

Online Appendix

“Is American Pet Health Care (Also) Uniquely Inefficient?”

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Consumer Expenditure Survey Data (Figure 1 and Figure 2)

Figures 1 and 2 use data from the Consumer Expenditure Survey (CEX) from 1996-2012. Prior to 1996 the format of the CEX files differs substantially; 2012 was the latest available year at the time we began this project.

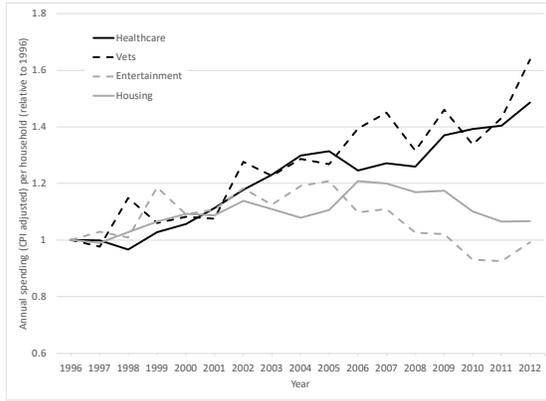
The CEX conducts interviews with households over 5 quarters – the first quarter is a baseline interview, while the remaining 4 quarters record expenditures (“consumption”) each quarter. These four quarters do not necessarily conform to a calendar year. We aggregate quarters within a calendar year. Observations of the same household across calendar years are treated separately. The unit of observation is therefore a household-year. When households do not appear in the survey for all four quarters of a calendar year, we use the available quarters and annualize the total to obtain annual expenditure levels.

We analyze data on four categories of expenditures: pet care, (human) health care, housing, and entertainment. Human health care includes the household’s (out of pocket) spending on health insurance premiums, physician, and hospital services. Housing includes spending on mortgages, rent, property taxes, and maintenance costs. Entertainment includes spending on recreational activities and equipment, and television subscriptions and equipment.

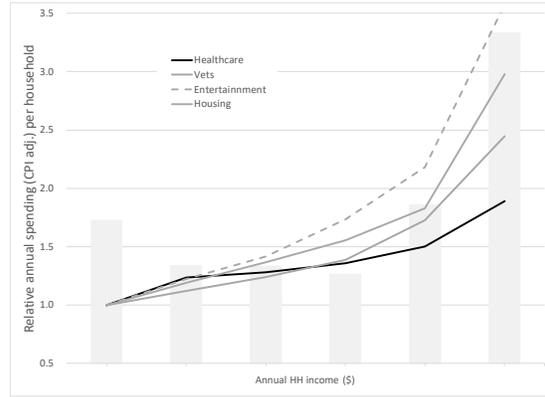
Our measure of pet care is based on three expenditure categories: (i) pet purchase and medical supplies; (ii) Veterinary services; and (iii) pet services except Veterinary services. These sub-categories account, respectively, for 50, 38, and 12 percent of total pet care spending. Of the two main categories, veterinary services are naturally part of pet health care, while some, but not all of the “pet purchase and medical supplies” category is too. It is unclear what is covered by the smaller “pet services except veterinary services” category. In our main analysis we aggregate all three sub-categories. In Appendix Figures 1 and 2 below we replicate Figures 1 and 2 in the main text limiting spending on pets to just the “Veterinary services” category; the results are qualitatively quite similar (the sample remains the same; a pet owner is still defined as a household with positive spending on pets, regardless of whether the spending is on veterinary services).

We start with the full CEX sample in every quarter, omitting only households (less than one percent) where the head of the household is younger than 18 or older than 90. This results in a sample of 240,390 household-years. We further limit all analyses to household-years with positive expenditure on pets, which is our proxy for pet ownership. About 35 percent of household-years are included as “pet owners,” so that our final sample size is 84,341 household-years, covering 57,346 unique households. Appendix Table 1 below compares demographics and expenditure on the main categories between our baseline sample and the entire CEX sample.

When we analyze expenditure by income in Figure 2, we categorize household-years by the household income bucket they report. Household income in the CEX is categorized into <20,000, 20,000 – 29,999, 30,000 – 39,999, 40,000 – 49,999, 50,000 – 69,999, >=70,000. The income category is missing for 8% of the observations.



Appendix Figure A1
Expenditure growth (vets)



Appendix Figure A2
Spending by income (vets)

	HHs w/ positive pet spending	Entire CEX sample
HH and head of HH Demographics:		
White	0.92	0.83
Male	0.50	0.51
Age 18-24	0.01	0.02
Age 25-64	0.84	0.76
Age 65-90	0.15	0.21
Family size	2.73	2.52
College degree	0.42	0.37
HH income >= 50k	0.49	0.37
Expenditure categories:		
Pets, medical supplies (2012\$)	369	130
Veterinarian services (2012\$)	283	100
Pet Services (except Vet) (2012\$)	93	33
Health care (2012\$)	3,532	2,956
Entertainment (2012\$)	3,470	2,587
Housing (2012\$)	11,626	10,185
Observations (HH-year)	84,341	240,390

Appendix Table A1

Summary statistics for our baseline sample (first col.) and the entire CEX sample (second col.)

US County Business Patterns (Figure 3)

We use annual data from 1996-2013 from the County Business Patterns (CBP) published by the US Census. We aggregated employment data across standard industry classification codes (the North American Industry Classification System, or NAICS) to the sector level. We analyze total employment as well as employment in two specific sectors: physicians and veterinarians.

Physician employment is defined as employment in hospitals, physician offices, dentist offices, and all other health care professional offices. Veterinarian employment is defined as employment at a veterinary office; both employment measures will therefore include support staff in those offices. We sum employment across counties to arrive at national, annual totals.

The CBP defines an establishment as “a single physical location at which business is conducted or services or industrial operations are performed.” An establishment is not necessarily equivalent to a company or enterprise, which may consist of one or more establishments. A single-unit company owns or operates only one establishment. A multi-unit company owns or operates two or more establishments. The series excludes data on self-employed individuals, employees of private households, railroad employees, agricultural production employees, and most government employees.

End of life care (Figure 4)

The data on end of life care for dogs come from a large veterinarian hospital in California. Using information on billed drugs, they identified animals who were treated for lymphoma between 2011 and 2014 (the period for which electronic billing data was available). We limit our analysis to dogs, which account for 80 percent of their patients. We received data for a random sample of 300 dogs who had received a biopsy, which is a diagnostic test for lymphoma, among other things. Of these 300 dogs, 44 were identified as having received chemotherapy, and we therefore code them as having lymphoma. Of those 44, we have 23 dogs who died during the period of our data and for whom we observe billing claims for at least 12 months before death. Our analysis of end of life spending pertains to these 23 dead dogs. For those dogs, we obtained detailed information about their claim-by-claim bills, and use this to create a monthly measure of total spending for each of the 12 months prior to death.

The data on end of life care for humans is based on claims data from Traditional Medicare. We selected a random sample of 433 patients who were diagnosed with Lymphoma latest by the penultimate year of life (i.e. if the patient died in 2012, she was diagnosed with Lymphoma by 2011 or earlier), and who died in December of a year between 2012 and 2014. Patients were identified as having Lymphoma based on ICD9 diagnoses codes in the 200xx (Lymphosarcoma and reticulosarcoma) or 202xx (Other malignant neoplasms of lymphoid and histiocytic tissue) families. These two groups are used by the AHRQ Condition Classification System (CCS) to define Lymphoma. For these 433 patients, we measure monthly total Medicare spending in each of 30-day windows (months) prior to death. In both cases (dogs and Medicare), we observe claims for the last 12 months of life. The spending values span several different years and hence the monthly values are inflation adjusted to be in 2012 dollars using the CPI-U series.