U. S. CLOTHING EXPENDITURES: A TIME SERIES ANALYSIS, 1929-1987

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The relationship between U. S. aggregate expenditures on clothing and selected economic and demographic factors was examined for the years 1929-1987. Clothing prices, personal disposable income, population size, and two major economic disturbances, the depression and World War II, were variables included in the statistical model. The results indicated that U. S. clothing demand is both own-price and income inelastic. Income had a statistically significant effect, while clothing prices did not. Population size had a significant negative effect.

INTRODUCTION

From 1929 to 1987, clothing and shoe expenditures (CSE) have increased at a rate of 5.84 percent per year while total personal consumption expenditures (PCE) rose at an annual rate of 7.15 percent (see Table 1 and Graphs 1 and 2). Some of this growth reflects price increases rather than actual increases in demand. During this same period, clothing prices, based on the Consumer Price Index for apparel and upkeep (CPIAPP), increased at a rate of 2.94 percent per year while the Consumer Price Index for all goods (CPI) rose at a rate of 3.60 percent per year (see Table 1 and Graph 3). Taking price increases into consideration, constant dollar clothing and shoe expenditures have risen at a rate of 2.90 percent per year while total personal consumption expenditures have increased at a yearly rate of 3.38 percent (see Table 1 and Graphs 1 and 2) (Office of the President of the United States 1970 and 1988; U. S. Department of Labor 1988).

TABLE 1. Average Annual Rates of Change in Expenditures and Disposable Personal Income in Current and Constant Dollars and Prices: 1929-1987[2]

Item	Average Annual Rate of Change Current Dollars	Constant Dollars
	%	%
Clothing & Shoe Expenditures	5.84	2.90
Total Personal Consumption Expenditures	7.15	3.38
Clothing Budget Share	-1.31	-0.048
Disposable Personal Income	7.19	3.41
Apparel and Upkeep Prices	2.94	
Overall Prices	3.60	

Besides price, an additional economic factor which affects consumer expenditures is income. Although disposable personal income (DPI) (in current dollars) increased at a yearly rate of 7.19 percent per year, real DPI increased at a slower rate--3.41 percent per year (see Table 1 and Graph 4).(Office of the President of the United States 1970 and 1988). Both income and the relative price of clothing are two major factors affecting the percent of total PCE allocated to clothing expenditures. Over time, this ratio, or the clothing budget share, decreased at a rate of 1.31 percent per year. In real terms, however, this ratio has shown a decline of .048 percent per year (see Table 1 and Graph 5). As apparel producers and retailers face greater competition, not only among themselves but with providers of other goods and services, both absolute and relative clothing expenditures are of obvious concern.

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It is the purpose of this study to ascertain the relative effect of selected socio-economic and demographic variables on U. S. clothing expenditures between 1929 and 1987. Other factors besides prices and income that affect consumption patterns will be included in the analysis. This research will attempt to answer questions such as "To what extent have clothing expenditures been affected by price changes, income changes, and population growth?" "What effect did events such as the depression and World War II have on U. S. clothing expenditures?" The model developed will also allow specific price and income elasticities of demand for clothing to be estimated.

An understanding of clothing consumption trends is not only important to apparel retailers and manufacturers, but to other professionals interested in U. S. consumption patterns. Recent research on clothing expenditures has provided an updated picture of household clothing consumption behavior at a point in time (Nelson 1989; Norum 1989). Yearly changes in clothing consumption have been discussed (Courtless 1988), but the trends have not been analyzed within a time series framework. Some work has been done analyzing clothing expenditures over time (Winakor 1962; Winakor 1986; Winakor 1989); however, extensions of these studies are warranted.

REVIEW OF LITERATURE

Recent trends in clothing and textiles are presented on a yearly basis in the Family Economic Review. The most current analysis indicates that annual per capita expenditures on clothing and shoes in 1987 was $724. Ninety percent of the $29 increase over 1986 was attributed to increased prices. The Consumer Price Index for apparel commodities rose 7.3 percent over the previous year. Women's dresses, suits, coats and jackets, separates and sportswear, as well as men's shirts showed the greatest price increases. This was the third year in a row that the price of clothing rose faster than overall prices (Courtless 1988).

Analysis of clothing expenditures from one year to a next is very important to an understanding of the current clothing consumption situation in the United States. However, additional insight can be gained by looking at clothing consumption over a longer time period. Clothing expenditures from 1929-1958 (Winakor 1962) and from 1929-1984 (Winakor 1986) have been analyzed. In her initial study, Winakor (1962) separately examined the effect of total expenditures, the relative price of clothing and time on clothing expenditures. Data from Illinois farm families, as well as the Department of Commerce were used. Information for the war years was excluded from the analysis "because exceptional market conditions prevailed at that time" (p. 116). An expenditure elasticity near one was estimated for both samples. As expected, the price effect was negative. However, an actual magnitude for the price elasticity was not presented. The time trend variable was also negative. Winakor (1962) attributed the decline in the budget share for clothing to quality changes in clothing not reflected in the price index, and the possibility that clothing may actually be considered to be more of a necessity than a luxury by consumers (Winakor 1962).

In Winakor's more recent studies (1986; 1989), data from the Survey of Current Business were used. A variety of approaches, including graphic techniques and ordinary least squares regression, were used to analyze the data. Total clothing and shoe expenditures, as well as the budget share for clothing and shoe expenditures, were examined. Previous year's expenditures, as well as yearly changes in expenditures were found to affect clothing expenditures. From her most recent study, Winakor (1989) concluded that clothing could not be considered a necessity, and, based on a point elasticity calculation, clothing appeared to be price inelastic. Additionally, a stock coefficient of .0327 was calculated, but Winakor did not calculate both an adjustment and depreciation rate.

Bryant and Wang (1988) conducted a more recent and comprehensive time series analysis of the U. S. demand for various durables, nondurables, and services. The primary purpose of this study was to determine the impact male and female wage rates had on shifts in demand away from nondurables towards durables and services. Quarterly data from the National Income and Product Accounts from 1955-1984 were used. An econometric model was developed in which expenditures on durables were viewed not only as a function of current prices and income, but as a function of lagged price, income, and expenditures.

Clothing and shoes, which were treated as durables, were estimated to be unitary price elastic, and wage rate and permanent income inelastic. The results indicated that as the value of female and male wage rates have increased, the demand for clothing and shoes has also increased. In addition, a depreciation rate of .6070 and an adjustment rate of .6511 were estimated (Bryant & Wang 1988).

THEORETICAL AND EMPIRICAL MODELS

A clothing consumption process model has been developed in which the acquisition, use, maintenance, storage, and discard of apparel are explicitly recognized as interrelated components (Winakor 1969). Within the clothing consumption framework, clothing is viewed as a semidurable or durable good. In light of the durable nature of clothing, it is necessary to explicitly recognize that households have a stock of clothing available to them from which services flow. The demand for apparel will be conditioned upon past decisions that constrain both the availability of income and current consumption. The demand for clothing in the current period will be composed of a "new" demand for apparel, as well as "replacement" demand that results from product depreciation. This is reflected in the following equation, which has typically served as the basis for estimating durable purchases demand (Bryant 1983; Norum 1989):

$$(1)\quad q_{lt} = h^{1}(p_{lt} \ldots p_{nt}, Y_t) - (1 - \delta)\, S_{lt-1}$$

where:

q_{lt} = the quantity of good l purchased in period t
p_{kt} = the price of good k in period t, k = 1 to n
Y_t = total income in period t
S_{lt-1} = the stock of good l at the end of period t-1 which is carried over into the current period, t
δ = depreciation rate in the stock

Estimation of this equation requires information on the flow of services from clothing stock as well as prices and income. Because information on a household's durable stock, particularly for clothing, is generally unavailable, this model has been modified. Using Chow's (1960) stock adjustment model as a basis, Bryant and Wang (1988) developed a demand equation for household durables in which durable expenditures in constant dollars are used as the dependent variable, and current and lagged prices and income, as well as lagged expenditures were included as independent variables. This model is written as:[3]

$$(2)\quad Q_{it} = d_i r_i \alpha_i + r \sum_{k} B_{pik} P_{kt} - (1-d_i) r_i \sum_{k} B_{pik} P_{kt-1} + r B_{iy} Y_t - (1-d_i) r_i B_{iy} Y_{t-1} + (1-r_i) Q_{it-1}$$

where

Q_{it} = expenditures on good i purchased in period t, i = 1 to n
P_{kt} = the price of good k in period t, k = 1 to n
P_{kt-1} = the price of good k in period t-1, k = 1 to n
Y_t = total income in period t
Y_{t-1} = total income in period t-1
Q_{it-1} = expenditures on good i in period t-1, i = 1 to n
B_{pik} = long-run own and cross price effect
B_{iy} = long-run income effect
d_i = annual depreciation rate
r_i = annual adjustment rate

This equation serves as the basis for the statistical estimation in this research. Two-stage least squares rather than ordinary least squares was the statistical procedure used because equation (2) is overidentified (Intriligator 1978). Two-stage least squares requires replacing the endogenous variables in the equation (P_{kt}, P_{kt-1}, and Q_{it-1}) with predicted values. Thus, reduced form equations were estimated for each endogenous variable using ordinary least squares. In the second stage, predicted values of the endogenous variables were included in the equation along with other appropriate exogenous variables. The final equation that was estimated using ordinary least squares was:

$$(3)\quad Q_{it} = b_0 + b_1 \hat{P}_{kt} + b_2 \hat{P}_{kt-1} + b_3 Y_t + b_4 Y_{t-1} + b_5 \hat{Q}_{t-1}$$

where:

$\hat{P}_{kt}$ = predicted value of P_{kt}
$\hat{P}_{kt-1}$ = predicted value of P_{kt-1}
$\hat{Q}_{it-1}$ = predicted value of Q_{it-1}

and the other variables remain as previously defined.

DATA AND VARIABLE MEASUREMENTS

Apparel Expenditures and Income

The National Income and Product Accounts provided yearly data from 1929 to 1987 on apparel expenditures and income (Office of the President of the United States 1970 and 1988).[4] Constant dollar expenditures on clothing and shoes (CSE) were used as the dependent variable. Clothing and shoe expenditures lagged one period were also included as an independent variable (LAGCSE). Disposable personal income (DPI) in constant dollars was another independent variable. The implicit price deflator for Personal Consumption Expenditures (base year=1982) was used to deflate the current dollar values.

Apparel Prices

The price of clothing was measured by the Consumer Price Index (CPI) for apparel and upkeep (base year-1982-84), available from the Bureau of Labor Statistics (U. S. Department of Labor 1988).[5] This index was also used to calculate constant dollar clothing expenditures.

Additional Independent Variables

Typically, in time series analysis taste shifters such as age and education are not included in the analysis. This same approach has been taken here, although variables to measure population size and major economic disturbances were included. Population size was included in the equation because expenditures and income were not expressed on a per capita basis. This allows the specific effect of population growth on apparel expenditures to be measured. The variable measures the population of the United States on July 1 of a given year, including Armed Services overseas; Alaska and Hawaii are included beginning in 1960 (Office of the President of the United States 1970 and 1988).

In addition, variables to account for the depression years and World War II were included. A dummy variable used to capture the effect of the depression was assigned a value of one for the years 1929-1933 and a zero otherwise. A dummy variable was included to measure the effect of World War II on aggregate clothing expenditures due to the restrictions (Limitation Order L-85) placed on clothing production and consumption during the war. The variable was assigned a value of one for the years 1941-1945 and a zero otherwise.

RESULTS

This section contains the results from the apparel expenditure function and related estimates. Table 2 presents the statistical estimates for the equation, while Table 3 presents the estimated short-run elasticities as well as depreciation and adjustment rates.

TABLE 2. Parameter Estimates for the U. S. Apparel Expenditure Equation, 1929-1987

Variable	Regression Coefficient	Standard Error
Intercept	14.03***	7.14
Price	-0.26	0.30
Lagged Price	0.32	0.28
Income	0.055*	0.01
Lagged Income	-0.04**	0.14
Lagged Expenditures	0.89*	0.13
Population	-0.00014**	0.00006
Depression	-2.43	1.91
World War II	0.95	1.36

* = significant at = .01
** = significant at = .05
*** = significant at = .10

N = 57
DW = 1.37
R = .99

TABLE 3. Estimates of Short-Run Price and Income Elasticities at the Point of Sample Means, Depreciation and Adjustment Rates

Short-Run Elasticities		Depreciation	Adjustment
Price	Income	Rate	Rate
-.1902	.9740	.22395	.11008

The regression results indicate that the estimated effect of price, income, and lagged expenditures is as theoretically expected. The current price effect is negative, while the lagged price effect is positive. Neither of these variables, however, is statistically significant. The current income effect and lagged income effect are positive and negative, respectively. Each of these variables was found to have a statistically significant effect. The statistically significant effect on the lagged dependent variables was positive. Population had a significant negative effect on annual apparel expenditures. The dummy variables used to control for the effects of the depression and World War II were statistically insignificant.

The price elasticity for clothing and shoes was -.1902. This elasticity indicates that the demand for apparel is own-price inelastic. The income elasticity was equal to .9740. This suggests that the demand for apparel is income inelastic. The estimated depreciation rate is .27273, while the estimated adjustment rate is .11008.

The estimated depreciation rate of .27273 suggests that 75% of any initial stock in clothing and shoes will depreciate in five years. Although this value is relatively low, it is important to bear in mind that this value simply reflects the effect of physical depreciation. As Bryant and Wang (1988) point out, "(T)he depreciation households experience when selling used durables, however, represents the depreciation in value which includes physical depreciation and any decline in the market value per physical unit" (p. 15). One would expect that used clothing would lose market value due to the loss of fashion appeal. Since the estimated depreciation rate does not reflect this effect, the value is lower than it might otherwise be. Given the relative durability of clothing, it is possible that the effect of fashion obsolescence on the depreciation rate is even greater than the effect of physical deterioration.

The estimated adjustment rate of .1108 indicates a rather slow adjustment rate. This rate indicates that the difference between actual consumption this year and last year is some fraction (.11) between where households were with respect to the clothing stock and where they would like to be. Bryant and Wang (1988) point out that the lack of good used markets for particular types of durables may hamper a household's ability to adjust the stock of that durable. For clothing, there has generally been a well established market for buyers of used clothing (e.g., garage sales, second hand stores, vintage clothing stores), but the market for consumers wishing to sell used clothing has not been very extensive. Garage sales or similar arrangements have served as the primary outlet available to consumers selling clothing directly to other consumers; the market for garage sale items is not as well developed for some categories of apparel (e.g., adult clothing) as compared with others (children's clothing). A primary means for clothing disposal has been the donation of clothes (for no payment or possibly a tax deduction).

Compared to Bryant and Wang's (1988) estimated depreciation rate of .61 and adjustment rate of .65, the depreciation and adjustment rates in this study are low. The difference in these values may reflect differences in the time periods used in each analysis, as well as the difference in model specification.

CONCLUSIONS

The primary purpose of this study was to examine the effect of economic variables on U. S. aggregate clothing and shoe expenditures for the time period 1929-1987. Unlike much of the previous time series research on clothing demand, this was done within a multivariate context. A modification of the standard stock-adjustment model was used, allowing expenditures to be used as the dependent variable, and lagged expenditures as an independent variable. Two-stage least squares was used to estimate the expenditure equation.

The results indicated that income has a statistically significant effect on apparel expenditures, while apparel price does not. The calculated elasticities indicate that U. S. clothing demand is both own-price and income inelastic. These results lend support to the findings and inferences of other researchers (Bryant & Wang 1988; Winakor 1986). Both the adjustment and depreciation rates seem reasonable for apparel, particularly in light of the fashion element embedded in apparel, and the lack of markets in which consumers may directly sell used clothing.

Based on historic trends, apparel manufacturers and retailers can expect consumer expenditures on clothing in both absolute and real dollars to continue to increase. However, the gain in real terms will be at a slower rate. Clothing expenditures as a percent of total personal consumption expenditures should remain fairly steady in real dollars, but may show a decline in absolute terms. Both clothing prices, and the prices of all consumer items can be expected to continue their overall positive trend. Given that changes in the price of clothing were not found to have a significant effect on aggregate U. S. clothing expenditures, as well as the relative price inelasticity of clothing demand, this positive trend in prices could be expected to have a minimal negative effect on clothing demand. On the other hand, relatively slow growth in disposable personal income, coupled with the income inelasticity of clothing demand is unlikely to provide a tremendous boost in clothing expenditures. Given the negative relationship between population growth and clothing expenditures, when taking other factors into consideration, future growth in the population is unlikely to result in greater per capita clothing expenditures.

Future research in this area might expand upon the model used in this study by including other characteristics of the population. For example, variables to measure the age of the population, labor force participation of women, or the number of people in various racial categories could provide insight into how clothing expenditures could be expected to change as these factors change. In addition, specific categories of apparel, such as men's, women's, and children's, could be analyzed to determine the extent to which elasticities, adjustment and depreciation rates vary between the categories. Investigation of factors that affect the adjustment and depreciation rates would also be insightful and have potential implications for consumer welfare. For example, does the fashion element embedded in clothing or physical deterioration have a greater effect on the depreciation of clothing stock? Another potential avenue of research would be to examine clothing expenditures within the context of a complete demand system.

REFERENCES

Bryant, W. Keith (1983), "Conditional Demand Functions, Separability, and the Length of Run: Some Notes for the Applied Researcher of Household Behaviour," Journal of Consumer Studies and Home Economics, 7: 187-200.

Bryant, W. Keith and Yan Wang (1988), "American Consumption Patterns and the Price of Time: A Time-Series Analysis," working paper, Consumer Economics and Housing, New York State College of Human Ecology, Cornell University, Ithaca, NY.

Chow, Gregory (1960), "Statistical Demand Functions for Automobiles and Their Use in Forecasting," in Harberger, A. C. (Ed.), The Demand for Durable Goods, Chicago: University of Chicago Press.

Courtless, Joan C (1988), "Recent Trends in Clothing and Textiles," Family Economic Review, 2: 10-16.

Intriligator, Michael D. (1978), Econometric Models, Techniques and Applications, Englewood Cliffs, NJ: Prentice-Hall, Inc.

Nelson, Julie (1989), "Individual Consumption within the Household: A Study of Expenditures on Clothing," Journal of Consumer Affairs, 23: 21-44.

Norum, Pamela S. (1989), "Economic Analysis of Quarterly Household Expenditures on Apparel," Home Economics Research Journal, 17: 228-240.

Office of the President of the United States (1970), Economic Report of the President, Washington, DC: U. S. Government Printing Office.

Office of the President of the United States (1988), Economic Report of the President, Washington, DC: U. S. Government Printing Office.

U. S. Department of Labor, Bureau of Labor Statistics, (1988), Consumer Price Index, All Urban Consumers, U. S. City Average, All Items, 1982-84 = 100.

U. S. Department of Labor, Bureau of Labor Statistics, (1988), Consumer Price Index, All Urban Consumers, U. S. City Average, Apparel and Upkeep, 1982-84 = 100.

Winakor, Geitel (1962), "Consumer Expenditures for Clothing in the United States, 1929-1958," Journal of Home Economics, 54: 115-118.

_____ (1969), "The Process of Clothing Consumption," Journal of Home Economics, 61: 629-634.

_____ (1986, October 23), "Trends in Aggregate Clothing Expenditures in the U. S., 1929-84," Association of College Professors in Textiles and Clothing Proceedings, Houston, Texas, 130.

_____ (1989), "The Decline in Expenditures for Clothing Relative to Total Consumer Spending, 1929-1986," Home Economics Research Journal, 17: 195-215.

NOTES

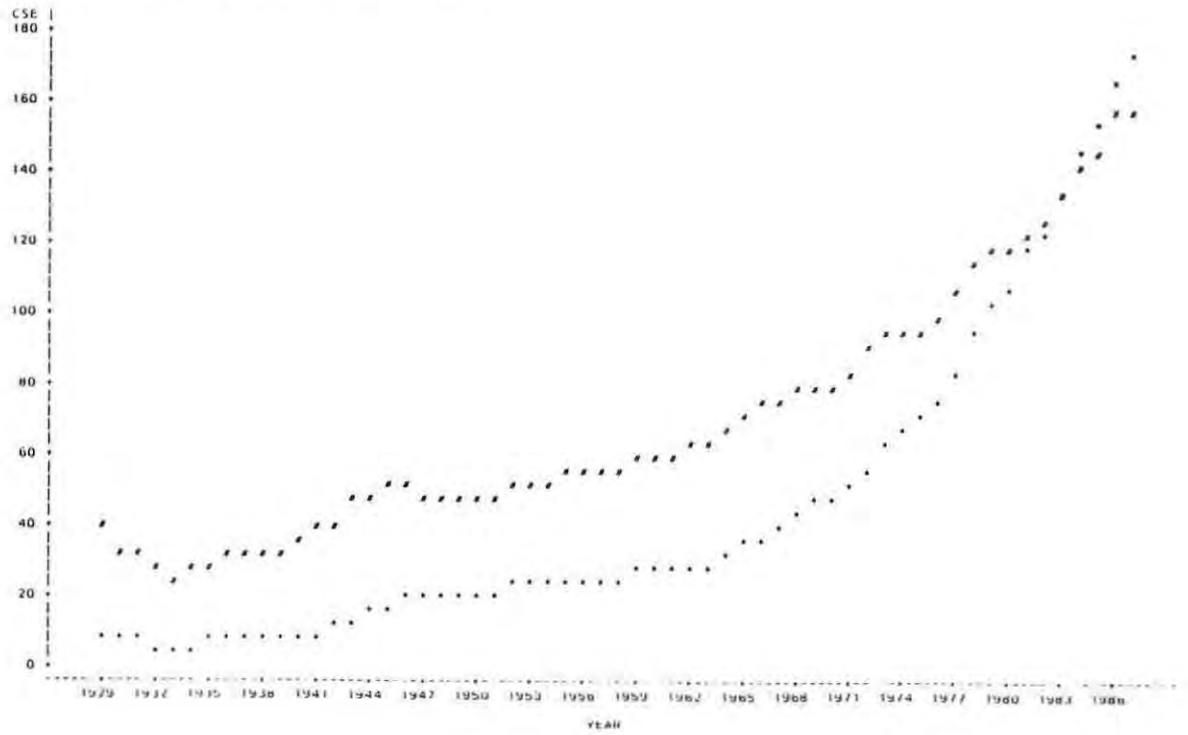
[2]The average annual percent changes were estimated based on simple regression equations where the natural log of each item listed in Table 1 was the dependent variable and a trend variable was the independent variable. The estimated coefficient indicates the percent change in the dependent variable for each one year change in time.

[3]See Bryant and Wang (1989) for the algebraic derivation of this equation.

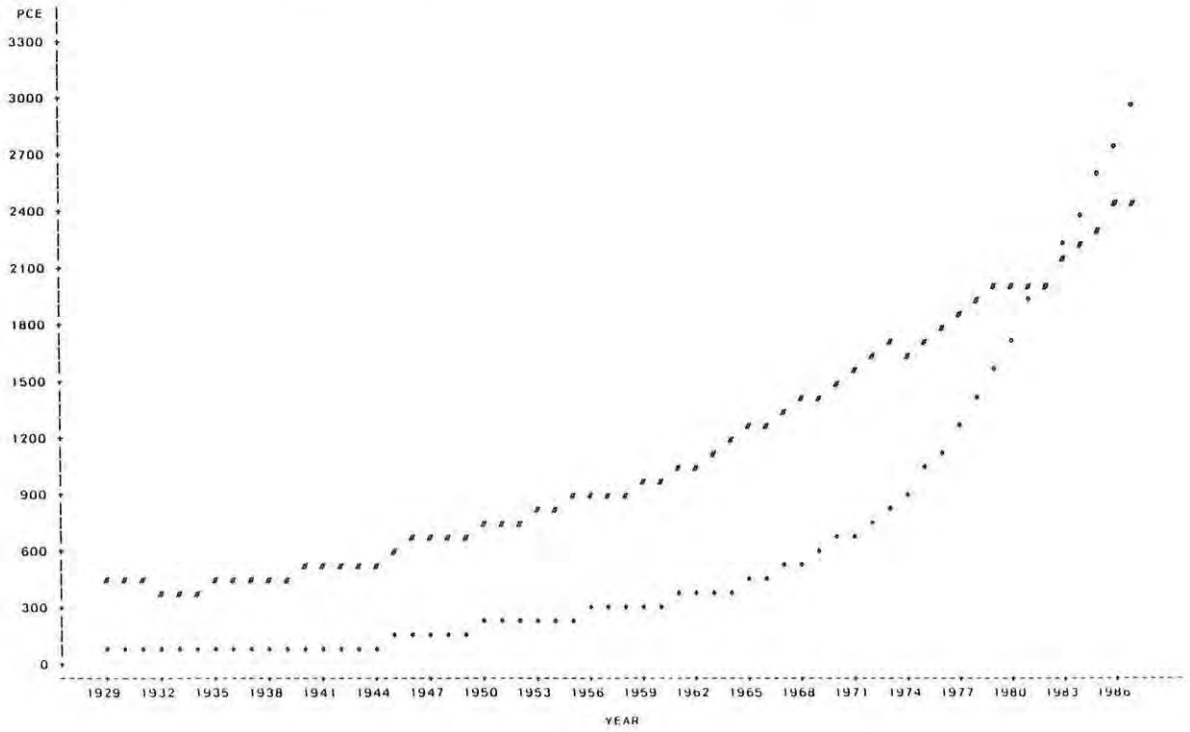
[4]Although the data were published as a historical series from 1929 to 1987, certain years were omitted. Data for these years were obtained through personal conversation with a Bureau of Economic Analysis employee.

[5]In January 1987, the Bureau of Labor Statistics updated the CPI to reflect changes in purchasing patterns. The base years for the new index are 1982-84. Although a historical series has not yet been published, the data can be obtained from BLS.

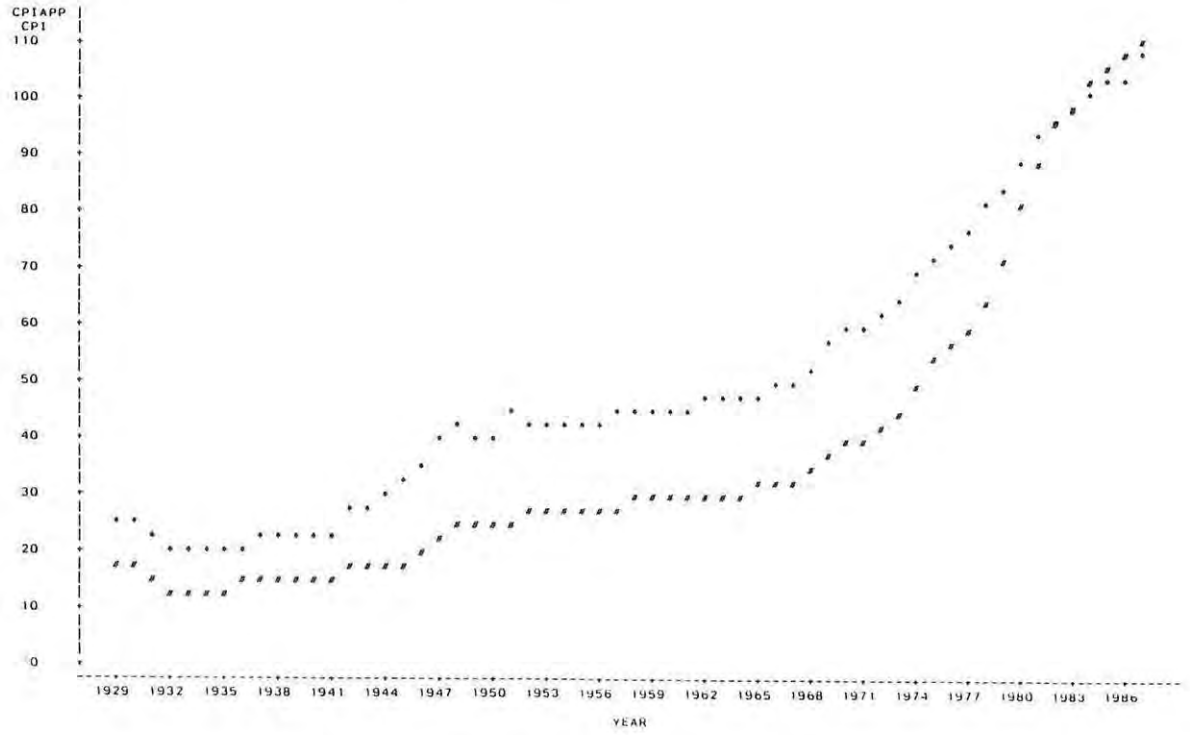
GRAPH 1. Plot of Current and Constant Dollar Clothing and Shoe Expenditures, 1929-1987 (Current Dollar = *, Constant Dollar = #)



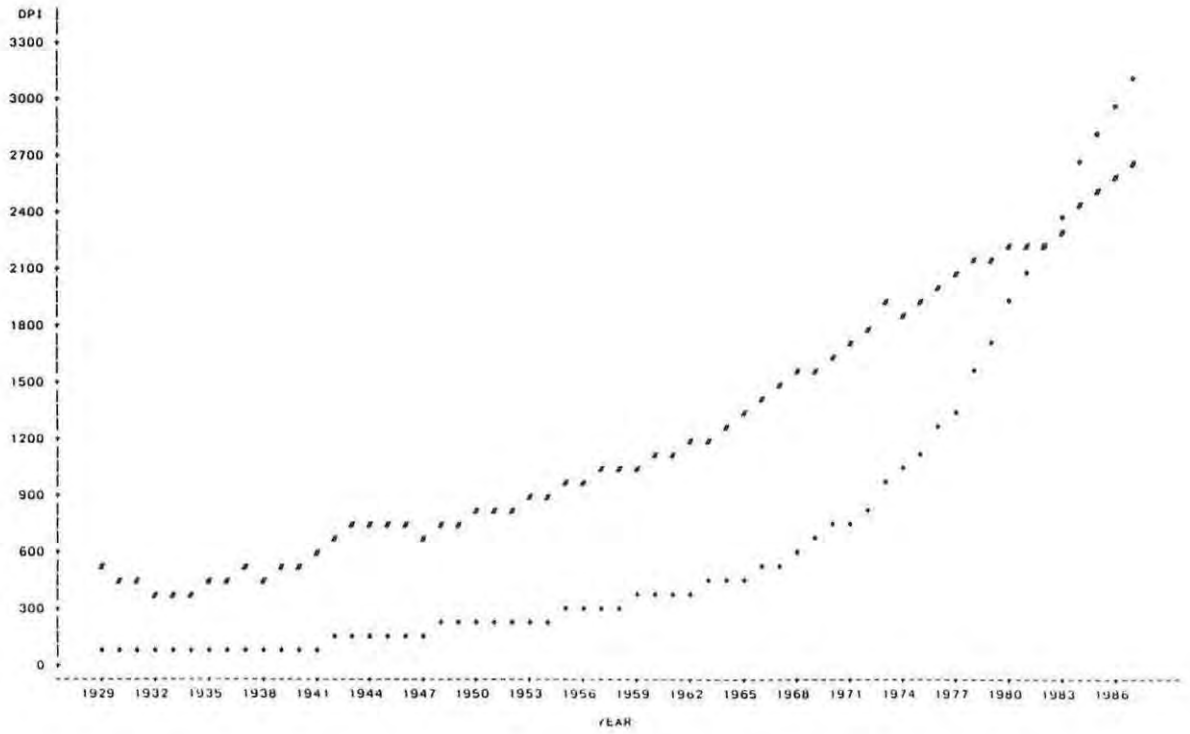
GRAPH 2. Plot of Current and Constant Dollar Personal Consumption Expenditures, 1929-1987 (Current Dollar = *, Constant Dollar = #)



GRAPH 3. Plot of Consumer Price Index, Apparel and Upkeep (*), and All Items (#), 1929-1987



GRAPH 4. Plot of Current and Constant Dollar Disposable Personal Income, 1929-1987
(Current Dollar = *, Constant Dollar = #)



GRAPH 5. Plot of Current and Constant Dollar Clothing Budget Share, 1929-1987
(Current Dollar = *, Constant Dollar = #)