

Concerning the consumerism gender gap, the sexes showed a similar divergence. Women agreed more than did men that government should become more involved in a variety of consumerism problem areas including product quality attributes, environmental impacts, health risks, children's products and retirement planning. Only the retirement planning issue did not show a significant difference at .01. In addition, women were more significantly anti-business, pro-consumer and pro-Nader than were men.

Men and women also differed on several demographics; differences which some have suggested are responsible for the political gender gap. Women, for instance, were less often employed outside the home, more often single, and had lower family incomes. When they were employed, they made less income, committed fewer hours to

their jobs, and expected to commit fewer hours in the future, than did men.

With one exception, TABLE 2 includes only those variables found to significantly differentiate between the sexes.⁴ These are correlated with the proxy measures for the political and consumerism gender gaps: Reagan's economic approach ratings and the consumerism support scale. Note that most of these variables are significantly related not only to sex but to the measures of both gender gaps as well. The evidence thus seems to support the relationship between the gaps as well as suggesting common origins.

⁴The Rokeach value of freedom was included for the sake of completeness since it is later used in a discriminant analysis testing a Rokeach derived hypothesis.

TABLE 2. Correlations Between Gender Gap Variables and Support for Reagan Economic Policies and for Consumerism (Spearman Rho)

	Sex (1,F/2,M)		Reagan Economic Approach Ratings		Consumerism Support Scale	
	r	prob	r	prob	r	prob
Ratings of:						
Consumerism (support scale)	-.15	.000	-.19	.000	----	----
Business	.10	.017	.36	.000	-.23	.000
Nader	-.18	.000	-.29	.000	.26	.000
Freedom (Rokeach ranked)	.07	.073	.04	.389	-.11	.006
Equality (Rokeach ranked)	-.11	.008	-.28	.000	.14	.001
Freedom (-4 to 4)	.02	.598	.14	.001	-.07	.010
Equality (-4 to 4)	-.16	.000	-.16	.001	.01	.770
Reagan	.16	.000	----	----	-.19	.000
Kennedy	-.11	.008	-.24	.000	.28	.000
Republicans	.11	.008	.65	.000	-.14	.001
Capitalism	.25	.001	.16	.000	-.28	.000
Demographics:						
Employment Status (1,unemp/2,emp)	.23	.000	.06	.170	-.10	.021
Personal Income (if employed)	.43	.000	.21	.000	-.16	.002
Hours currently committed to job	.18	.001	.05	.360	-.07	.176
Expected hours committed to job in the future	.18	.001	.03	.620	-.19	.001
Marital Status	.22	.000	.10	.013	-.02	.669
Family Income	.20	.000	.15	.000	-.17	.000

Multivariate Results

TABLE 3 summarizes the tests of the explanatory hypotheses presented earlier. Among the variables hypothesized to be causal to both the political and consumerism gender gaps are the Rokeach political values of freedom and equality. The two variables were entered first into a stepwise discriminant procedure.⁵ Although together they significantly contributed to discriminating between the sexes, they did not completely eliminate the significance of either measure of the

⁵See Jennrich (1977) as a reference for this technique.

respective gender gaps.⁶ That is, even with the effects of freedom and equality removed, both the consumerism support scale and the Reagan economic approach ratings retained significant partial squared correlations.

Discriminant Analysis II entered the before mentioned Rukeyser variables of marital status and family income which he and others have contended account for the political gender gap. Again, these variables do significantly differentiate between the sexes but do not eliminate either the political nor the consumerism gender gaps. Both retain significant partial squared correlations with male/female group membership.

⁶It should be noted that the generally weaker interval scales measures were used since the Rokeach ranking method violated parametric assumptions.

TABLE 3. Summary of Discriminant Analyses of Explanatory Hypotheses.

Stepwise Discriminant Analysis I: Rokeach derived hypothesis (freedom and equality entered first)

Step	Variable Entered	Partial R**2	F	Prob >F	Average Squared Canonical Corr	Prob ASCC
0	Freedom and Equality				.032	.000
1	Consumerism Support Scale	.020	11.11	.001	.051	.000
2	Reagan's Economic Policy Ratings	.010	5.98	.015	.061	.000

Stepwise Discriminant Analysis II: Rukeyser derived hypothesis (marital status and family income entered first)

Step	Variable Entered	Partial R**2	F	Prob >F	Average Squared Canonical Corr	Prob ASCC
0	Marital Status and Family Income				.050	.000
1	Reagan Economic Policy Ratings	.018	10.17	.002	.068	.000
2	Consumerism Support Scale	.012	6.70	.010	.079	.000

TABLE 3 (continued)

Stepwise Discriminant Analysis III: Rokeach and Rukeyser variables considered together (freedom, equality, marital status and family income entered first)

Step	Variable Entered	Partial R**2	F	Prob >F	Average Squared Canonical Corr	Prob ASCC
0	Freedom, Equality, Marital Status, Family Income				.083	.000
1	Consumerism Support Scale	.013	7.044	.008	.095	.000
2	Reagan Economic Policy Ratings	.008	4.40	.037	.103	.000

Stepwise Discriminant Analysis IV: Rokeach, Rukeyser and producer role orientation considered (freedom, equality, marital status, family income, and personal income entered first)

Step	Variables Entered	Partial R**2	F	Prob >F	Average Squared Canonical Corr	Prob ASCC
0	Freedom, Equality, Marital Status, Family Income, Personal Income				.278	.000
1	Consumerism Support Scale	.010	3.42	.065	.286	.000
<u>Variable Not Entered</u>						
	Reagan Economic Policy Ratings	.000	.14	.711		

In Discriminant Analysis III, Rokeach and Rukeyser variables are entered simultaneously. Both gender gap measures still retain significant partial correlations. However, after the consumerism measure is entered, the Reagan support measure just barely retains significance at .05.

In the final discriminant analysis in addition to the Rokeach and Rukeyser derived variables, the measure of producer role involvement is entered simultaneously. Personal income was used as the proxy measure since it was shown in a separate analysis to largely include effects of employment status and hours currently and expected to be committed to the job.

The non-redundant effects of all these variables together seem to account for both gender gaps. One can argue that the consumerism support scale retains some potency at .065. But the Reagan measure all but disappears as a differentiating factor between the sexes.

CONCLUSION

The sample used in this study supports the existence of the political gender gap and some views commonly held by pollsters as to its nature. That is, President Reagan's approach to the economy is a major part of the gap and marital status and income differences between the sexes help account for it.

The study also attempts to show that a commensurate "consumerism gender gap" exists that is at least partially a subset of the larger political/economic gap. How one views economic power distribution in a society would seem to be related to how one views power distribution in the marketplace (e.g. between consumers and business).

The author further contends that the Rokeach identified values of equality and freedom at least partially determine one's more specific attitudes toward income and power distribution from the perceived "haves" to the perceived "have nots." The present analysis linking these variables to the political gender gap as well as the consumerism gender gap seem to merit further investigation.

Likewise, the concept identified as "producer role orientation" may be partially causal to both gender gaps. The less one is involved in an income producing role, the less supportive he/she seems to be of Ronald Reagan, the Republican party, and capitalism and the more supportive of consumerism.

Perhaps the two proposed causal constructs introduced into the gender gap discussion in this paper (i.e., equality and freedom values and producer role involvement) are largely influenced by the differential socialization experiences of

the sexes. If so, the Rukeyser view that economic recovery will largely eliminate the gap is suspect. Under the above assumption, a short term recovery can only influence relatively ephemeral causal factors such as family income, thus reducing but certainly not eliminating the gap. Any more significant dissipation of the political/economic/consumerism differences between the sexes would seem to require not only an economic recovery but a considerable reduction in single woman households and/or the long term continuation of the merging of sex associated roles and differential socialization processes.

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BLACKS IN ADVERTISING -- SOCIAL CRITICISM & MARKETER PARANOIA

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ABSTRACT

Advertising is often criticized for its portrayals of various minorities, such as blacks, working women and the elderly. The academic literature is filled with content analyses that criticize the portrayals; the advertising and marketing literature is seeing growing numbers of articles describing how to best sell products to these growing market segments. With blacks, however, there is also an extensive body of research looking at the basic reasons for negative (or nonexistent) portrayals in ads, namely, the advertiser concerns about how the larger white markets will respond to the black models. In general, research has found virtually no support for fears of a white backlash.

INTRODUCTION

During the mid sixties, marketers and advertisers began to divert more attention towards black consumers. This change of focus may be explained from two points of view.

First, civil rights organizations began to put pressures on the advertisers to increase the number of black models in their ads. Second, and probably more important, were the economic concerns; advertisers started to see the black market as an increasingly desirable target that could be more fully exploited.

SOCIAL PRESSURES VS. ECONOMIC CONSIDERATIONS

Although the economic reasons for using black models in ads are more clear cut and easier to show, the pressures from civil rights groups do not deserve to be ignored. Articles and studies on the subject go as far back as the early sixties and have appeared in many diverse publications, some of the most famous being The New York Times, Advertising Age, Printers Ink, and Journalism Quarterly. These issues were also discussed in the many industry journals. (A thorough discussion of these activities is found in Gibbs [12].)

The NAACP played an extensive role in attempting to convince advertisers to increase the number and importance of black roles in advertisements that were not intended specifically for black audiences. CORE, the Congress of Racial Equality, was also instrumental in this area. They contacted marketers and ad agencies directly requesting that blacks appear more often in ads. CORE members even threatened product boycotts to those agencies that maintained a "whites only" practice in their advertisements [12,13]. These groups wanted to

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reduce racial prejudices by using the blacks in ads to achieve social change. It was thought that more extensive and realistic use of blacks in ads would lead to reduced racial stereotypes, and ultimately, reduce prejudices [10].

While it was evident that pressures put on the advertisers by CORE and the NAACP were effective to a degree [12], it is naive to imagine that this was the advertisers' main motivation to change. One cannot be sure how much of the advertisers' concern stemmed from a sense of social responsibility and how much came from their self-interest--a wish to capitalize on changing social conditions. Also, because no matter how much it would benefit society as a whole, it is intuitively obvious that advertisers' overall practices cannot be expected to change for purely altruistic reasons [For example, see the discussion in: 15].

WHITE BACKLASH

The initial fear of advertisers when using black models was the possibility of a white backlash, the negative reaction of the white consumers to these ads. Traditionally, messages were directed towards whites with the hopes that black consumers would also pick up on them [20]. Practitioners feared that sales response would be adversely affected if the ads were integrated and tried to appeal to the two "distinct" market segments at once. Since whites were by far the largest market, advertisers were reluctant to take the chance.

Many studies were conducted during the late sixties and early seventies to see if there was a "backlash" from the white consumers. They usually had similar intentions with their hypotheses, but many varied in their research methodologies. In general, the earlier studies concerned themselves with attitude changes of white consumers for ads containing integrated, white, and black models. The first such study concluded that whites' responses to integrated ads or ads containing just black models was indifferent or slightly positive [1]. These results were echoed by a host of other researchers as the decade went on.

Guest [14] made four different magazine ads, each containing a secretary and an executive, varying the race of the models, making them both white, one black, then the other, and finally both black, and failing to find any clear cut differences between the attitudes toward the companies portrayed in the different ads. In addition, Guest reported positive responses by whites to the integrated ads regarding attention and the amount of comments his subjects had on the ads. Based on these results he concluded that, "Advertisers need not be fearful of adverse effects on the use of negro models, either by themselves or integrated with whites" [14, p. 33].

Schlinger and Plummer [19] did a similar study using television ads. Their findings were consistent with Guest's; they found no significant difference in the subjects' involvement with the characters, their perceptions of the message, or their perceptions of the products when blacks and whites were used as models in the ads. Tolley and Goett [21] had reached these same conclusions in their study of whites' responses to blacks in a different medium, newspapers.

Stafford, Birdwell and Van Tassel [20] did an experiment using very different methodology. They felt that questionnaires, interviews, and projective techniques might not be accurate, for it is difficult to get at personal attitudes and feelings by these means. One might misreport private thoughts to prevent looking prejudiced. They therefore used an indirect measurement, an eye camera which is an electronic device that measures pupil dilation and/or eye movement. Again, their findings were consistent with the main body of research. They concluded that there was no adverse reaction by whites to integrated ads. In fact, these ads had a higher rating in almost every category used to evaluate them.

Schlinger and Plummer also found a positive response from the black audience. Black models brought out more empathy with the characters, more interest in the ads, and a more positive reaction toward the advertised brand. The findings showed this trend was not only evident in the all black ads, but carried over to the integrated ads as well. They reported:

In short, all of the available studies on specific advertising stimuli, including the present research, suggest that advertisers can increase their effectiveness among blacks by using black models [19, p. 153].

Another study by Choudhury and Schmid, concluded that:

As the results of this study clearly indicate, the use of black models in ads may very well determine to a great degree who gets how much of the over \$30 billion Negro market. . . .

It would appear that the use of black models could be a very positive approach to the black market without necessarily adversely affecting the white market [8, p. 22].

The only study that found strong negative reactions by white consumers to black models in advertising was by Cagley and Cardozo [7]. Controlling the variable of prejudice, highly prejudiced whites were found to react negatively to integrated advertising whereas less prejudiced whites were found to react the same to white, black and integrated models. Cagley and Cardozo interpreted their results to mean that the response from less prejudiced whites would not be offset by the strong negative reactions of highly prejudiced white

consumers. These results stood for many years as an indication of the potential "white backlash" to integrated advertising. However, when Bush, Hair and Solomon attempted to replicate this study in 1979 they found only one interaction effect of prejudice on white response to black models in advertising and that effect was felt to be virtually nonexistent, an artifact of the research setting, because of its low strength and that it was the only significant finding yielded by 48 separate F-tests [3].

Despite their failure to replicate the Cagley and Cardozo findings, Bush *et al* warned that there might have been an interaction between level of integration and product type and that an impact might be found with a socially consumed product. A later study by Reid, Rotfeld and Wilcox looked at the reactions of whites to ads for a socially consumed product, wine, using a romance theme and 5 ad variations: product alone, white couple, black couple, and male-black, male-white racially mixed couples. They found differences in white responses only in terms of price perceptions, and those were quite small and not related to factors of the race of the models [16].

SALES RESPONSES

Bush, Gwinner, and Solomon [2] used point of purchase displays to show direct sales impact. They set up displays in supermarkets picturing black, white, and integrated models, and recorded how each influenced the sales response of white consumers.

They found no difference in the purchasing behavior of white consumers, regardless of whether the displays' models were white, black, or integrated. They concluded that the fear of white backlash was unfounded and there was no reduction of sales. These results were consistent with the research on attitudes of white consumers.

Bush, Solomon and Hair [5] examined whites and blacks' sales responses to black models. The methodology was similar to the previous study. They again found no evidence of an adverse reaction by the white consumers, but they also found no increase in the purchasing of black consumers from any of these displays.

Bush and Solomon [4] was another study testing direct sales response of blacks and whites. They purportedly used bath soap and wine for their products to re-examine the relationship that black and white models have on personal products and socially consumed products. However, in this study, the experiment's design was varied. They set up a television viewing room to show programs to their subjects. Interspersed with the programs were the ads for the study. After the subjects viewed the programs, they were given free gifts as "payment" for their participation and these gifts were used as a surrogate measure of sales responses. The effectiveness of the ads was judged on the proportion of the subjects that chose the advertised product over the non-advertised product for each of the three categories—white models, black models, and integrated models. Their conclusions supported previous

research; they found no evidence of negative "sales" responses of white consumers to the black models. However, they differed from some of the previous studies in that they found that the black models had a positive impact on "sales" to the black consumers.

ROLE CHANGES AND AUDIENCE SEGMENTS

Before civil rights groups made integrated advertising an issue, messages were directed toward whites with hopes that any blacks that were exposed to them might pick up the intended messages also. Blacks were viewed as a distinct market segment, and any attempts to reach them on a large scale were through distinctly different appeals. Advertisers were afraid to appeal to the two distinct segments with one ad for fear of alienating the larger white market [20].

With the start of integrated ads in the early 1960's, there was still a great deal of stereotyping of blacks. In 1965, blacks, when they appeared, portrayed a disproportionate number of fashion models (in ads for clothing), entertainers (in ads for records), and exotic foreigners (in ads for travel and tourism). It has also been noted that there was an absence of blacks in ads for medicines, automobiles, products such as toothpaste, deodorants, ready to eat cereals, detergents and other soap products [19]. Dominick and Greenberg made several categories of roles: major/background, product holding, speaking/nonspeaking, announcers, and with/without whites [11]. They found that compared to the previous decade, there was an increase in the amount and proportion of blacks in more prestigious roles. However, they also found blacks were more likely to be used in public service or station promotionals than product ads. Bush, Hair, and Solomon updated Dominick and Greenberg's study in 1977 [6]. They found the trend for blacks to appear in more prominent roles had continued. They also found, like the earlier study had, that blacks were often out of focus or in background roles, and although their use was on an upswing, they were still most likely to be seen in ads with a lot of surrounding whites. A major difference from the findings of Dominick and Greenberg was a substantial increase in the number of blacks used in product ads. Based on their findings, they concluded that advertisers have made a great deal of progress in using more black models and giving them better roles. Reid and Vanden Bergh [17] echoed these findings. They cited studies, starting from the 1940s, showing that as time progressed the number of roles increased and the roles themselves were upgraded. They also concluded that there is a great deal of evidence showing increased efforts by advertisers to more fully integrate their ads, whatever their reasons may be (although there is still room for improvement).

CONCLUSIONS AND IMPLICATIONS FOR OTHER MINORITIES

With so many criticisms about advertising's portrayals of various minorities, consumerists might often wonder why the advertisers do not simply

alter the portrayals. We can reply to the consumerists by returning to the premises we set up in our introduction. When one realizes that advertisers will not be motivated to change because of a desire to be socially responsible, the question is answered.

Traditionally consumerists' research about elderly and women has taken two orientations: 1) content analyses that criticize the portrayals, and/or 2) studies about how firms can best appeal to these growing market segments. To a consumerist, future research will have more impact if it appeals to the advertisers' motives for using these portrayals. This must be done by showing that there is a desirable market to be reached here and that it can be reached without hurting existing market segments.

Even though advertisers will not change for the "highest" of ideals, they will probably change. A good consumerist should first try to understand the motives of business practitioners in order to present a case in the most persuasive manner.

With research on black models in advertising, one can easily conclude that the white backlash in a fiction, a paranoia of marketers, that has been upheld only in one old study that yielded opposite results when replicated. Ads are (slowly) starting to change. Research on responses to the elderly or working women are much more limited, but are coming to comparable conclusions [e.g., 18].

In effect, the research on reactions to blacks in advertising stands as an example of how consumerists should not simply act as critics, but may also try to provide data that gives businesses a reason to change behavior in the desired directions.

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COMPARISON OF THE THRIFTY FOOD PLANS: COSTS AND CALORIES

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ABSTRACT

Responding to the criticisms of its former plan, USDA recently published a revised Thrifty Food Plan. In order to evaluate the success of the new plan in silencing the critics, this research compares the calorie level and time and money costs of the two plans.

INTRODUCTION

The U.S. Department of Agriculture (USDA) has recently revised its Thrifty Food Plan (1983 TFP), the least costly of the four USDA plans. Justification for the revision was based on four significant areas of change which made the 1975 Thrifty Food Plan (1975 TFP) out of date [15].

1. Dietary standards for the 1975 TFP were based on 1974 Recommended Dietary Allowances (RDA). The RDA's were revised in 1980, increasing the recommended levels of intake for several nutrients including vitamin C [9].
2. The nutritive value of some foods changed. For example, the enrichment levels of certain B vitamins in bread and flour were increased in 1975 [15, p. 34701].
3. The 1975 TFP was formulated using the food consumption patterns of households with relatively low food costs in the 1965-66 Consumer Expenditure Surveys. New data on the food expenditure patterns of low-income consumers were available from the 1977-78 Nationwide Food Consumption Survey [15, p. 34701].
4. Relative prices of specific foods have changed since 1975 necessitating changes in the proportional representation of some foods in the plan in order to maintain the low cost [15].

The 1983 TFP provides a detailed list of foods in 31 different groups for 11 sex-age categories in contrast to the 1975 TFP which specified foods in 17 groups for 14 sex-age categories. Minor revisions in age groups were also made in the new plan; for example, the categories for older women and men were changed from 55 and over to 51 and over [1].

The major differences in the 1975 and 1983 TFP's result from changes in both food consumption patterns and dietary standards. For example lower standards for fat, cholesterol, and sweeteners in 1983 plus changes in eating habits resulted in lower quantities of fats, sugars, bakery products, and eggs specified in the 1983 TFP. However, larger amounts of meats, dry beans, vegetables,

fruits, cereals, and flour were included in the new plan, partly to help provide desired levels of folacin and zinc, nutrients not considered in the development of the 1975 TFP [15, p. 34701].

The two plans have some similarities. Both provide a five percent allowance for food waste. The cost of the 1983 TFP will be updated monthly using the Bureau of Labor Statistics Consumer Price Index for food as was the 1975 TFP. According to USDA spokesperson Betty Peterkin, the general cost level of the 1983 TFP is approximately the same as for the 1975 TFP. However costs for some sex-age categories such as women over 50 and children one to five are higher in the revised plan while costs for other sex-age categories, including men 20 to 50, are lower. Both plans also assume that all foods are prepared at home. The decreased number of bakery products and other commercially prepared grain mixtures [10] suggests that greater time may be required for preparation of foods in the 1983 TFP, however.

Criticisms of the 1975 TFP -- that it was based on outdated food consumption patterns and dietary standards and that it was nutritionally inadequate [4] -- were addressed in its revision. The feasibility of purchasing the plan at the prescribed costs was also questioned. This was, and continues to be, an important issue since food stamp allotments are based on the cost of the TFP. Many of the factors making the actual cost level of the 1975 TFP questionable apply to the revision as well. For example, the 1981 Omnibus Reconciliation Act mandated annual rather than semiannual adjustments in food stamp allotments, setting October 1 as the date for adjustment. In further cost-reducing action in 1982, Congress required that the adjustment be based on the increase in the cost of the plan minus one percent [2,3]. Thus food stamp allotments based on the 1983 TFP will continue to lag four to 15 months behind food prices and the annual increases will be less than food price inflation.

Testifying before a 1981 Congressional subcommittee, Lynn Parker, Society for Nutrition Education, succinctly pointed out inadequacies in the Food Stamp Program and the 1975 TFP. Many of the concerns she raised may also be relevant to the revised plan. Ms. Parker noted that families have to be able to buy food at nationally average prices as well as to find the money for sales tax which is not included in the cost of either plan. Families have to be able to purchase in bulk and store large quantities. All family members must be healthy with no special dietary needs, no pregnant women, teenage males, or persons engaged in heavy physical activity. Food waste must be kept to five percent, although the results of one study showed the national average is 25 to 30 percent [16, pp. 454, 456].

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In summary, while the revision of the TFP may have addressed criticisms of its nutritional adequacy, the feasibility of purchasing the foods in the plan on a food stamp allotment remains an important question. Not only does the plan serve as a basis for food stamp allotments but it is also widely used to make food budget recommendations. Its validity is therefore a vital concern.

OBJECTIVES

The purpose of this paper is to:

1. Compare the 1975 TFP and the 1983 TFP with respect to:
 - a. total caloric value and distribution of calories from fats, proteins, and carbohydrates;
 - b. money costs; and
 - c. time costs of meal preparation.
2. Compare the cost of the 1983 TFP with the current maximum food stamp allotment for a four person family.

PROCEDURES

The 10 day market order of the 1975 TFP and the 7 day market order of the 1983 TFP along with the accompanying menus and recipes published by USDA served as the basis for this research [17,18]. The market orders list specific foods to be purchased along with specified quantities. The sample menus and recipes recommend preparation methods for use of the foods.

Calorie Comparison

The quantities recommended for purchase were converted to edible weights using a standard reference [19]. Allowances were made for losses due to cooking as well as trimming fresh fruits and vegetables. No allowance for discard of edible food was included.

The Nutrient Dietary Data Analysis[©] System, an optical character reader system at Southern Illinois University, Carbondale, was used to assess the energy content of the USDA sample menus. The system, which uses a modified version of Ohio State University's Nutrient Data Base, has been used for a variety of studies, and its reliability has been documented [13]. The program print-out gave the amount of energy available to the four person family for each of the two sample menus as well as the percent of calories from protein, carbohydrate, and fat. The total energy intake was divided by 10 for the 1975 TFP and by 7 for the 1983 TFP to provide an average daily value for comparison to recommended levels [5].

Money Costs

The foods listed in the two market orders (including spices, condiments, and beverages) were priced in a large national chain supermarket in Carbondale, Illinois, and a grocery affiliated with a regional chain in a rural Southern Illinois community (population, 970). Data were collected for the 1975 TFP in March 1983 and for the 1983 TFP in October 1983. Two trained surveyors collected the

data using two assumptions. In the first, it was assumed the shopper could afford the higher item prices of large sizes with no restrictions imposed on total expenditures. Therefore, the surveyors were to identify the items with the lowest price per unit. The only restrictions were that institutional sizes were to be excluded and that, for certain perishable products such as bread and milk, only the quantities to be used in the market order period would be purchased.

In the second set of price data, the assumption was made that the shopper must limit the total expenditure. The surveyors were to identify the items with the lowest item price in a size as close as possible to the quantity actually to be used in the market order period.

The two sets of price data were each used to calculate two cost estimates for each food plan: cost in use and grocery expenditure. Cost in use was defined as the cost of the quantities of the foods to be used during the market order period. Grocery expenditure was defined as money needed to purchase the actual items selected by the surveyors. When larger quantities would be purchased than would be consumed during the market order period, grocery expenditures would be greater than costs in use.

Costs in use were calculated by first determining the unit price of each item selected and then multiplying the unit price by the quantity to be used during the market order period. Grocery expenditures were calculated by summing the item prices of the surveyors' selections.

For example, when no size restrictions were imposed, the surveyors selected a 32 ounce jar of salad dressing at 85 cents as the "best buy." At a unit price of 2.7 cents per ounce, the cost of the 10 ounces to be used during the market order period was 27 cents compared to a grocery expenditure of 85 cents. In contrast, when total grocery expenditures were limited, the surveyors selected a 16 ounce jar at 79 cents. The cost in use of the 10 ounces (at 4.9 cents per ounce) was 49 cents versus a grocery expenditure of 79 cents.

Not all food items needed to be replaced each shopping trip. In order to compare grocery expenditures to the food stamp allotment, a monthly average expenditure was computed by adding the expenditures required each month over a six month period and dividing by six.² This method also yielded a range of monthly expenditures. Average expenditures were computed using each set of price data.

Time Costs

To compare the relative time costs of preparing and serving the 1975 and 1983 TFP sample menus, five categories of time intensity were identified. The

²Since the 1975 market order was for 10 days and the 1983 market order was for 7 days, two additional days' menus were randomly assigned to each of the six months for the revised plan to increase the total number of days in a four week period from 28 to 30. This made direct comparison between the two plans possible.

Table 1. Calorie Information Comparisons.

	1975 TFP		1983 TFP	
	Individual ¹	Family ²	Individual ³	Family ⁴
Average Daily Kilocalories	2713	8350	1964	7640
Recommended Energy Intake	2700	9500	2000	8800
Percent of Standard	100.5%	87.9%	98.2%	86.8%
Percent of Calories From:				
Protein	13%	13%	19%	19%
Fat	36	36	17	17
Carbohydrate	51	51	64	64

1. Male, 20 to 50 years of age.

2. Male and female adult, ages 20 to 50, and two elementary school age children.

3. Female adult, age 20 to 50.

4. Female adult, age 20 to 50, and three children, ages 3 to 5, 6 to 11, and 12 to 14 (male teen).

categories ranged in time required from relatively simple tasks (serve canned peaches, toast bread) to very time consuming menu items (prepare and serve beef chuck roast with vegetables and gravy). The categories were developed considering not only the time required for actual preparation but also time necessary for the other two stages of food preparation -- "get ready and clean up." A panel of three home economists specializing in food and nutrition were given the definitions. They were instructed to place into one of the five categories each of the 111 menu items in the 1975 TFP sample menus and each of the 80 menu items in the 1983 sample menus. The percent of menu items falling into each of the five categories was computed for each food plan.

The distribution of calories from protein, fat, and carbohydrate was significantly different in the two plans. The percent of calories from protein was 6 percent higher in the 1983 TFP (19 percent compared to 13 percent) and the percent of calories from fat in the 1983 TFP (17 percent) was nearly one-half that of the earlier plan (36 percent). Thus it appears that one objective of the revision, to reduce the fat content of the diet, has been met.

Due to differences in the composition of the sample families, the calorie level of the new plan was approximately 9.3 percent below that of the 1975 TFP. Therefore, in order to make comparisons on a similar basis, the costs and expenditures for each category for the 1983 TFP were increased by 9.3 percent.

RESULTS

Calorie Comparisons

Table 1 reports the results of the calorie comparisons. One major difference between the 1975 and the 1983 sample menus should be noted. The 1975 sample menu was prepared for a four person family consisting of two adults, a male and a female, and two preschool or elementary school age children. The 1983 sample menu used a sample family composed of one female adult and three children, ages 3 to 5, 6 to 11, 12 to 14.

If the foods in the sample menus were equally divided among the four person family, the 1975 TFP provided 2713 calories for the male adult, just over 100 percent of the 2700 calories recommended. The caloric level of the 1983 TFP for an individual (1964 calories) was 98 percent of the 2000 calories recommended for a female adult. Neither plan provided more than 88 percent of the energy requirements for the two four person families. However, the ability of the two plans to meet the energy needs of the individual adult as well as those of the entire sample families appears not to be significantly different.

Money and Time Costs

Table 2 reports the cost and total expenditure required to purchase the foods in the two plans for the shopper with no size restrictions.³ Looking first at the costs in use for the urban shopper, the results indicate that the cost of the actual quantities of foods used in the 1975 TFP during a month were \$180.63 and \$212.24 (17 percent higher) for the 1983 TFP. Costs of the 1983 TFP for the rural shopper were considerably higher than for the urban shopper, and the cost of the 1983 TFP (\$254.73) was 11 percent higher than the cost of the 1975 TFP (\$229.14).

³The April 1983 Consumer Price Index (CPI) for food was compared to the latest available (September 1983) to determine whether inflation was a significant factor requiring adjustment of the cost estimates prior to comparison. Overall, the CPI for food at home decreased by .3 percent during the five month period. Therefore, no changes in cost estimates were made to reflect the relatively minor effects of inflation.

Table 2. Costs and Expenditures Without Restrictions on Total Expenditures.

	Urban		Rural	
	1975 TFP	1983 TFP	1975 TFP	1983 TFP
Costs in Use				
Monthly	\$180.63	\$212.24	\$229.14	\$254.73
Total Expenditures				
Average Monthly	\$185.39	\$216.08	\$234.82	\$257.64
Range	\$175.42- 216.14	\$201.63- 255.44	\$221.30- 266.14	\$244.94- 297.96

The maximum monthly food stamp allotment is \$253.

Total grocery expenditures are also shown in Table 2. The average total monthly grocery expenditure for the rural shopper purchasing the foods in the 1983 TFP (\$257.64) was higher than for the urban shopper (\$216.08). Compared to the 1975 TFP, average expenditures for the 1983 TFP were \$31 higher (17 percent) for the urban shopper and \$23 higher (10 percent) for the rural shopper. Expenditures for the 1975 TFP, ranging from \$175.42 to \$216.14, were all below the maximum monthly food stamp allotment of \$253 for the urban shopper as were expenditures in five of the six months for the 1983 TFP. For the rural shopper expenditures for the 1975 TFP were above the maximum allotment by \$13 for one month as well as for the 1983 TFP by \$45. Although the average expenditure for the 1975 TFP was below the maximum allotment by \$18 for rural shoppers, the average expenditure was \$4.64 above the maximum allotment for the 1983 TFP.

Table 3 reports the same data for the shopper who must restrict the sizes bought because of limited purchasing power. Again, rural shoppers' costs and expenditures were higher than those for urban shoppers and the costs and expenditures for the 1983 TFP were higher than for the 1975 TFP. In addition, costs for the revised plan were 20 percent higher for the urban shopper and 10 percent higher for the rural shopper.

Comparing results in Tables 2 and 3 indicates that limiting sizes purchased imposes a financial penalty on consumers. For the urban shopper costs were \$14 higher for the 1975 TFP and \$22 higher for the 1983 TFP when sizes were restricted. The penalty was smaller for the rural shopper at \$8 for the 1975 TFP and \$7 for the 1983 TFP.

When size restrictions were imposed, expenditures for the urban shopper were below the maximum food stamp allotment in each month for the 1975 TFP and \$13 above the maximum in one month for the 1983 TFP. For the rural shopper, the average expenditure was approximately \$12 below the maximum food stamp allotment for the 1975 TFP and \$10 above for the 1983 TFP. Expenditures for the 1975 TFP were \$9 above the food stamp allotment for one month

Table 3. Costs and Expenditures with Limited Expenditures.

	Urban		Rural	
	1975 TFP	1983 TFP	1975 TFP	1983 TFP
Costs in Use				
Monthly	\$194.40	\$234.11	\$237.27	\$261.38
Total Expenditures				
Average Monthly	\$197.57	\$236.37	\$240.61	\$263.02
Range	\$185.96- 219.72	\$227.63- 266.25	\$232.50- 262.16	\$251.39- 296.18

and from \$2 to \$43 above the maximum in five of the six months for the 1983 TFP.

Table 4 reports the raters' evaluations of the relative time intensity of the items in the sample menus. The evaluation indicates that the 1983 TFP requires more time in meal preparation. A greater percentage of items were in Categories IV and V in the new food plan than in the 1975 TFP. Much of the difference is due to decreased use of commercially prepared foods and mixes in the new plan.

Table 4. Relative Time Intensity of Food Preparation.

Category ¹	1975 TFP		1983 TFP	
	Number	Percent	Number	Percent
I	52	46.9%	30	37.5%
II	29	26.1	22	27.5
III	16	14.4	12	15.0
IV	9	8.1	10	12.5
V	5	4.5	6	7.5
Total	111	100.0%	80	100.0%

¹Listed in increasing order of relative time intensity.

DISCUSSION

The results of the calorie comparison indicate that the 1975 and the 1983 TFP do not vary greatly in their ability to meet the energy needs of the respective sample families. While both plans provide approximately 100 percent of the energy needs of an adult, neither plan provides more than 88 percent of the energy needs of the four person sample families. Additionally, if the family included a pregnant woman or anyone involved in hard manual labor, the energy level would be well below the recommendation.

The stringent five percent waste allowance underlying the plan makes it appear less likely that many low-income families will receive adequate energy levels following the 1983 TFP, however. Based on the 25 to 30 percent national rate for food discard, both the 1975 and the 1983 TFP's provide far fewer calories than is desirable. However, one objective of the revision, to reduce the fat content of the diet, was achieved.

Analysis of the money costs of the two plans indicates that purchasing the 1983 TFP requires a higher expenditure. For the urban shopper, purchasing the foods in the 1983 TFP would require an expenditure 16 percent above that necessary to acquire the same number of calories through buying the foods in the 1975 TFP. However for both plans the average expenditure was below the maximum food stamp allotment for a family of four for the urban shopper. The higher prices paid by rural shoppers are a concern. Since the average monthly expenditure was above the maximum allotment, it seems unlikely that rural shoppers could acquire the diet on a food stamp allotment.

As expected, a lower cost in use and grocery expenditure were estimated when larger sizes were selected. This shopping strategy is realistic however only for large households or those with adequate knowledge and storage facilities to use the foods before spoilage occurs. Furthermore, this strategy ignores all possible quality and brand preferences.

The results indicating that in the urban store it is generally possible to purchase the foods in the plan at the cost allowed should also be interpreted with caution. There are many reasons why individual consumers either could not or would not be likely to purchase the plan at the costs estimated in this research. Many of the selections made by the surveyors were generic or store brands based on their instructions to unit price in order to find the lowest cost items. Generic products are often not available in small stores or in rural areas [20]. Lower income consumers are less likely than others to select generic products even when available [8,11]. Furthermore, they often do not own automobiles or live within walking distances of supermarkets [14].

The costs estimated in this research were also based on the assumption that no errors were made in unit pricing. This is obviously an erroneous assumption for most consumers regardless of their incomes, since in five research studies error rates in using unit pricing ranged from 34 to 54 percent [12]. Moreover, research has indicated that consumers with low educational levels [7] and low incomes [6] use unit pricing less often than well educated, middle-income consumers. Therefore, low-income consumers who do not accurately unit price appear likely to pay prices much higher than those estimated here.

It is recognized that this study has limitations. Most importantly, data were collected in only two stores in one county. Thus the results may not be typical of other localities.

In summary, one objective of the revision, to reduce the fat content of the diet, seems to have been achieved. However, higher money and time costs will be incurred by those following the 1983 TFP. Consumers will need to better utilize existing knowledge and skills or acquire those necessary to efficiently purchase and use foods to reduce food waste, meet nutritional requirements, and lower food costs. Homemakers who incur high opportunity costs in food preparation may need to find ways to increase their efficiency in preparing meals or find additional resources to purchase convenience foods without sacrificing nutritional quality. Programs designed to provide low-income families with nutrition education, comparative shopping skills, and improved food management techniques will be important.

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IMPACT OF CONSUMERS' PERSONAL CHARACTERISTICS ON
HEDONIC PRICES OF ENERGY-CONSERVING DURABLES

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ABSTRACT

The sample was disaggregated by demographic characteristics of consumers who bought houses between 1971 and 1977. For each subset of consumer determinants of housing prices were estimated using regression analysis and hedonic price theory. Implicit prices of energy-conserving features of houses were focused upon. The implicit prices of these features varied with demographic characteristics of consumers.

Demand theory as outlined by Lancaster and others [1, 20, 32] assumes that all consumers' preferences are ranked similarly, i.e., all consumers recognize and agree on which characteristic is the most important, which the second most important, etc., in determining the quality of a good. Thus the relative prices for each attribute imputed with regression analysis for an aggregated sample of consumers equal the relative prices resulting from a competitive market and are invariate over the market.

If, however, consumers' tastes vary it is likely that their preferences and thus the prices they pay for different attributes of the same good will also vary. For example, large families may place a higher value on house size and the school system than small families. Older families may prefer single story houses while younger ones may prefer the separation of rooms offered by two stories; the preferences of families with high incomes may be very different from those with middle incomes. If segments of consumers vary in their definitions of quality then the prices imputed from aggregated data are not likely to accurately reflect the preferences of all the consumer market segments included.

The purpose of this study was to compare hedonic prices of energy-saving attributes of houses estimated in aggregated and disaggregated samples. The disaggregation was by demographic characteristics of consumers who bought houses in the Columbus, Ohio SMSA between 1971 and 1977. It was realized that hedonic prices result from the interaction of both demand and supply forces [32], however only the personal characteristics of consumers are considered herein.

Straszheim [35] pointed out that urban areas often have geographically insular, unique, submarkets. He estimated a hedonic regression for

a large metropolitan area and then for submarkets and found that the attribute prices varied in each equation. Schnare and Struyk [33] using similar logic found similar patterns.

Geographic market segmentation is a function of the supply of types of housing and neighborhood features which remain relatively fixed over extended periods due to the durability of the housing and community stock. In addition market segmentation, as Muellbauer [25] pointed out, may also be a function of socioeconomic characteristics of consumers such as income. In Columbus, as in other cities, many neighborhoods are similar in housing and community qualities but different in types of consumers residing there.

Assuming homogeneous consumer preferences has important implications for homeowners who consider investing in energy-conserving durables but who recognize they won't live in the house long enough to accrue sufficient fuel bill savings and comfort to compensate for the capital costs. Estimating positive implicit prices for insulation, for example, using an aggregate sample, implies that all sellers can rely on receiving a salvage value for the extra insulation at time of sale. This reduces risk and thus encourages homeowners to retrofit. If however, preferences vary, the homeowner's risk increases as the salvage depends upon the characteristics of buyers interested in his or her house.

HYPOTHESES

Determinants of Energy Consumption

The determinants of energy consumption for heating include the economic and environmental factors of price and climate [5, 7, 23]. Structural characteristics positively related to heating fuel consumption include the size of dwelling, energy-conserving features, structural condition and age of the house [11, 25, 27, 38].

Demographic factors have also been demonstrated to affect fuel usage. Energy consumption has been shown to be positively related to household income and size and tends to be lower in young and old families than in middle-age families [25, 27]. Behavior has also been demonstrated to have a significant impact upon energy consumption and many of these behaviors are closely linked to demographic factors [39].

Because of their higher levels of energy consumption buyers with larger households and

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those entering or in the middle stages of the family life cycle would be more likely to incorporate the thermal efficiency into sale price than would buyers from smaller families and those who were young or old. Buyers with higher incomes, and thus higher consumption rates, have the incentive to at least partially capitalize the value of energy savings into their bid prices. However, fuel bills tend to consume a lower percentage of income for higher than lower income households. Furthermore the marginal increment for sale price for extra thermal efficiency will be financed at the mortgage rate. If the real mortgage interest rate exceeds zero, which is likely, it will be less expensive for them to pay for additional insulation in cash later. If the household can't pay outright for the retrofit the real interest rate on the mortgage may be less than that of a home improvement loan and thus may be an incentive to lower-middle income households to capitalize insulation and other retrofit devices.

Determinants of Energy Conservation

There is a dearth of literature on factors determining actual conservation efforts. Smiley [34] found the probability of installing insulation to vary by income level. Poor consumers were the least likely to have added insulation whereas those with incomes in the next group, \$15,000-\$20,000, were the most likely. Those with incomes between \$20,000 and \$30,000 were the second least likely to have added insulation. Gladhart [11] found a positive relationship between income and conservation for the combined years 1975-78 and 1973-1978 but generally no relationship was found in the individual years.

Gladhart [11] found age unrelated to conservation while in Smiley's [34] study the only relationship between age and conservation was the positive one for consumers aged 30 to 50 years. Family size was positively and statistically significantly related to conservation efforts in some years [11]. In neither of these studies was education included as a determinant of conservation.

Conservation efforts may be related to likelihood of capitalizing energy efficiency into sale prices. If consumers had improved the thermal efficiency of previous homes or apartments they may have been concerned enough to consider the thermal efficiency of the most recent homes purchased. Based upon the findings above it is unlikely that people with low incomes would capitalize the value of insulation into sale price, people with middle levels of income would be more likely to do so. Those in the middle age groups would be more likely than old or young consumers to capitalize values of energy-saving features into sale price and is consistent with their relative consumption rates as well.

Based on efforts to conserve it is likely that larger families would also be more likely than smaller families to account for thermal efficiency in sale price. This conclusion is also consistent with that based on the consumption rates.

Education should be positively related to likelihood of capitalizing sale price because it enables consumers to make better decisions. Educated people should have more knowledge of the importance of the various energy-conserving techniques to reducing consumption and better ability to determine whether potential houses contain the energy-conserving features. They should also have better ability to perceive probable future energy prices.

Determinants of House Values

Housing can be described as a function of the attributes of service flows of which it is composed and for which it is demanded. Thus the sale price of housing is seen as a function of the prices of each of the attributes of the home. This study hypothesizes that the determinants of housing value are as follow:

$$P_{it} = P_{it} (S_{it}, A_{it}, PS_{it}) \quad (1)$$

where P = sale price of house i,
 S = a vector of structural characteristics including energy-influential characteristics,
 A = a vector of accessibility characteristics,
 PS = a vector of public service characteristics,
 i = refers to the individual house,
 t = refers to the time period.

In addition this study posits that the imputed values of the determinants will vary with the demographic characteristics of the buyers of the houses.

From the information gained from previous research and intuition the following hypotheses were generated to be tested in this study.

1. Households with middle-aged heads buying houses were more likely than those with younger and older heads to have paid extra for energy-conserving features.
2. Larger households buying houses were more likely than smaller households to have paid extra for energy-conserving features.
3. Households with middle and upper-middle level incomes, buying homes, were more likely than those with lower-middle or higher incomes to have paid extra for energy-conserving features.

4. Households buying homes whose heads had higher levels of education were more likely than those with lower levels of education to have paid extra for energy-conserving features.

SAMPLE AND DATA

Columbia Gas of Ohio provided gas meter records of 1973 monthly gas consumption for residences located in the Columbus, Ohio, Standard Metropolitan Statistical Area (SMSA). In 1978 a questionnaire was mailed to the addresses on the consumption records. The questionnaire provided information about the structural characteristics of the house, especially those related to energy consumption, demographic and attitudinal characteristics. Fifty-four percent of the questionnaires were returned. Approximately one-sixth, 436, of the single family detached homes were sold between 1971 and 1977. These were the homes composing the sample for this analysis.

All sample homes were previously owned, single family detached dwellings which were presently owner-occupied and heated with natural gas. New homes were excluded as their prices were assumed to be derived more from building costs than the prices of existing houses where the latitude for achieving equilibrium of demand and supply bids was greater. The sample was limited to detached, owner-occupied single family dwellings in order to ensure that energy costs were borne solely by the buyer, rather than a renter as would likely have been the case for multiple unit dwellings. Also, most homes in the Columbus SMSA are of this type, allowing generalizability.

In addition to the questionnaire data, data were gathered from the Columbus, Ohio, Multiple Listing Service, county tax and deed records, the U.S. Census and the Ohio Department of Education. Variables by source are listed in the Appendix. Data components were matched by address. A few sample members were eliminated due to missing data. Missing structural characteristic data were supplied by Multiple Listing Service and tax data where possible. Census data were substituted for missing demographic data, otherwise means from the questionnaire data were employed.

VARIABLES

Variables used in this analysis were of three types, 1) independent variables describing the house; 2) independent variables characterizing the buyers of the house; 3) the dependent variable; and 4) a time trend variable. Each will be briefly discussed.

Housing sale price has been demonstrated to be a function of structural characteristics including those affecting energy usage, accessibility and public service characteristics [6, 12, 15, 16, 18, 19, 21, 28]. Selected measures

of structural characteristics used herein were house size, number of stories, age of house and number of bathrooms, thus accounting for size, age and arrangement of space. The contributions thermal efficiency makes to housing sale price have been estimated by Halvorsen and Pollakowski [14], Johnson and Kaserman [17], and Zaki and Isakson [41]. Variables used to measure thermal efficiency were inches of wall and ceiling insulation and the presence of wood or vinyl versus aluminum window frames.

Variables measuring characteristics of buyers included education and age of household head, size of household, annual household income in 1978, and per capita income. The demographic variables were categorized for use in this analysis. The categorizing process aimed to achieve distinctive categories within the confines of sample size necessary for the analysis.

Variables selected to reflect the characteristics of both houses and buyers are defined in the Appendix, means are reported in Table 1, frequencies of demographic characteristics in Table 2.

Table 1. Means and Standard Deviations of Variables

Variables	Mean	Standard Deviation
Total sale price of house 1980 dollars	52017.79	23183.54
Inches of wall insulation	1.22	1.30
Inches of ceiling insulation	4.15	1.80
Presence of wood/vinyl window frames	0.35	0.48
House size	1297.29	430.38
House age	22.02	16.03
Stories of living area	1.63	0.67
Number of bathrooms	1.65	0.64
Distance from CBD	6.75	2.13
Pupils per teacher	23.48	2.38
Sale year	1974.47	2.30

The dependent variable was sale price of house inflated to 1980 dollars. Sale price was inflated with the Boeckh Construction Price Index for Columbus, Ohio. The Boeckh Index was used rather than the CPI as it better reflected local building costs.

A time trend variable was the year of sale of the house. It was included to capture variations in the dependent variable due to omitted variables that may have been highly correlated with time. As the most important omitted variable was probably consumers' inflationary expectations, the time trend variable was expected to have had a positive and statistically significant effect on sale price.

Table 2. Frequencies of Demographic Variables

<u>Education of Household Head</u>	<u>n</u>	<u>Percent</u>
1. High school graduation or less	148	34
2. Technical training, college graduation or less	130	30
3. Post graduate training	158	36
	<u>436</u>	<u>100%</u>
<u>Age of Household Head</u>		
1. Less than 32 years	123	28
2. 32 to 46 years	191	44
3. More than 46 years	122	28
	<u>436</u>	<u>100%</u>
<u>Household Size</u>		
1. 1 or 2 members	121	28
2. 3 or 4 members	220	50
3. More than 4 members	95	22
	<u>436</u>	<u>100%</u>
<u>Household Income</u>		
1. Less than \$22,500	75	17
2. \$22,500 to \$29,999	143	33
3. \$30,000 to \$39,999	96	22
4. More than \$40,000	122	28
	<u>436</u>	<u>100%</u>
<u>Per Capita Income</u>		
1. Less than \$8,135	155	35
2. \$8,135 to \$14,000	159	37
3. More than \$14,000	122	28
	<u>436</u>	<u>100%</u>

METHODOLOGY

To determine the imputed values of the attributes of the houses sale price was regressed on the variables measuring the characteristics of the houses with ordinary least squares regression (OLS). To determine whether the imputed values of the energy-related features varied with the characteristics of buyers the OLS regressions were reestimated for each level of each demographic characteristic. The regressions were estimated each time by a single demographic variable, rather than simultaneously with two or more demographic variables, because of sample size limitations. Simple correlations and chi squares were estimated for the demographic characteristics to aid in interpretations since multivariate tests were not possible. Summary statistics are reported in Tables 4 and 5.

Preliminary analysis on the pooled sample was used to eliminate severely collinear variables and to determine the existence of heteroscedasticity. The error term was hypothesized to be proportional to house size so the equations were estimated with weighted least squares with the weight equal to the inverse of house size squared.

THE EMPIRICAL ANALYSIS

In Table 3, the R^2 's and F values for all equations showed that the independent variables

explained at least 55 percent of the variation in sale price and all equations differed statistically from zero. Equation 1 was estimated for the pooled sample. The regression coefficient for each of the energy-conserving features was positive, as predicted, and differed statistically significantly from zero. The other coefficients in Equation 1 had the expected signs and were all statistically significant.

Equations 2 to 4, Table 3, were estimated by age of household head. Each group incorporated a different energy-conserving durable into sale price. Wall and ceiling insulation and wood window frames were important to younger, mid-thirties and older households, respectively. Younger heads were probably buying smaller, starter homes which may have been more likely to have had problems with wall insulation than homes bought by older households.

Older households had long experienced low energy costs thus they may have been more skeptical than younger households of the validity and permanence of high energy costs and so eschewed insulation as an important factor in housing quality, consistent with Hypothesis 1. Older households tend to consume less total energy than middle-aged households so the expected savings of insulation are less for older than middle-age households. Older consumers may not have liked the work associated with many wood window frames but may have been affluent enough to afford homes with more modern wood and vinyl frames that require little care but tend to be much warmer than aluminum frames. These frames also often denote a higher quality of construction in general, a luxury that older households with substantial previous home equity may have decided was important to them.

Younger households also tend to use less energy but capitalized at least part of the value of insulation into sale price, probably as a consequence of their expected near-term advancement into the energy-intensive middle stage of the family life cycle.

Consumer valuations of the durables also varied by size of household, see Equations 5 to 7, Table 3. Households of one or two people capitalized part of the value of wood/vinyl window frames into sale price while households with five or more people capitalized values of both wall insulation and wood/vinyl window frames, supporting Hypothesis 2. Nearly one-half of the small households in the sample were older. Thus the preferences for the wood window frames by smaller households may have been a function of age. That larger households were more likely to have capitalized the durables than smaller families probably reflected their expected future fuel bills which tend to increase with household size.

Table 3. Regression Analysis by Demographic Characteristics: Sale Price as Dependent Variable^a

Equation	1 Whole Sample	2 Age Less Than 31 Years	3 Age 31-46 Years	4 Age 47 Years	5 HH Size 1-2	6 HH Size 3-4	7 HH Size More than 4	8 Income \$22,500- \$29,999	9 Income \$22,500- \$29,999
ENERGY CONSERVING CHARACTERISTICS									
Inches of Wall Insulation	1110.52** (2.47)	1555.51** (2.27)	328.77 (0.46)	1218.36 (1.12)	710.35 (0.64)	489.89 (0.88)	3230.67*** (3.23)	3169.44** (2.68)	590.27 (0.93)
Inches of Ceiling Insulation	552.69** (1.97)	197.66 (0.40)	1087.80** (2.60)	100.52 (0.16)	694.89 (1.23)	494.08 (1.27)	-308.08 (-0.40)	1079.55* (1.82)	512.89 (1.39)
Presence of Wood/Vinyl Window Frames	2945.65** (2.53)	2253.13 (0.66)	631.38 (0.40)	5637.93** (2.05)	5908.91** (2.16)	1079.19 (0.70)	5039.85** (2.04)	698.76 (0.32)	2397.52 (1.46)
GENERAL STRUCTURAL CHARACTERISTICS									
House Size	25.87*** (13.01)	24.41*** (6.21)	23.05*** (8.76)	30.32*** (5.91)	30.14*** (5.85)	26.72*** (11.05)	16.48*** (2.99)	11.44** (2.69)	24.52*** (7.33)
House Age	-174.81*** (-4.02)	-173.68** (-2.38)	-37.08 (-0.56)	-340.26*** (-3.26)	-180.50* (-1.85)	-198.03*** (-3.14)	-194.37** (-2.08)	-144.53** (-2.35)	-215.27*** (-3.07)
Number of Stories	2888.54*** (3.39)	3828.22** (2.47)	1876.33 (1.60)	3266.50* (1.67)	5153.76** (2.07)	2862.10** (2.68)	1556.53 (0.90)	5.53 (0.00)	3593.41*** (3.12)
Number of Bathrooms	9051.70*** (6.59)	2979.98 (1.23)	11131.47*** (5.78)	9196.60** (2.69)	9819.13*** (3.13)	8643.97*** (4.70)	3455.28 (1.17)	3441.53 (1.08)	4187.22* (1.93)
ACCESSIBILITY CHARACTERISTICS									
Distance from CBD	9694.85*** (5.54)	2726.49 (0.66)	13584.19*** (4.84)	9025.15** (2.73)	8833.53** (2.65)	11214.38*** (3.95)	4380.23* (1.79)	2587.17 (1.00)	10756.22*** (3.90)
Distance from CBD ²	-705.88*** (-5.74)	-160.45 (-0.56)	-983.14*** (-5.02)	-688.02*** (-2.93)	-643.72** (-2.72)	-824.33*** (-4.19)	-221.27 (-1.15)	-116.20 (-0.59)	-700.10*** (-3.60)
PUBLIC SERVICE CHARACTERISTICS									
Pupils per teacher	-1557.27*** (-5.03)	-1167.42** (-2.39)	-2371.58*** (-4.79)	-1376.26** (-1.40)	-722.79 (-1.10)	-1898.12*** (-4.74)	-1195.54* (-1.80)	192.35 (0.24)	-488.07 (-1.02)
TIME PERIOD									
Sale Year	1061.62*** (3.60)	712.34 (1.36)	1819.86*** (4.28)	1007.84 (1.40)	314.33 (0.52)	1404.34*** (3.70)	1135.20** (2.01)	135.88 (0.20)	300.46 (0.68)
R ²	.72	.62	.79	.71	.65	.78	.56	.59	.61
F Ratio	99.21***	16.63***	64.07***	24.61***	18.73***	65.09***	11.15***	8.22***	18.57***

Table 3. Regression Analysis by Demographic Characteristics: Sale Price as Dependent Variable^a

Equation	10 HH Income \$30,000- \$39,999	11 HH Income \$40,000+	12 Per capita Income less than \$8135	13 Per capita Income \$8135-14000	14 Per capita Income \$14,000+	15 Education High School	16 Education Technical or College	17 Education Masters or Above
ENERGY CONSERVING CHARACTERISTICS								
Inches of Wall Insulation	-521.88 (-0.58)	778.28 (0.77)	2090.68*** (3.07)	-13.60 (-0.02)	548.11 (0.47)	474.44 (0.67)	2167.44** (3.00)	-225.35 (-0.27)
Inches of Ceiling Insulation	263.79 (0.40)	524.69 (0.70)	223.74 (0.53)	229.68 (0.46)	208.73 (0.34)	882.14** (2.03)	253.32 (0.58)	676.43 (0.99)
Presence of Wood/Vinyl Window Frames	6661.08** (2.33)	771.40 (0.27)	2103.19 (1.38)	3806.97** (2.02)	2767.91 (0.93)	1036.16 (0.67)	5385.10** (2.60)	168.09 (0.06)
GENERAL STRUCTURAL CHARACTERISTICS								
House Size	16.35*** (4.06)	25.37*** (5.52)	16.21*** (5.02)	23.65*** (7.87)	30.64*** (7.02)	24.74*** (6.77)	23.06*** (6.32)	22.68*** (6.63)
House Age	-35.71 (-0.31)	-357.02** (-2.76)	-167.99*** (-3.19)	-320.41*** (-4.34)	-133.17 (-1.14)	-132.60** (-2.41)	-322.13*** (-3.89)	-251.51** (-2.49)
Number of Stories	1403.08 (0.84)	2993.39 (1.46)	1997.41 (1.62)	4472.68*** (3.68)	5380.96** (2.30)	1955.54* (1.65)	2976.28** (2.09)	3014.24* (1.65)
Number of Bathrooms	11317.48*** (4.70)	11097.60*** (3.57)	4955.37** (2.33)	8310.28*** (4.29)	14604.52*** (4.61)	2098.83 (0.94)	7562.18*** (3.11)	13160.46*** (5.56)
ACCESSIBILITY CHARACTERISTICS								
Distance from CBD	4395.60 (0.99)	8215.80 (1.40)	7532.74*** (3.71)	4192.38 (1.22)	17680.71*** (3.41)	8076.56*** (3.79)	12053.45*** (3.79)	9131.27** (2.34)
Distance from CBD ²	-330.30 (-1.08)	-783.09** (-2.02)	-475.47*** (-3.16)	-352.32 (-1.51)	-1293.08*** (-3.46)	-523.37*** (-3.00)	-782.07*** (-3.53)	-830.22*** (-3.17)
PUBLIC SERVICE CHARACTERISTICS								
Pupils per teacher	-953.81* (-1.88)	-3059.50*** (-4.01)	-1324.70** (-2.81)	-1432.08*** (-2.95)	-1336.43** (-2.04)	-378.49 (-0.73)	-793.31 (-1.56)	-2926.95*** (-4.93)
TIME PERIOD								
Sale Year	0.69 (0.00)	2781.04*** (4.16)	1199.80** (2.60)	1333.53*** (3.10)	873.45 (1.40)	113.57 (0.25)	857.89* (1.71)	2134.76*** (3.90)
R ²	.70	.73	.64	.75	.79	.58	.72	.76
F Ratio	17.43***	26.37***	23.47***	40.73***	37.93*	16.91***	27.01***	41.54***

^aDependent variable is total sale price of house in 1980 dollars. Mean sale price was \$52,018 with a standard deviation of 23,184 when adjusted to 1980 dollars. Source was columbus Board of Realtors, Multiple Listing Service, Columbus, Ohio, and Deed Office, Franklin County, Idaho.

*p ≤ .10 ** ≤ .05 ***p ≤ .005

Table 4. Correlation Matrix of Precategorized Demographic Variables¹

	Education of Household Head	Age of Household Head	Household Size	Household Income
Age of household head	-0.24***			
Household size	0.05	-0.22***		
Household income	0.40***	-0.04	0.08	
Per capita income	0.25***	0.17***	-0.56***	0.67***

*p₂.10 **p₂.05 ***p₂.005
¹Pearson product moment correlation coefficients

Table 5. Summary Statistics for Chi Square Tests for Independence Between Demographic Variables¹

	Education of Household Head	Age of Household Head	Household Size
Age of household head	20.72*** (4)		
Household size	9.86** (4)	71.82*** (4)	
Household income	87.43*** (6)	29.71*** (6)	30.02*** (6)
Per capita income	28.11*** (4)	15.96*** (4)	146.79*** (4)

*p₂.10 **p₂.05 ***p₂.005
¹Chi square statistic, degrees of freedom in parenthesis

Implicit prices for the energy-conserving durables also varied by household income as is shown in Equations 8 to 11, Table 3. Households in the lowest income category (with incomes ranging from \$2,900 to \$22,000, the median was \$17,000, in 1980 dollars) paid \$3,169 and \$1,080 for an extra inch each of wall and ceiling insulation. The only other income group to have at least partially capitalized the value of the energy-conserving features was the upper-middle income group (incomes between \$30,000 and \$40,000) which paid \$6,662 for wood/vinyl window frames. This finding generally confirmed Hypothesis 3. The contradiction was that those with incomes between \$22,000 and \$30,000 didn't value the energy-saving features sufficiently to affect sale price. This finding is similar to Smiley's [34] regarding conservation data.

To capture the effect of both income and needs the equations were estimated for various categories of per capita income (Equations 12 to 14). Sale prices of homes sold to households in the lower-middle and upper-middle income ranges were sensitive to at least one energy-conserving durable while sale prices of homes sold to higher per capita income households were not. Households with lower-middle per capita incomes paid nearly \$3,000 for an extra inch of wall insulation while households with middle per capita incomes paid an additional \$3,807 for wood/vinyl window frames. Households with lower-middle per capita incomes tended to be younger. As was mentioned previously the younger age group also capitalized at least partial value of wall insulation.

Equations 15 to 17 were estimated for buyers classified by education. For those who had a high school education or less an extra inch of ceiling insulation added \$882 to sale price, a slightly higher amount than for the sample as a whole. Consumers with technical training or a college education capitalized at least part of the expected value of wall insulation and wood window frames into sale price, but not ceiling insulation; the absolute values of these coefficients were greater than those for the pooled sample also. However, the most highly educated consumers, those with masters, doctorates or professional degrees did not incorporate the expected value of energy-conserving durables into their offer prices.

These results contradicted the prediction of Hypothesis 4. The unimportance of energy features to highly educated consumers may however have been more a function of their higher incomes than their knowledge of energy costs. Correlation coefficients and chi square tests, Tables 4 and 5, show that education and income were positively related. One reason why the lower educated, lower income households may have capitalized the value of both ceiling and wall insulation may have been their superior knowledge of construction. While consumers with more education may have had better decision-making skills in general, those with lower levels of education may have been more likely to have worked in construction and thus were better educated for this type of decision.

Of course, without a knowledge of construction lower-middle income households may have been more gullible than those with better educations. They may have been less likely to have searched the market for prices of installing insulation and may have exaggerated expectations of future energy prices and thus have paid extra for the existant insulation.

The stability of the coefficients of the energy-unrelated attributes varied with the specific feature. The hedonic price per square foot tended to be very stable and was always statistically significant, as was the imputed price of bathrooms. The coefficients of age and story differed from zero in most of the equations but had large fluctuations. The same pattern existed for distance from CBD, pupil/teacher ratio and sale year.

SUMMARY AND DISCUSSION

When hedonic price equations were estimated separately by personal characteristics of buyers it was found that hedonic prices of energy-conserving durables varied implying that preferences for these features varied by the needs of individual buyers. For energy-conserving attributes these data did not uphold the assumption of consumers' homogeneous ranking of attributes of quality. The assumption was better supported for the other housing characteristics, especially for house size and number of bathrooms.

In general when the coefficients of the energy-conserving features were statistically significant their magnitudes varied. When demographic characteristics were held constant the imputed price of an additional inch of wall insulation ranged from \$1556 to \$3231 compared with \$1111 estimated in the pooled sample. In the disaggregated samples houses with an additional inch of ceiling insulation garnered as much as \$1088 and as little as \$882 extra compared with the \$553 an inch of ceiling insulation was estimated to contribute in the pooled sample. Implicit prices of wood window frames estimated in the disaggregated samples were more stable. Four of five prices ranged between \$5,040 and \$6,662 compared with the \$2,946 price imputed in the pooled sample.

Capitalization of the energy-conserving durables tended to occur among households with lower-middle to upper-middle incomes, low to middle levels of education and larger households which tended to have lower per capita incomes. Results were mixed for age groups.

Thus the probability of obtaining a salvage value to recoup an investment in energy conservation varied with the demographic characteristics of the market segment within which the house sold. Sellers who have retrofitted and not recovered their capital costs thus need to be especially diligent in providing information about the conservation investments they've made and in convincing consumers of the savings they will gain from the added thermal efficiency in order to recover capital costs.

APPENDIX

List of Independent Variables

Characteristic and Variable	Source ^a	Definition
ENERGY CONSERVING STRUCTURAL FEATURES		
Wall Insulation	OARDC	Inches of wall insulation
Ceiling Insulation	OARDC	Inches of ceiling insulation
Window Frames	OARDC	Dummy indicating presence of wood or vinyl versus metal window frames
STRUCTURAL CHARACTERISTICS		
House size	FCAO	Interior living area of house in square feet
House age	FCAO	Age of house at time of sale in years
Stories of living area	OARDC	Number of stories (floors) of living space
Bathrooms	OARDC	Number of bathrooms
ACCESSIBILITY CHARACTERISTICS		
Distance from CBD	FCBCC	Straight-line distance to CBD in miles
PUBLIC SERVICE CHARACTERISTICS		
Pupil/teacher ratio	ODEDI	Average ratio of pupils to teachers in public school systems
TIME PERIOD		
Sale year	FCAO	Year of sale of house
PERSONAL CHARACTERISTICS		
Education	OARDC	Categorized levels of education completed by household head
Age	OARDC	Categorized levels of age of household head
Household Size	OARDC	Categorized number of members of household
Income	OARDC	Categorized total annual income of household
Per Capita Income	OARDC	Total annual income of household/number of household members, categorized

APPENDIX (continued)

^aSources are OARDC = Ohio Agricultural Research and Development Center, The School of Home Economics, College of Agriculture and Home Economics, Department of Home Management and Housing, Project Hatch 570, Energy Questionnaire 1978. CGOH = Columbia Gas of Ohio, Consumption data for 5000 addresses, 1973. FCAO = Franklin County, Ohio, Assessor's Office. Individual Residential Property Appraisal Records, 1972-1978. BOC = U.S. Department of Commerce, 1970 Census of Population and Housing, Social and Economics Statistics Administration, Bureau of the Commissioners, Franklin County Highway Map, Cletus E. McPherson, County Engineer, Columbus, Ohio, 1978. ODEDI = Ohio Department of Education, Division of School Finance, Total Employees and Classroom Teachers per 1000 pupils, 1970 to 1980. BFSL = Buckeye Federal Savings and Loan Assn., Average Annual Mortgage Interest Rates, 1971 to 1980, Columbus, Ohio.

^bExpressed in 1980 dollars

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**A DEFINITION OF MICROECONOMIC SAVING IN THE
CONTEXT OF HOUSEHOLD WEALTH GROWTH**

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ABSTRACT

In this paper, a measure of household saving is developed using a model of household wealth accumulation. Our approach deviates from traditional macrooriginated measures and employs microlevel balance sheets, cash flow, and income tax identities. Saving is measured separately from investment and debt cash flows and the tax elements of the saving measure are shown.

The rate of household saving has received considerable attention in economic literature. Changes in the level of household saving and its macrolevel impacts have been examined in regard to capital markets, the flow of funds, capital formation, economic growth and productivity. However, considerably less attention has been given to micro-implications and measures of household saving. In this paper, we derive a measure of saving together with its component parts. We maintain that this view of saving provides greater insight into the financial environment and behavior of an individual household.

Our measure of saving is developed in context to wealth growth. Rather than starting with a definition of saving, we begin with the financial structure in which financial behavior occurs. Building on these microconstructs, the resulting wealth growth model brings together balance sheets, cash flow and tax algorithms. From this work, a general relationship is derived which shows the basic elements of household wealth growth (or decline) and the role of saving (or dissaving) within it.

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The saving/wealth growth relationships provide a basis for microlevel decision-making and analysis. Conventional formulations of household saving have a macroeconomic origin. As such, they do not differentiate between potential sources of household income, types of expenditures and the attendant tax implications. The basis for understanding decision and behavioral aspects of individual households is, therefore, limited. We will show that when wealth growth is an important concern, sources of income, tax rate, leverage, asset returns and tax sheltering are all potentially important distinctions.

THE MACROLEGACY

Economists usually begin their analysis of household consumption and saving behavior with the equation $Y=C+S$; consumer income equals consumption plus saving. In this equation, household saving and consumption are defined in the context of a Keynesian macroincome accounting model. Research on household saving behavior has been based on this macroformulation or on a variant of it. In unaltered form, it has been used in both theoretical [1,2,7,10] and applied [4,6] work.

A number of alterations or refinements of the macrosaving definition have been developed. Friend [3] separates durable expenditures from consumption

Table 1
TWO HOUSEHOLDS WITH EQUAL INCOME,
CONSUMPTION AND RATE OF SAVING-HIGHLY
UNEQUAL WEALTH GROWTH RATES*

	Household A	Household B
Net Worth	\$20,000	\$200,000
Earned Income	20,000	2,000
Asset Income	2,000	20,000
Total Income	22,000	22,000
Consumption	18,700	18,700
Savings	3,300	3,300
Saving Rate	15.0%	15.0%
Wealth Growth		
Nominal Rate	16.5%	1.7%
Real Rate	+11.5%	-3.3%

*Inflation assumed to equal five percent annually. Taxes are ignored.

and treats the durables as a tangible form of saving. He shows evidence that this provides a more stable saving function. Lieberman [9] treats automobile and housing expenditures in a similar manner. Katona [8] treats contractual payments on consumer durables separately and labels them 'contractual saving.' He suggests that expenditures in this category have psychological meaning distinct from other saving. Other studies have used changes in net worth [3,6,9] as a measure of saving. Whether this measure is inclusive or exclusive of capital gains and consumer durables is not always clear. The choice of this as a measure of saving seems to be primarily a function of the available data.

We assert that macromeasures of saving, regardless of the formulation one may choose, are not well suited to the microlevel decision needs of the household. Macroformulations aggregate nearly all forms of income, taxes, and expenditures. By so doing, much detail is lost. In this way, the basis for household decision-making is diluted. Insights into household liquidity, cash flow management, tax decisions and related investment returns are simply melted away through aggregation.

An example may help illustrate how insight at the microhousehold level may be blurred using a macromeasure of savings. In Table 1, let household A be a family that is in the early to middle stages of the life cycle while household B is at a later stage. Both households are receiving \$22,000 in total income, though from different sources. Both are consuming \$18,700 a year. After consumption, \$3,300 remains for both. In a macro sense, both households are the same with respect to saving.

Macrosaving theory suggests we might find a savings difference between these two households that is not seen here. A popular version [6], a combination of the permanent income and life cycle theories, would predict a high saving rate for the young household A and a markedly lower or dissaving rate for the elderly household B. Juster [6] tested this hypothesis with the 1972-73 Consumer Expenditure Survey data of U.S. households. He found no evidence of the expected relationship. We suggest that an incorrect measure of saving might have been used. Better results might well be obtained with a measure of microsaving.

While each household in Table 1 has identical total income, consumption, and saving, and both households have the same rate of saving, they are experiencing very different financial fortunes.

Household A is consuming less than it is earning. Part of earned income and all of investment return is being poured into assets for the future. In contrast, Household B is eating all earned income and most of asset income. Relatively little is being plowed back.

Wealth for Household A is growing in both nominal and real terms. The wealth of Household B has slowed to almost a stop. In terms of inflation, Household B wealth is declining. Households A and B are behaving consistently with the theorized notions of saving by a young household for retirement, and a wind down in old age.

These two households are headed in two very different economic directions. Yet, the macromeasure of saving fails to indicate this fact. The macromeasure may not reveal everything that we may want to know about what is happening within the household.

The discussion which follows develops a micromeasure of saving that will provide better insights into household finance and decision-making. First, basic accounting relationships are introduced. Then, all is brought together in a wealth growth model. Before this, another reason for using the micromeasure of saving is discussed.

RETURN AND SAVING IN MICROFINANCE

There is yet another reason to use a micromeasure of household saving: finance theory requires it.

All conventional discussions of portfolio theory and investment selection define the opportunity set in terms of the asset returns that are expected. Discounted cash flow analysis, for example, uses an internal rate of return to express the profitability expected over a number of years. Each asset return is an indication of the marginal impact that the asset will have upon wealth growth. Indeed, in order for the internal rate of return to hold as a wealth growth indicator, all subsequent cash flows are assumed to be reinvested at the internal rate of return.

As a result, use of asset returns in a wealth growth context implicitly assumes the reinvestment of investment cash flows. Saving then becomes differently defined in this environment. This paper develops such a definition.

Specifically, we show that three separate elements contribute to wealth growth: investment returns, financial leverage,

and saving from personal income. This new view will provide insight in the explanation and planning of wealth growth strategies.

BASIC ACCOUNTING RELATIONSHIPS

The Balance Sheet

In its simplest form, a balance sheet consists of three components: assets, debt, and equity. If the market value of assets at the beginning of a period is denoted as A, and the face value of the liabilities at the same moment is represented as D, then the equity of the household at the beginning of the period is

$$E = A - D. \quad (1)$$

Saving from the previous period is assumed to already be invested in A.

Assets will likely have both taxable income and cash flow implications throughout the next period. Specifically, any or all of the following four tax and cash results are possible:

- a. taxable income, an amount upon which the internal Revenue Service will want taxes to be paid by the asset holder, a_1A ;
- b. cash flow, payments to the asset holder from the asset; a_2A ;
- c. proceeds from asset sale, the asset, whose amount is A at the beginning of the year, is sold for $(1 + a_3)A$ at the end of the year with the sale receiving long-term capital gain treatment; and
- d. tax credits, a_4A , a tax incentive which is available upon the purchase of an asset; it may be applied directly as a deduction from tax liability.

Taxable income from assets may or may not equal the cash flow. In the case of a taxable corporate bond, interest received will be both taxable income and cash flow. A municipal bond, however, will pay interest that will be cash but not taxable income. A bond mutual fund, where the dividend payments of interest are reinvested will incur taxable income without a corresponding cash flow. Depreciable assets, such as real estate, that are held directly or through a partnership, will often produce distinct differences between taxable income and cash flow due to non-cash deductions. In some such cases, taxable income may be negative while cash flow is positive.

Debt also may influence both taxable income and cash flow over the coming period. Any new financing or principal repayment is done at the end of the period. The following three flows may be related to the debt:

- a. interest payments, the amount paid to creditors for the use of the money, d_1D ;
- b. scheduled debt amortization, the amount paid to creditors which is applied against the balance of the loan, d_2D ; and
- c. net financing, the net amount of new financing incurred at the end of the period, d_3D .

We will assert here that C, the total cash available for investment by the household at the end of the period, is composed of both d_3D , the net debt financing, and C' the net cash flow, the level of saving, or equivalently, the difference between the household's personal receipts and disbursements. This can be expressed as

$$C = C' + d_3D. \quad (2)$$

Since all of C will be used for asset purchases, the level of assets will increase by C at the end of the period. The level of assets at the end of the period may thus be indicated by A_1 where

$$A_1 = A(1 + a_3) + C.$$

Similarly, the level of debt at the end of the period is D_1 , where

$$D_1 = D(1 - d_2 + d_3).$$

Using equation (1), the above expressions for A_1 and D_1 , and equation (2), the change in the level of equity from the beginning to the end of the period is indicated by ΔE , where

$$\begin{aligned} \Delta E &= E_1 - E \\ &= (A_1 - D_1) - (A - D) \\ &= (A(1 + a_3) + C) \\ &\quad - D(1 - d_2 + d_3) - A + D \\ &= a_3A + d_2D + C' \end{aligned} \quad (3)$$

In words, this expression indicates that the increase in net worth is influenced by the appreciation in the assets, the repayment of the debt and the net cash flow for the household. The discussion below will further refine and expand this relationship.

Receipts and Related Items

Receipts refer to cash paid to the household for services, for the ownership of its assets, and from the sale of