9.41
1948	1,442	178,313	8.19	1.18	9.86
1949	1,433	181,158	9.81	1.14	10.65
1950	1,523	195,013	11.10	1.05	10.87
1951	1,535	209,805	10.18	0.99	11.08
1952	1,551	219,774	9.97	0.95	11.55
1953	1,598	232,649	11.32	0.91	11.81
1954	1,582	238,025	11.00	0.85	12.23
1955	1,654	256,940	12.52	0.78	11.96
1956	1,706	269,400	11.34	0.74	12.16
1957	1,711	284,442	11.62	0.70	12.43

SOURCE: Oi and Shuldiner, 1962, p. 179.

explained in terms of a simple cross-sectional correlation between income and ownership. These studies thus underline the need for continuous and compatible time series data for forecasting transport demands.

Overall, it may be concluded that within fairly broad limits the effect of income on expenditure patterns tends to be stable over space and time. But how does this assist the transport planner?

Planning implications

Knowledge of the pattern of wealth spending by income groups provides the transport planner with a framework for assessing the social impact of planning and policy decisions. Both the relative importance of consumption items to different income groups and their shares in the overall budget are critical considerations when assessing social impact. Income elasticities measure the responsiveness of expenditure to shifts in income, and by inference also the relative importance of consumption items to different income groups. Thus the elasticities indicate which groups are most likely to gain or lose in different ways from planning decisions. For instance it is clear that public transport is not simply for the poor nor the car for the rich, and that policies relating to either will affect all income groups. Of course, some policies will directly benefit particular groups more than others. A reduction in bus fares will clearly have different distributional effects at first round from an across-the-board reduction in rail fares. The overall scale of the impacts is also important. The car is of overwhelming importance for all income groups in Australian society. Consequently policies affecting private transport will have the greatest overall impact. For example, removal of car registration and insurance fees would be of greater absolute benefit to low income groups than a reduction in bus fares (refer to Table IV), despite the fact that higher income groups would benefit to a relatively greater degree.

Taken in conjunction with the relative importance of different expenditure categories, income elasticities provide some indication of the probable *ceteris paribus, short-run* effects of any increase in income on consumer spending. When weighted by their respective budget shares the component income elasticities sum to one. The largest proportion of any increased income will be spent on transport, especially private transport; other categories including recreation and education, food, housing and clothing will also receive a large share of the benefits from income rises.

Fiscal policy is essentially complementary to the fields served by transport planning. From the latter standpoint the relationship between income and expenditure is less useful than a measure of the relationship between income and some physical measure of consumption such as vehicle-kilometres or passenger-kilometres (Oi and Shuldiner 1962). There are three major factors which detract from the use of dollar outlays as a proxy for travel activity. These are variations among income groups in access to non-pecuniary transport benefits (like company cars); in the prices paid for goods and services; and in the time spent in travelling. The first two factors work in opposite directions, while the effect of the latter is less clear.

Some insight into the effect of company cars on vehicle purchases is given in Table X which is taken from the Sydney pilot survey of consumer finances conducted in 1963-5. From the first and third columns of Table X it will be seen that both the levels of car ownership and the proportion of families purchasing a car increases with income but for a significant drop at the highest income level recorded. The second and fourth columns of Table X demonstrate that company cars could well account for much of the drop in

TABLE X   <u>EFFECT OF COMPANY VEHICLES ON PURCHASES</u>

INCOME RANGE £ p.a.	Ratio of Families Acquiring a Vehicle to All Families in the Sample		Ratio of Vehicles Acquired to all Families in the Sample	
	<u>Excluding</u> those acquiring a Company Vehicle	<u>Including</u> those acquiring a Company Vehicle	<u>Excluding</u> those acquiring a Company Vehicle	<u>Including</u> those acquiring a Company Vehicle
	1	2	3	4
0 - 799	.074	.074	.074	.074
800 - 1199	.167	.167	.167	.167
1200 - 1599	.133	.150	.133	.150
1600 - 2199	.167	.197	.167	.197
2200 - 2999	.264	.302	.283	.321
3000 - 4499	.400	.486	.457	.543
4500 and over	.294	.471	.412	.647
TOTAL (all families)	.204	.241	.221	.262

SOURCE :   Edwards *et al* (1966, 80)

expenditure. Company cars are more readily available to persons in the higher income ranges, particularly business and professional people. Car *availability* in high income households is therefore greater than their private expenditure records would suggest. This may well be of significance in explaining the proportionate decrease observed earlier for the 1974-5 Australian survey data (refer to Tables III - IV, Fig 3).

The general effect of company cars is to lead to understated expenditure on transport, particularly for the higher income groups. Variations in prices tend on the other hand to overstate differences in travel activity between income groups. This is because higher income groups tend to spend more money per unit of travel activity than is spent by lower income groups.* Oi and Shuldiner (1962) certainly found this to be the case for American urban families, while Tulpule (1974) suggests that this may apply in Britain as well. The 1974-5 Australian survey data also point to variations in qualitative aspects of transport consumption between income groups. The level of spending on certain aspects of private motoring (e.g. car purchase and maintenance expenses) increases at a higher rate with household income than does expenditure on other aspects (e.g. petrol consumption). This suggests that higher income groups buy higher quality cars and maintain them in better running order relative to lower income groups. Alternatively, higher income groups buy more cars and therefore spend more on vehicle maintenance, despite less intensive vehicle usage. The available evidence confirms that both the number and the quality of cars purchased varies with household income. The differences between columns 1 and 3 and between 2 and 4, respectively, in Table X identify multiple purchases at higher income levels. Table XI also comes from the 1963-5 Sydney pilot study and provides insight into qualitative variations in transport consumption. By comparing the first and third columns it may be seen that buyers of new cars are more heavily weighted towards the upper end of the income range than are buyers of used motor vehicles - even though the used motor vehicle market has general appeal to persons at all levels of income. The relatively large proportion of families purchasing new cars in the income range 800-1199 reflects purchases made by well-established families on the one hand, and by young married adults on the other. The average value of vehicles bought does not alter significantly until the highest income range where the value is more than double that of purchases in each of the other income groups British evidence also points to the existence of quality variations in private motoring. For example, Bates (1971) found a strong relationship between household income and the age of vehicles owned by British families.

The prices paid per unit of activity for public transport are also likely to be correlated with income. Higher income groups are more likely to opt for a superior class of travel when this is available (for example, first class rather than economy air fares) while many persons on low incomes (such as pensioners) receive fare concessions. Furthermore, some public transport modes offer reduced fares during off-peak periods when the bulk of travellers are public transport captives, including many on low incomes (Bence 1973; 1974).

Income elasticities for expenditures reflect both the variation in physical quantities *and* the variation in quality (average price per physical unit) associated with a rise in the level of living (Houthakker 1957).

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* Of course prices vary for other reasons besides quality of goods and services They also vary over space and time, and this further undermines the utility of a monetary measure for the estimation of physical quantities of consumption

TABLE XI

FAMILIES PURCHASING NEW AND USED MOTOR VEHICLES

Average Value of Purchases and Net Expenditures on Motor Vehicles, by Income

Income Range	Families Purchasing a Vehicle						Families (Total Sample)	Vehicle Pur-chases	Net Expendi-ture per family purchas-ing	Net Expendi-ture on Vehicles
	NEW		USED		TOTAL					
	Value per Family		Value per Family		Value per Family					
£ p.a.										
	1	2	3	4	5	6	7	8	9	10
	%	£	%	£	%	£	%	%	£	£
0- 799	-	-	6.1	625	3.3	625	9.2	3.1	414	31
800-1199	13.3	1251	6.1	461	10.0	988	12.2	9.2	830	135
1200-1599	3.3	1170	21.1	397	13.3	493	20.4	12.3	422	56
1600-2199	16.7	1297	18.2	484	18.3	854	22.5	16.9	565	94
2200-2999	16.7	1161	27.2	508	23.4	742	18.0	23.1	521	138
3000-4499	33.3	1058	15.2	628	23.4	980	11.9	24.6	618	247
4500 +	16.7	2028	6.1	669	8.3	2295	5.8	10.8	1675	493
TOTAL	100.0	1306	100.0	512	100.0	935	100.0	100.0	662	135

SOURCE: Edwards *et al* (1966,84)

Thus in order to estimate changes in physical quantities we require information on price elasticities. The latter are typically derived from longitudinal data series, although it should be noted that Williams (1976) has recently employed a framework for estimating price elasticities from cross-section data when information on prices is not available. Only when the 'true' price elasticity is -1 will the income elasticity for expenditure also be an unbiased estimate of the income elasticity of physical consumption, assuming of course that the income elasticity for expenditure is unbiased in the first place, and that access to non-pecuniary benefits is equal for all income groups. While neither of the latter conditions may be fulfilled it is interesting to note that evidence from both overseas (Oi and Shuldiner 1962) and Australia (Williams 1976) indicates that a price elasticity of -1* is generally appropriate for private transport. On the other hand, the available evidence and opinion indicate that the demand for public transport is predominantly price inelastic (Oi and Shuldiner 1962; John Paterson Urban Systems 1972). Thus a 10 per cent increase in fares is typically associated with less than a 10 per cent decline in patronage. Given these results, income elasticity for expenditure on public transport forms an approximate upper limit to the income elasticity for public transport passenger-kilometres.

Thus the economic resources available to the household are reflected in both quantitative and qualitative aspects of transport consumption. Expenditure patterns provide an approximate - though by no means perfect - indicator of travel activity by families at different income levels. We turn now to consider what additional information is needed to enhance the value of the results obtained from family expenditure survey data.

4. EXTENSIONS TO THE ANALYSIS

The use of a monetary value reduces consumption patterns to a common denominator, thus providing a means of measuring the priorities which people place on different elements in their daily lives. But for any one expenditure item the use of a monetary value has its limitations. In this section we examine some possible extensions to the analysis of family expenditure survey data in transport planning and appraisal. This involves specifying additional information which should be collected and/or made available by family expenditure surveys, as well as other data sources which may be used to enhance the value of the results. The areas which are of particular concern are the estimation of future travel demands and the development of an evaluative frame-work for, firstly, monitoring the performance of the transport system and, secondly, for assessing the social impact of transport planning *within* cities.

4.1 MEASUREMENT OF FUTURE TRAVEL DEMANDS

As already noted, expenditure is not a perfect indicator of travel activity. In order to obtain a clearer picture of the quantitative and qualitative aspects of transport/consumption it is necessary to have additional information besides total financial outlays. In the two earlier surveys conducted in Australia other information has been collected which permit considerable refinement. The 1966-68 family expenditure survey contains information on the

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* A price elasticity of -1 means that a one per cent increase in costs per vehicle-kilometre will be associated with a one per cent decline in vehicle-kilometres consumed.

number of vehicle miles per annum, including a separate estimate of the
percentage of mileage for business use. Besides being of direct relevance
in estimating levels of travel activity, this information will provide
considerable insight into qualitative aspects of travel. For instance,
estimates of expenditure per vehicle-mile may be computed for different income
groups in order to provide further insight into the relationship between house-
hold income and the cost of private motoring.

The 1966-68 survey also provides the opportunity for a more rigorous
analysis of variations in private transport consumption. The survey furnishes
information on a wide range of vehicle characteristics including method of
purchase, ownership details (company owned or private), make, type, year of
first registration, value, new or second hand when bought, hire purchase debt,
method of disposal of previous car, and so on. Some of these aspects, such as
make, age and value of the asset, provide fairly direct measures of qualitative
aspects. Thus it would be possible to estimate the relationship between
household income and value or age of vehicle(s), using Australian data.

Examination of these qualitative aspects of travel has considerable
practical value. For instance, knowledge of the average age of vehicles owned
by different income groups and of the new or second hand characteristics of the
vehicle when bought aids our understanding of the role of the second hand car
market. These aspects in turn have important distributional implications.
Age of vehicles can be expected to influence the diffusion of innovations (as
for example, seat belts) through the vehicle fleet (Thoresen and Stella 1977).
Moreover, there is some indication that vehicle age is associated with accident
risk potential, although the relationship is by no means simple. For instance,
Foldvary and Potter (1970) found from their 1961 Brisbane study that the oldest
group of cars (17 years and older in 1961) displayed the greatest risk of
casualty accident involvement, while for non-casualty accident involvement the
one and two years old class, right at the opposite end of the age-sequence,
exhibited the largest involvement rate. The second highest involvement rate in
each of these classifications was found for the 9-10 years age-group of cars
manufactured in 1951-52, reflecting particular aspects of vehicle design of that
era in Australia. It is not yet known whether similar information has been coll-
ected by the Australian Bureau of Statistics for the 1974-5 or subsequent surveys,
and if so whether this information will be available for research purposes.

Of course, even with the inclusion of such information family expenditure
surveys provide only a partial picture of travel demands. Private travel is only
one component of total travel activity. Furthermore, data on expenditure or
aggregate distances travelled provide no insight into the temporal and spatial
patterns of travel activity. Clearly, too, travel demands in urban areas differ
from those in rural areas due to lower levels of car ownership and availability
of public transport in cities.

Information on many of these aspects is available from complementary
data sources. Motor Vehicle Usage Surveys conducted periodically (viz. 1963,
1971 and 1976) by the Australian Bureau of Statistics provide information on
levels of travel activity by different types of vehicles, for various purposes
and in different types of areas. They provide information on the number of
vehicles, distance travelled per vehicle per annum, vehicle occupancy and vehicle
loads. Assuming continuity, the latter surveys provide a more comprehensive
basis for predicting travel demands over time and for identifying the differing
planning requirements of major cities, other urban areas and rural areas.
Furthermore, by differentiating between work travel and other private travel

consumption these surveys make it possible to incorporate the impact of changes in leisure time on future traffic growth predictions. Other sources (such as census information on car ownership) may be used to provide independent checks on estimates of future travel demands. Morely (1971) and Tanner (1974) have outlined a wide variety of such sources which may be used to provide cross-checks in Britain.

At the intra-urban scale, journey to work data produced by the Australian Bureau of Statistics from population census sources furnishes information on the interactions between sub-areas of Australian cities. This information together with the results of the transportation studies which have been conducted in Australia's major urban areas provide a basis for the microscale aspects of urban transport planning.

Predictions based on any or all of these data sources implicitly assume a continuation of current trends and trade offs. One area in which family expenditure survey data have a special role to play is in examining the effect of variations in relative prices on consumption levels. Continuous time series data together with information on changing prices would provide a sounder basis for predicting long-term trends of travel activity +(see Gaudry 1975). Knowledge of the cross elasticities of demand - or the tendency of buyers to shift from one good to another when the price of the latter changes - is of vital importance when attempting to predict the affect of, say, rising fuel costs on consumption of transport and other commodities? How do people react to rising fuel costs? Do they modify their travel behaviour? Or do they skimp on non-transport items of expenditure? If so, what commodities are likely to be most affected? Does the response differ for different income groups? The answers to such questions can only be provided from analyses of time series data on expenditure and prices, thus underlining the need for continuity and compatibility in the conduct of family expenditure surveys, and the systematic collection of information on prices.* The surprising result from the U.K. that food expenditure was squeezed rather than transport expenditure at a time of rapid increases in fuel costs is indicative of such trade-offs, and points to the difference between short-run and long-run responses which such data can distinguish effectively. Information on price elasticities and cross-elasticities is clearly relevant to many policy areas, since relative prices are more easily manipulated to achieve given redistibutional goals than changes in income levels and distribution.

+ Shifts in consumption patterns are not simply of interest in forecasting personal travel, but also in predicting movements of goods.

* Estimates of private final consumption compiled in the Australian National Accounts may be of some assistance in this regard. Nevertheless, the estimates are not directly comparable with family expenditure survey data due to substantial differences in the way in which expenditure is defined, in areal coverage, and in the definition of the household sector itself. In addition, the estimates are not disaggregated and therefore do not permit the analysis of distributional questions.

4.2 TOWARDS AN EVALUATIVE FRAMEWORK FOR TRANSPORT PLANNING

Even at a fairly aggregated level of analysis family expenditure survey data provide valuable insight into distributional questions. But for the most part, a greater degree of disaggregation in analysis is required to assess the social impact and distributional consequences of transport planning and provision. Many of the pertinent questions which confront the transport planner can only be examined at a finer (i.e. intra-urban) spatial scale. Since family expenditure surveys are residentially-based, additional information on the relative location of households *within* cities would be of considerable value in assisting the development of an evaluation framework, not only for assessing the social impact of transport planning and provision, but also for identifying current failures in accessibility.

Cities exhibit a marked internal differentiation of their physical and social elements. Residential segregation of urban populations on the basis of socio-economic status, stage in the life cycle, ethnicity and other character- istics is well established (Morris 1976a; King 1977). To the extent that these population characteristics are associated with variations in economic resources and financial commitments, significant spatial variations in consumption expenditures are likely to occur. Relative location within cities may also exert an independent influence on consumption expenditures for specific commodities or commodity groups. For example, it is to be expected that transport expenditure will be higher for families in outer suburbs due to lower levels of accessibility to most activities and services, and the greater dependence on private transport in these areas.

Yet, we know surprisingly little about the distribution of economic constraints within cities and the way in which they interact with other constraints on human behaviour. For instance, it is frequently stated that the poor locate on the urban fringe where housing is cheaper (see Australia. Commonwealth Bureau of Roads 1975). But household resources and commitments change throughout the life cycle (see Edwards *et al.* 1966). Since many fringe dwellers are young households in the process of formation or expansion, their current housing costs may well be quite high by comparison with established families in the higher-priced residential areas. It seems likely, therefore, that residents in outer areas devote a higher proportion of their household budget to both transport and current housing costs, irrespective of income. If this is the case, what expenditure items are sacrificed to finance these commitments? And more importantly, what are the implications for transport planning?

Some insight into the nature of intra-urban differentials in consumption expenditures is provided by Tulpule's (1974) comparative analysis of households with and without cars in Britain. Questions of spatial distrib- ution are not addressed explicitly in Tulpule's (1974) paper, but they may be inferred from systematic patterns of variation observed between the selected household characteristics. Tulpule (1974) found that at a given level of expenditure per head, expenditure per head on transport and vehicles tends to be higher in car-owning households than in non-car-owning households. Similar increases were also observed for housing and durable goods, whereas the reverse situation was found to apply for food, drink, tobacco and clothing. Inferences concerning correspondingspatial variations in expenditure patterns are strengthened by the observed relationship between owner-occupancy and car ownership, since the tendency for both of these variables to increase with increasing distance from the city centre is a well-established feature of western cities (Morris 1976a; King 1977).

How does a knowledge of intra-urban differentials in household expenditure patterns assist the development of an evaluative framework for transport planning? The choice of residential location typically involves trade-offs between access to urban opportunities, the total cost of the residential package, and environmental amenity. It may be agreed, therefore, that people who choose to locate in outer areas should not expect special consideration in planning provisions. But many people are constrained in their choice of residential location by income. The choice is likely to be especially constrained for residents of State housing, since the latter caters for a captive market. Nevertheless, it also applies to those on low incomes generally. Information on the distribution of income within cities is available from other sources. These include the various transportation studies, although in some cases these are rather dated. In addition there are two relatively new sources of income data which have been compiled by the Australian Bureau of Statistics. The first of these new sources is entitled 'The Australian Municipal Information System' (Maher 1976), while the second is 'The National Survey of Incomes' conducted for the Poverty Inquiry in 1973 (Australia Commission of Inquiry into Poverty 1975; Manning 1976). Unfortunately such data are only available for fairly aggregated spatial units, and as King (1977) has clearly shown, patterns of residential differentiation are heavily scale-dependent. Moreover, in a cross-section context income is not synonymous with disposable monetary resources. The availability of family expenditure survey data at a finer level of aggregation is thus of vital importance in identifying patterns of interaction between economic constraints within cities.

In developing an evaluative framework, other factors besides the money costs of travel are important. Information on the distribution of time costs within cities is of fundamental importance. This is clearly dependent upon the distribution of activities in relation to the distribution of the relevant user population, thus requiring analyses of market segmentation and accessibility to urban opportunities. Here the problem of defining an appropriate spatial scale of inquiry is especially critical. Data sources which should be tapped for this phase of the analysis include census of population and housing characteristics and journey-to-work data compiled by the Australian Bureau of Statistics, as well as the results of other studies relating to the distribution of opportunities within cities (for example, Manning 1972; Morris 1976b; UDPA Planners 1975).

Knowledge of the spatial distribution of travel costs relative to the economic resources and other commitments of urban households can be of considerable value in identifying areas of high priority for transport improvements. This is exemplified by the study of Green Valley undertaken by the Commonwealth Bureau of Roads (see Australia. Commonwealth Bureau of Roads 1975). The latter study found that it costs considerably more in time and money for some workers to travel from home to work than it does for others. In particular people living in the outer western suburbs of Sydney were found to have both high transport costs and low incomes and were identified as allocating the largest proportion of their household time and cost budgets to journey-to-work. Deficiencies were identified in the existing public transport systems for the journey-to-work and several improvements were made.

Other services are also relevant, too. The western suburbs of Melbourne are better endowed in terms of accessibility to work than their Sydney counter-parts, but they are nonetheless relatively deficient in many services, including health and welfare services. Levels of service provision for most health services are generally lower in the outer suburbs of Melbourne; but problems of access are likely to be especially critical in areas of lower socio-economic status (Morris 1976b).

In devising an evaluative framework we are therefore interested in developing a picture of the major constraints which affect behaviour and the extent to which these constraints overlap in particular areas of the city and for particular market segments. The availability of family expenditure survey data at a spatially disaggregated level is clearly an important ingredient in the development of such a framework. The 1966-68 Australian survey furnishes information for individual households including an area coding for small groups of Local Government Areas (for example, Melbourne is divided into sixteen regions). But, once again, it is not yet known whether such information is available for either the 1974-5 survey or its successor.

5. WHAT FAMILY EXPENDITURE SURVEYS CANNOT TELL US

Family expenditure surveys portray expressed demands and are thus limited in their ability to provide information on the extent and incidence of unmet needs in the community, the distribution of consumption within the household, quality variations in consumption patterns and related issues. For instance the data tell us nothing about the level of unmet needs among such visible transport-disadvantaged groups as the aged, the handicapped and the carless, or the way in which transport consumption is distributed within the household. Does the husband take the household car to work thus imposing restrictions on the mobility of his wife and children for much of the day? Or does he arrange a lift with a friend, or catch public transport in order to make the car available for other uses? Further, data on expenditures provide no basis for estimating mobility expectations and desires, or levels of satisfaction. Clearly, information on all of these aspects is necesssary to make definitive statements on the distributional aspects of transport planning.

Despite these limitations, some attempts have been made to compute indices of mobility directly from household expenditure survey data. Schoon (1973) suggests that it may be appropriate to define a desirable standard of 'person kilometres' of mobility purchasing power for a defined consumer unit in any given socio-economic environment; and has devised an index for comparing existing or base conditions with proposed conditions in a way which he claims affords an assessment of equity aspects. The index depends on matching levels of expenditure on public and private transport by consumer units to the average costs per kilometre for public and private transportation used by the respective consumer units. It thus requires information on the equivalency of public and private cost structures which is exceedingly difficult to obtain. More importantly, however, Schoon's (1973) index is highly aggregated and simplistic. It implicitly assumes that the price-elasticity of public transport demand is -1, an assumption which is not fully supported by presently available evidence. Differences across the income range in access to non-pecuniary transport benefits, in expenditure per unit of physical quality, and in times spent in travelling, detract from the use of monetary outlays as a proxy for travel activity. Meaningful statements on equity aspects of mobility require a disaggregated analytical approach, and at the very least must be evaluated within the specific spatial, demographic and socio-economic context of any given market segment.

Information on the way in which households budget their time forms a necessary complement to family expenditure survey data. The consequent links between time valuation, mobility, perception and the degree of reaction to transport changes by different population groups is at the very heart of an evaluative framework for assessing the social impact and potential influence of transport planning instruments.

6. CONCLUSION

Family expenditure survey data provide valuable insights into some of the major constraints influencing transport use and provision. They are especially useful in identifying some of the less obvious factors which generate and constrain consumption patterns which are not readily identifiable from other data sources.   This is exemplified by the finding that at least part of the consumption expenditure by low income families is financed from savings, loans or other sources besides 'income'. Furthermore, the use of monetary value is the only practicable measure by which the vast array of consumption items can be meaningfully compared.   Such comparisons are clearly necessary in order to accurately assess the distributional effects and overall social impact of planning and policy decisions. The facility to examine variations in expenditure patterns across income groups, space and time also provides a basis for forecasting future transport demands, and gives a sound basis for establishing useful and appropriate segmentation for transport purposes.

Unfortunately, the use of a monetary value also conceals vital information which is necessary for the planning task. Additional information is required in order to derive the greatest value from family expenditure survey data in developing and maintaining an evaluative framework and in forecasting transport demands. This will involve matching with complementary data sources and obtaining access to the existing data at a highly disaggregated level. At the same time some revision of the procedures adopted in the collection and release of family expenditure survey data may be needed. One survey clearly cannot cover all issues. However, certain critical factors ultimately determine the utility of family expenditure survey data to transport planning. These factors are: compatibility; continuity; comprehensiveness; availability; and documentation. The latter three factors in particular require consultation between the transport planner and the data collection agency concerned. It is hoped that this paper will assist in the continuing interchange between data gathering and planning agencies. A slightly more detailed report will be published shortly by the Australian Road Research Board.

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