Staff Paper

An Examination of US Consumer Pet and Veterinary Expenditures, 1980-1999

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Introduction

The veterinary medical profession touches nearly everyone's life, either directly or indirectly. An estimated 58.3% of US households own pets (AVMA, 2002), and most people consume livestock products in the form of meat, dairy products, wool, or leather. The health and well being of all these animals depend heavily on relationships with veterinarians. Veterinarians also contribute to public health through the FDA, CDC, USDA, and numerous other government agencies at the federal, state, and local levels. Issues of primary concern include food safety, biosecurity, and the numerous emerging (and re-emerging) infectious diseases that are zoonotic in nature. Finally, veterinarians have an additional impact through their research contributions. Virtually all of the laboratory animals used in research are raised, housed, and managed under the care of veterinarians, and veterinary researchers regularly provide valuable contributions to the knowledge base in the biomedical sciences.

This study was designed to assess the general trends in pet and veterinary expenditures as well as factors associated with pet ownership and expenditures on veterinary medical services. Providing such key information on the sector of greatest economic importance will enhance the probability of sustained economic viability in the veterinary medical profession as a whole.

Materials and Methods

This study utilizes a large, comprehensive data set collected by the U.S. Bureau of Labor Statistics to analyze expenditures on pet supplies, pet services and veterinary services over the period from 1980 through 1999.

Data

The Consumer Expenditure Survey (CEX) has as its goal providing information on the buying habits of American consumers, including expenditures, income, and consumer unit (families and single consumers) characteristics. The surveys target the total non-institutionalized population (urban and rural) of the United States. The survey data have been collected quarterly since 1980 with approximately 5,000 households completing the survey each quarter prior to 1999 (7,500 households beginning in 1999). The survey focuses on monthly out-of-pocket expenditures on items such as housing, apparel, transportation, health care, insurance, and entertainment. A rotating sample design is utilized. Consumer units[1] are interviewed once per quarter for five consecutive quarters. Thus, the intention is that 20% of the respondents complete their fifth interview as 20% begin each quarter. The first interview is a bounding interview and the data are not used. In general, 90 to 95% of all expenditures are covered by the survey.

The survey data serve as a basic source for revising the items and weights in the market basket of consumer purchases to be priced for the Consumer Price Index--commonly referred to as the CPI. The information provided by the data assist in the construction of statistical measures of consumption, analysis of expenditure patterns by characteristics, market research studies, and economic research.

The major expenditure categories included in the CEX include food, housing, medical, and entertainment. Among the specific expenditures collected are those for "pet services," "pet supplies and medicine," and "veterinary services." The sum of these expenditures will be referred to as "total pet related" expenditures. Although we do not know the specific prices and

[1] A consumer unit consists of members of a household who are related or share at least two out of three major expenditures—housing, food, and other living expenses. Throughout we will refer to the consumer units as households.

quantities related to these expenditures, these data allow us to examine the amount expended and relate them to socio-economic variables including income, family size, housing type (i.e., owned or rented), race, urban or rural residence, and education.

The expenditure data were adjusted for inflation using the CPI and presented in real 1999 dollars. The CPI measures the general increase in price level. Growth in price level almost certainly explains part of the growth in expenditures. As only expenditures are available, rather than the prices and quantities that compose expenditures, when we put the expenditures in real terms we cannot control for the extent to which veterinary service prices might have grown more (or less) than general consumer products. Putting the values in 1999 dollars also does not control for changing quantity of veterinary services consumed.

In addition to the quarterly expenditures of interest, many socio-economic variables that might relate to these expenditures were collected. The "consumer unit" refers to either: (1) all members of a particular household who are related by blood, marriage, adoption, or other legal arrangements; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who use their income to make joint expenditure decisions (U.S. Bureau of Labor Statistics, 2006).

The "reference person" owns or rents the home, and is referred to as the household head for purposes of this study. Descriptive variables pertaining to the household and household head are defined in Table 1.

Income after taxes is the total money earnings and money receipts during the 12 months prior to the interview data less personal taxes (Federal, State, and local income taxes). Family size is the number of members in the consumer unit. Housing tenure refers to whether the

family's principal place of residence during the survey was owned or rented (where rented also included those families living rent-free in lieu of wages). Rural is defined as living outside a metropolitan statistical area and within an area with a population of less than 2,500 people. A Metropolitan Statistical Area is a large population nucleus together with adjacent communities which have a high degree of economic and social integration with that nucleus as defined by the Office of Management and Budget.

Regions and states in those regions include: Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont), Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin), South (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Virginia, and West Virginia), and West (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming).

Analysis

The analysis is comprised of two methods: summary statistics with trends over time and a regression analysis of the socio-economic factors related to the likelihood of an expenditure. We hypothesized that family sociological and economic characteristics influence the likelihood of veterinary and pet expenditures. The empirical model utilized to determine whether households participated in the market (ie, had a an expenditure on that item) is a probit model of existence of veterinary or pet expenditures. The probit model is defined as $Pr(y \neq 0 | x_j) = \phi(x_j b)$ where ϕ is the cumulative standard normal distribution and $x_j b$ is called the probit score. The probit model has the estimation form $y = b'x_j + e$, where

y = 0 for households without the expenditure in question, and

y = 1 for households that had a positive expenditure for that category in that quarter.

The estimated coefficients have a nonlinear relationship with the probability of expenditure. The probit score, $x_j b$, has a normal distribution, and interpreting coefficients involves thinking in the normal quantile metric. To facilitate intuitive interpretation the results are transformed into the change in probability of an expenditure caused by a change in that explanatory variable evaluated at the mean of the data. These marginal changes help us to understand the apparent effects of the regressors on the dependent variable. The marginal effects are calculated as a percent change in the dependent variable caused by a one unit change in that variable at the mean value. For a continuous variable, the change in probability for a change in x_1 is calculated as $\varphi(\bar{x}b)b_1$ (Stata 7.0 Reference Manual). For a dummy (categorical) variable, which takes on the value of 1 when true and 0 when false, the marginal effect is calculated as the change in probability when that variable is true.

The explanatory variables, x, are characteristics including age and education level of the household head, household income, family size, marital status, race, whether the family owns or rents their residence, whether the household is urban or rural. Also included are the region as well as year and quarter to capture time trends and seasonality. Variable descriptions are in Table 1.

A standard probit model assumes that the cumulative normal distribution describes the probability. A heteroskedastic probit generalizes ϕ by no longer fixing the variance at one but allowing it to vary as a function of the independent variables. Following Jensen and Yen (1996) heteroskedasticity was assumed to be caused by the continuous variables in the model (income

age, education, and family size). Robust standard errors were acquired by accounting for the appropriate weighting and clustering of the data. Estimations were performed in Stata Version 7.0.

Household income was expected to be positively related to the probability of expenditure in every category. Households who owned their residence were expected to be more likely to have pets. Family size was expected to be quadratically related to the probability of owning a pet. Rural households are thought to be more likely to have had a pet related expenditure. Other characteristics including age, education, race, and marital status are expected to help explain the probability but the prior effect is not known.

We estimated the probability of any pet- or veterinary-related expenditure in total as well as the three categories (veterinary expenditures, pet services, and pet supplies) as a function of the explanatory variables. With many of the available socio-economic variables entered as categorical (dummy) zero-one variables and shifting the intercept, one category for each set was necessarily omitted. Thus, the coefficients on the categories present the change from the omitted category. The omitted household was in the Northeast region, Fall season, where the family owned the residence in an urban area with a household head who was single and white. The effects should be interpreted as the marginal difference in that expenditure as the household characteristics vary (either continuously or categorically) from that omitted set of characteristics.

Results

Summary statistics and trends

As all dollar values were inflated to 1999 dollars (the last year examined), average values can be meaningfully examined across the time period. Mean values of pet and veterinary

expenditures over time were calculated for all households, those households that had any pet related expenditure (pet supplies, pet services and/or veterinary services greater than zero), and households with veterinary services expenditures greater than zero (Table 2). Households with positive pet expenditures spent more than four times as much on pets as the expenditure averaged across all households. Those households with any reported pet expenditure appeared to be younger, more educated, with larger families, more likely to own their residence, married, in a rural area, and with a higher after tax income. Most of these characteristics were also shared by households with an expenditure on veterinary services where the average household had an even higher income.

All categories of pet related expenditures increased from 1980 through 1999. Figure 1 displays the annual average household pet related expenditures averaged across all households. Averaged across all households, expenditures on veterinary services increased from an average of $35.32/household/year in 1980 to $60.84/household/year in 1999 (Figure 1). This represents an increase of 72%. Similarly, pet service expenditures increased from $9.84/household/year in 1980 to $18.76/household/year in 1999 (91% increase) and pet supplies expenditures increased from $31.52/household/year in 1980 to $82.84/household/year in 1999 (163% increase) averaged across all households.

When attention is restricted to only households with a positive pet-related expenditure, average expenditures on veterinary services increased from $179.52/household/year in 1980 to $213.44/household/year in 1999 (19% increase). Meanwhile, those same households average expenditures on pet services increased from $47.08 in 1980 to $85.96/household/year in 1999 (83% increase) and expenditures on pet supplies increased from $144.08 to $328.72/household/year (128% increase) over the same period. For only those households with

a positive veterinary service expenditure, veterinary expenditures increased from $352.20 in 1980 to $615.44 in 1999 (75% increase).

Figure 2 displays share of total pet related expenditures by category. Although the trend displayed some variation from a simple linear change over the 20-year period examined, in general share of total pet related expenditures appears to have moved from veterinary services to pet supplies. Meanwhile, share expended on pet services was fairly stable. In 1980, 46.1% of total pet related expenditures was put towards veterinary services with 12.8% to other pet related services and 40.1% to pet supplies. In 1999, the share expended on veterinary services had declined to 37.4% while share on pet services had fallen slightly to 11.6% and share on pet supplies had risen to 51%. Of course, one must keep in mind that expenditures on all three categories rose in absolute dollar terms.

Another way to evaluate the pet and veterinary expenditures is as a share of all household expenditures. Figure 3 displays the average share of all annual household expenditures spent on the pet related categories for households with a positive pet expenditure (the pattern across all households was the same but about one-third of the share of total expenditures). Total expenditures on pet related areas increased from about 1.1% of all money spent in 1980 to about 1.5% in 1999. Expenditures on veterinary services was around 0.5% ranging from a low of 0.48% in 1983 to 0.61% in 1995. Expenditures on pet supplies increased from 0.45% in 1980 to 0.75% in 1999.

In addition to average expenditures, the percentage of households with an expenditure in each category were considered. Figure 4 displays the percentage of all households with an expenditure by category and year. Households with any reported pet expenditure increased (from 19.7 to 28.5% of all households). Most of this increase was driven by households with an

expenditure on pet supplies (from 11.2 to 23% of all households). The percentage of all households with a veterinary service expenditure remained fairly constant at about ten percent. Examining only households with a pet related expenditure reveals that those purchasing veterinary services declined over time from 51 to 34.7% (Figure 5).

Explaining the probability of a pet or veterinary expenditure

Results to explain the probability of a pet or veterinary expenditure with a probit regression are presented in Table 3. With other variables controlled, the overall trend was for the likelihood of a positive veterinary services expenditure to decline by 0.26% each year. Income demonstrated a positive association with the probability of all pet-related expenditures, as did education level of the household head. In contrast, age of the household head demonstrated a negative association.

The likelihood of a pet-related or veterinary service expenditure in Winter and Spring were somewhat lower than the omitted Fall season. For the most part, the probability of any pet-related expenditure was lower in the Northeast than in other regions of the country. Households in the West, Midwest, and South regions were all about 1.5 to 1.7% more likely to have a positive veterinary services expenditure.

In general, the likelihood that an expenditure increased with family size up to three and then declined as the negative family size squared term swamped the positive linear effect. Households where the head was married, widowed, or divorced were more likely than those that were single to have a pet-related expenditure, and were more likely to have spent money for veterinary services. Heads of household that were separated were less likely to have a veterinary service expenditure.

Household heads that indicated their race as white were more likely to have both pet-related and veterinary service expenditures. Relative to white households, black households were 10% less likely to have spent money on veterinary services, Native American households were 4.8% less likely, and Asian households were 8% less likely.

Households who rented their residence were about 5% less likely to report pet-related expenditures, and were about 2% less likely to purchase veterinary services. Those households located in rural areas were more likely to spend money on pets, demonstrating about 1.3% greater likelihood of spending money on veterinary services.

In contrast to the general results, it is insightful to focus on the probability of a veterinary expenditure in the subpopulation containing only those households that had a pet-related expenditure. The results of this estimation are presented in the last two columns of Table 3. Over time, the probability of an expenditure on veterinary services within this group declined significantly (about 1.2% per year). In addition, the likelihood of expenditure on veterinary services within this subgroup decreased with increasing family size. In contrast, those households that had a positive pet-related expenditure were more likely to spend money on veterinary services as the age of the heads of household increased. Within this population, the probability of a veterinary service expenditure was not significantly different between households located in the West and the Northeast. Similarly, no significant difference was found in this group between single and divorced heads of household, or between households located in rural vs. urban settings.

Discussion

In the aggregate, US consumer pet-related expenditures increased—even adjusted for inflation—approximately 70 to 160% from 1980 through 1999. Pet-related expenditures as a share of all consumer expenditures increased by about 50% in real terms over the period examined with pet supplies being the largest growth category, and the percent of households with a pet related expenditure also increased. In a broad sense, these trends speak to the evolving role of the pet in American culture, and support the widely-held opinions that the human/animal bond is strengthening. However, the percentage of households with an expenditure on pet-related services was flat after controlling for confounders, and the percentage of households that had a veterinary expenditure actually declined over the period examined. These results hold some potentially important implications for the veterinary profession as it strives to meet the needs of an ever-changing society.

As expected, the probability of pet-related expenditures was found to be positively associated with household incomes. Because incomes also demonstrated a significant upward trend over the period of this study, results of the probit analysis suggest that the apparent positive time trend in increasing willingness to spend on veterinary services (Figure 5) is primarily an income phenomenon. Once the income effect was removed with the probit model, the time trend disappeared. In a sense, this indicates that increasing incomes have been a key enabler of the aforementioned ongoing evolution of the human/animal bond. Undoubtedly, people are spending more on their pets both because they want to (human/animal bond trend) and because they have the means (income trend). However, these results do not indicate that the increase in spending would have occurred in the absence of a steady increase in incomes. More importantly, perhaps, these results contain a critical mixed message on veterinary service spending. Although

overall spending on veterinary services increased, the likelihood of any single household purchasing veterinary services actually decreased. This says that those households who continue to spend on veterinary services are spending substantially more, but an increasing proportion of households choose not to spend on veterinary services at all.

With the exception of heads of household who were separated, results indicate that those individuals who are/have been inclined to engage in the institution of marriage may place a higher value on companionship afforded by pets. The fact that separated individuals demonstrated some inconsistency with this pattern is not too surprising considering the major life transitions in which these individuals are often embroiled. Overall, these results do not differ substantially from AVMA data, which indicated that couples with no children were more likely to own pets than are those individuals who were parents (AVMA, 2002). And, AVMA found that parents were much more likely to own pets than were single individuals without children.

On a related note, it is interesting to see that pet-related expenditures peaked at a family size of about three. Data available in the current study do not allow further investigation of this phenomenon, but reasonable hypotheses may relate to a decreasing marginal value of the companionship afforded by pets once family size reaches three. In combination, the availability of time and money to adequately care for pets also may be somewhat limiting as family size increases above three.

The concept of seasonality is certainly not new to veterinary medicine. Individual practices and practitioners are well aware of the swings in demand for service that wax and wane with the seasons. Certainly, the rate of pet ownership does not change with the seasons, nor does the value we place on our pets fluctuate substantially throughout the year. Factors driving these results are more likely related to seasonal differences in availability of time and money to seek

veterinary care, along with some fundamental seasonal differences in the risk of disease within pet populations. In a broad sense, results of this study only serve to confirm previously held notions on the need for veterinary practices to manage resources in a manner that appropriately anticipates seasonal fluctuations.

The regional differences identified in this study suggest that households located in the Northeast were less likely than those in other regions to incur pet-related expenses. AVMA data indicate that households in the Northeast are somewhat less likely to own pets (AVMA, 2002), so current findings are consistent, in general, with previous studies.

Similarly, households were less likely to incur pet-related expenses as the age of the household head increased. This finding is not inconsistent with the AVMA finding indicating that retired people are less likely to consider pets as a family member (AVMA, 2002). In addition, it might reasonably be hypothesized that this apparent generational effect may be augmented by a hidden income effect not fully captured in the present model. Such an effect, if present, could conceivably stem from a smaller proportion of this group's (fixed) incomes being available for pet-related expenses as a result of proportionately higher medical and housing costs.

The fact that renters are less likely, and rural dwellers more likely, to incur pet-related expenses is consistent with the respective feasibilities of pet ownership under these two sets of circumstances. Pet ownership is comparatively more difficult in rented housing, but faces fewer restrictions in rural settings.

In considering race, the fact that persons of color were less likely to spend money on pets may indicate that these cultures may not be as likely to own pets, or that pets may not yet be seen as a part of the family in these cultures. Even if these conditions are true, which cannot be either substantiated or refuted in the current study, both situations may well evolve over time. Such

evolution is likely to be enabled by economic growth (increasing incomes). Another possible contributing factor might be the relative lack of availability of veterinary care for these communities. The lack of diversity in the veterinary profession is well documented (Lloyd, 2006), and may in fact be restricting the probability of pet ownership in non-white households.

Many of the findings discussed to this point can be readily understood by considering the demographics of pet ownership. Even though the percentage of households with a pet-related expenditure in this study was substantially lower than reported estimates of the percentage of households that own a pet (the proportion of households reporting a pet-related expenditure in this study is less than half of the proportion of households that reportedly own a pet), the likelihood of spending money on any pet-related expense might still be considered as a reasonable general indicator of the likelihood of owning a pet. In that regard, results of the current study's analysis involving only those households with a positive pet-related expenditure provide insights as to patterns of consumption for veterinary services within the pet owning population. However, because it is not known if the probability of pet owners incurring a pet-related expenditure is constant over time and across the other explanatory variables included in this study, inferences must be interpreted with some degree of caution.

Within the population of pet owners who spend money on their pets, the time trend in probability of expenditure on veterinary services was found to be decidedly negative, with the likelihood decreasing at a rate of about 1.2% per year. This finding is somewhat alarming, and underlying causes are unclear. In this case, it may be hypothesized that the rapid increase in available medical technology and the associated increase in real cost may actually be driving some pet owners from the market for veterinary services. Whatever the cause, the results suggest an expanding proportion of animal owners who are not seeking veterinary care, and

suggest a potentially viable and growing niche market for low cost, low frills veterinary service. Obviously, the challenge for anyone delving into this potential market will be to develop a model for offering quality veterinary medical care that meets accepted standards of practice in a low cost environment.

Further consideration of this pet-owning subgroup indicates that spending on veterinary services is less likely in the Northeast and West. Reasons for this disparity are not clear, but possible roots include inherent cultural difference in the human/animal bond in these regions, a lower relative availability of veterinarians, less available time to seek veterinary care, and regional differences in cost of living (which may lead to effective differences in disposable income). Additional study will be necessary to fully understand the potential contribution of these factors.

Finally, the lack of difference between single and divorced heads of household in this subgroup is also somewhat unclear. The fact that divorced heads of household are more similar to singles than marrieds in this case suggests that additional, unspecified constraints may exist in those divorced households owning pets that make it substantially more difficult to obtain veterinary care.

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Table 1. Description of Explanatory Variables

Variable	Description	Type
Year	Interview year	1980-1999
Quarter	Interview quarter	1 = January, February, March 2 = April, May, June 3 = July, August, September 4 = October, November, December
Region	Northeast, Midwest, South, West	Dummy variables, Northeast omitted
Income	After tax family income	Dollars transformed to natural logarithm
Area	Urban or rural area	Dummy, urban omitted
Age	Age of household head	Years
Education	Formal education of household head	Years
Housing tenure	Owned or rented housing	Dummy, own omitted
Family size	Number of family members	Count
Marital status	Married, divorced, separated, widowed, never married	Dummy variables, never married omitted
Race	White, Black, Native American (including Aleut and Eskimo), Asian (including Pacific Islander), or Other	Dummy variables, white omitted

* Note that with respect to the characteristics represented by dummy variables, this means that a series of zero/one variables represented the category and shifted the constant.

Table 2. Mean household values, 1980-2005

Variable	All Households	Pet Related Expenditures > $0	Veterinary Services Expenditures > $0
Quarterly Expenditures ($)[1]			
Veterinary Services	15.69[2]	62.09	155.90
Pet Supplies	4.98	19.71	22.68
Pet Services	17.07	67.50	64.28
Total Pet Expenditures	37.74	149.30	242.86
Region (%)			
Northeast	0.206	0.1831	0.1813
Midwest	0.2409	0.2547	0.2633
South	0.3375	0.3303	0.3288
West	0.2156	0.2319	0.2266
After Tax Annual Income ($)	38,255.59	50,626.86	54,091.35
Age (years)	47.53	45.47	46.10
Education (years)	12.55	12.93	12.94
Family size	2.55	2.80	2.76
Race (percent)			
White	85.10	93.50	95.85
Black	11.50	4.28	2.60
Native American	0.94	0.79	0.59
Asian	2.26	1.11	0.77
Other	0.20	0.26	0.19
Own residence (percent)	62.11	72.49	74.73
Marital Status (percent)			
Married	55.33	67.26	70.68
Widowed	5.21	1.70	0.95
Divorced	12.36	11.73	10.42
Separated	3.25	2.10	1.63
Never Married	23.85	17.21	16.32
Rural (percent)	13.00	14.29	14.33

[1] Note expenditures and income are in real 2005 dollars. All individual characteristics (e.g., age, education, and race) refer to the head of household.

[2] Values in the table are means.

Table 3. Estimates of Probability of any Pet Related Expenditure, a Veterinary Expenditure, or a Veterinary Expenditure given Any Pet Related Expenditure

	Total Pet Related Expenditures		Veterinary Services		Veterinary Services| Pets>0	
Variable	Marginal Effect dy/dx	P > |z|	Marginal Effect dy/dx	P > |z|	Marginal Effect dy/dx	P > |z|
Year	0.0004	0.152	-0.0026	<0.001	-0.0124	<0.001
Income[1]	0.0488	<0.001	0.0276	<0.001	0.0481	<0.001
Age	-0.0024	<0.001	-0.0006	<0.001	0.0015	<0.001
Education	0.0021	0.001	0.0022	<0.001	0.0047	<0.001
Family size	0.0680	<0.001	0.0272	<0.001	-0.0157	0.005
(Family size)^2	-0.0083	<0.001	-0.0038	<0.001	-0.0003	0.659
Winter	-0.0094	<0.001	-0.0088	<0.001	-0.0230	<0.001
Spring	-0.0100	<0.001	-0.0071	<0.001	-0.0173	<0.001
Summer	0.0010	0.517	0.0020	0.098	0.0068	0.161
West	0.0336	<0.001	0.0154	<0.001	0.0085	0.199
Midwest	0.0316	<0.001	0.0168	<0.001	0.0216	<0.001
South	0.0255	<0.001	0.0166	<0.001	0.0256	<0.001
Married	0.0503	<0.001	0.0261	<0.001	0.0408	<0.001
Widowed	0.0388	<0.001	0.0195	<0.001	0.0465	<0.001
Divorced	0.0447	<0.001	0.0150	<0.001	-0.0016	0.875
Separated	0.0009	0.908	-0.0090	0.038	-0.0374	0.020
Black	-0.1867	<0.001	-0.0980	<0.001	-0.1190	<0.001
Native	-0.0714	<0.001	-0.0476	<0.001	-0.0810	<0.001
Asian	-0.1666	<0.001	-0.0829	<0.001	-0.0897	<0.001
Rent	-0.0508	<0.001	-0.0230	<0.001	-0.0290	<0.001
Rural	0.0364	0.001	0.0131	<0.001	0.0028	0.809

Note: Income is natural logarithm of after tax household income. Individual characteristics (age, education, race, and marital status) refer to the head of household. With respect to the dummy variables (intercept shifters), the omitted categories are the Fall season, Northeast region, with a single, white head-of-household, that owns a residence in an urban location.

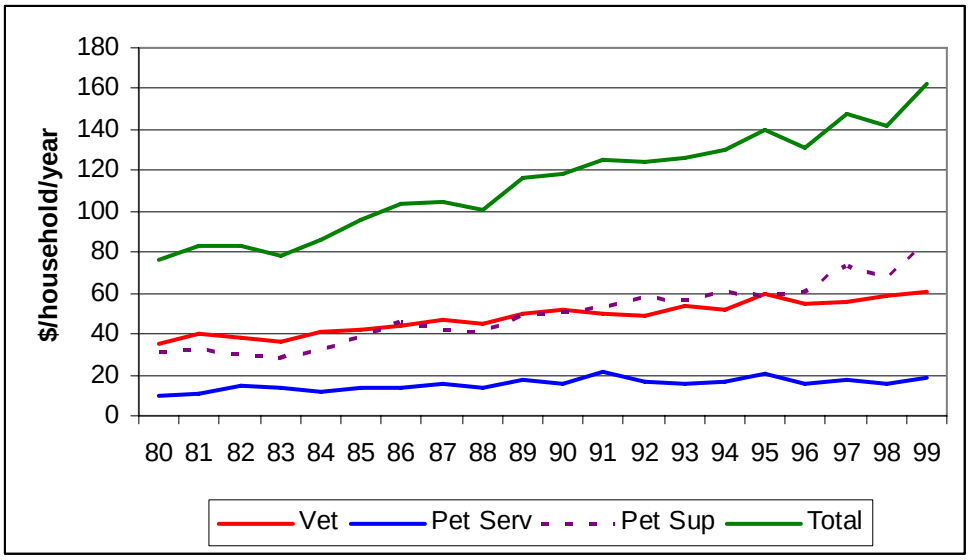

Figure 1. Average annual real expenditures per household on pet supplies, pet services, and veterinary services, All households 1980-1999, (1999 dollars)

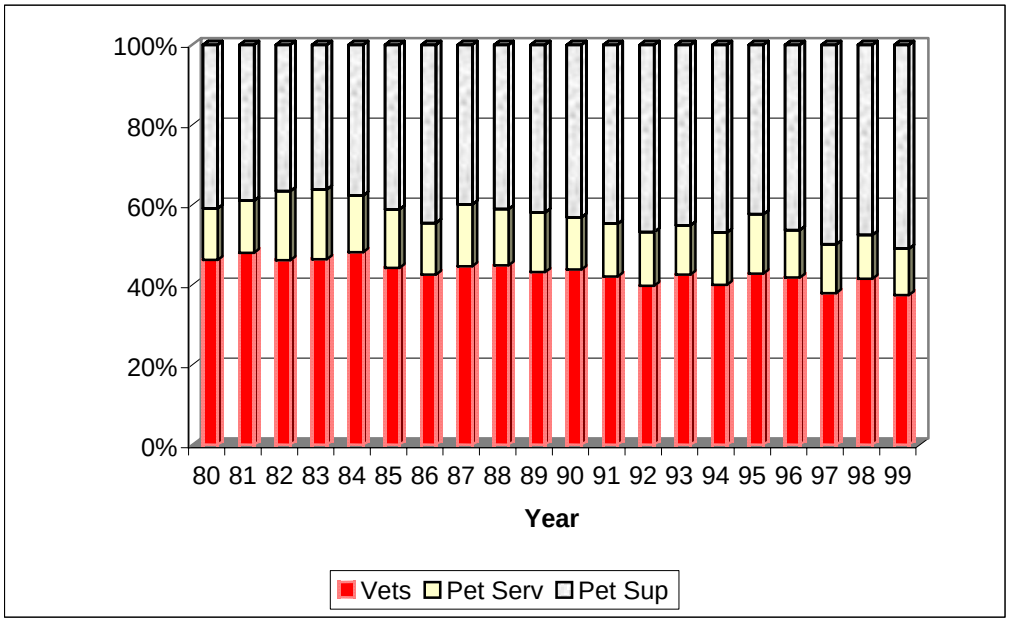

Figure 2. Shares of total pet supplies, pet services and veterinary services expenditures, 1980-1999

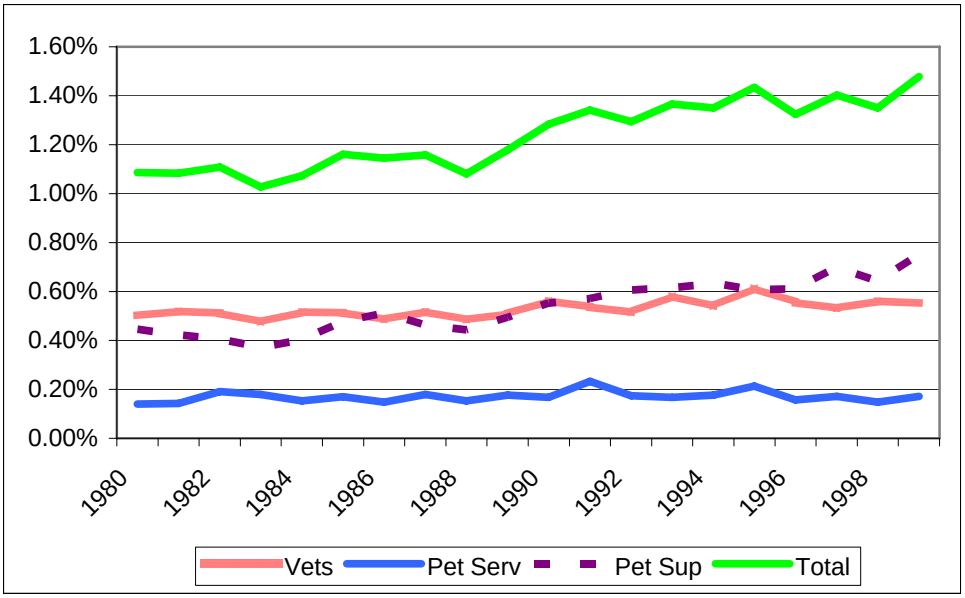

Figure 3. Pet supplies, pet services and veterinary services expenditures as a share of total household expenditures for households with pet expenditures, 1980-1999

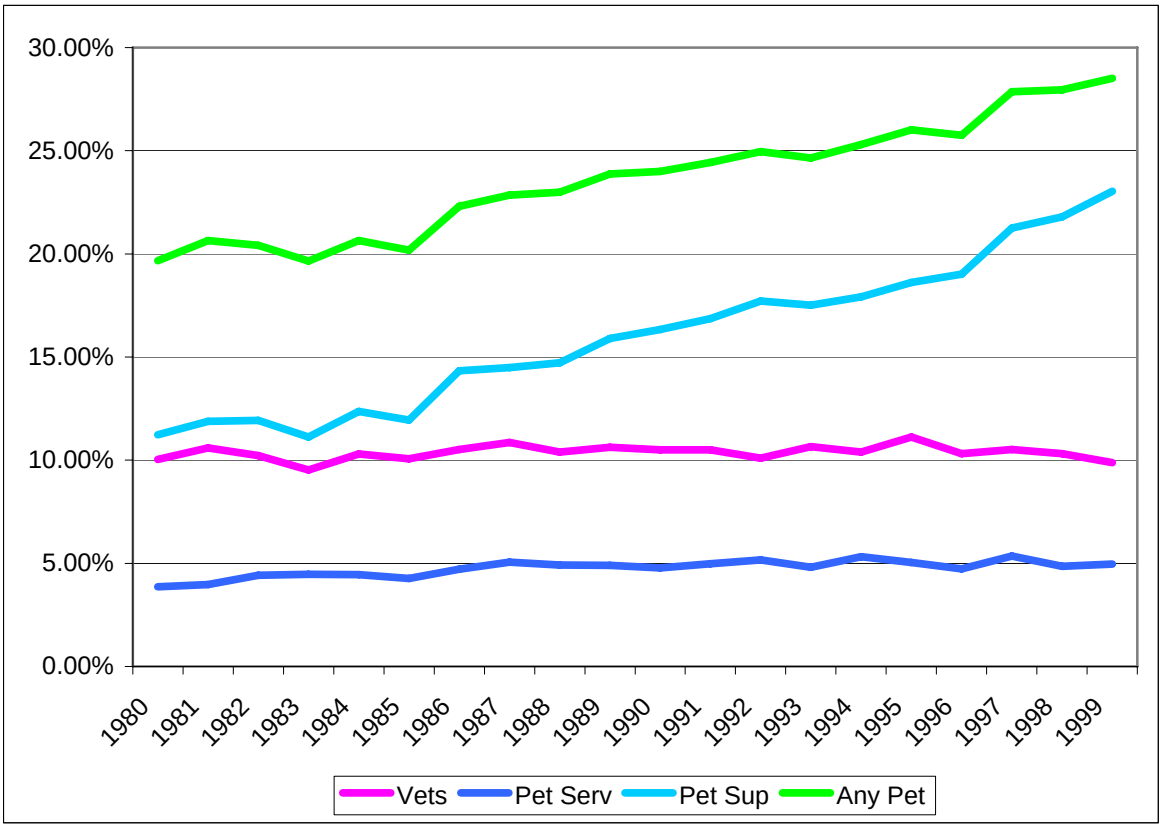

Figure 4. Percent of Households with a veterinary, pet service, or pet supplies expenditure, 1980-1999

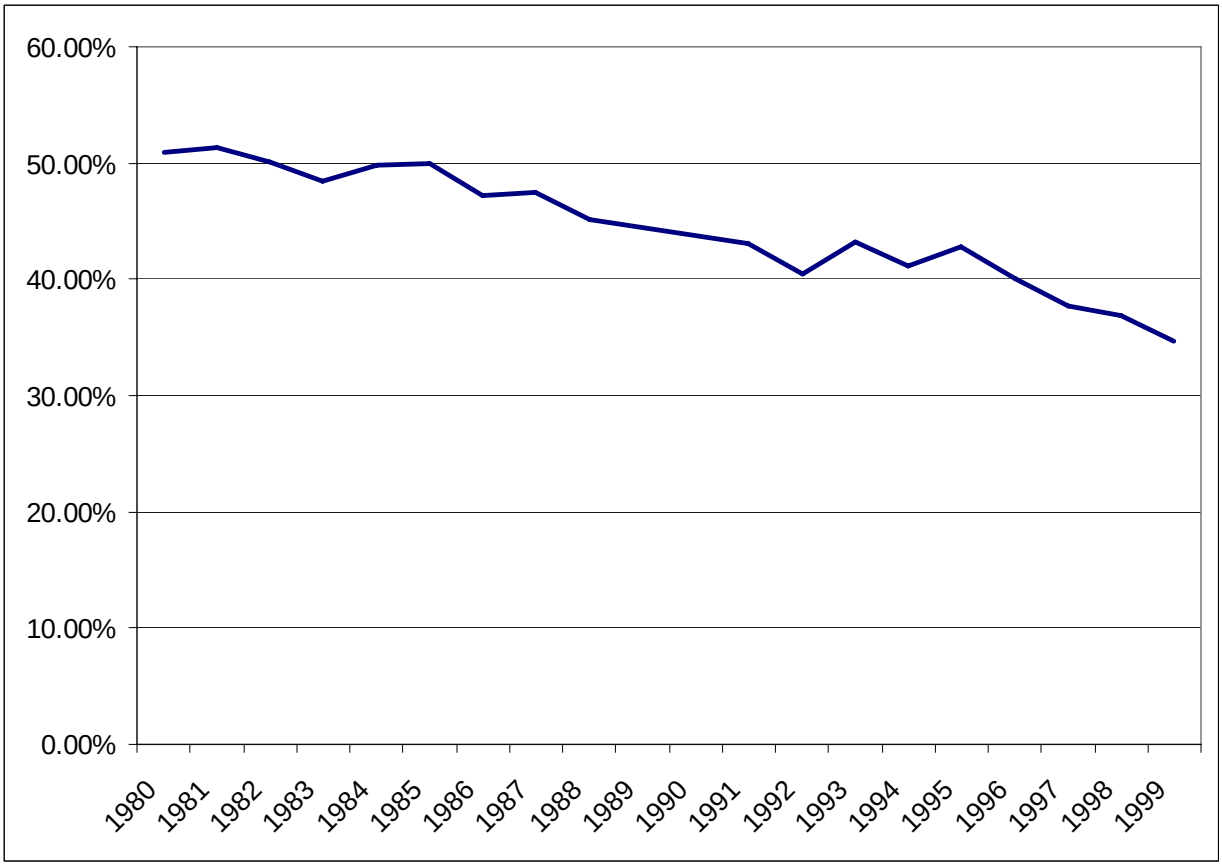

Figure 5. Percent of households with a veterinary services expenditure given any pet expenditure, 1980-1999

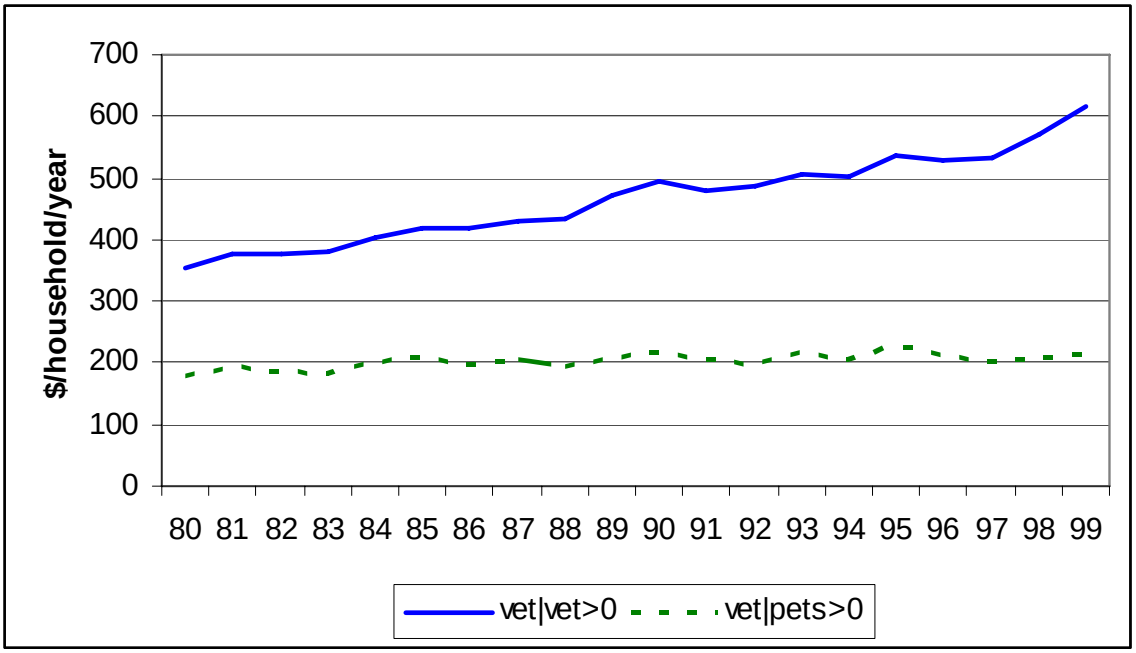

Figure 6. Annual expenditures per household for Veterinary Services for Households with a Pet or Veterinary Expenditure