Analysis of Pet Care Spending: Implications for Emerging Pet Insurance Markets

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Introduction

Pet insurance is an emerging growing market. The industry has grown by 13.4% over the past five years and reached a revenue of $1billion in 2018. The potential explanations for this growth include the changes in technology, society, and markets. By analyzing patterns of consumer expenditures for pet care, I investigate changing market prospects for the pet insurance industry.

- US consumers spend $16 billon on veterinary care, for which the cost keeps growing as the technology and medication options for treatments expand.
- Pet insurance rate: 1% in the U.S., compared to 25% in the U.K. and 30% in Sweden (PetInsuranceQuates.com, 2018).
- Socially, pet owners are becoming more diverse in terms of their family composition and lifestyles.
- Two market trends: large insurance brands like GEICO entered the market, and some companies started offering pet insurance as an employee benefit (JAVMA News, 2014).

Research Questions
1. What types of households tend to have high pet care expenditure?
2. How does pet care expenditure differ across income levels?
3. What are some implications for the pet insurance market and for the society?

Methods and Materials

- Dataset: This research analyzes large microdata files of the Consumer Expenditure Survey (CES) from 2003 to 2017. In this preliminary analysis, I focus on the comparison of the 2003 and 2017 data. My main variable of interest is the quarterly pet expenditure (including veterinary services, pet foods, and pet toys) at the household level. I utilize the household composition classification provided in the CES data.
- Comparison of means: I compare the mean expenditure for pet care across household compositions and across years based on t-tests. I also visualize this variable by box-plots and inspect differences at various points of distribution.
- Regression model: I estimate the following regression model

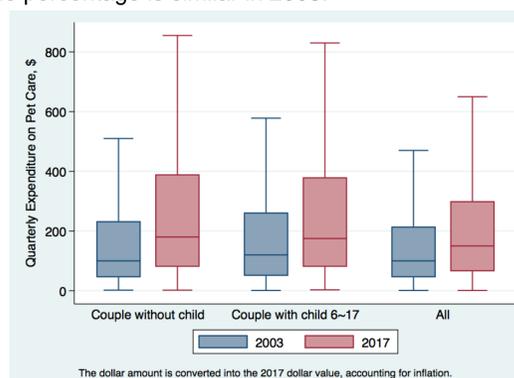$$\ln y_i = \alpha_0 + \beta_1 \ln x_i + \beta_2 (\ln x_i)^2 + \varepsilon_i$$

where y_i is pet care expenditure, and x_i income, $(\alpha_0, \beta_1, \beta_2)$ coefficients to be estimated, and ε_i the error term for household i. The specification allows for a quadratic fit for the predicted pet care expenditure by household income. The model is estimated by quantile regression at 25th, 50th, and 75th percentiles of the distribution for the 2003 and 2017 data and plot the predicted pet expenditure curves. I also repeat the estimation for each combination of household composition and time period and calculate the income elasticity of pet care expenditure, given by

$$Income\ elasticity_i = \frac{\%\ change\ in\ y_i}{\%\ change\ in\ x_i} = \frac{\partial \ln y_i}{\partial \ln x_i} = \beta_1 + 2\beta_2 \ln x_i$$

Figures and Tables
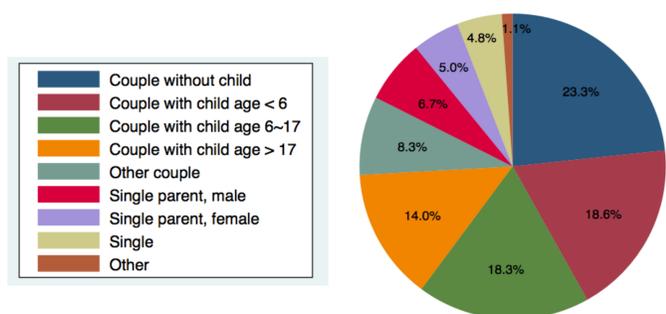
Figure 1: Percentage of different customer groups of the pet market in 2017. The percentage is similar in 2003.

Legend:
- Couple without child
- Couple with child age < 6
- Couple with child age 6~17
- Couple with child age > 17
- Other couple
- Single parent, male
- Single parent, female
- Single
- Other

Figure 2: Box plots of quarterly pet care expenditures for selected household compositions and all households with pets, 2003 and 2017. Pet care expenditure includes expenses for pet foods, toys, and veterinary care. The box with the line inside represents the 1st, 2nd, and 3rd quartiles of the distribution. Two horizontal lines extend from the bottom and top of the box stand for the smallest and largest non-outliers in the data set respectively.
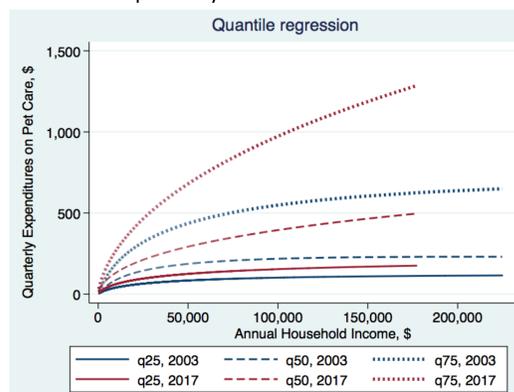
Figure 3: Predicted quarterly pet care expenditures from annual household income, 2003 and 2017. Estimations are based on quantile regressions at the 0.25, 0.50, and 0.75 quantiles where the quantiles can be seen as the combination of the pet's needs for veterinary care (0.25 good health, 0.50 typical health, and 0.75 bad health) and the pet owner's willingness to spend on pet care (0.25 thrifty spender, 0.5 typical spender, and 0.75 high spender) for a given household income level.

2003 / 2017	Couple without child	Couple with child age 6~17	Single	All
q25	-0.090 / 0.353	0.186 / 0.241	0.307 / 0.472	0.286 / 0.324
q50	0.132 / 0.416	0.182 / 0.411	0.318 / 0.749	0.242 / 0.441
q75	0.316 / 0.404	0.242 / 0.565	0.292 / 0.643	0.347 / 0.542

Table 1. Income Elasticity of Pet Care Spending for Average-Income Household, Selected Quantiles. This income elasticity measures a relative percentage change in pet care spending to a percentage change in the household income. For example, the income elasticity of 0.40 would indicate that a 10% increase in household income leads to an average of 4.0% increase in pet care spending. The elasticity varies with household income level, and the average income level is used for the calculations presented in the table.

Results

- By t-test of group means, I find that pet expenditure increased from 2003 to 2017 and that couples without children and couples with children aged 6-17 had higher pet care spending compared to others in 2017 at the 1% significance level (Figure 2).
- The quantile regression results indicate that pet care expenditure increased in the past 15-year period for the median and high spenders (i.e., p50 and p75 quantiles), holding household income constant. The rate of increase was larger at higher levels of household income (Figure 3).
- At the average-household income level, the median and high spenders exhibited large increases in the income elasticity, confirming that pet care spending grew rapidly among higher spending households. Interestingly, single consumers also exhibited large increases in the income elasticity, suggesting an increasing importance of this consumer segment (Table 1).

Conclusions

Pet care spending grew substantially from 2003 to 2017, in particular among the couples without children and the couples with children aged 6-17. At every income level, the growth was larger for households with higher pet care spending (for example, owners of unhealthy pets or owners who have a higher willingness to spend). The increased income elasticity of such high spenders indicates that an increase in their income will translate into more spending on pet foods, toys, and veterinary treatments. Interestingly, single consumers in 2017 show particularly high income elasticities of pet care, which reflects a change in market trends. Today, people are ever more willing to spend on pet care, including increasingly costly veterinary care, possibly due to the increased perception that pets are important family members. Household composition and income level influence their propensity to pet care spending.

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