CHAPTER 1

BUYER BEHAVIOUR

1.1. *The* Role of Repeat-Buying

This book deals with the repeat-buying of frequently-bought branded goods. In this chapter, we first outline some general aspects of buyer behaviour in § 1.2 and then consider the data-collection or measurement procedures most commonly used in § 1.3, the general choice of analysis-variables in § 1.4, and some specific indices of repeat-buying in § 1.5. The crucial point that regularities occur in consumers' observed repeat-buying is introduced in Chapter 2, together with theoretical formulations to summarise and interrelate these regularities, and a first example of a practical application of the results. Both theory and applications will be more fully developed in Parts II to IV.

Consumer behaviour is mainly studied by manufacturers of the goods that are consumed. Initially, a manufacturer tends to be production-orientated and thinks mainly in terms of his sales: so many tons of X, so many millions of cases of Y, so many pounds or dollars worth of Z – and sales perhaps going up or going down. Then comes some realisation that individual and highly varied people are involved who buy or use his product (the marketing or consumer-orientated approach). Data are therefore collected which allow him to separate sales into two components – numbers of buyers and how much they buy. There comes also the discovery that some consumers buy the brand or product in question far more frequently than do others (with a small proportion of buyers usually accounting for the bulk of sales), and that consumers may vary in their needs and habits (consumer profiles and market segmentation).

The data also show that buyers of a brand do not necessarily satisfy all their needs through this one brand, but tend to buy other brands as well – one of several points first documented in some quantitative form in Brown's pioneering articles on brand-loyalty many years ago [Brown 1951]. And it also appears that a brand does not always keep all its buyers: perhaps only 60% of the people who bought it last month buy it again this month. Such a loss of repeat-buyers might seem to imply that only 36% of last month's buyers would buy it again *next* month (60% of 60%), and only about 20% the month after that, and so on.

The failure to achieve 100% repeat-buying might indicate a loss of consumer demand or acceptance and presage a catastrophic decline in sales. On the other hand, it might be that a large turnover of customers is quite normal under steady sales conditions, with the lost buyers constantly, being replaced by new buyers (the "leaky bucket" theory). Or perhaps the "lost" buyers merely lapse for a time and normally come back again later.

But what really happens in terms of repeat-buying, and what its implications are, is broadly speaking the topic of this book. Is the month-by-month incidence of repeat-buying for Brand X really 60%? And if so, is 60% in fact "high" or "low" – as *many* as 60% repeat-buyers, or *only* 60% repeat-buyers? What does this depend on? Are the implications of 60% "good" or "bad" or "normal"? Is there additional erosion of a brand's repeat-buying franchise in time-periods further apart? And what are the underlying mechanics of brand-choice and repeat-buying generally? Are there generalisable norms of behaviour?

Some interpretative background of knowledge is clearly needed. Repeat-buying is any situation where a person buys the item in question more than once. It can be studied in different ways, but these must ultimately lead to the same insights and the same practical conclusions. The justification of the particular analytic approach taken in this book – which turns on the NBD/LSD theory – is that it works in practice in giving simple and interrelated results which hold under a wide range of conditions.

The main result is that repeat-buying of any item from any frequently-bought branded product-field tends, within certain broad limits, to follow a common pattern and can be dealt with by one single theory, irrespective of what the brand or product is and irrespective of what other brands its buyers may or may not have bought as well. This simple result is noteworthy, given the large variety of different conditions under which buyers make their purchasing decisions. It makes it possible to establish an empirically-based theory and to discern simple interpretative norms to assess whether any particular observation (e.g. the 60% incidence of repeat-buyers month-by-month) is *high* or *low*, or perhaps merely *normal*.

1.2. Consumer Behaviour

Consumer behaviour is complex. There are pre-purchase needs and attitudes, the experience of previous usage, and external influences such

as advertising and promotion, retail availability, personal selling and word-of-mouth effects, and differences in product-formulation, packaging and pricing. Decisions have to be made about whether and what to buy, how much and at what cost, and when and where. Then there are various usage or consumption activities and responses which generate post-usage feelings of satisfaction and changes in attitude. These various aspects of consumer behaviour are briefly touched on in Chapter 11 (§11.2), but in the bulk of this book we consider only buyer behaviour in the narrow sense of the buying act itself, and repeat-buying in particular.

Repeat-buying is one aspect of the way in which consumers buy fast-moving goods. These are the kinds of products which are bought fairly frequently, like the various lines of food and drink, of soap and toiletries, of cigarettes and petrol, and so on, which tend to be generally available from grocery and other retail outlets. In as far as the same person buys any particular item more than once within a relatively short time-period, such as a week, a month, or a year, the notion of *repeat-buying* becomes particularly relevant.

The factors involved in the buying situation are highly varied. The kinds of products dealt with here are typically sold in pre-packaged branded form, but they may be available in different types of packages, in different pack-sizes, in different varieties (e.g. flavours), at different levels of quality and price (e.g. grades of petrol) and under different manufacturers' brand-names. The items are generally low-priced (although a purchase of several gallons of petrol, say, may be relatively costly). Some products are bought more or less as necessities or staple commodities. (Most people tend to buy *some* bread, potatoes, meat, vegetables, soap, petrol – if they have a car – and so on). Others are bought more for variety with an element of luxury (different types of breakfast cereals, or the modern "convenience" foods, say). These various distinctions might affect the regularity with which the items were bought, i.e. their repeat-buying patterns.

Further variations in the buying situation are that some products like tinned vegetables have a long storage life and can be stocked up, others (like frozen vegetables) can be stored for a relatively short time only (other than in a deep-freeze), and some can only be bought and stored in limited amounts (like petrol). Some products are generally used up in one go once the package is opened (e.g. frozen or tinned vegetables), others tend to be used in small amounts but may have a relatively short storage life once opened (e.g. breakfast cereals or butter) or quite a long one (e.g. toilet soap or toothpaste).

For some products the different brands available are virtually indistinguishable apart from their brand-names and possibly their packaging (e.g. petrol, or some brands of washing powder or of cigarettes), in others the "brands" are clearly different (e.g. breakfast cereals) or there are different "varieties" of the same brand (e.g. different flavours), while in yet other cases there may be two or more distinct *types* of product competing directly (soups in cans and soups in foil packets).

Some products have a single end-use and others have a variety of different end-uses (e.g. butter is used for cooking, frying, baking, and to put on bread). Some end-uses can be satisfied by only one product (e.g. petrol), while others are open to a variety of products (e.g. eggs and bacon and/or cereals for breakfast, or neither).

Shopping habits for different products and retail availability also greatly vary. Some may be bought nearly every day as demand requires (break, milk, or cigarettes), some are mainly bought at most once a week, often as part of a general weekly purchase trip for household needs. Some are always kept in stock in the household and some are only bought again some time after the initial purchase has run out.

Grocery outlets usually sell several different brands of the same product (including possibly the retailer's own "private label" version), but may not stock the particular brand required. In contrast, a given brand of petrol is usually only available from a solus-site outlet but is then always "in stock". The extent of retail availability is often correlated with total sales or market-share, and here different brands differ widely, with the market-leader often having 30% or more of the market, whilst small brands may account for only 1% or less.

Promotional support (advertising, special offers,, etc.) tends to vary greatly by product and brand. It is usually much heavier for market-leaders than for smaller-selling brands, and differs also in type and content. Consumer attitudes to different products and brands may therefore also differ.

Individual consumers differ greatly in their consumption levels of particular products or brands, quite apart from obvious factors like household size. Some households consume several tins of soup per week every week, and many others only buy a few tins in a year. Some people mostly buy one single brand, pack-size, variety or whatever, while others switch around a great deal.

The buyer's role tends also to vary. Purchases made by the housewife, for example, may be made primarily for her own usage (e.g. laundry products), or for the family as a whole (many food products), or with individual family-member's tastes predominating (as perhaps

with types of breakfast cereals or toothpaste), or for someone else's usage altogether (as with pet-foods).

It is clear from this brief review that there are many different buying situations and a possibly almost bewildering set of choices and decisions which the buyer has to make. But in as far as the consumer is dealing with frequently-bought and low-priced items, the amount of risk involved in the individual purchasing transaction is low and there is ample opportunity to develop *habits,* to simplify the repetitive choice-situation.

Logically, when a buyer is choosing between different manufacturers' brands which are of more or less identical product-formulation, pricing and availability, it might appear equally "rational" either to buy the same brand as before or to buy a different. brand. Empirically, the finding is that most people tend to develop habits of buying one or some small number of brands, each fairly regularly.

A simplifying tendency towards brand-loyalty and repeat-buying appears to exist in practice. What its origins and causes are in psychological terms (e.g. "risk-reduction", "brand-image differentiation", "advertising", "segmentation", "learning", "cognitive dissonance", "reinforcement", etc.) is beyond the intended scope of this book, and is in any case still largely unclear*. First we need to understand rather precisely what it is that we would want to explain – i.e. *how* people buy, before we can succesfully consider *why*. A theory is needed at this stage which describes and interrelates, rather than one which aims to provide instant explanation.

The results reported here still do not say why consumers buy a particular product, or why they choose one brand rather than another. Instead, if in a given time-period a certain number of people buy a particular brand, the results show how they do this, and with what other facts this ties in. For example, the number of people who buy a particular brand at all in a given period is related to how *often* they buy it, to how many additional buyers of the brand there will be in some longer period, to how often these additional buyers will buy the brand, to what *other* brands any of these people also buy, and to how often they do so. And we note how these patterns are interrelated for different brands, for different product-fields, and for different lengths of time-period.

The unifying tendency towards some more or less "habitual" buying behaviour, instead of the variety of buying situations, is therefore what

* Reference to some leading accounts of the broader aspects of consumer behaviour is made in §11.2 of Chapter 11.

the work underlying the present book – and used in the illustrative examples – include the Television Consumer Audit (operated by Audits of Great Britain), and panels run by Attwood Statistics, Research Bureau, and Sales Research Services in the United Kingdom, and by the Chicago Tribune and the Market Research Corporation of America in the United States.

The crucial feature of consumer panel data is that it consists of the continuous purchasing records of the same people or households over extensive periods of time of up to one year or more. Table 1.1 gives a simple illustration of the variable nature of individual purchasing behaviour. It shows the purchases of two brands A and B made by four households over successive weeks. That is the form in which the raw data would be used for analysis – together usually with information about the type of shop visited, the price paid, any special offer involved, any special variation in the flavour or variety or packaging and so on, plus the actual day (rather than merely the week) of purchase.

Table 1.1. An Illustration of Purchasing of Two Brands A and B in Successive Weeks

	Purchases in Week:												
	1	2	3	4	5	6	7	8	9	10	11	12	etc.
1st household	–	–	–	–	A	–	A	A	A	B	–	A	.
2nd household	A	–	A	A	–	–	–	–	–	–	–	–	.
3rd household	–	B	–	–	–	–	–	B	A	–	–	–	.
4th household	–	–	–	–	–	–	–	–	–	–	–	–	.
etc.	.	.	.	.	.	.	.	.	.	.	.	.	.

Collapsing such daily or weekly records into 4-week "months" as in Table 1.2 simplifies the results for visual inspection here. Thus we see that the first household bought nothing in the first month, made three purchases of Brand A in the second month, and two purchases of Brand A and one of B in the third month. The second household made three purchases in the first month and nothing in the next two. And so on.

Table 1.2 still typifies the apparent irregularity of purchasing behaviour at the individual level. It illustrates two further features of such data:

Table 1.2. The Purchasing Data in Table 1.1 Aggregated in 4-Week Periods

	Number of Purchases in Month:				
	I	II	III	etc	Total
1st household	–	3A	2A, 1B	.	5A, 1B
2nd household	3A	–	–	.	3A
3rd household	1B	1B	1A	.	1A, 2B
4th household	–	–	–	.	–
etc.	.	.	.	.	.
Total	3A, 1B	3A, 1B	3A, 1B	.	9A, 3B

(i) There are large differences between different consumers in their average (or total) purchasing frequency in any given period of time (the first household made a total of 6 purchases in the three months covered, the next two households bought 3 times each, the fourth bought nothing).

(ii) Despite such variations, the *aggregate* levels of purchasing can be more or less steady or "stationary" from period to period. Thus there is no change from month to month, with a total of three purchases of Brand A and one of B each month.

Errors in the Data

In practice, not all panel-members return a completed diary in every single week and such informants have then to be excluded from most kinds of repeat-buying analyses. This is one of several possible sources of statistical error or bias in panel data. There is however evidence that co-operators and non-co-operators do not differ systematically in their purchasing behaviour (cf. § 6.4 in Chapter 6), and that increasing length of panel-membership does not produce any changes in purchasing cl-aims [e.g. Ehrenberg 1940; for related technical evidence on long-term panels in television audience measurement see Ehrenberg and Twyman 1966].

Errors of *measurement* also occur, such as incorrect recording or omission of information, or over-reporting [cf. Sudman 1964]. But these errors tend to be less than might be thought. Panel-members become experienced in keeping their records if they continue to co-operate, and it seems that the efficient and satisfying way of filling out a diary each week is to try and do so more or less correctly.

The aggregate data from consumer panels tend to be widely checked by users of the data for systematic bias against other information (e.g.

retail audits, factory shipments, and data from *ad hoc* sample surveys). When bias occurs, it generally affects the aggregate macro-totals (e.g. sales estimates or brand-shares) rather than the internal relationships between different aspects of buying at the micro-level [cf. Kosobud and Morgan 1964]. Errors and discrepancies can certainly occur, but the better-run consumer panels tend to give reasonably accurate representations of real-life purchasing patterns. The data are in fact amongst the most fully checked and reproducible that are available in the social sciences.

One is of course dealing with *reported* purchases, or *claims* to have bought something, and considerable care and vigilance is necessary, as with any massive data-handling exercise. But there is little need here to use the possible occurrence of measurement or statistical errors in the data to explain away *major* discrepancies in the repeat-buying results, as major discrepancies do not generally occur. Instead, since a great variety of purchasing data from many different sources tend to show the same regularities (as is discussed in this book), the role of error or bias in the data can be summarised as follows [Chatfield et al. 1966]:

> "If the purchasing claims more or less represent *actual* purchasing behaviour, we are discussing some empirical regualrities in sociology and marketing, but if they refer to *imaginary* purchases, then we are discussing regularities in psychology and as such they might be deemed the more remarkable."

Apart from data from panel operations which are fully continuous in the sense of aiming to measure all purchases made by a sample of informants over some extensive period of time, repeat-buying can also be studied with data from "dip-stick" surveys of the same informants made at intervals, or even with single interviews in which the informant is asked to recall his past purchasing behaviour over some specified period of time. The danger of measurement error with these techniques is usually much greater than with full-scale panels, but their flexibility and relative inexpensiveness will make them an increasingly important source of data as repeat-buying patterns become better understood. Some early examples are discussed in Chapters 5 and 6.

1.4. The **Choice of Analysis-Variables**

Two of the basic decisions the consumer may be thought to make are (i) whether or when to buy the given product-class at all, and (ii) if so,

what brand (or variety, etc.) to buy. It may therefore seem natural to analyse buyer behaviour likewise – first to analyse repeat-buying for the total product-class and then to follow on with the question of brand-choice – and this has been quite a common approach [for a recent discussion, see for example Massy et al. 1970].

An alternative approach, again a two-step one, is to consider first the purchasing of any particular brand on its own – the subject-matter of Parts I to IV of this book – and only then to start dealing with the question of brand-choice and the relation between buying the brand and the total product-class – where early results are outlined in Part V.

This approach of first looking to the individual brand and only later integrating results for different brands – rather than examining total product-class buying and then breaking it down by brand-choice – has not been taken for *a priori* or intuitive reasons, but because it has worked in the sense of giving the simple and generalisable results set out in this book. The basic empirical finding has been that one can successfully examine repeat-buying of one particular brand (or of one pack-size or variety, etc.) without having to take into account what other brands people may or may not be buying as well. It is by no means obvious that one should be able to do this usefully. The justification is in fact *empirical* – the facts have shown that it works. This is one of the most fundamental empirical discoveries treated here, and one whose explanation or *theoretical* justification (§ 11.4, Chapter 11) arose only quite recently, ten years afterwards.

Next we need to consider the choice of analysis unit. The most useful unit in which to work has been found to be neither the amount of money paid nor the weight or volume of units bought, but the "purchase occasion". In other words, we have to concentrate our attention on the frequency of purchase. This has turned out to be useful, again in the sense that it has led to a wide range of simple and coherent results. The initial work on repeat-buying was however all carried out in terms of the number of units bought, which related directly to sales volume. This worked well when dealing with a single pack-size of any particular brand. But aggregating different pack-sizes posed major problems, as did products where more than one unit was generally bought on a single shopping trip. These problems were partly dealt with by various "fudges" [e.g. Ehrenberg 1959], but largely by-passed altogether. Gradually there came the realisation that the number-of-units-bought formulation was really inappropriate and that a "purchase occasion" approach would work much better. In many product-fields, a single pack or other "unit" tends to be bought at each purchase, so that

the distinction between "units" and "purchase occasions" is trivial anyway. But the purchase occasion is more generally useful because it also allows multi-unit purchases (as in buying several tins of dog food or varying numbers of gallons of petrol) and the aggregation of different pack-sizes all to be dealt with by the same theory, and it also leads to simple results in dealing with multi-brand buying or brand-switching (see also § 11.4 in Chapter 11). Sales volumes can still be estimated, by multiplying (at the *end* of an analysis) the number of purchase occasions by the average number of units bought per purchase and by the weight or price per unit.

A third basic orientation in determining an analysis approach is to work in terms of distinct time-periods (such as 1-week, 4-week, or quarterly periods). An alternative is to follow each individual consumer's sequence of purchases, e.g. for the two brands A and B in Table 1.1, the sequence AAAABA, say, for the first household, AAA for the second household, and BBA for the third household, and so on. This purchase-sequence approach has been a very popular one to try out [Lawrence 1966, Sheth 1967, and Massy et al. 1970 have reviewed most of the work here].

One consumer's purchases however quickly get "out of phase" with the next consumers's purchases, and no generalisable results have in fact yet been reported. The justification for using fixed time-periods instead is two-fold, firstly that it has given a wide range of generalisable results and secondly that these are easy to tie in with other marketing data which are measured on a time-period basis (such as sales figures, promotional activity, retail availability, seasonalities, etc.) One particular simplification resulting from this time-period orientation is that most repeat-buying results for any given item (e.g. a brand, a pack-size, a variety, etc.) can be expressed in terms of just two main variables, namely:

Penetration: the proportion of people who buy an item *at all* in a given period, denoted by *b,*

Purchase Frequency: the average number of times these buyers buy the item in the period, denoted by w,

with w, the average frequency of purchase per buyer, itself being the most basic measure of repeat-buying in the theory*. Sales therefore equal the number of buyers times the average number of purchases per buyer times (as noted earlier) the average number of packs per purchase and the average price or size of the pack.

* The distribution of individual readings about this average is generally of the same form (the LSD – see Chapter 4) and hence this is a statistically good measure to use.

A major finding in the more general study of buyer behaviour (§ 10.2 of Chapter 10) about these two variables *b* and w is that the penetration of different brands can differ greatly one from the other, whilst their average purchase frequencies tend to be more or less the same. The two variables tend therefore to be relatively independent or uncorrelated. And this applies not only for *all* buyers of a brand, but also to a great many sub-groupings, both in the analysis of repeat-buying and in that of multi-brand buying (Part V). Many analysis problems can be tackled simply by considering the proportions of various relevant sub-groups who buy the item, ignoring (as it were) how often they buy — and this is possible just because the average frequency of purchase per buyer varies little from sub-group to sub-group. This is the kind of simplifying breakthrough which is crucial for *analysis* purposes and which at the same time is of direct *marketing* significance†.

A fourth and final basic orientation in developing an analysis approach is that the theoretical model-building work here generally relates to the "stationary" or "equilibrium" condition. This is defined as the situation where there is no short-term change in the aggregate sales or penetration level of the brand or item in question**. Such stability on the surface however covers highly variable and quite complex patterns of *individual* purchasing behaviour (as was illustrated by Table 1.1), and the focus of this book is on the analysis and suitable aggregation of these individual purchasing patterns.

"Stationarity" in the sense used here — absence of any marked short-term sales trend for the item in question — does not necessarily mean a lack of changing conditions in the market-place (or an absence of trends for other brands), but merely that the sum total of all the varying and dynamic marketing inputs — advertising, pricing, distribution, etc. — has had no overall effect on the sales of the item in question during the relevant time-period. In practice, the degree of stationarity in even the most stationary observed data is usually approximate rather than exact (e.g. a few percent up or down from one period to the next is typical). This should lead to discrepancies between the data and the theoretical models, but the stationary models to be discussed here tend in fact to give a good fit even in such situations where the stationarity is only approximate.

Doubts have often been expressed about the general restriction to the stationary or near-stationary situation. The question raised is

† If the average purchase frequency of different items does not vary greatly, this imposes a major constraint on marketing action.

** The term "stationary" is used here in the specific sense defined, and does not carry overtones from its uses in economics, etc.

whether there is much point in examining "stationary" conditions when good marketing is thought to mean trying to *change* the status quo anyway. However, to dismiss a theory as being purely "academic" because it deals with the stationary purchasing situation would be naive, for two distinct reasons.

Firstly, if one wants to create change, it is as well to understand the stationary no-trend situation from which one wants to depart. And to evaluate what change has been achieved, one must compare the results with what would have happened in the *absence* of change. Many applications of the theory to non-stationary situations have in fact been made and some examples will be given here (starting in §2.4 of Chapter 2).

Secondly, any examination of actual data for frequently-bought consumer goods will show that large trends or big variations in sales are the exception. The sales of most established brands or products are in fact approximately stationary most of the time.

The theory discussed here therefore does not account in direct terms for any dynamic effects of advertising, pricing etc. in changing the level of sales – it is not that sort of theory. But nobody yet knows much about the effects of such varying marketing inputs, and it would be premature to try and "model" what we do not know. Put in another way, the repeat-buying theory tells us more or less all about stationary buyer behaviour except for one thing, namely why one brand has more buyers than another. That is therefore where past and current marketing activities come in and further research is needed, as is discussed in Part VI.

1.5. Some Repeat-Buying Indices

As an introduction to repeat-buying behaviour as such, we now describe several aspects of repeat-buying in terms of a small illustrative example. Table 1.3 sets out the reported purchases of the standard pack-size of Lux by a sample of 983 housewives in a certain 12-week period*. There were 22 buyers of the standard size of Lux in this

* An impression of competitive anonymity is maintained in this case-history by suppressing the time and place, and the precise definition of a "standard" pack-size. "Lux" here is a brand of Soap Flakes, but it could also be liquid detergent, a toilet soap, or another product altogether* In any case, all the main companies who market the product in question obtained the data in Table 1.3 long ago; indeed, anybody could have had the information by suitably measuring a sample of 983 households. In general however, it is necessary in reporting the data to which we have had access to "code" the product-fields and brand-names fully.

sample in the 12-week period, of whom 17 made 1 purchase, 3 made 2 purchases, and 2 made 3 purchases, accounting for 17, 6 and 6 purchases respectively and totalling 29 purchases in all, as is shown in the first ("All buyers") section of the table.

Table 1.3. Buying of Standard Lux in a 12-Week Period

A Worked Example of various Repeat-Buying Indices for a Panel of 983 Households

Standard Size Lux in 12 Weeks		Number of Purchase Occasions in in the period 1 2 3 4+	Total	Average Purchases per Buyer
All Buyers in the given period	No. of Buyers: Total Purchases:	17 3 2 – 17 6 6 –	22 100% 29 100%	1.3
Those who HAD bought in the previous period	No. of Repeat-Buyers: Total Purchases:	6 2 1 – 6 4 3 -	9 41% 13 45%	1.4
Those who had NOT bought in the previous period	No. of "New" buyers: Total Purchases:	11 1 1 – 112 3 –	13 59% 16 55%	1.2

The table also shows how these purchases in the given 12-week period break down by whether or not the buyer had bought standard Lux in the preceding 12-week period. Thus the 17 households who made precisely one purchase in the given period are made up of 6 who *had* bought in the previous period and 11 who had *not* bought in the previous period. Similarly, of the 3 people who made two purchases in the given period, 2 were "repeat-buyers" and 1 was a "new" buyer ("new" only .in the limited sense of not having bought in the previous period). And so on.

† Multiplying these two measures 2.2% and 1.3 together gives the number of purchases (or sales) in the 12-week period as about 0.03 purchases *per informant*, or 3 purchases per 100 households in the sample.

Such buying behaviour of individual consumers can be summarised by various indices or statistical measures. For a single time-period, two measures are the penetration and the average frequency of buying. The penetration is the percentage of informants who made at least one purchase in the period, i.e. 22 out of the sample of 983 housewives in Table 1.3, or just over 2.2%. The average frequency of purchase per buyer is 29/22=1.3†.

Next, the "Totals" column shows that in terms of repeat-buying from the preceding time-period, 41% of the buyers in the period (9 out of 22) had bought the item in the preceding period, and that these repeat-buyers accounted for 45% of total sales in the given period. The last column shows that they had bought in the given period at an average rate per (repeat-) buyer of 1.4 purchases (i.e. 13/9). Similarly, 59% of all buyers in the 12 weeks were "new" buyers, and they accounted for 55% of all sales in the period, at an average rate of 1.2 purchases per "new" buyer.

Another simple index arises if we want to assess the relative importance of the lighter and heavier buyers in the given period. For example, we may ask what percentage of total purchases (or sales) are accounted for by consumers who made at least r purchases, where r may be any whole number greater than or equal to 1. The calculations are illustrated in Table 1.4 and show that households making at least 2 purchases of standard Lux (i.e. two or more) accounted for 41% of total sales (12/29) in the 12 weeks, and that those making 3 (or more) purchases accounted for 2 1%. It also follows that 59% of sales are taken up by once-only buyers in the period.

Table *1.4.* The Cumulative Number of Purchases by Housewives who made at least r Purchases (r = 1, 2, 3 etc.)

Standard Size Lux in 12 weeks	Number of Purchase Occasions in the Period				Total
	1	2	3	4+	
Cumulative Purchases:	29	12	6	–	29
Share of Total Purchases:	100%	41%	21%	–	100%

In the next chapter we start to examine patterns in such data. The question is whether there are in fact any common patterns for different brands, different products, and different lengths of time-periods.

1.6. Summary

Consumer goods are bought for a great variety of needs and under varying conditions. For frequently-bought goods, the act of repeat-buying is a central part of the consumer's response to the product.

Data on individual consumer's purchasing behaviour are mostly obtained from continuous "consumer panels". When well-run, these tend to be amongst the most fully checked and reliable data-sources that are available in the social sciences.

Such data allow one to tabulate repeat-buying results, (e.g. that 60% of the people who bought the item one month bought it again the next month, and how often they bought it then). The approach used is in fact to analyse the individual consumer's frequency of purchasing a given item in specific time-periods. The main model-building emphasis is on the ***stationary*** situation, where there is no change in the aggregated purchasing-levels of the brand from one time-period to the next. The way in which this leads to simple and generalisable results is discussed in the next chapter.

CHAPTER 2

REGULARITIES OF BEHAVIOUR

2.1. The Fundamental Finding

The fundamental finding in the study of buyer behaviour is that there are simple and highly generalisable patterns. This is by no means an obvious result, given the complexities of the buying situation, and it is illustrated by some examples in §2.2 of the present chapter and in more depth in Chapter 3.

Simple formulae have been developed which successfully summarise or "model" these observed regularities. Such formulae are introduced in cook-book fashion in § 2.3, the general theory from which they stem being given in outline in Chapter 4 and in more mathematical detail in Part IV of the book.

The theory applies to the "stationary" situation, defined as there having been no change in the sales-level of the item being analysed. This is the most usual situation for most brands in most markets. Any change in marketing inputs which may have occurred – e.g. a change in price, advertising, distribution, etc. – therefore did not have any ***net*** effect on the sales of the item and does not enter into the analysis. This stationary theory can however also be used to interpret ***non-stationary*** situations. An example of such an application is given in §2.4, further practical applications of the theory being described in Chapters 5 and 6 in Part III.

2.2. Regular Patterns

In \$1.5 of Chapter 1 we described several indices of repeat-buying for a particular product. Examination of similar data for a wide range of cases has shown that such indices tend to follow regular patterns which are the same for different brands and products and different marketing conditions *.

To illustrate the nature of these generalisations and the range of conditions under which they tend to hold, a varied assortment of 20

* It is primarily by starting from such empirical regularities that the work described here differs from other attempts at building models of buyer behaviour (as are briefly reviewed in Chapter 11).

case-histories is set out in Table 2.1. The cases cover various food and non-food products at different points in time from 195 1 to 1963, from various parts of the U.K. or the U.S., and for different length time-periods ranging from one week to half a year (as is shown in the third column from the right). Penetration levels varied from 1% to 50% of the sample buying the brand in question at least once in the analysis-period, and sales-levels varied from 3 purchases to as many as 200 purchases per 100 informants. In all cases sales had been more or less stationary from the preceding period.

The first case in the table – Soap Flakes, Brand A – is in fact that of the standard pack-size of "Lux" in the 12-week period which was already discussed in § 1.5 *. The table here shows that just over 2% of the sample bought standard Lux at an, average rate of 1.3 purchases each in the 12 weeks, and since buying was "stationary", about 2% of the sample (but not necessarily the same buyers) had also bought standard Lux in the preceding 12-week period, again at an average rate of about 1.3 purchases each.

There is nothing special about the selection of the 20 cases in the table. Many thousands of similar cases have been analysed in more recent years (see for example Chapters 3, 5 and 6) and the major manufacturers of non-durable and semi-durable consumer goods in Western Europe and the United States have spent something like fifty million pounds in the last ten or twenty years on collecting consumer purchasing information and therefore have the same kind of data available on almost innumerable similar cases,

Three of the indices of buyer behaviour which were described in § 1.5 of Chapter 1 are now set out in the central section of Table 2.1, namely:

Sales Accounted for by Repeat-Buyers: The percentage of total sales in the analysis-period accounted for by those buyers who also bought the item in the preceding period (e.g. 45% in the 12 weeks for Soap Flakes Brand A in the first line),

Sales Accounted for by Heavier Buyers: The percentage of total sales accounted for by buyers making at least r purchases in the period, for selected values of r *(e.g. 4 1%* and 2 1% for $r = 2$ and 3 in the first line).

The Average Purchasing Rate per "New" Buyer: The average number of purchases made in the time-period by "new" buyers, i.e. those who had *not* bought the item in the preceding period (e.g. 1.2 in the first line).

Certain patterns can now be seen-by visual inspection of the table. This inspection has been facilitated by arranging the 20 cases according

* The fifth case in Table 2.1 is also standard Lux, but for a *24-week* period.

Table 2.1. The **Percentage of Total Sales accounted for by Repeat-Buyers from the Preceding Period and by Consumers making *r* Purchases in the given Period, and Other Statistics**

(Approximately stationary sales over two equal time-periods: twenty variable-histories)

Product	Brand	Place & Year	Average Number of Purchases per Buyer: *w*	Percentage of Sales accounted for: by repeat-buyers	by buyers of at least *r* purchases, for *r* = 2	3	4	6	8	12	16	20	Average Number of Purchases per "new" buyer	Buyers (as % of sample)	Sales: Purchases per 100 Informants	Analysis-Period (in weeks)	Buying of other brands	Marketing activities
Soap Flakes	A	Midl. '65	1.3	45	41	21							**1.2**	2	3	12		
Clothing	B	U.K. '65	1.4	55	54	17	8	3					1.5	45	63	1		
Flour	C	U.S. '51	**1.8**	65	67	41	41	13					1.6	**21**	36	**13**		
Detergent	D	Lancs. '63	1.8	69	**72**	39	25						1.3	8	14	**4**	N	N
Soap Flakes	A	Midl. '65	1.9	*	67	53	29	16					*	**4**	8	24	0	0
Detergent	E	Lancs. '63	2.2	83	81	59	40	(6)					1.3	21	45	4	T	T
Soap Flakes	G	Midl. '65	2.6	82	78	70	58	38	**19**				1.3	4	10	12		
Drink	G	U.K. '55		76	**81**	68	55	39	29	19	2		1.6	**15**	38	13		
Detergent	H	Lancs. '63	2.9	84	88	80	54	(27)	(27)				1.6	14	40	4	S	S
Fuel	I	U.K. '66	3.1	85	89	78	63	(36)	(21)	(6)	(4)		1.8	27	85	4	P	P
Drink	G	U.K. '53	3.3	*	8	7	7	6	6	5	4	9	3	7	2	2	14	**11**	*	19	63	26	E	E
Detergent	D	Lancs. '63	3.3	78	88	74	67	48	38	**(18)**			1.7	**13**	43	12	C	C
Soap Flakes	F	Midl. '65	3.8	*	**88**	82	74	56	46	32	**17**		*	5	19	24	**I**	**I**
Soap Flakes	J	U.S. '51	3.9	89	90	82	67	62	46	33			1.5	**16**	65	13	F	F
Margarine	K	U.S. '51	3.9	87	**91**	84	72	72	53	33	33	15	1.8	26	100	13	I	**I**
soup	L	U.K. '58	4.7	*	94	87	82	71	63	50	38	30	*	14	66	26	E	E
Detergent	D	Lancs. '63	4.7	93	94	89	84	67	55	**(20)**	**(3)**		1.6	30	140	12	D	**D****
Fuel	I	U.K. '66	4.8	*	94	88	84	69	58	(32)	**(15)**	(8)	*	46	221	8		
Detergent	H	Lancs. '63	6.2	94	**96**	93	90	86	**75**	47	(26)	(26)	1.7	**18**	108	**12**		
Detergent	H	Lancs. '63	10.1	*	98	95	93	91	87	77	64	49	*	22	219	24		

* No information on previous period

** No net effect on sales **level**, i.e. stationary.

to the size of the average rate of buying per buyer (the first column of figures), this being generally denoted by w. Such inspection of the table leads to six main regularities:

(i) Repeat-buyers account for a percentage of sales which increases more or less steadily from 45% to 94% as we go down the table. It therefore increases with increasing values of w: the higher the average frequency of purchases per buyer, the higher the percentage in question. (The relationship is non-linear, and its quantitative form will be described later.)

(ii) The percentage of sales accounted for by buyers making at least 2 purchases in the time-period ($r = 2$) also increases steadily, as we go down the table, from 41% to 98%. It is therefore also directly related to *w*.

(iii) Each pair of percentages just discussed, i.e. the percentage of sales accounted for by buyers of at least 2 purchases and that accounted for by repeat-buyers (the two columns of ***bold*** figures), are numerically almost identical, to within an average of 3%, i.e. 45% and 41%, 55% and 54%, 65% and 67%, and so on. This is therefore another very simple regularity in the data*.

(iv) The percentage of sales accounted for by those buyers who made at least 3 purchases in the analysis period also tends to increase with the increasing value of w, i.e. 21, 17 (a slight inversion), 41, 39, 53, 59, 70, and so on. Similar relationships with w occur for the percentages of sales accounted for by still heavier buyers, e.g. those making at least 4 purchases, and so on.

(v) For relatively high values of r — ones equal or greater than the number of weeks in the analysis-period — a departure from the pattern in (iv) sometimes occurs. The observed values in question are shown in brackets and are always *lower* than expected. For example, for the $r = 6$ column, we have the usual pattern of increasing numbers, broken by the bracketed exceptions, i.e. 3, 13, 16, (6), 38, 39, (27), (36), 49, etc. There are therefore *two* empirical patterns, each regular in its own way.

* The near-equality of these two percentages would be trivial if virtually all people who made at least 2 purchases in a given time-period were also repeat-buyers from the previous period (and if none of the once-only buyers in the period had bought the item in the previous one). This however is not so, as was illustrated by the real-life case-history of standard Lux in Table 1.3: of the five people who had made at least 2 purchases of Lux in the 12-week period in question, 2 had ***not*** bought it in the previous period. (It would have been a very striking regularity if virtually all buyers making more than one purchase in each single period were also repeat-buyers from period to period. But of course this is not so. Only the total numbers of purchases made by these two groups tend to be equal.)

(vi) Turning to the "new" buyers in the analysis-period, we note that the average number of purchases per "new" buyer in Table 2.1 is roughly 1.5 units, within about ± 0.2 on average. Thisvariation is small both in absolute terms and compared with the variation in the average purchase frequency w by *all* buyers (which varies from about 1.3 to 10). The average purchase frequency for "new" buyers in Table 2.1 is in fact virtually unrelated either to w, or to the proportion of informants who bought (i.e. the penetration), or to the length of analysis-period, or to any other specific characteristic of the brand or product-field. In other words, this particular buying rate appears to be more or less constant, a very simple result.

2.3. Repeat-Buying Theory

The natural question raised by the patterns illustrated in Table 2.1 is why they occur. For example, what factors lead to the percentage of sales accounted for by repeat-buyers being 45% in the case of Brand A Soap Flakes (the first line in Table 2.1), and 94% for Brand H Detergents (the last-line-but-one)? Do Soap Flakes generally have fewer repeat-buyers than powdered Detergents, or is there some specific difference between Brands A and H as such, between the two regions of the U.K. involved (the Midlands and Lancashire), or between the two lengths of analysis-period (12 weeks and 24 weeks), or is the difference due to some marketing variable (such as heavier advertising leading either to higher loyalty or to more brand-switching)?

It might be thought that the incidence of repeat-buying will in fact depend on a large variety of factors, such as:

> current or past marketing activities (such as advertising, consumer promotions, distribution, pricing, etc.), the nature of the brand and the product-field in question, the brand's sales level or share of the market, the brand's penetration level, the average rate of buying per buyer, the length of the time-period analysed, the purchasing pattern for competitive brands, the general degree of brand-switching in the product-class, consumer attitudes toward the brand, usage habits, and indeed specific factors such as the particular time and country or region to which the data refer.

Table 2.1 however illustrated not only that regular patterns of stationary purchasing behaviour exist, but also that the variation in the values in question can largely be explained by, or predicted from, one

single measure, the average rate w of buying per buyer. This was made self-evident to the eye by the layout of the table: all the repeat-buying indices tended to increase in reading down the figures in any one column, just as did w. And this pattern was not some coincidence for the particular selection of data in the table, but has also generally been found in many thousands of other cases.

It follows that the other factors mentioned above — the brand or product as such, the length of the analysis-period, and so on — have little or no apparent bearing on the results. This is not a consequence of any theoretical considerations or hypothetical assumptions, but a sheer matter of empirical observation and analysis, as is illustrated by Table 2.1. No mathematical analysis has so far been needed — these patterns simply exist, and they can be observed as such. The importance of this finding lies in the wide range of different conditions under which this has been established empirically (as is discussed further in Part II).

To describe the quantitative detail of these relationships it is necessary to model each regularity in some convenient mathematical form. Here we therefore set out some simple formulae in "cook-book" fashion, because all that needs to be noted at this stage is the way in which quite simple formulae do what is required. The formulae all derive from a particular version of the general repeat-buying theory which involves only w, the average frequency of buying per buyer*.

Table 2.2. Values of the LSD Parameter q for Selected Values of the Average Purchase Frequency w

w	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
q	.oo	.17	.30	.40	.47	.53	.58	.62	.66	.69
w	2.0	2.2	2.4	2.6	2.8	3.0	4.0	5.0	6.0	8.0
q	.72	.76	.79	.81	.83	.85	.90	.93	.95	.96

To apply this theory we have to start with one relatively complex step, namely the need to calculate a new quantity q. This is directly related to w, the average frequency of purchase per buyer. Table 2.2

* This is the Logarithmic Series Distribution (or LSD) model which is discussed in §4.4 and Chapter 8. It is a simpler version of the more general Negative Binomial Distribution (or **NBD**) theory which is discussed in §4.2 and Chapter 7, and in which the proportion of buyers of the item also enters into the calculations.

gives the numerical value of q for a selection of values of w. Thus for w = 1.3 (as observed for Brand A in the first line of Table 2.1), q is about .40*.

Given the value of q corresponding to each observed w, there are then six theoretical formulae corresponding to the six empirical results (i) to (vi) whichwere noted for Table 2.1 in §2.2. The background to these formulae is discussed in later chapters as already mentioned, but the formulae themselves are very simple:

(i) Firstly, a formula for the proportion of total sales accounted for by repeat-buyers. This is simply

$$q,$$

(or 1 00q in percentage terms). Thus for an item like Brand A in Table 2.1 with w = 1.3 and hence q = .4, repeat-buyers from the previous period should theoretically account for .4 (or 40%) of total sales in the current period. This may be compared with the observed value of 45%. In general, these theoretical estimates fit the observed values for the proportion of sales accounted for by repeat-buyers in Table 2.1 to within an average of 3 percentage points**.

(ii) Next, the proportion of sales accounted for by buyers who made at least two purchases in the given time-period. The theoretical estimate for this is also

$$q.$$

The fit for the observed figures in Table 2.1 — the r = 2 column — is to within an average of 2 percentage points.

(iii) These two formulae both take the value q and therefore say that the percentage of sales accounted for by repeat-buyers should in theory

*The quantity q is the single parameter of the LSD model. The relationship between w and q is $w = -q/(1-q)\ln(1-q)$, where "ln" stands for the "Napierian" or "natural" logarithm to base e (a table of natural logarithms is given in Appendix B). The equation gives w in terms of q, but it cannot be written the other way round. In other words, it is algebraically impossible to express the unknown quantity q directly in terms of the known quantity w. Hence we give a table such as Table 2.2 from which q can be read off. For routine use, a more extensive table of this kind is set out in Appendix B, or q can be calculated by iteration. For w greater than 2, it is also possible to use the approximate formula $q \doteq (w-1.4)/(w-1.15)$: this holds to within ± 0.01, which is accurate enough for many practical purposes.

** Some of the differences may be statistically significant (even though the sample sizes in the table are often fairly small). But as in most of the work in this book, the important point here is not so much whether any of the discrepancies are real (or merely sampling errors), but that the same theoretical formula accounts for much of the greater part of the observed variation, and that the remaining deviations are relatively small and more or less unbiased. Some sampling error formulae are discussed in § 6.4.

equal that accounted for by "more-than-once" buyers. This was found to be so for the observed data in Table 2.1 to within an average of 3 percentage points (as already noted as item (iii) in §2.2).

(iv) The theoretical formula for the proportion of sales accounted for by buyers who make at least r purchases in the period is

$$q^{r-1}.$$

This is a more general result corresponding to the expression q in (ii), i.e. q^{r-1} with $r = 2$. This formula holds for all the observed values given in Table 2.1, to within an average of 3 percentage points (other than for the values in brackets).

(v) The bracketed values in Table 2.1 are exceptions to the pattern in item (iv). Comparison with the theoretical formula q^{r-1} shows that these bracketed values are all lower than q^{r-1}, as already noted empirically in §2.2, so that the theoretical values serve to show up this particular sub-pattern as being itself systematic*.

(vi) Finally we have the theoretical expression for the average frequency of purchase per "new" buyer. The theoretical formula for this is $q/\ln(1+q)$. The numerical value of this expression varies very little for different values of q when w is greater than about 2, so that the "new" buyers' theoretical average frequency of purchase may in fact be taken as

1.4,

a virtual constant. This agrees with the observed values in Table 2.1 to within an average of about .2.

The significance of these theoretical formulae is three-fold. First and foremost, they succesfully describe the observed results to a close degree of approximation (as can readily be checked in detail by using the value of q given in Table 2.2 for the observed value of w of each item in Table 2.1). Second, the formulae are very simple, in that they all turn on one single statistic q, which is itself uniquely determined by w, the observed average frequency of purchase among all buyers. Third, they are not merely "best-fitting" isolated formulae for various sets of data, but are all inter-related. This is clear from their common formulation in terms of the quantity q, and is made explicit in the LSD theory from which the formulae stem.

* This is the so-called "shelving" or "variance discrepancy" phenomenon which is discussed in § 7.8; it is of relatively little practical importance at this stage, although it has basic theoretical implications.

Many additional aspects of repeat-buying under stationary conditions can also be succesfully deduced from the LSD theory and from the more general NBD theory. Examples are formulae for the number of repeat-buyers, for their average frequency of purchase, for the number of "new" buyers (whose average purchase frequency $q/\ln(1+q)$ has already been given in (vi) above), and so on. These additional results and their theoretical background will be developed in Chapters 4, 7 and 8, together with certain simplifying approximations. Here we now turn to illustrate a practical application.

2.4. A Practical Application: A Seasonal Trend for Brand M

We now illustrate the use of the repeat-buying theory in a simple case-history which turns on evaluating a *non-stationary* situation, namely a change in the sales level of a certain Brand M. The sales increase in question was due to a recurrent seasonal trend, i.e. it was due to natural causes.

The problem was not to establish whether or not there had been a sales increase – that was clear from the aggregate data. Thus Table 2.3 shows how the purchasing level of Brand M had increased during the peak-season quarter to 48 purchases per 100 households from a level of 36 purchases in the preceding off-season quarter. The latter is the "stationary norm" for the aggregate sales in the peak quarter, i.e. what the sales would then have been if there had in fact been no increase.

Table 2.3. The Seasonal Trend in the Aggregate Level of Purchasing Brand M

Peak-Season Quarter	Observed	Stationary Norm*	Difference
Purchases (per 100 households)	48	36	12

* As in off-peak quarter.

The problem was therefore to understand the *nature of* the increase. Were the extra peak-season sales due to there being more repeat-buyers, to their buying more, to there being more "new" buyers, to *their* buying more, or to some combination of these various possibilities?

Table 2.4 gives two breakdowns of the observed data (based on a sample of about 2000 households). Firstly, it shows that the peak-season sales of 48 purchases per 100 households were made up of 16%

of the sample buying on average 3 times each in the quarter, whereas the 36 purchases per 100 households in the off-season quarter came from 12% of the sample buying on average 3 times each. The sales increase was therefore due to an increase in the number of households buying the brand, and not due to any change in the average rate of buying. That is one finding.

Secondly, the peak-season buyers are classified in the table as either "repeat-buyers" or "new" buyers, according to whether or not they had also bought Brand M in the preceding (off-season) quarter. The table shows that there was an equal division into 8% of the sample being repeat-buyers (who on average made 4 purchases each) and 8% "new" buyers (who on average made 2 purchases each). The total sales of 48 purchases per 100 households were therefore made up of 32 purchases by repeat-buyers and 16 purchases by "new" buyers.

This latter tabulation however does not show whether the sales increase of 12 purchases per 100 households from the previous period came more from abnormally high repeat-buying or more from an abnormally high influx of new buyers. To answer this, we need to know how many repeat-buyers and how many "new" buyers there would have been (and how often each group would have bought) if there had been no seasonal trend. In other words, we have to compare the observed repeat-buying behaviour with the pattern to be expected if there had been *no* trend, i.e. with the theoretical norm of *stationary* repeat-buying behaviour.

Now the findings which have been illustrated in § 3 (and which are elaborated in Parts II and IV) are that stationary repeat-buying should depend only on the observed buying behaviour in the *preceding* period. Thus given the average rate of buying of w = 3 purchases per buyer observed in the off-peak quarter (see Table 2.4), the no-trend NBD/LSD estimate is that about two-thirds of all the buyers of Brand M in that quarter would have been repeat-buyers (i.e. 8% of the total sample), and that they would on average have bought 4 times each in the quarter*. This is shown in Table 2.5 and agrees exactly with the observed results for repeat-buyers. The seasonal sales trend therefore did not affect the repeat-buying of previous off-peak buyers, either in the *number* who were repeat-buyers or in their average *rate* of buying. If there had been no sales increase or no "season", repeat-buyers would have accounted for about 32 purchases per 100 households in the peak-season (8% times 4 purchases), just as was observed when the trend did actually occur.

* The actual calculations here were based on the NBD version of the theory.

Table 2.4. Observed Purchasing in the Peak-Season **Quarter** broken down into Repeat-Buyers and "New" Buyers

Peak-Season Quarter	Observed	Stationary Norm*	Difference
All Buyers	16% of the sample buying at av. rate of 3 purchases = 48	12% of the sample buying at av. rate of 3 purchases = 36	12
Repeat-Buyers HAD bought in previous quarter	*8%* of the sample buying at av. rate of 4 purchases = 32	?	?
"New" *Buyers* had NOT bought in previous quarter	8% of the sample buying at av. rate of 2 purchases = 16	?	?

* As in off-peak quarter.

Table 2.5. Observed Repeat-Buying Compared with Stationary NBD Norms

(All observed and theoretical figures rounded to the nearest whole number for expository simplicity)

Peak-Season Quarter	Observed	Stationary Norm *	Difference
All Buyers	*16%* buying at av. rate of 3 purchases = 48	12% buying at av. rate of 3 purchases = 36	12
Repeat-Buyers HAD bought in previous quarter	*8%* buying at av. rate of 4 purchases = 32	8% buying at av. rate of 4 purchases = 32	0
"New" *Buyers* had NOT bought in previous quarter	*8%* buying at av. rate of 2 purchases = 16	4% buying at av. rate of 1 purchase = 4	12

* Predicted from off-peak quarter.

The seasonal increase of 12 purchases per 100 households was therefore all due to "new" buyers. The observed incidence was that 8% of the sample were "new" buyers, making an average of 2 purchases each and accounting for an aggregate sales level of 16 purchases per 100 households. This compares with the theoretical no-trend incidence of

4% new buyers making about 1 purchase each (the theoretical norm of 1.4 rounded to the nearest whole figure), and thus accounting for about 4 purchases per 100 households. The difference between the observed and theoretical sales figures of 16 and 4 therefore pinpoints the observed sales increase of 12 purchases.

It follows that the market for Brand M was segmented into two kinds of buyers. There were all-the-year-round buyers whose repeat-buying from the off-peak to the peak-season was in no way affected by the seasonal trend, and peak-season-only buyers – the *extra* 4% "new" buyers – who did not buy in the off-season, and who bought at an above-normal rate of almost 3 purchases each*.

2.5. **Summary**

The nature of repeat-buying could vary with a lot of different factors. It might be different for market-leaders than for smaller-selling brands, it might depend on the number and the popularity of *other* brands or pack-sizes or varieties available, it might vary with the nature of the product (its usage patterns, retail distribution, etc.) or with the weight and nature of promotion (advertising, consumer deals, etc.). However, it is found empirically that under stationary no-trend conditions, none of these factors matter explicity. Instead, various indices of repeat-buying follow regular patterns which generalise across a wide range of brands, products, time-periods and other conditions. The numerical values in question all vary primarily with the average frequency of purchase per buyer, w.

It follows that theoretical formulae to "model" these regularities must all be interrelated. This is illustrated in §2.3 by some simple formulae from the repeat-buying theory which is described in more detail in Parts II and IV.

This is a theory of *stationary* repeat-buying but it can also be used to interpret *non-stationary* situations. An example is given in §2.4, where a seasonal sales increase is found to be due to extra buyers coming into the market during the peak-season, the all-the-year-round buyers being quite unaffected by the seasonal uplift.

* Half the observed new buyers in Tables 2.4 and 2.5 are *normal* new buyers, i.e. all-the-year-round buyers who would buy relatively infrequently, on average about 1.4 times each in any quarter in which they buy at all. The additional peak-season-only new buyers had therefore to be more heavy buyers – buying on average three times each – so as to bring the *overall* average frequency of purchase to the value of 2 actually observed.