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CHAPTER 6

CAUSES OF CHANGE IN CONSUMER SHOE BUYING

In our culture, almost anything can influence what, when, and how much people buy. This hypothesis has the unhappy attribute of being too general to use and too complicated to test. The problem, therefore, is to develop a more specific one.

Though all sorts of factors seem capable of shifting the kinds and amounts of shoes that people buy, some influences are certainly far stronger than others. If they could be isolated, they would account for the major outlines of change in aggregate shoe buying from one time to another. In this context, a "strong" factor is one capable of causing substantial changes in aggregate shoe buying by virtue, first, of the strength of its influence on individual shoe buying and second, of the extent of its variation over time. By examining such evidence as can be mustered and by testing, revising, testing again, we select the strong factors. Thus the final specific hypothesis is produced from the empirical evidence.

The search for and test of the specific hypothesis are long and painstaking. Much of the process involves negative conclusions; much of it remains inconclusive. This chapter does not trace the full course of the search.[1] Instead, we concentrate on those factors that were shown to influence the history of shoe buying substantially during the period studied—1926 to 1941. During this period (and the closest observations are further confined to 1929 to 1941), the income that people had to spend appeared to be the overpowering determinant of spending on even the single commodity group, shoes—though in addition shoes lost ground over the years to the wealth of other goods and services offered for sale. From sources other than time series, however, there was evidence that many other factors have the capacity to influence shoe buying—the direction in which income has recently changed; the distribution of income between rich and poor and between farm and city families; the change in the size and constitution of the population; and prices. Nevertheless, the history of buying over the period seemed quite well explained without explicitly taking these factors into account. The same is true of factors which logic, though little evidence, suggests may be important—expectations about future income and the presence in consumers' closets of shoes that still retained their usefulness.

But though a surprising proportion of all shoe buying can be explained by the current level of income after adjustment for a downward trend, much of the sensitive month-to-month or quarter-to-quarter change remains unexplained. Also, postwar changes in buying are not well explained by the same relationship to income that explained prewar buying. This suggests that the importance of income for the period studied may have resulted from the extraordinarily powerful changes that characterized consumers' income between 1929 and 1941. For this period, the other variables often paralleled consumer income or followed straight-line trends, and their more delicate contours were partly absorbed by, and partly lost in, income's rugged shapes. At other times this may not be the case. Consequently, anyone who wants to apply the findings of this study to other problems—the isolation of factors underlying the buying of other goods or of shoes at other times—should not confine himself to the summaries concerning the influence of each variable that are given in this chapter, but should examine the evidence as it is developed and described in the technical paper.

Influence of Aggregate Income

What people buy of all goods or of any major good is significantly influenced by the amount of money they have to spend. Evidence of this appears in all sorts of statistical data. The powerful influence of income may be seen in the shoe buying of families having different incomes: the higher family income, the more money spent on shoes. The famous 1935–1936 consumer purchases study provided information on the items of clothing bought by about 150 thousand individuals.[2] Analysis indicates that if, for each income class, the average family income is plotted on

[1] See Ruth P. Mack, *Factors Influencing Consumption: An Experimental Analysis of Shoe Buying*, National Bureau of Economic Research, Technical Paper 10, 1954.

[2] The study was a Work Projects Administration project conducted by the Bureau of Home Economics and the Bureau of Labor Statistics under the joint supervision of these agencies and the National Resources Committee. The data cited in the

one axis and shoe expenditure on the other, both on logarithmic scales, a rise on the income scale of 1 per cent was, at the point of average income, associated with a rise of shoe expenditure of 0.75 per cent. We may call this the average interfamily income elasticity of shoe expenditure, though it is at best only a rough approximation of even the concept, let alone the true figure.[3] Further, it applies only to families having incomes in the lower and central ranges; for higher-income families, elasticity seemed substantially less—nearer 0.50.

Though it is not directly relevant to our problem, one is curious to know how the interfamily income elasticity of shoe buying compares with that of other consumer goods. Table 21 answers the question in a rough and tentative fashion. The figures given there are derived in the same way and from the same source material (the 1935–1936 survey of income and expenditure) as the statistics for shoe expenditure. Because the table constitutes a digression, I present it without comment. There is much in it to ponder.

TABLE 21

Interfamily Income Elasticity of Selected Categories of Expenditures, 1935–1936
(*per cent*)

	Income Elasticity [a]
Major category:	
Saving	2.60 [b]
Education	1.55
Auto and expense	1.30
Household operation	1.30
Recreation	1.27
Clothing	1.00
Furnishings and equipment	0.97 [b]
Reading	0.88
Personal care	0.85
Medical care	0.85
Housing	0.78
Tobacco	0.70
Food	0.52
Fuel and light	0.48
Clothing subdivision:	
Coats	1.28
Dresses	1.23
Underwear	1.04
Suits and trousers	1.04
Hats	1.00
Shirts	0.92
Hose	0.82
Footwear	0.75

[a] Income elasticity is the percentage shift in expenditure associated with a 1 per cent shift in family income. The measures are based on Tables 1, 7, 9, 11, and 101 in *Family Expenditures in the United States, Statistical Tables and Appendixes, 1935–36* (National Resources Planning Board, 1941). The elasticity coefficients are the slopes of straight lines fitted by inspection to the regression of family expenditure of specified sorts on family income, both plotted on a logarithmic scale.

[b] Elasticity seems characteristically to decrease as income shifts upward, so that the figure given here does not apply to most of the income range but only applies in the neighborhood of its center.

INCOME AND SHOE BUYING IN CURRENT DOLLARS

The influence of income on shoe expenditure likewise seems visible in monthly time series. In Chart 9, shoe sales and disposable consumer income are shown, and their movements may be compared from 1929 through 1941. We start in 1929 because it is only then that monthly income payments became available; we end in 1941 to avoid the disruptions that occurred during the war period.

The chart pictures a slight downward trend in shoe sales relative to income (the space between the two lines grows smaller as time proceeds), a fact to which we return later. The major business-cycle fluctuations (the drop after the peak in 1929, the rise from 1933 to 1937, the short but marked drop in the latter half of 1937 and beginning of 1938, and the rise thereafter) appear clearly both in consumer income and in the dollars spent on shoes.

The minor fluctuations apparent in shoe buying appear also in aggregate income payments. If all the income from soldiers' bonus payments is included the moment when the bonds were redeemed (the dotted lines on the chart), both consumers' income and shoe buying have small fluctuations at the same times, except for the recession in 1939 when income payments merely flatten. Further, they typically reach peaks and troughs at very nearly the same time with no systematic lead or lag. Seven of the thirteen matched turns occur in the same month. The average deviation from the mean of 0.4 month by which shoe sales, on the average, lead income payments is ±1.0 month. Of the 144 months from the beginning of 1929 to the end of 1940, there are only 22 (15 per cent) when shoes sales and income are not in matching specific-subcycle phases, either because of a difference in the month when peak and trough occurred or because, in one case, of a missing phase in one of the series—income.[4] There appears to be no systematic difference in timing.

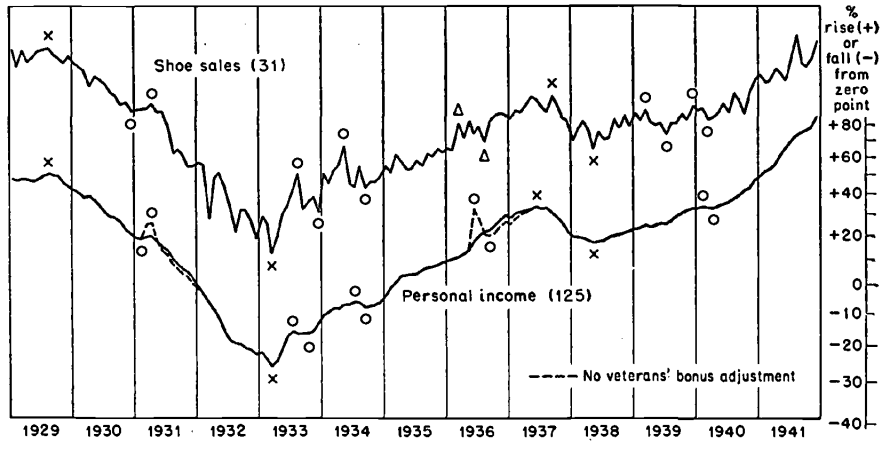
text, obtained during personal interviews, are based on tables in *Family Expenditures in the United States—Statistical Tables and Appendixes, 1935–36* (National Resources Planning Board, 1941).

[3] Actually, many factors are correlated with family income—family size, wealth, living standards, and even the recent direction of change in income; all these influences are inextricably amalgamated in the data. The figure of 0.75 per cent is thus not a pure interfamily *income* elasticity.

[4] In 26, or 18 per cent, of the 144 months, the subcycle phases for either shoe sales or income moved in the opposite direction from the major cycle phase. These episodes were short—four or five months. Though all but one of the six episodes were

CHART 9

Shoe Sales and Personal Income Payments, Current Dollars, 1929–1941



Specific-cycle turns are marked by ×, specific-subcycle turns by O, and retardations by △.

The parallelism in shoe buying and personal income can be studied further in Chart 10, where monthly first differences in each are depicted smoothed by a centered five-month average. The chart also shows the unsmoothed monthly data for income payments; because of the far broader base and the diversity of components for the income series, these probably afford the more appropriate comparison for smoothed shoe sales. Except for some confusion in the neighborhood of the two bonus payments, rates of change in shoe buying seem to respond with considerable sensitivity to rates of change in consumer income. Change in income leads sales by 0.4 month, on the average, with an average deviation of 1.4 months for the fifteen matched turns. Nineteen per cent of the months, a very low figure for first difference series, are in unlike subcyclical phase.

Study of these charts raises a question: though shoe sales and income have, by and large, the same minor movements at roughly the same time, the minor movements of shoe sales seem to have a somewhat larger amplitude, relative to the major swings, than have those of income payments. To study this matter, first the specific amplitude of all subcycles was computed and then the amplitude of movements associated with the four major turns (plus the two incomplete terminal expansion phases) that took place between 1929 and 1941.[5] For shoe sales, the major movements contributed 79 per cent of the total fluctuation of major and minor ones in sequence. For income payments, with the soldiers' bonuses of March 1931 and June 1936 distributed over the next nine months, the corresponding figure was 98 per cent. This means that the minor movements that interrupt the major swings were, for income payments, primarily flattened areas or slanted banks, as the chart suggests.

But the contrast in the two percentage figures, 79 and 98, certainly overstates the relative importance of major and minor movements in consumer buying of shoes compared with those of income receipts. The difficulty rests in technical characteristics of the time series. Virtually of necessity, the shoe-sales series has a large erratic component not possessed to anything like the same degree by a complex aggregate like income payments.[6] The amplitude measures fasten on absolute highs and lows regardless of what caused them. Erratic components at peaks and troughs influence the amplitude of subcycles more than that of major movements, if only because more subcycles are included. But insofar as the amplitude measures for shoe sales are influenced by technical factors not present in the income data—the whimsies of small samples, the diffi-

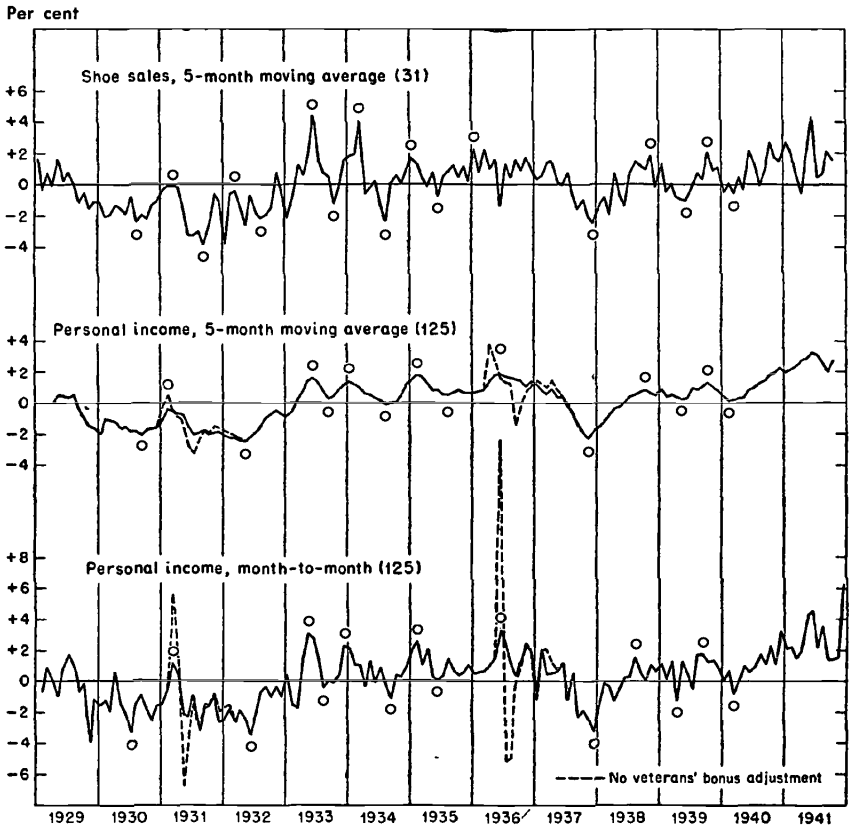
marked for income as well as shoe sales, they were typically shorter in the former series. For income payments, 12 months were in contracycle subcyclical phase, and during all but 3 of these, shoe sales were in like phase. For shoe sales, 24 months were in contracycle subcyclical phase, and during 15 of these, income payments (largely because of the shorter movements) were in opposite subcyclical phase.

[5] For a description of how specific-cycle amplitudes are computed, see Appendix A, sec. 16.

[6] Income payments are the sum of an enormous number of diverse series, which lose much of whatever erratic character they may have in the process of summation. Further, something in the order of 15 per cent of total income payments were, at least for the earlier years for which they were computed, obtained by arithmetic interpolation of annual data.

CHART 10

Monthly First Differences in Shoe Sales and in Personal Income Payments, 1929–1941



Specific-subcycle turns are marked by O.
The series are expressed as percentages of monthly shoe sales (31) or income payments (125), averaged for 1929–1941. The moving averages are of month-to-month change and are centered.

culty of adjusting properly for very heavy seasonal patterns, the influence of weather and special promotions, to mention a few—it would be desirable to reduce the erratic component of shoe sales. To this end, the data were smoothed mechanically by applying a five-month moving average.[7] The major movements are found to constitute 87 per cent of total subcyclical amplitude for the moving average of sales and 95 per cent for the month-to-month personal income payments.

This means that even after an attempt to make the erratic components of the two series more comparable, income payments seem to bear a different relation to major movements in shoe sales than to minor ones. The extent of the difference (if one ignores differences in timing) can be roughly indicated by dividing the per month amplitude for shoe sales (already expressed as a percentage of the average standing of the series) by that of income payments. For all subcycles it is 1.19/1.23, or 0.97; for major specific cycles (those associated with reference cycles) it is 1.05/1.17, or 0.90; for only the four countercycle subcyclical phases it is 0.71/0.38, or 1.87. In other words, shoe sales vary a little less than proportionately to income during major movements and almost twice as much during the minor movements that interrupt the major business swings. Differences of this order are likely to be meaningful. Furthermore, examination of the estimates of shoe sales reported in the appendix to the technical paper indicates that there is no reason to believe that they overplay the minor fluctuations in actual shoe sales relative to the major ones. This indication that fluctuations in aggregate shoe buying are not entirely explained by a uniform relation to changes in

[7] In calculating amplitude measures, peak and trough standings are simply single peak and trough months in the five-month average for shoe sales and single peak and trough months in the monthly data on income payments.

aggregate consumer income spurs the search for other factors that might explain the differences.

INCOME AND SHOE BUYING ADJUSTED FOR PRICE CHANGE

Theoretically, consumer income in current dollars may be converted to real income by adjusting for the change in the quantity of consumer goods that the dollar can buy; similarly, shoe sales may be adjusted for the change in price of a group of identical shoes. Actually, there are all sorts of practical problems involved in both deflations, so that practice and theory may differ substantially. Nevertheless, the operations were performed as well as might be, and the two series (income deflated by the cost of living and shoe sales in standardized pairs) may be compared in the same fashion as has just been done for the data in current dollars. In general, virtually everything that has been said about the cyclical and subcyclical parallelism between income and shoe buying applies to the series in constant prices also.

Actual pair sales (shoe sales deflated by a price series that purports to show the average price paid by consumers for all shoes bought each month) show the same major and minor movements that appear in the data in current dollars or in standardized pairs. However, the major downward swing in the early thirties and the upward sweep thereafter are greatly muted. When income falls—and this was particularly marked during the severe depression of the early thirties—consumers tend to shift to cheaper grades of shoes. Conversely, when income rises, they tend to trade up—to buy better shoes. This tendency to trade up or trade down means that rising or falling income affects not only the proportion that will be spent on shoes but what sorts of shoes will be bought. There is, in other words, a quantity-quality dimension of choice as well as an allocation-of-dollar-income dimension. This phenomenon can be seen in a very interesting way in family budget surveys.

From the 1935–1936 survey one can obtain information about the number of pairs of shoes bought in a year and the average price paid per pair by husbands and wives, and the two together, in families classified by income level. The data appear in Chart 11. They were obtained by consolidating information published separately for twelve different areas.[8]

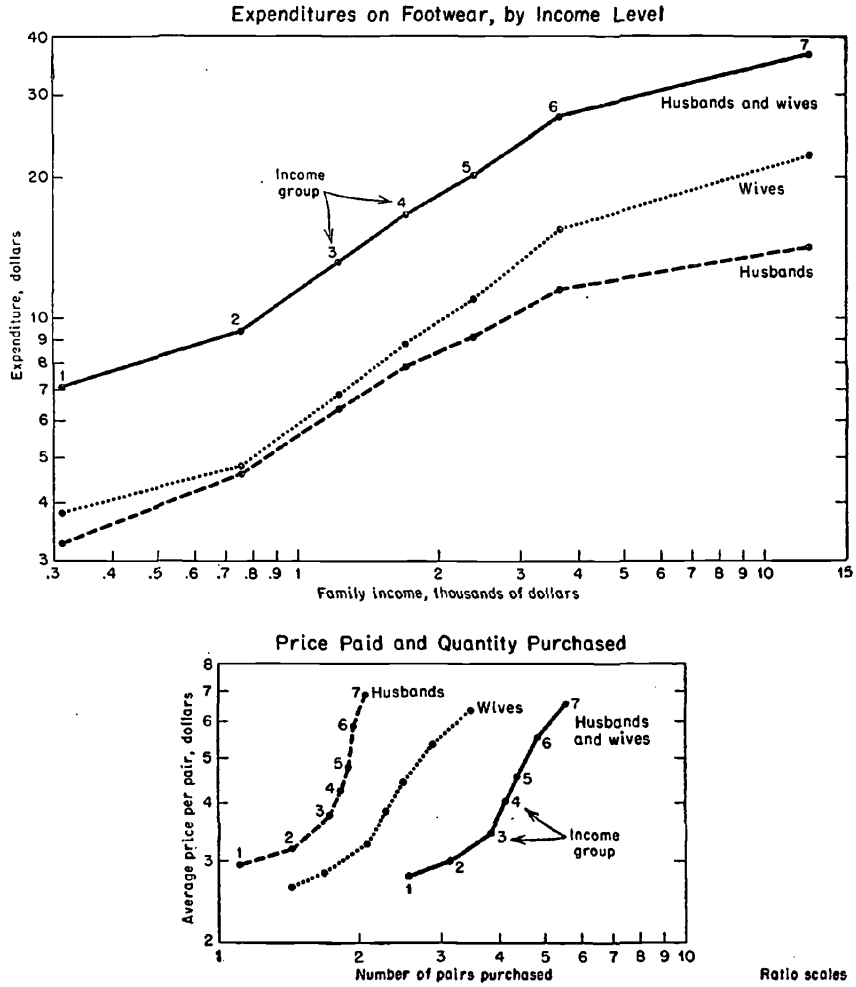
[8] The figures are simple averages for eight urban and four rural nonfarm areas for which detailed information on clothing purchases was obtained in the 1935–1936 study. For the eight urban areas, data are in *Study of Consumer Purchases, Family Expenditures in Selected Cities, 1935–36* (Vol. III, *Clothing and Personal Care*, Bureau of Labor Statistics, Bull. 648, 1941, Table 5, pp. 256 ff.). For the four rural nonfarm areas, data are in *Consumer Purchases Study, Family Expenditures for Clothing, Five Regions* (M. Y. Pennell *et al.*, Dept. of Agriculture, Misc. Pub. 422, 1941, Table 36, pp. 274 ff.).

The upper section shows the total expenditure on shoes by husbands, wives, and the two together, by family income level. The numerals designate the successive income classes for which data are averaged; for example, class 2, having an average income (reading on the horizontal axis) of $758, includes families with incomes between $500 and $1,000. The lower section shows how shifts both in the price paid per shoe (vertical axis) and in the number of shoes bought (horizontal axis) contribute to the changes, income level by income level, in total shoe buying. Each observation that is plotted represents information for one of the seven income groups. They can be identified on the upper section by their numbers. As the line moves up and to the right, it indicates that a higher price per pair was paid and more pairs were bought as income shifted upward. Ignoring the two open-end income classes—1 and 7—the number of pairs bought by husband and wife together increased from three to just under five, and the average price paid from about $3.00 to $5.50 as family income shifted from $500 to $5,000, although virtually all of the price shift occurred after the $1,500 level.

Several differences between husbands' and wives' buying are brought out in the chart. These are interesting since they probably bear on the general question of the impact of style on spending. In the upper section, we find that wives' expenditures both are higher and have greater interfamily income elasticity than those of husbands (the line is steeper). In the lower section we see that the additional options afforded above the $1,000 family income level (groups 3–7) take the form for husbands primarily of buying higher-priced shoes; for women, the drive to buy more pairs of shoes continues to persist along with the wish for better pairs. It is this desire to buy perhaps blue shoes, red shoes, and brown shoes, evening shoes, day shoes, and sport shoes that accounts for the higher absolute level and income sensitivity of wives' shoe buying and, perhaps, also for the lower average price paid by wives at each income level. These data suggest that were consumer income to be higher in one year than in another and were reactions to an *alteration* in income broadly to follow interfamily quantity-price characteristics, the average price that individuals would pay for shoes would also be higher in the second year. This higher price would, on the average, be paid even had there been no change in the price of a shoe of identical quality and no change in tastes or industry offerings.

CHART 11

Expenditure on Footwear, Price Paid, and Quantity Purchased by Husbands and Wives at Seven Income Levels, 1935–1936



Source: See note 8 in the text.

Regression Analysis

We have learned in no uncertain terms that shoe buying fluctuates over the years in response to fluctuations in the amount of money received by individuals. The extent of the response is a question to which multivariate analysis of time series might be expected to give an answer. But before the method can be profitably applied, it is important to learn what variables other than income should be taken into account. This knowledge is not easy to come by. The effort to acquire it is described in the technical paper. Though some of the variables studied were included in preliminary regression equations, none of them appeared to have significant identifiable influences in the actual history of shoe buying, 1929–1941 with the exception of price and trend. Consumers may spend less money on shoes the more expensive shoes are judged to be relative to other things that can be bought. To approximate this factor roughly, the retail-shoe price index was divided by the cost of living. It was found that consumers spent less money for shoes in the late thirties than they did in the early twenties in spite of an increase in real income, so that the presence of a time trend is indicated.

These two factors—relative price and trend together with aggregate consumer disposable income, were introduced into a multiple correlation analysis in which they were the independent variables and shoe sales the dependent one. This method yielded in effect a system of weights for combining these various influences in such a fashion as to reproduce actual shoe

sales, 1929–1941, as nearly as possible. However, the computation was confined in certain ways: a straight-line formula was used, so that a change of one unit in any of the explanatory factors must always account for a uniform amount of change in shoe sales; [9] also a least-squares requirement was imposed; finally, the model was incomplete—it was necessary to ignore changes in supply and its possible influence on shoe sales as well as the influence of purchases of commodities other than shoes. Table 22 indicates the computations and summarizes their results. Obviously, the measurements are at best very rough approximations that apply only to the period for which there is reason to suppose that structural relationships remained

[9] There seems little indication that some other formula would be preferable for the period covered, and this one is the simplest to apply. It would nevertheless have been desirable to test other sorts of relationships, particularly for the income variable, but this was not done.

TABLE 22

Information Concerning Estimates of Shoe Sales Yielded by Multiple Correlation Analysis, 1929–1941

	ANNUAL SALES, IN DOLLARS [a]				MONTHLY SALES, AT ANNUAL RATES, AGGREGATE, IN BILLIONS OF CURRENT DOLLARS:		
	PER CAPITA:			AGGREGATE, IN BILLS:	SMOOTHED [b]		
	DEFLATED	CURRENT	CURRENT	CURRENT	*Two variables*	SMOOTHED [b]	UNSMOOTHED [b]
	Two Variables		*Three Variables*			*Three Variables*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Average value of shoe sales [c]	$10.00	$10.12	$10.12	$1.24	$1.243	$1.243	$1.243
Coefficient of multiple correlation	.9936	.9952	.9987	.9985	.9924	.9946	.9791
Standard error of estimate, percentage of average sales	1.13%	1.72%	0.91%	0.93%	2.1%	1.8%	3.5%
Regression coefficients: [d]							
Disposable income [e]	+.01529	+.01689	+.01661	+.01648	+.01677	+.01658	+.01643
Relative shoe prices [f]			+.06110	+.00741		+.00497	+.00564
Time, per year, origin in 1935 [g]	−.18943	−.11774	−.18041	−.02099	−.01279	−.01780	−.01915
Constant	+$2.08	+$1.04	−$4.76	−$0.57	+$0.14	−$0.34	−$0.39
Elasticity coefficients at average value of a series: [h]							
Disposable income	+0.792%	+0.897%	+0.882%	+0.877%	+0.890%	+0.880%	+0.873%
Relative shoe prices			+0.589%	+0.581%		+0.400%	+0.443%
Time, per year, origin in 1935	−1.89%	−1.16%	−1.78%	−1.69%	−1.03%	−1.43%	−1.54%
Reliability of regression coefficients, number of times they exceed their standard error of estimate:							
Disposable income	30.6	35.2	63.9	61.0	99.8	115.2	56.6
Relative shoe prices			5.2	4.9		7.9	4.6
Time, per year, origin in 1935	18.8	8.9	12.9	11.9	22.0	22.1	12.1
β-coefficients: [i]							
Disposable income	+1.200	+1.014	+.997	+.865	+1.043	+1.031	+1.014
Relative shoe prices			+.161	+.136		+.114	+.128
Time, per year, origin in 1935	−.730	−.255	−.390	−.317	−.226	−.314	−.336

[a] Summations of monthly data (series 31 in Appendix B). Per capita figures are for individuals over two years old. Deflation is effected by the index of the retail price of staple shoes (series 8) put on a base of average prices in 1935–1939.

[b] Monthly data (series 31) smoothed by a five-month moving average; "unsmoothed" is, simply, monthly data (series 31).

[c] Average value of shoe sales is in the units given in the column headings.

[d] Regression coefficients are in units which when multiplied by the series to which they apply (see notes e, f, and g below) yield products that, together, sum to shoe sales in the units given in the column headings.

[e] Income is in units analogous to those given for shoe sales in the column headings—annual figures (columns 1–4) or monthly figures at annual rates (columns 5–7), aggregate (columns 4–7) or per individual over two years of age (columns 1–3), current dollars (columns 2–7) or deflated by the cost of living on a 1935–1939 base (column 1). The basic data are the personal income series of the Department of Commerce (July 1947 revision) converted by the National Bureau of Economic Research to civilian disposable income (with the soldiers' bonuses of March 1931 and June 1936 distributed over the next nine months; series 126).

[f] Retail price of staple shoes (series 8) divided by the Bureau of Labor Statistics index of living costs for the urban worker (1935–1939 = 100; series 124).

[g] Annual data; one unit per year, cumulating with negative signs before, and positive signs after, 1935; monthly data: one-twelfth the increments, origin in January 1935.

[h] At average values for all variables, the coefficients give the percentage change in the dependent variable associated with a 1 per cent change in each independent variable.

[i] β-coefficients give the proportion of the standard deviation of shoe sales that is "explained" by the standard deviation times the regression coefficient of each independent variable; thus:

$$\beta_{12\cdot34} = b_{12\cdot34}\frac{\sigma_2}{\sigma_1}, \quad \beta_{13\cdot24} = b_{13\cdot24}\frac{\sigma_3}{\sigma_1}, \text{ etc.}$$

stable; this would certainly exclude the volcanic eruptions of the war period and thereafter.

Before the time-consuming monthly analyses were undertaken, experiments were tried with annual data (columns 1–4). In two of the calculations using monthly data, shoe sales were smoothed by a five-month moving average; but one set of computations was done for the monthly figures themselves (column 7). The smoothing was predicated on a lack of confidence in the seasonal correction and on the knowledge that many factors, such as weather or catchy styles, could cause monthly ups and downs, with compensating downs and ups in neighboring months, and would in any event not be explained by the same factors that accounted for sales for a season—the influences that the analysis might hope to measure.

All the measures of explanatory power and reliability are very high. Even for the unsmoothed monthly data, the multiple correlation coefficient is .98, whereas for the others it is over .99.[10] As the standard errors in the third line of Table 22 show, very respectable guesses could have been made about the value of shoe sales for 1929 to 1941 had disposable personal income, relative shoe price, and the equation relating them been known.

Table 23 supplements the average measures with semester-by-semester estimates. They are quite satisfactory; they average within 1.2 per cent of the actual figure for each six-month period. Moreover, *change* from semester to semester is estimated within 30 per cent, on the average, of the correct figure. Not only are the signs correct in all but three of the twenty-five cases, but if the amount of change for actual and estimated sales is ranked, the two sets of figures have rank correlation coefficients of .96.[11] The monthly estimates also reproduce the pattern of shoe sales with fidelity. This can be seen at a glance in Chart 12, which is a graphic presentation of the equation for column 6 of Table 22. Not only the major but most of the minor movements appear in the estimated series. Turns occur very close indeed to those of actual shoe sales with virtually no systematic lead or lag.

Although it is interesting and useful to achieve an adequate reproduction of shoe sales for a given period —perhaps primarily useful for the dignity with which it endows our construct of shoe sales itself—the chief contribution is the analytic value of the calculation. Chart 12 displays graphically the statement of the correlation analysis on the contribution of each of the variables. This knowledge may be profitably combined

[10] The reliability measures for the multiple correlation and for parameters are useful for comparisons within each class of computation; they need to be taken with more than a grain of salt in view of the questionable applicability of many of the theoretical propositions on which they are based. The serial association of sequential observations in most time series is disturbing here as elsewhere; in the smoothed data, such correlation is artificially imposed and the reliability measures are therefore certainly too high. Examination of the residuals for autocorrelation, using the mean-square successive-difference test, shows no reason to reject the hypothesis that those for the annual or individual month calculations are uncorrelated, though, as I have said, I hesitate to base much reliance on tests of these data based on probability theory. Of course, when we introduce serial correlation in the dependent variable by a moving average, the error term is likely to show autocorrelation, and this the tests show to be the case.

[11] For annual data, the signs are correct in all cases and the ranks virtually identical. Change averages 8 per cent of the correct figure. For sales proper, there is as much as a 1 per cent error in only three years.

TABLE 23

Actual and Estimated Shoe Sales and Their Change, by Six-Month Periods, 1929–1941
(*dollars in millions*)

	SHOE SALES			CHANGE IN SHOE SALES BETWEEN SEMESTERS				
			Error of Estimate	*Actual*		*Estimated*		*Error of Estimate*
SEMESTER	*Actual* [a] (1)	*Estimated* [b] (2)	(1) − (2) (3)	*Change* (4)	*Rank* (5)	*Change* (6)	*Rank* (7)	(4) − (6) (8)
1929 1st	$802.8	$803.2	−$0.4					
2nd	807.0	800.5	+6.5	+$4.2	12	−$2.7	10	+$6.9
1930 1st	751.8	747.7	+4.1	−55.2	4	−52.8	5	−2.4
2nd	686.0	682.6	+3.4	−65.8	3	−65.1	3	−0.7
1931 1st	659.7	646.2	+13.5	−26.3	7	−36.4	7	+10.1
2nd	562.7	587.2	−24.5	−97.0	1	−59.0	4	−38.0
1932 1st	508.4	509.9	−1.5	−54.3	5	−77.3	1	+23.0
2nd	438.7	443.7	−5.0	−69.7	2	−66.2	2	−3.5
1933 1st	431.4	429.6	+1.8	−7.3	10	−14.1	8	+6.8
2nd	477.5	480.5	−3.0	+46.1	22	+50.9	23	−4.8
1934 1st	527.3	516.7	+10.6	+49.8	23	+36.2	21	+13.6
2nd	507.5	517.5	−10.0	−19.8	8	+0.8	11	−20.6

(continued on next page)

TABLE 23 (continued)
(*dollars in millions*)

SEMESTER	SHOE SALES			CHANGE IN SHOE SALES BETWEEN SEMESTERS				
				Actual		Estimated		
	Actual [a] (1)	*Estimated* [b] (2)	*Error of Estimate* (1) − (2) (3)	*Change* (4)	*Rank* (5)	*Change* (6)	*Rank* (7)	*Error of Estimate* (4) − (6) (8)
1935 1st	535.3	542.6	−7.3	+27.8	17	+25.1	18	+2.7
2nd	553.2	561.8	−8.6	+17.9	14	+19.2	14	−1.3
1936 1st	596.8	582.9	+13.9	+43.6	21	+21.1	17	+22.5
2nd	627.3	632.3	−5.0	+30.5	18	+49.4	22	−18.9
1937 1st	663.3	658.5	+4.8	+36.0	20	+26.2	19	+9.8
2nd	654.9	650.2	+4.7	−8.4	9	−8.3	9	−0.1
1938 1st	601.4	599.6	+1.8	−53.5	6	−50.6	6	−2.9
2nd	614.2	600.7	+13.5	+12.8	13	+1.1	12	+11.7
1939 1st	633.5	621.4	+12.1	+19.3	16	+20.7	16	−1.4
2nd	630.9	641.3	−10.4	−2.6	11	+19.9	15	−22.5
1940 1st	649.1	654.5	−5.4	+18.2	15	+13.2	13	+5.0
2nd	681.7	683.3	−1.6	+32.6	19	+28.8	20	+3.8
1941 1st	738.5	741.3	−2.8	+56.8	24	+58.0	24	−1.2
2nd	804.6	827.5	−22.9	+66.1	25	+86.2	25	−20.1
Average, ignoring signs	$621.0		$7.7	$36.9				$10.2
Average error as per cent of average actual value			1.2%					27.6%
Correlation coefficient for ranks in columns 5 and 7							.96	

[a] Series 31 in Appendix B.
[b] Estimated by income, time, and price (see Table 22, column 6).

with information about the three variables—as well as about others—gleaned from area surveys and other sources.

Quantitative Impact of Income on Shoe Buying

The primary determinant of what people spend on shoes is the money they have to spend. Perhaps the best way to appreciate the importance of the income parameter for the period 1929 to 1941 is to see in Chart 12 and in Table 22 its contribution to the explanation of shoe sales.

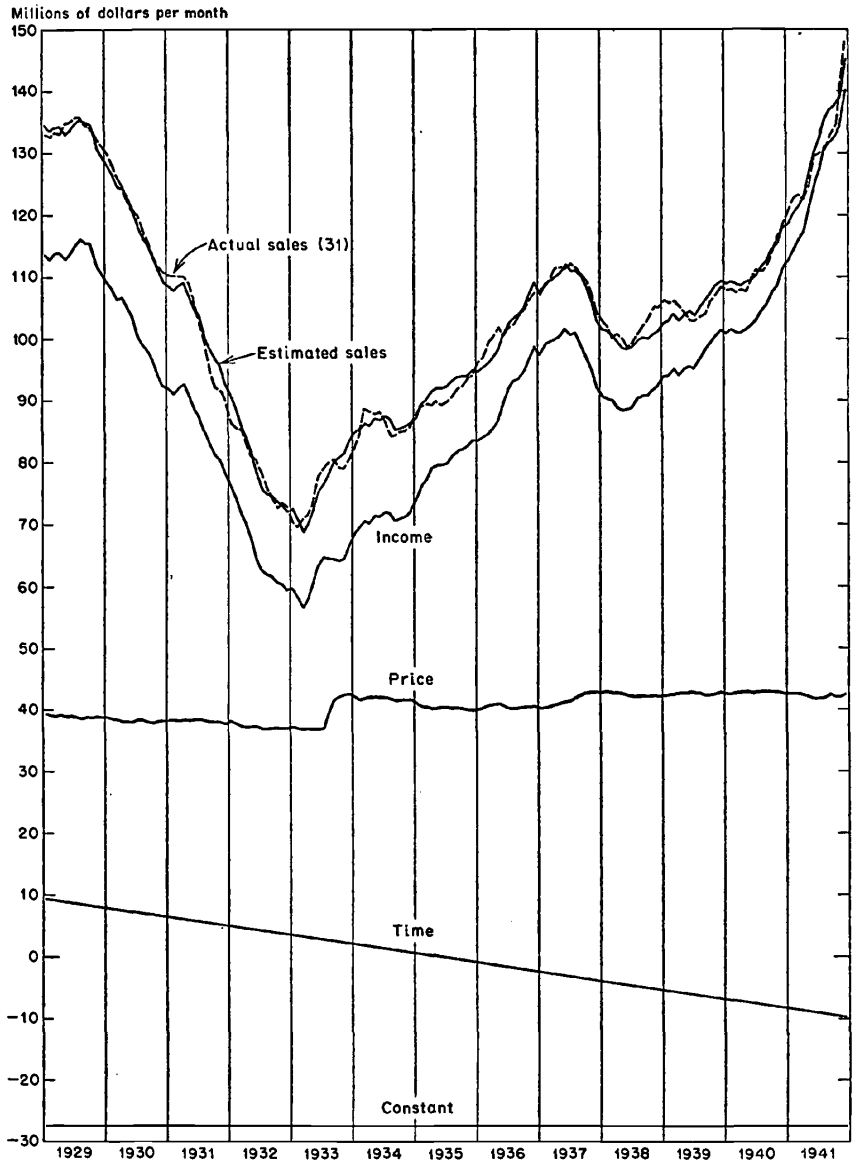
When consumers got more income, they spent a certain proportion of the increment on shoes—around 1.6 or 1.7 per cent for the period studied; a reduction in income caused a comparable decline in the buying of even this single commodity. An alternative way of describing the relation—and we really do not know which is the more accurate—is that a 1 per cent change in income was associated with a change of 0.8 or 0.9 per cent in shoe buying.[12]

[12] As calculated, this figure applies only at average values for shoe sales and income. We did not experiment with other formulae, so there is no way of being sure that the uniform incremental relationship is really the most stable one. The income elasticity of shoe buying for, say, column 5 of Table 22 is 0.89 at the average value as shown for the elasticity coefficient for income; were it computed, by means of our regression equation, for December 1941 when income was at its peak and shoe sales at the figure for that month, it would have been 0.97; the corresponding figure at the lowest value, in March 1933, was 0.84. Had a logarithmic equation been used, elasticity would have been constant throughout.

Income elasticity based on time series may be compared very gingerly with an estimate based on area surveys. An interfamily income elasticity of shoe buying of 0.75 at average family income was suggested by the 1935–1936 income and expenditure study. Obviously, this figure could be at best highly approximate. But even if trustworthy, correspondence with the statistic on elasticity derived from time series would not constitute a simple verification of either, for the two figures are not directly comparable. We know that the size of a family is correlated with income in budget studies and strongly suspect that percentage expenditure on shoes increases with the number of feet requiring them. Thus the pure interfamily income elasticity is probably lower than the net 0.75 that the budget data show, assuming the figure is the result of accurate reports on shoe buying by a representative sample. But it may well not be. The survey data on shoe buying are obtained by itemizing and

CHART 12

Contribution of Each of Three Variables to the Estimation of Shoe Sales, 1929–1941



Source: Table 22, col. 6 and Appendix B.

summing the purchases that each individual made. The probability of forgetting items must increase with the scale of living and the complexity of family structure. If this is the case, the true interfamily income elasticity may be higher than 0.75.[13] The elasticity figure based on time series, though not subject to the same shortcomings, is subject to others. Adjustment for some of the factors absorbed in the income param-

[13] One cannot put this proposition to a test, but for whatever it is worth I calculate that an estimate of aggregate shoe buying for 1935 to 1936 built up from the area surveys gives a lower figure ($938 million) than that based on these time series ($1,156 million). This could of course also mean not that the interfamily income regression was too flat but merely that underreporting was found throughout the range. The estimate of $938 million was made in this way: The proportion of clothing expenditure composed of footwear was calculated for families at the seven income levels for which data are published in *Family Expenditures in the United States* (Table 9, p. 4). These ratios were then applied to the aggregate expenditure on clothing of families *and* single individuals, income level by income level, as published in *Consumer Expenditures in the United States* (National Resources Committee, 1939, Table 31A, p. 89). Expenditures on shoes by institutional residents were added; they were estimated by applying the clothing-shoe expenditure ratio for low income families to data from Table 12 (*ibid.*, p. 63).

eter, such as income distribution and expectations, might lower the figure; adjustment for others, consumers' stock for example, might raise it. Close comparison, then, between the estimates of income elasticity of shoe buying based on cross section studies and on time series must be resisted, both because neither are sufficiently accurate measures of those factors which they reflect, and because they do not reflect all of the same factors. At least this much may be said: comparison of the two elasticity figures does not actually indicate inconsistency in the pure income-elasticity measurement after allowances are made for bias that may well be present.

Comparing the income elasticity based on regression analysis with the crude computations in which measures of subcyclical amplitude were used, the upper figure from the equations and the elasticity estimate for major (not minor) waves are both about 0.9.[14]

The reduction in shoe buying when income falls has two components—a reduction in the number of pairs bought and shifts from higher- to lower-priced pairs. When income rises, the opposite two changes occur. Alternate trading down and trading up seems especially characteristic of women's shoe buying. Retailers report this phenomenon, and evidence of it appears in both time series and area surveys.

As between expansions and contractions, no material difference appeared in the marginal propensity to consume shoes. Such factors as might bring this about—for example, the negative association of shoe buying with the direction of change in income and the positive association with income distribution and expectations—tend to counteract one another for this commodity. The average (as contrasted with the marginal or incremental) relation between income and shoe buying does seem to have a cyclical pattern: it is somewhat higher in bad than in good years, that is, the proportion of income spent on shoes tends to decline as income rises.[15]

Long-Term Trends

The second most important factor in explaining variation in shoe sales, 1929–1941, is time, as the *beta* (β) coefficients in Table 22 indicate. Shoe sales have been subject to a marked downward trend amounting to around 1.5 per cent per year, other things separately accounted for.[16]

This omnibus figure includes all sorts of influences each of which impelled in one direction over time, though not each in the same direction; they did not, of course, necessarily bear a stable relationship to one another or even actually follow the straight-line principle implied by the equation. The sorts of factors involved were discussed in the previous chapter. The more important contributors to the downward trend were probably the ever-increasing assortment of goods and services offered to consumers, increasing urbanization, and an aging population; only partly counteracting this influence was the upward impact of the improved product offered by the industry, the added emphasis on style, the trend toward a more even distribution of income that set in around the end of the twenties, and the ever-increasing number of feet to be shod.

Of the many factors that contribute to the net change over time, very little of a quantitative nature can be said. Area surveys suggest that shoe buying is more strongly influenced by the size of the population than most buying, other things (including income) the same. The regression equations suggest this too. They seem to indicate that per capita figures overcompensate and aggregate figures undercompensate for the influence of the number of people in the country.[17] The per capita statistics appear to provide a slightly more comprehensive explanation of aggregate shoe buying and thus suggest that per capita relationships may be more stable than aggregate relationships including a trend factor. Certainly when change in population does not follow substantially a straight-line trend, as when data for the twenties and thirties are combined or when the postwar period is included, changes in population ought to be taken into account

[14] See page 63 and Table 22. It is reasonable that the regression coefficients should reflect the association during the strong movements.

[15] This can be seen by simply contrasting the average ratio of sales to income for the peak years of 1929, 1937, and 1941 with that for the trough years of 1932, 1933, and 1938. They are 1.81 and 1.95 respectively for dollar, and 1.86 and 2.04 for deflated, figures.

It could also be deduced from the equation. When the constant and the minimum value of the price ratio (not its change, which operates in effect as a constant in the equation) are jointly considered, the Y-intercept is positive in all years even after the downward trend is allowed for. The incidence of the other factors is not systematic with respect to major peaks and troughs.

[16] The size of this figure is associated with the price variable for, as we noted, the price ratio had an upward trend. Consequently, for current dollars the trend is smaller when price is not included—around 1.0 per cent a year. For deflated figures, for which the price ratio has a negative coefficient, it is smaller when price is included.

[17] I refer to the fact that the downward trend was less in aggregate than per capita figures. The reduction is probably not statistically significant, but it conforms to the thesis that shoe buying is less when population is small than when it is large; population increases over the years; consequently, aggregate shoe buying should also increase, *ceteris paribus;* and, consequently, the downward trend shown in the statistics has been moderated. For the per capita figures, the opposite argument applies. Area surveys support the notion since per capita shoe sales are less for larger than for smaller families.

explicitly.[18] For other reasons, too, both analysis of the several contributory factors and the evidence of the time series suggest that the net trend for 1929 to 1941 would not necessarily apply to other times.[19]

Price

The regression analysis seems to support the familiar and reasonable notion that people buy more shoes, *ceteris paribus*, when they feel that the price of the article is relatively low compared with the prices of other things they might buy. The variable used to express this tendency was the price of a comparatively stable and unchanged group of shoes divided by an index of the cost of living.[20] Multiple correlations all improve when price is added.[21] The same thing may be seen in Chart 13, where errors of estimate (actual minus estimated sales) are plotted, first when the independent variables are income and time alone, and second when relative price is included. Allowing for the influence of price rids the error term of some of its cumulative swings.

However, inspection of Chart 12 reveals grounds for uneasiness. We see there that the price variable jumped vigorously during the days of the National

[18] When equations in columns 3 and 4 of Table 22 are projected for 1926 to 1928 and 1946 to 1949 inclusive, the error is less for the per capita than for aggregate figures in virtually every year. For the early group of years, the error of estimate as a percentage of average shoe sales averaged 2.5 and 3.0, respectively, for the per capita and aggregate data; for the four postwar years the corresponding figures were 6.2 and 7.2 per cent, respectively. The best way to account for the population factor would probably be to use per capita figures *and* population as an additional variable.

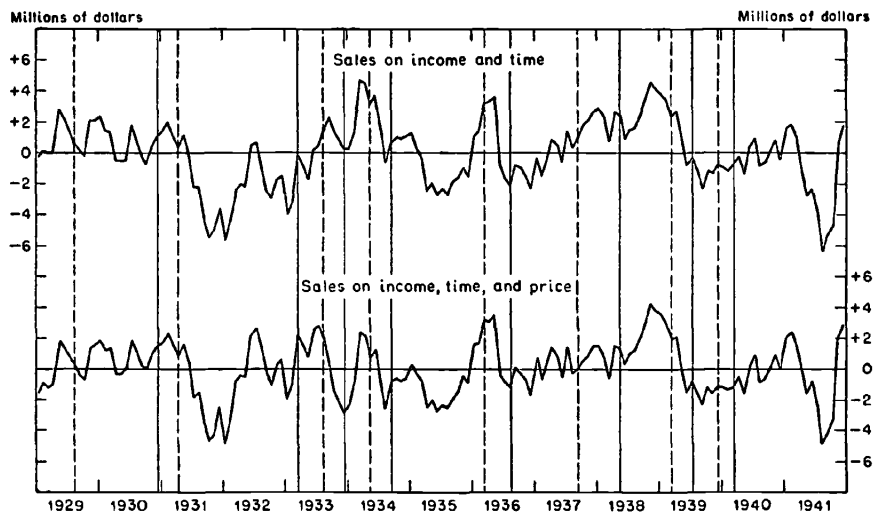
[19] If the equations are used to compute shoe sales in 1926, 1927, and 1928, the error of estimate is positive and increases progressively from 1926 to 1928. If the trend variable is simply dropped in the projection, most of the error in estimating sales for 1926 to 1928 on the basis of the 1929–1941 relation is eliminated. In postwar years, too, the error of estimate has a trend—it goes from plus in 1946 to minus in 1949. For this span of four years too, estimates would be slightly improved by dropping the trend variable, though the statement does not apply to the intervening 1941–1946 period. But so much else changed over these years that these facts are not very meaningful.

[20] Richard Stone has used each of these two prices separately in correlation analysis rather than the ratio between the two, believing that consumers may under some conditions be more or less sensitive to changes in a specific price than to the buying power of money. This seems to me to be altogether sound procedure, providing the price histories are sufficiently different to give adequately reliable separate coefficients. I have not followed it because I have tried to economize variables introduced in the correlation analysis. Besides, Stone's findings suggest that shoes might well be a type of product for which a simple ratio between particular and general prices provide a good approximation to consumers' reactions (see his article, "The Analysis of Market Demand," *Journal of the Royal Statistical Society*, Vol. CVIII, Parts III and IV, 1945).

[21] Statistical measures of the improvements achieved through the addition of the price variable appear in Table 22 in the slightly increased coefficient of multiple correlation and decreased standard errors when column 1 is compared with column 3, and 5 with 6. The fact that the coefficient of price was four or five times its standard error—the absolute level of this figure for the smoothed monthly data in column 6 is certainly too high—is perhaps further evidence in favor of the relevance of a price variable in estimating shoe sales.

CHART 13

Actual minus Estimated Shoe Sales for Two Regression Equations, 1929–1941



Broken and solid vertical lines identify specific-subcycle peaks and troughs in dollar shoe sales (series 31 in Appendix B).
See Table 22, columns 5 and 6, for the regression equations.

Recovery Administration, when shoe prices apparently rose more than other living costs; for the rest of the time the prices of shoes and other consumer goods tended to change proportionately, and consequently the ratio remained fairly stable. This means that there was really only one short period in which the behavior of the ratio was distinctive. For the rest, it was, in effect, two broken, almost horizontal lines, the later one higher than the earlier one. To make matters worse, when relative (and absolute) shoe prices are changing sharply, the reaction of consumers to price could well be different per unit of price change than when change is slight. Further, in the calculations, reaction to price change may be confounded with the trend parameter; we noted that the trend coefficient shifted when price was added.

For these reasons we view the actual coefficient of relative price with some suspicion. For whatever it may be worth, however, we learn from Table 22 that when the monthly equations are phrased in current dollars, shoe sales rose around 0.4 per cent when the price ratio rose 1 per cent. This means that the price elasticity of demand in physical units as conventionally stated was inelastic; dollar value of shoe buying rose when prices rose—physical volume fell, roughly, by 0.6 per cent (0.4 — 1.0) as prices rose 1 per cent. This calculation made in a preliminary form directly on an annual per capita deflated basis shows a still more inelastic reaction.[22]

Other Factors

Income, time, and price account for a substantial portion of the history of shoe buying between 1929 and 1941. Nevertheless, a glance at the difference between actual sales and those estimated by the three-variable equation (Chart 13, second line) indicates that by no means all of the smoothed month-by-month course of shoe buying, 1929 to 1941, is explained by a straight-line relationship to these variables. Is the pattern of the error term reminiscent of the course of factors that previous study has suggested might help to condition consumer buying? To aid in answering the question, the error term is replotted in Chart 14, where it may be compared with other time series.

First, the chart brings out that the estimating formula shares a common attribute of most efforts to explain buying: it underestimates rates of change in buying. Comparing the errors with first differences in sales, we see that when shoe buying was accumulating momentum in a rise or fall, the explanatory series often fails to account for the full impetus of the change; this was especially clear in connection with the rise at the beginning of 1931 and the several fluctuations in 1933, 1934, 1935, and 1938, though it occurred at other times also. The first line, column 7, of Table 24 indicates that change in sales and the residuals were in like subcyclical phase 70 per cent of the time. This result was foreshadowed earlier when the income elasticity of shoe buying seemed, on the basis of measures of amplitude of both sorts of movement, about half again as high for minor movements as for major ones.[23] There is no reason to attribute this result to economically meaningless eccentricities of the shoe-sales index. Careful examination of the index, of its components, and of other relevant data[24] led to the conclusion that most of the minor movements in shoe buying were probably at least as reliably portrayed as the major ones. Their patterns therefore demand explanation.

The answers might be found in the influences of the direction and the rate of change in income, shifts in income distribution, changing expectations, and, perhaps, previous holdings of shoes. Of course, a large part of such influences would be taken account of implicitly in the correlation of their time patterns with the influence of trend or of income. But to make matters worse, it is hard to find a time series capable of quantitative representation of the part not so accounted for. Chart 14 reveals another difficulty—efforts to achieve such representations yield series that are highly correlated among themselves. The second section of Table 24 supports the visual impression. Nevertheless, there is evidence that some of these variables may be important, especially at times when changes in the level of income are less domineering than they were between 1929 and 1941. Because of this potential future importance it is worthwhile to spend a few moments canvassing what we do and do not know about them. The statements are based on investigations described in the technical paper.

CHANGES IN INCOME AND EXPECTATIONS

The impact of income on buying may be a function not only of the level of income but also of the direc-

[22] Elasticity of quantity with respect to price is approximately equivalent to elasticity of dollar value with respect to price minus one, though a calculation in current prices with price as an additional variable suffers from a technical deficiency of including prices twice. But this is certainly a very minor objection (see, for example Stone's interesting point mentioned in note 20, above).

A pair of calculations was made in which change in income was also included, one in current and the other in deflated figures, directly comparable in other respects. Price elasticity for the dollar calculation is 0.664. Subtracting one yields a conventional elasticity figure of —0.336. The direct calculation from deflated data shows price elasticity of —0.285 (cf. Mack, *op. cit.*, Table 7).

[23] Cf. *supra*, p. 63.

[24] Mack, *op. cit.*, Appendix, Part II.

TABLE 24

Timing of Subcycles: Actual minus Estimated Shoe Sales Compared with Selected Data, 1929–1941

	NUMBER OF TURNS		TIMING (*months*)		MONTHS IN UNLIKE PHASE AS % OF ALL MONTHS [a]		
						Timing That Maximizes Correspondence	
	All (1)	*Matched* [b] (2)	*Mean Lead (−) or Lag (+)* (3)	*Average Deviation* (4)	*Synchronous Timing* (%) (5)	*Lead (−) or Lag (+)* (*months*) (6)	(%) (7)
1. REFERENCE FRAME: ACTUAL MINUS ESTIMATED SHOE SALES (20 TURNS) [c]							
First differences: [d]							
Shoe sales [e]	17	15	−0.8	1.9	30.5	0	30.5
Income payments: [f]							
Centered	18	13	+0.3	1.9	35.4	0	35.4
Plotted on last month (inverse) [g]	16	9	−1.6	2.9	59.0	−2	53.5
Factory payrolls [h]	21	16	−0.4	1.5	32.6	−1	30.5
Ratio of factory payrolls to income payments [i]	20	15	−0.7	1.2	31.2	−1	29.2
Factory man-hours [j]	20	13	−0.2	1.4	36.1	−1	33.3
2. REFERENCE FRAME: FIRST DIFFERENCES IN SHOE SALES (17 TURNS) [e]							
First differences: [d]							
Income payments	18	17	−0.5	1.4	22.9	−1	21.5
Factory payrolls	21	17	−1.1	1.3	27.1	−1	22.2
Ratio of factory payrolls to income payments	20	13	−0.8	1.1	31.2	−1	27.1
Factory man-hours	20	17	−0.7	1.8	29.9	−1	24.3

[a] See Appendix A, sec. 14.

[b] For the rules used in matching specific-subcycle turns to reference turns, see Appendix A, sec. 10b.

[c] Sales estimated by income, time, and price (see Table 22, column 6).

[d] Centered five-month moving averages of month-to-month change for the series described in the notes (except as indicated for one of the income payments series).

[e] Shoe sales are series 31 in Appendix B.

[f] The series here used is an earlier (1944) revision of series 125 (revised 1947). Conclusions given in the text apply equally to comparisons based on series 125.

[g] When the association is inverse, specific peaks are matched to reference troughs and specific troughs to reference peaks.

[h] Bureau of Labor Statistics index of factory payrolls, converted by the National Bureau of Economic Research to an estimate of actual dollar payrolls, seasonally adjusted (series 127).

[i] Series 130.

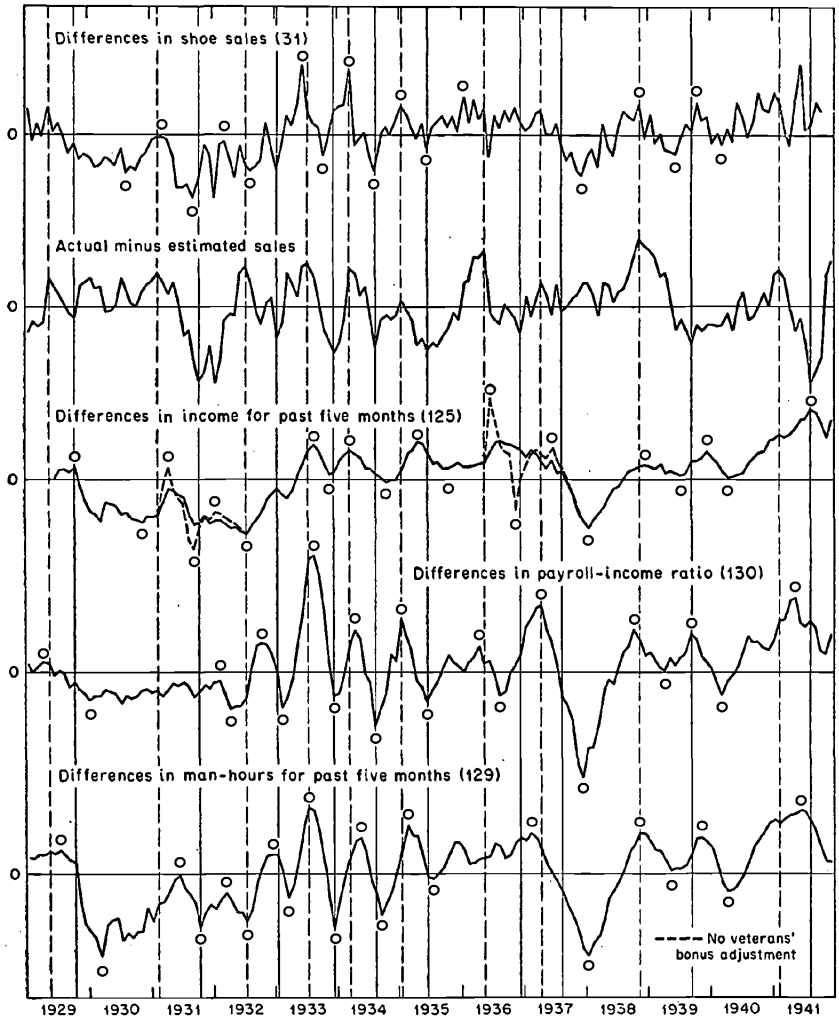
[j] Based on seasonally adjusted National Industrial Conference Board indexes of factory man-hours, 1921–1932, and BLS data on factory employment and average hours, 1932–1941 (series 129).

tion in which it has recently changed. People may cut the purchase of a basic good less when income falls by a given amount than they raise it when income rises by the same amount, but such studies as have been undertaken suggest that shoes would be a marginal commodity in this respect. The time-series analysis indicates that the income-change elasticity for shoes is not far from zero, and more likely to be negative than positive. Optimistic expectations about future income, introspection suggests, may increase buying, and pessimistic ones decrease it. But there is no information bearing on the association of shoe buying and expectations in area surveys, and efforts to contrive a systematic representation of expectations that could be used as a variable in regression analysis were unsuccessful. (Changes in man-hours in manufacturing shown in Chart 14 is one such attempt).

However, two major failures to reproduce actual shoe sales on the basis of income, time, and price appear to reflect the impact in one case of pessimism and in the other of optimism about future income. In the first—the second half of 1931 and early 1932—shoe sales were substantially lower than our estimates as Charts 12 and 13 show; sales of men's rather than women's shoes seem chiefly responsible. These were days of intense pessimism: banks were closing; prices of all sorts were plummeting; and unemployment, underemployment, and falling wages seemed to have come

CHART 14

Error of Estimating Shoe Sales by Three-Variable Equation Compared with Possible Additional Factors, 1929–1941



Broken and solid vertical lines identify specific-subcycle peaks and troughs in *dollar shoe sales* (Series 31 in Appendix B). For the other series, specific-subcycle turns are marked by O. The regression equation for actual minus estimated sales is in column 6 of Table 22. All other series are five-month moving averages of month-to-month change. For shoe sales, the averages are centered; they are plotted on the fourth month for the payroll-income ratio and on the fifth month for income and man-hours.
The scales have been adjusted to make comparison of fluctuations easier.

to stay. Certainly, it would be more surprising if matters of this sort did not affect judgments about spending than if they did.[25] In the second case, optimism rather than pessimism may have been reflected in the considerable excess of actual over estimated sales between January and May of 1936. The Adjusted Compensation Act was passed in January and appropriations in March. But it was not until June that bonds could be cashed and receipts appear in income pay-

[25] I give the figures on the number of bank suspensions as reported in the *Federal Reserve Bulletin*. They averaged 249 a month for June 1931 through February 1932 as compared with 100 for the rest of 1932:

	Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*
1931	202	77	86	64	91	167
1932	342	121	48	74	82	151
	July	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
1931	93	158	305	522	175	358
1932	132	85	67	102	93	161

The disproportionate decline in buying relative to income payments seems visible in the other two departments selling men's wear for which I have information—men's clothing and men's furnishings—but not for the other departments. There is a suggestion that total department-store sales show the slump, at least faintly, and mail-order sales seem to do so quite clearly. Income from agriculture slumped heavily also.

ments. The figures suggest that spring wardrobes might have been refurbished in anticipation of the June bonanza.[26]

Expectations about prices might—if they were strong and clear enough—cause consumers (like industrial buyers) to try to stock up before the rise. There seems to be some suggestion in the unexplained excess of actual over estimated sales that this may have been the case on one occasion when very clear expectations about rising prices must have prevailed—the days of the President's Re-employment Agreement and of the early National Recovery Administration when much publicity was given to the fact that prices would rise with rising wages and labor costs. Between March and August 1933, actual shoe sales were higher than those estimated by the regression equation, and this was exactly the time that people may have rushed to buy while prices were low. When prices did rise abruptly in August and September, the spurt in buying turned to a deficiency. Indexes of sales of seven departments of department stores seem to afford interesting support for this explanation. The spurt of buying in early 1933 tended to be systematically larger relative to that in 1934 the larger the unit of purchase for the department.[27] This seems reasonable; for people would presumably be more eager to achieve a larger saving than a smaller one (the same percentage saving on an expensive item than on an inexpensive one). In late 1941, expectation of rising prices, but in this case of shortages too, may have accounted for the underestimation of buying by the regression equation.

INCOME DISTRIBUTION

Budget studies suggest that shifts in income between the relatively rich and poor or between farm and urban population may well affect the amount of shoes bought, other things the same. This would certainly be the case if people responded to changes in income in line with the patterns revealed for families in the various income groups of the 1935–1936 area survey. A combination of estimates based on that study with figures on the share of income going to the top 5 per cent of income recipients, 1926 to 1941,[28] indicated that a trend increase of less than 0.3 per cent a year in shoe buying may have resulted from the trend toward equality of distribution, whereas short-term shifts may have caused maximum increases or decreases of perhaps ±0.4 in a year. But these calculations are extremely hazardous. Unfortunately, they cannot be buttressed by the introduction of appropriate variables into the multiple-regression schemes. On the one hand, income-size distribution has been subject to a trend toward greater equality, and this factor in the net trend pattern cannot be isolated; on the other hand, variation around the trend follows a pattern too similar to that of many other eligible variables to be isolated.[29]

CONSUMERS' STOCKS OF SHOES

Another variable that may affect consumer buying of shoes is the stock that they already possess. Of particular interest is the question of whether such holdings may be at least partly responsible for the short waves in shoe buying which the time series display so prominently. From time to time in connection with similar movements in the textile industry, a theory has been put forward that the short cycles are primarily a function of the intermediate life term of these semidurable goods.[30] The articles last a year or a year and a half, and the short swings in business last, on the average, about the same period; the wearing out and consequent need for renewal is thought to cause an initial wave in buying to echo in subsequent waves.[31] This question turns out to be an extremely complicated one to which the answer finally achieved in the technical paper is altogether inconclusive. The impact of stock on buying has three aspects, other things the same—the inverse impact of stocks (the more people own, the less their current need), the direct impact of replacement needs (the more people own and use, the more is worn out currently), and the direct impact of stock objectives (the more people and their friends and neighbors have, the more they want).

It is possible on the basis of assumptions about the

[26] It will be recalled that the income series used in the regression distributes funds from cashed bonds over a series of subsequent months. Thus the very large hump in income that would otherwise have appeared in June is distributed over the next half of the year.

[27] See Mack, *op. cit.*, p. 63.

[28] Simon Kuznets, *Shares of Upper Income Groups in Income and Savings*, National Bureau of Economic Research, 1953.

[29] For annual data, payroll income and other income were used separately, but the income elasticity of the former was found to be lower (rather than higher) than that of the latter. In the monthly analysis, first differences in the ratio of payrolls to income were used as a variable in addition to income proper. The variable carried the correct sign in the regression but was statistically insignificant. Its course is plotted in Chart 14 and its correspondence to the unexplained residuals measured in Table 24.

[30] See Norman J. Silberling, *The Dynamics of Business*, McGraw-Hill, 1943, Chapter 19; George F. Warren and Frank A. Pearson, *World Prices and the Building Industry*, Wiley, 1937, Chapter 8, especially p. 165; and T. M. McNiece, "The Economic Significance of Replacement Cycles in Demand," *Transactions of the American Society of Mechanical Engineers*, May 1934, pp. 337–353.

[31] When the goods last just one year, as when they are always renewed in a given month, a tendency toward echo waves would be largely removed by the seasonal correction.

life term and patterns of depreciation of shoes to construct hypothetical time series for each of these influences with the aid of statistics on shoe sales. But especially for replacement needs, the pattern is very sensitive indeed to the particular assumptions made. Do shoes, for example, inspire replacement abruptly at the end of a fixed period or do they do so gradually as their usefulness decreases? What is the precise pattern, and how immutable is it? But even if we could determine the actual pattern of each of the three influences, it is impossible to decide a priori concerning their relative importance, nor can the question be answered by empirical study. So in the end, the complicated analysis yields no firm hypothesis or method of selecting one.

One thing seems clear: the minor waves in buying are not primarily a function of the typical life span of shoes, for they occur at the same time in commodities that last a month, a year, or half a decade. This is apparent in monthly statistics for seven departments of department stores, as well as in other retail statistics. On the other hand, the evidence is not inconsistent with the hypothesis that minor movements in shoes are stronger relative to those in income payments than is the case for major ones, and this may or may not be true for commodities of greater durability; we do not know. It is possible that this phenomenon for shoe buying may be explained by the influence of stock; if so, it seems more likely to be a function of the inverse impact of stock on the major swings in buying than of the direct influence of the replacement echo effect on minor ones. For if shoes are assumed to have a useful life of around nine to eighteen months, stocks would reproduce the major swings in buying but bridge, and consequently lose, the minor ones; their inverse impact on current buying would therefore damp the major but not the minor swings. Replacement would only cause short waves if it followed substantially a sudden-death rather than a gradual depreciation formula. Even then the replacement waves would appear in current buying with a pattern which, as far as one can judge, the minor waves do not seem to show.

CHANGES IN THE PRODUCT

We have been speaking of the impact on the buying of shoes of the broad facts of the environment in which people live. But the businessmen who supply shoes spend their days trying to hold or attract consumer dollars. Do they succeed merely in attracting them from one another, or do they manage to coax them away from dress or from automobile manufacturers, or even from life insurance companies or other depositories of savings?

The downward trend in shoe buying, other things the same, in part expresses the difficulty any one commodity has in maintaining its grip on the consumer dollar in the face of the ever-increasing number of new utilities and needs that men devise. But we saw in Chapter 5 that sales of women's shoes stood up a great deal better than sales of men's shoes, and it seems likely that the added appeal of style in women's shoes at an attractive price has slowed the pace of decline in aggregate shoe buying. Later chapters raise a question concerning the impact on fundamental operating problems in the shoe and leather industry of this increased emphasis on style, a trend found in a great many different sorts of industries. Are short fluctuations in production (rather than in consumption) of shoes emphasized in a business environment in which "high-style" goods are made and sold?

In addition to this trend, there is a hint, in the difference between the estimated and actual shoe sales, of one period when unusual developments in the field of style may possibly have raised aggregate shoe sales relative to what they otherwise would have been. Near the close of 1938, total shoe sales and most of the components of the shoe-sales index were high, particularly women's shoe sales. Other retail sales data, however, seem typically to show a bulge more nearly proportional to that of income payments. The picture points to a style event in women's shoes capable of really stimulating consumer interest. I have asked several people in the industry whether they knew of any such occasion in the dozen or so years preceding World War II. They seemed to agree that the fall of 1938 was such a time.[32] But even if shoes did exert some special magnetism on the income dollar during

[32] The sling-back pump became a mass consumption item in 1938, though it had been introduced much earlier; this is also the time when the "loafer" shoe, introduced originally from Sweden via Bermuda, became an important selling item in the United States. The Sears Roebuck catalogue of 1938 also speaks of the "success story" of the saddle oxford "rediscovered" by the college girl; it was featured in a half-page spread in the fall catalogue. Other style trends (enumerated of course independently of any question about a specific year) were believed to constitute an exceptional stimulus to sales in the winter of 1938 to 1939—the round-toed "baby-doll" shoe, platform construction, and the lower heel.

These stories are supported by the fact that the movement was more marked in the retail sales of women's than in those of men's shoes. Production statistics, though they bear a pretty fuzzy relation to sales, also add assent: production of all shoes was about 7 per cent lower between August 1938 and July 1939 than for the other twelve months of these two years; production of women's shoes was about 2.5 per cent lower and of misses' and children's shoes 8.5 per cent higher.

this period, this probably afforded only a part of the total explanation.[33]

Evaluation

These investigations yield both quantitative and qualitative insights into changes in consumer shoe buying and the factors that determine them for the period studied. We saw the overpowering influence of consumer income (together with whatever else paralleled its course) in explaining the history of shoe buying between 1929 and 1941. When the net downward trend contributed by a variety of factors—perhaps including the reaction to relative shoe prices—was added, a very substantial part of total shoe buying for the dozen or more years preceding World War II was "explained."

The rather surprising success in explaining most of the course of shoe buying, 1929 to 1941, on the basis of income, trend, and relative price is no more informative than the failures to explain the rest. For there is reason to believe that failures cannot be attributed to inadequacies in the shoe-sales index itself, nor do they seem to be scattered at random. They are of several sorts.

First, the estimating equation that gives such good results for the prewar years gives bad ones for 1946–1950, as Table 25 shows. In view of the poor estimation of change, I am quite unimpressed by the fact that the broad level of shoe sales (the 1948 estimates were very close indeed to actual sales) was so well reproduced by our formula, in spite of a virtual doubling of sales during the war. Whether the estimates are made in current or deflated dollars, per capita or aggregate, the 1929–1941 relationship when projected to later years overestimates shoe sales during the war, underestimates them for several years afterwards, and returns to almost the actual figure in 1948. This picture could be explained in terms of impoverishment of selections and rationing during the war with make-up buying afterward. But whether this is an important part of the explanation and what other factors are also involved need examination preceded by far more careful attention than I have given to the estimates of postwar shoe sales, prices, and the like.

TABLE 25

Actual and Estimated Shoe Sales and Their Change, by Years, 1946–1950
(*dollars in millions*)

	SHOE SALES			CHANGE IN SHOE SALES BETWEEN YEARS				
				Actual		Estimated		
YEAR	*Actual* [a] (1)	*Estimated* [b] (2)	*Error of Estimate* (1) − (2) (3)	*Change* (4)	*Rank* (5)	*Change* (6)	*Rank* (7)	*Error of Estimate* (4) − (6) (8)
1946	$3,007.2	$2,557.2	+$450.0					
1947	3,155.0	2,817.8	+337.2	+$147.8	1	+$260.6	3	−$112.8
1948	3,147.0	3,128.6	+18.4	−8.0	3	+310.8	1	−318.8
1949	3,013.7	3,071.3	−57.6	−133.3	4	−57.3	4	−76.0
1950	3,138.8	3,341.3	−202.5	+125.1	2	+270.0	2	−144.9

[a] Series 31 in Appendix B.
[b] Estimated by income, time, and price (see Table 22, column 6).

For, the whole tenor of our work has emphasized the fact that shoe buying, and I have no doubt the buying of most other commodities, too, is substantially influenced by aspects of the environment that are not at all likely to remain unaffected by changes in the economy such as those accompanying a war. There were changes in what the industry supplied, in competing products, and in the rate at which population grew; during the war, income distribution departed radically from its trend of the thirties; there were marked changes in the relationship among prices of major commodity groups and between shoes and the cost of living (relative shoe prices rose considerably); the buying power of current income was augmented by huge accumulations of personal savings; consumers' stocks of shoes, as well as of other commodities, were depleted. What effect would these changes have on the downward trend in shoe buying, on the propensity to consume shoes, and, finally, on the force of the impact of the several other factors, some of which could not be isolated for the prewar period but might, because of their greater range of fluctuation, be apparent now?

[33] The explanation applies to the shoes worn by women and older girls. Assuming that these constitute about 60 per cent of shoe sales, the error for the eight months between September 1938 and April 1939 amounted to almost 5 per cent of this 60 per cent share of shoe sales for the same period. This strikes me as rather more stimulation than seems likely, though it is certainly not impossible.

A second sort of failure is the inability to estimate some of the amplitude of the short waves in shoe buying. A variety of information suggests several ways in which these minor fluctuations may come about and yet fail to be quantitatively reflected in the data that can be used to explain shoe buying. Two sorts of deficiencies in the estimates would result, and both are apparent in the statistics: first, a systematic tendency to lose some of the response of buying to a group of factors likely to have a significant short-term impact (or at least aspect of their impact) on buying—rates of change in income, shifts in income distribution, in expectations, and in holdings of shoes; second, sporadic failures to account for buying at particular times when some special set of factors is unusually influential.

Yet interestingly enough, sifting down through both success and failure in these efforts to explain consumer shoe buying is the impression of the remarkable rationality and stability of aggregate consumer behavior, even with respect to the purchasing of this single commodity. The difficulty in describing its rationale lies in our power to isolate the great variety of factors—a quite reasonable variety—that determine its major contours. Isolation by means of the mathematics of correlation analysis of aggregate figures, averaged for income groups or for long periods of time, is a poor half-way answer. Monthly data make a sharper statement than blunt annual statistics, but are not enough. To improve the answer we need to capitalize on differences between periods of time, among individual families, among groups of families that have been selected to expose some variables and suppress others. Nevertheless, for the particular period we have studied, these methods would embroider rather than alter the basic finding: the great changes that took place in the money that people currently received caused of necessity parallel changes in what they spent on anything and everything.