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## PET GOODS CONSUMPTION IN POLISH HOUSEHOLDS

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*Quote as:* Gromek, N., and Perek-Białas, J. (2022). Pet goods consumption in Polish households. *Econometrics. Ekonometria. Advances in Applied Data Analysis*, 26(3).

DOI: 10.15611/ead.2022.3.01

JEL Classification: D12, D19, J19, D01

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**Abstract:** This paper expands the considerations of Becker's and Leibenstein's family theories with a focus on the additional member of the household (pet/animal) in the analysis of consumption. It is the first analytical approach regarding pet goods consumption with references to microeconomic theories based on Polish data. The study analyses the households' characteristics that have an impact on expenditure on pet goods. This article used the Polish Household Budget Surveys for 2018. The findings from the logistic regression models suggest that the household's socio-economic group, place of living, children in household and whether the household rents the flat/accommodation impact on determining the probability of owning a pet among Polish households; analyses of interactions between significant variables were also conducted. However, the human-animal bond could not be included in analysis, which is a limitation, the overall work is pioneering, as it shows the quantitative approach to household economy that highlights the need to elaborate the economic family theories of Becker and Leibenstein by a new family member – a pet.

**Keywords:** pet ownership, consumption expenditures, economics of the household.

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## 1. Introduction

Nowadays, pets are more frequently becoming family members, which deserve certain products and goods, as well as services. In this way, pets are becoming consumers even if they do not have the possibility to make decisions (as opposed to human beings).

In 2019, 85 million households worldwide owned a pet (38%) and about 17 million households in Poland (45%) (FEDIAF, 2020). According to the FEDIAF report (2020), the value of the pet goods market and pet ownership is increasing.

Many pet owners feel not like a pet owner but like a pet parent. In this way, the phenomenon of pet parents shows that people do not resent spending money on their 'babies'. On the other hand, not everyone treats a pet like a baby, but most people treat their pet just like a friend (Zacharek, 2017). As a friend living with the owner, a pet can cost a lot of money and have an impact on the consumption patterns of a household.

Pets have gained an increasing popularity recently, with the media reporting on the newest pet-related business developments such as pet insurance, day care, and pet-friendly hotels on an almost daily basis. The physical and emotional health advantages of owning a pet have also been highlighted by health professionals (Barker, 1999). Yet pets have hardly been touched upon in any formal analysis, economics or otherwise. One possible explanation for the lack of economic analysis is that having a pet could be based on an impulse purchase and not subject to economic analysis (Endenburg, Hart, and Bouw, 1994).

First, the paper briefly presents the overview of similar studies in economic literature, which was used for constructing hypothesis. Second, the theoretical foundations of the method of analysis is described, and the Polish Household Budget Surveys for 2018 which was used. This source of data gives information about households characteristics and expenditure on pet goods consumption. Next, based on these data, two models were built step by step, i.e. a logistic regression model and a logistic regression model with interaction terms. Then the results of analysis are presented, with the conclusions and the limitations of the analysis.

The analytical approach of the study can be considered as innovative, due to the theoretical approach (based on economic consumption theory) and empirical (using the advanced modeling of households' expenditure on pet goods and services on the Polish Household Budget data for the first time in this way). The results of the paper are pioneering, as it shows the possibility to analyse the probability of such expenditure, while in study of household consumption there is also a need to take into account expenses on pets.

The original motivation to carry out the analysis was to extend Becker's and Leibenstein's considerations about consumer behaviour and economic decisions among families with children (Becker, 1976; Leibenstein, 1957). As such, this study attempted to expand their considerations with a focus on an additional member of the household (i.e. a pet/animal). The aim of the analysis was 1) to find households' characteristics (e.g. socio-economic, demographic and other factors) that have an influence on expenditure on pet goods, and 2) to analyse the substitution and complementary effects between children in households and pets, based on the Polish example as a reference. The main research question is: how the pet goods consumption performs in Polish households, and how to predict the expenditure on pet goods consumption? Additional detailed questions are as follows:

1. What Polish households' characteristics (such as socio-economic, demographic and other factors) determine the expenditure on pet goods consumption? (Q1)

2. Are there any specific categories of Polish household expenditure that can determine the existence of expenditure on pet goods consumption? (Q2)

Based on the literature analysis, the hypotheses of the paper are:

H1a: The household socio-economic subgroup has an impact on the expenditure on pet goods. Households made up by employees have a greater chance to incur expenses on pet goods than the households of pensioners.

H1b: The unemployment status of the head of the household has a negative impact on the expenditure on pet goods.

H1c: A household with a balcony (terrace)/garden has a positive impact on the expenditures on pet goods.

H1d: The place of residence has an impact on the expenditure on pet goods. Households in rural areas have a greater likelihood to incur expenses on pet goods than urban households.

H1e: A subjective evaluation of the material situation of the household has an impact on the expenditures on pet goods. Households that have a good/very good subjective financial situation have a greater likelihood to incur expenses on pet goods than households with a bad/very bad subjective financial situation.

H1f: Renting house/flat has a negative impact on the expenditure on pet goods.

H2: The level of education has an impact on the expenditure on pet goods. The higher the level of education, the lower the likelihood to incur expenses on pet goods.

H3a: The size of family has an impact on the expenditure on pet goods. The larger the family, the larger the probability of incurring expenses on pet goods.

H3b: Children in a household (under 18) have a negative impact on the expenditure on pet goods.

## 2. Literature review

### 2.1. Pet good consumption in literature

Pet goods consumption is not often analysed in the economic field (the authors, a forthcoming publication). There are no econometric studies regarding pet goods consumption with reference to economic theories. This gap may occur due to the fact that pet goods consumption has not been treated in line with the other key economic issues such as households' savings (microeconomics) or global growth (macroeconomics). Furthermore, the lack of agreed standardised methodology of such analysis, and so accepted in economic literature may have impacted this gap.

On the other hand, a wide range of studies related to pet goods consumption can be found in international literature, but primarily focused on the consumer side (Archer, 1997) and marketing decisions and preferences (Chen, Hung, and Peng,

2012). The other studies are focused on the motives of owning pet (McConnell, Brown, Shoda, Stayton, and Martin, 2011; Zasloff and Kidd, 1994), the relations between pet and pet owner (Ellson, 2008; Jyrinki and Leipämaa-Leskinen, 2005) and the influence of pet-owning on pet owners' health e.g. blood pressure (Karen, 2003).

## **2.2. Households' characteristics affecting pet ownership**

The likelihood of having a pet has been variably reported in relation to the households income or family affluence that is typically based on material markers, such as owning a car, etc. There are some American studies, focused on the ownership of pets in general, which have identified a trend for higher household income predicting pet ownership (Murray, Browne, Roberts, Whitmarsh, and Gruffydd-Jones, 2010; Teclaw, Mendlein, Garbe, and Mariolis, 1992). On the other hand, (Marsa-Sambola et al., 2016) reported that adolescents from high-income families were less likely to own a dog than those from low-income families. Other studies found no significant association between household income and dog ownership (Murray et al., 2010).

Some sociodemographic variables, such as gender and age, are also linked to pet ownership. According to (Westgarth et al., 2007), households with an adult female were 2.2 times more likely than other households to own a dog. The respondents' gender did not include complete descriptions of the gender makeup of the household in (Murray et al., 2010), except in single-person households. On the other hand, (Marsa-Sambola et al., 2016) did not find gender differences between pet owners and non-pet owners. Respondents below 65 years old were significantly more likely to report that their households had a cat than those aged 65 years or more (Murray et al., 2010). Similarly, (Westgarth et al., 2007) found that households with persons aged 60 or older were substantially less likely than other households to own a dog. This association may be linked to the decline in physical health that occurs as people become older due to aging, which may explain why people aged 55 and over are hesitant to commit to the obligations of dog ownership.

Other variables that are linked to the likelihood of owning a pet among households are associated with living conditions: easy ground access, i.e. living at ground level or first floor, access to a garden and location (urban/semi-urban/rural) (Westgarth et al., 2007). Pet-owning households were also slightly more likely to have a garden than households without cats or dogs, as anticipated, reflecting the householders' willingness to have outdoor access for both cats and dogs. Living in certain localities like urban, semi-urban or rural was found to have a strong relation with pet ownership. Cats were more likely to be owned by households in semi-urban or rural areas. Dogs were more likely to be owned by households in rural areas only, indicating that the householders were mindful of the need for space to exercise a dog (Murray et al., 2010).

Education can be perceived as a good predictor of having a pet. An analysis of UK households ( $N = 2,980$ ) showed that the likelihood of dog ownership decreased when the household member had a higher level of academic qualification (Murray et al., 2010). According to the other meta-analysis of cohort-studies, a higher educational level significantly reduced the odds of dog ownership in European households (Eller et al., 2008). During modelling the interaction of current dog ownership, parental education and pet ownership during the parents' childhood, the relation between dog ownership and the owner's education, using data from a UK birth cohort, was highlighted (Westgarth et al., 2010). According to this study there are interactions between the mother owning pets during childhood and paternal education – in cases where the mother had never had pets as a child, as the level of paternal education increased the probability of dog ownership decreased. On the other hand, in cases when the mother had owned pets in childhood, this effect has not been observed.

Thirdly, the number of people in a household and the household's structure can also be a key variable in predicting the fact of dog ownership (Nassar and Mosier, 1984a, 1984b). Households with five or more occupants are more likely to own a dog than those with fewer members (Westgarth et al., 2007). The same dependence has been found in a cross-sectional study of pet-owning households across the UK, in which it has been reported that the likelihood of dog ownership increased as the number of people within a household increased (Murray et al., 2010). The other factor that can have an influence on pet-ownership is children at home. Many studies reported that dogs are more likely to be owned in households with children (Westgarth et al., 2007; Teclaw et al., 1992). Some researchers highlighted that the age of the children might indicate the likelihood of dog ownership. Households without children aged five or younger were more likely to own a dog than those with children aged five or below (Westgarth et al., 2007). Similarly, families with children aged ten or younger were almost half as likely as households without children in this age group to own a dog (Murray et al., 2010). According to Schwarz, Troyer and Walker (2007), households with very young children are less likely to own pets and have lower pet expenditure, showing a substitute relationship. On the other hand, households with older children are more likely to own pets, suggesting a complementary relationship between children and pets. However, households with more children show reduced pet spending, evidence of a substitute relationship between children and pets.

A summary regarding what kind of characteristics were found already significant in analysis of the likelihood of a household owning is presented in Table 1.

Several studies found a connection between a person's childhood interactions with pets and their adult preferences and attitudes when it comes to pet ownership. For example, Westgarth and others (2010) found a connection between dog ownership and prior pet ownership in a cohort study involving the mothers of 14,663 children were examined whether the mother had pets during her childhood was a strong predictor of pet ownership. Similarly, a strong positive correlation was found between a person's childhood experience with pets and their recorded probability

**Table 1.** Households' characteristics affecting pet ownership

Households' characteristics affecting the chance to own a pet	Publications
Gender	J. K. Murray et al. (2010); C. Westgarth et al. (2007)
Age	J. K. Murray et al.(2010); C. Westgarth et al. (2007)
Number of persons in household	J. K. Murray et al.(2010); C. Westgarth et al. (2007)
Own or rent house	J. K. Murray et al. (2010)
Having a garden	J. K. Murray et al.(2010)
Location (urban/semi-urban/rural)	J. K. Murray et al. (2010)
Household income	J. K. Murray et al. (2016)
Qualifications/education of head of the household	J. K. Murray et al. (2010); E. Eller et al. (2008)
Children in household	J. K. Murray et al. (2010); C. Westgarth et al. (2007) P. M. Schwarz et al. (2007)
Unemployment status of the head of the household/other members	C. Westgarth et al. (2007)
Easy ground access, i.e. living at ground level or first floor	E. Eller et al. (2008)

Source: own elaboration.

of keeping pets as an adult in a small-scale survey of UK university students ( $n=385$ ) (Paul and Serpell, 1993). The study's focus on the participants' considerations about their pet-keeping goals, rather than on data documenting their actual actions, is a drawback, given that the sample was made up of students. However, when the findings of many other studies (Kidd and Kidd, 1989; Serpell, 1981) are taken into account, it becomes clear that pet ownership is more common among people who have previously owned a pet. A more recent analysis of dog owners' previous experiences with dogs found that this prior experience was also influential in their subsequent dog acquisition practices (Tesfom and Birch, 2013). This survey of 255 dog owners in Washington, USA, discovered that 43% of owners said their decision to adopt a dog was influenced primarily by their previous experience with dogs.

### 3. Methodology

#### 3.1. Data

Data analysis were based on the Polish Household Budget Surveys Central Statistical Office from 2018 (CSO, 2019) ( $N = 36,166$ ). The Household Budget Survey is the basis for economic analysis, including quality of life. It is an important source of information on the income, expenditures, consumption and other aspects of households' living conditions. The Survey is a representative study which allows

for the generalisation of the results to the whole population of Polish households. The most often used parameters estimated from the Polish Household Budget Surveys of the Central Statistical Office are the average value-related expenditure and consumption per capita in a household. The main source of information on incomings and outgoings (monetary and non-monetary) of each household participating in the survey is the “Household Budget Diary” completed by the household on paper, the collected receipts/bills, or an electronic version (CSO, 2019).

### 3.2. Variables

In the analysis data from the Polish Household Budget Surveys Central Statistical Office (CSO, 2019) were used. Expenditure on pet goods consumption was included in the aggregated category “Recreation and Culture”, subcategory “Other equipment”, connected with recreation, garden articles and pets, is separated into the categories: “Pet goods” (symbol 093411) and “Vet services and other pet related services” (symbol 093501). The category of pet goods consists of three subcategories: pet food, pet medicines, pet accessories. The category of vet services and other pet related services consists of the subcategories: “Vet services” and “Pet grooming”.

The dependent variable was equal to 1 if total of expenses on pet goods was above 0 and it was calculated based on three separated categories which include expenses on pet goods:

$$\begin{aligned} \text{Total expenses on pet goods} &= \text{Pet goods} + \\ &\text{Vet services and other pet related service.} \end{aligned} \quad (1)$$

Due to the nature of the dependent variable (any reported expenditure above 0 in households for pet consumption coded as 1, versus 0), a logistic regression model of the socio-economic and demographic household factors related to the likelihood of an expenditure on pet goods consumption was built. Next, a multiple regression model with level of these expenditures was built to determine the socio-economic and demographic household characteristics affecting household expenditure on pet goods.

The variables that were used in the analysis (the variables which, on the basis of the literature, affect the ownership of a pet by a household or the amount of household expenses for pets), were taken as independent variables in the logistic regression model. Respectively, the level of the highest completed education by any member of household, household socio-economic subgroup, unemployment status of head of the household, household with balcony (terrace)/garden, household family type, place of living, assessment of the material situation of the household, renting house/flat, children in household and monthly household income. Within a variable socio-economic group one can distinguish the following categories: employee, farmer, living on unearned sources and pensioner. Variable size of place of living consists of five categories: >500k residents, 200k-499k residents, 100k-199k residents, 20k-99k

residents, and rural. Own/rented house and Children in household can take two values: yes or no. All the independent, qualitative variables are presented in Table 2. The detailed frequency distribution of households due to the expenditure on pets is presented in Appendix A.

**Table 2.** Explanatory variables used in the models

Characteristics	Categories
Level of the highest completed education by any member of household	Higher education; Secondary; Primary/without education
Household's socio-economic subgroup	Employee; Living on unearned income; Pensioner
Unemployment status of head of the household	Yes (the head of the household is unemployed); No (the head of the household is not unemployed)
Household with balcony (terrace)/garden	Yes (household with balcony (terrace)/garden); No (household without balcony (terrace)/garden)
Household's family type	Couple with children; Couple without children; One-person; Other
Place of residence	>500 thousands (city with >500 thousand residents); 100-199 thousand (city with 100-199 thousand residents); 200-499 thousand (city with 200-499 thousand residents); 20-99 thousand (city with 20-99 thousand residents); Rural
Subjective evaluation of the financial situation of the household	Bad; Good; Not good but not bad
Children in household	Yes (household with children); Yes (household rented)
Renting house/flat	Yes (household rented); No (household not rented)

Source: own analysis.

All the independent, qualitative variables with sample characteristics are shown in Table 3.

**Table 3.** Summary sample statistics

Characteristics	Categories	Percentage
1	2	3
Level of the highest completed education by any member of household	Higher education	31.8
	Secondary	39.2
	Primary/without education	29
Household's socio-economic subgroup	Employee	54.4
	Living on unearned income	7.8
	Pensioner	37.8
Unemployment status of head of the household	Yes	3.1
	No	96.9



1	2	3
Household with balcony (terrace)/garden	Yes	82.9
	No	17.1
Household's family type	Couple with children	20
	Couple without children	27.1
	One-person	21.9
	Other	31
Place of residence	>500k	12.7
	100k-199k	8.1
	200k-499k	8.4
	20k-99k	17.5
	Rural	53.4
Subjective evaluation of the financial situation of the household	Bad	8.3
	Good	42.9
	Not good but not bad	48.8
Children in household	Yes	34.3
	No	65.7
Renting house/flat	Yes	16.8
	No	83.2

Source: own analysis.

Additionally, the average monthly household income in 2018 was around 4552.42 PLN (about 910 euro) with a standard deviation of approximately 3435.91 PLN (687 euro). Due to the nature of collecting information on expenditure among Polish households, there are no missing independent variables as if no expenditure was reported on the analysed categories, coded as 0. This means that the household did not have any consumption expenditure as defined above (not reported during time of data collection).

### 3.3. Analysis

To verify if there has been expenditure on pet goods with reference to the households' characteristics presented above according to hypothesis 1, 2 and 3a and 3b, two models were built step by step, i.e. logistic a regression model and a logistic regression model with interaction term.

The empirical logistic regression model utilised to determine whether households participated in the market (in this case the household had any expenditure on the pet goods defined above, above 0) is a logistic regression model of pet expenditure.

The logistic regression model was defined (Kleinbaum and Klein, 2002) as:

$$P(D = 1|X_1, X_2, \dots, X_k) = P(\mathbf{X}). \quad (2)$$

$$P(\mathbf{X}) = \frac{1}{1 + e^{-(\alpha + \sum \beta_j X_j)}}. \quad (3)$$

where:  $\alpha, \beta_j$  represent unknown parameters needed for the estimation based on the data obtained  $X_1, X_2$  up to  $X_k$  independent variable values.

This logistic regression model considers the following study framework: the author observed independent variables (households' characteristics):  $X_1, X_2$  and so on up to  $X_k$  on a group of subjects, for which the author also determined expenditure on pet goods as either 1 if "with expenses on pet goods", or 0 if "without expenses on pet goods".

The model with constant shows 40% of correct classification, while with all the presented variables already at 60.1%, so the overall prediction of consumption expenditure on pets increased by 20.1%, however Nagelkerke's R2 was only 0.04. The total number of correct classifications (i.e. when the expenses/no expenses on pet goods are predicted correctly) is 60.1%. At the same time, 88% of households which did not have expenses on pet goods were also predicted by the model not to have expenses on pet goods, while 18% of households with expenses on pet goods were correctly predicted by the model to have expenses on pet goods.

In the next step, the analysis of the effects of interactions between the independent variables in the logistic regression was conducted by introducing the product of these variables to the model. All the statistically important variables in the first model were used as independent variables. An independent variable was used as a moderator (if the household had any expenditure on the pet goods defined above, higher than 0) whose values influence the strength and/or direction of the fundamental relationship.

The logistic regression with the interactions model (with two predictors) was defined (Jackowska, 2011) as

$$\text{logit}(p) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2, \quad (4)$$

where:  $\beta_0, \beta_1, \beta_2, \beta_3$  represent the unknown parameters needed for the estimate based on the data obtained,  $X_1, X_2$  independent variable values.

In the second model, the percentage of the correct classification was the same at 60.1%. The overall prediction of consumption expenditure on pets and Nagelkerke's R2 (0.04) were the same. The classification statistics in the second model were quite different: 89.9% of households who did not have expenses on pet goods were also predicted by the model not to have expenses on pet goods, while 15.2% of households with expenses on pet goods were correctly predicted by the model to have expenses on pet goods.

## 4. Results

Almost 40% of Polish households reported some expenditure on pet goods ( $N = 14,420$ ) in 2018. This result is comparable with other sources such as those according to (EEDIAF, 2020), almost half of the Polish households (45%) own a pet. The analysis based on logistic regression without interactions showed that only four

variables included in the analysis were statistically significant, as shown in Table 4: 1) Household Socio-economic subgroup 2) Place of residence, 3) Children in household and 4) Renting house/flat. The likelihood of incurring expenses on pet goods is 51% higher for households of employees as opposed to the households of pensioners. On the other hand, the likelihood is 2% lower for households living on unearned income as opposed to the households of pensioners. Households in large cities (>500 thousand inhabitants) have a 38% lower chance of incurring expenses on pet goods (assuming that household has a pet/pets) as opposed to rural households. This is respectively lower by 30% for households in medium cities (100-199 thousand) and lower by 35% for households big cities (200-499 thousands), and 37% lower for households in small cities (20-99 thousand) in comparison to rural households. Households without children have a 15% lower probability of expenses on pet goods as opposed to households with children. The likelihood of incurring expenses on pet goods is 13% greater for people who do not rent a house opposed to those who rent accommodation.

**Table 4.** Results of the logistic regression on expenditure on pets with statistically significant variables

		B	St.error	Wald	Df	P	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Household's socio-economic subgroup				288.528	2	0.000			
	Employee	0.410	0.026	237.306	1	0.000	1.507	1.430	1.587
	Living on unearned income	-0.020	0.045	0.205	1	0.651	0.979	0.896	1.070
	<i>Pensioner (ref)</i>								
Place of residence				384.508	4	0.000			
	>500 thousand inhabitants	-0.475	0.035	180.259	1	0.000	0.622	0.580	0.667
	100-199 thousand	-0.352	0.042	70.914	1	0.000	0.703	0.648	0.763
	200-499 thousand	-0.425	0.041	105.249	1	0.000	0.654	0.603	0.709
	20-99 thousand	-0.459	0.031	221.114	1	0.000	0.632	0.595	0.672
	<i>Rural (as ref)</i>								
Children in household	No	-0.159	0.026	37.544	1	0.000	0.853	0.811	0.897
	<i>Yes (ref)</i>								
Renting house/flat	No	0.121	0.030	15.949	1	0.000	1.128	1.063	1.197
	<i>Yes (ref)</i>								
Constant		-0.435	0.043	102.125	1	0.000	0.647		

Source: own analysis.

In the next step a logistic regression with interactions was built. In the model only four interactions included in the analysis were statistically significant, as shown in the Table 5: 1) Children in household \* Renting house/flat, 2) Children in household \* Place of living, 3) Children in household \* Household's socio-economic subgroup, 4) Renting house/flat \* Household's socio-economic subgroup.

As such the probability of having expenses on pet goods is 37% less likely for households living on unearned income as opposed to the households of pensioners. The likelihood of incurring expenses on pet goods is lower by 23% for households in large cities (>500 thousand), and lower by 18% for households in small cities (20-99 thousand) in comparison to the households rural areas. This is respectively 12% less likely for households big cities (200-499 thousand) as opposed to the households living in rural areas. In the regression logistic model with interactions, the probability of incurring expenses on pet goods is 42% lower for households without children as opposed to households with children, and 7% less likely for people who rent a house as opposed to the people who own a house. The likelihood of expenses on pet goods is 6% greater for families without children and for those who do not rent a house (reference group for the variable Children in house as a moderator), as opposed to families with children who rent a house. The likelihood of incurring expenses on pet goods is lower by 28% for households without children in large cities (>500 thousand) as opposed to households with children in rural areas. Respectively, this likelihood is 0.30 times lower for households without children in medium cities (200-499 thousand) as opposed to households with children in rural areas. Moreover, the probability of incurring expenses on pet goods is lower by 39% for households without children in medium cities (100-199 thousand), as opposed to households with children in rural areas. Finally, the probability of incurring expenses on pet goods is 33% less likely for households without children in small cities (20-99 thousand) as opposed to households with children in rural areas. The likelihood of expenses on pet goods is 79% greater for households without children inhabited by employees in comparison to households with children inhabited by pensioners. Households without children inhabited by people living on unearned income have a 59% greater probability to incur expenses on pet goods in comparison to households with children inhabited by pensioners. The likelihood of expenses on pet goods is 5% greater for people who do not rent a house but only live on unearned income in comparison to rented households inhabited by pensioners.

Taking together all the results, not only economic (such as income), but also household's socio-demographic (gender, age of owner, living conditions) factors may influence the expenditure on pet goods consumption. Hypotheses: *H1a: Household's socio-economic subgroup has an impact on the expenditure on pet goods. Households inhabited by employees have a greater likelihood of expenses on pet goods than households inhabited by pensioners, H1d: Place of residence has an impact on the expenditure on pet goods. Households in rural areas have a greater likelihood of expenses on pet goods than households in cities,*

**Table 5.** Results of the logistic regression on expenditure on pets with interactions of statistically significant variables

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Household's socio-economic subgroup				35.498	2	0.00			
	Employee	-0.118	0.080	2.138	1	0.143	0.888	0.758	1.040
	Living on unearned income	-0.461	0.096	22.687	1	0.000	0.630	0.521	0.762
	<i>Pensioner (ref)</i>			28.433	4	0.000			
Place of residence				28.434	4	0.000			
	>500 thousand inhabitants	-0.266	0.062	18.390	1	0.000	0.766	0.679	0.865
	200-499 thousand	-0.127	0.073	3.099	1	0.078	0.880	0.763	1.015
	100-199 thousand	-0.106	0.072	2.159	1	0.142	0.899	0.781	1.036
	20-99 thousand	-0.199	0.052	14.817	1	0.000	0.819	0.740	0.907
	<i>Rural (as ref)</i>								
Children in household	No	-0.546	0.102	28.942	1	0.000	0.579	0.475	0.707
	<i>Yes (ref)</i>								
Renting house/flat	No	0.072	0.052	1.963	1	0,161	1,075	0,971	1,190
	<i>Yes (ref)</i>								
Children in household * Renting house/flat	No * No	0.054	0.063	0.760	1	0.038	1.056	0.934	1.195
Children in household * Place of living				71.151	4	0.000			
	No * >500 thousand inhabitants	-0.322	0.076	18.162	1	0.000	0.724	0.625	0.840
	No * 200-499 thousand	-0.355	0.089	15.928	1	0.000	0.701	0.589	0.835
	No * 100-199 thousand	-0.488	0.089	30.443	1	0.000	0.614	0.516	0.730
	No * 20-99 thousand	-0.408	0.065	40.004	1	0.000	0.665	0.586	0.754
Children in household * Household's socio-economic subgroup				46.942	2	0.000			
	No * Employee	0.584	0.086	46.557	1	0.000	1.792	1.516	2.119
	No * Living on unearned income	0.462	0.113	16.701	1	0.000	1.587	1.272	1.981
Renting house/flat * Household's socio-economic subgroup				6.966	2	0.031			
	No * Employee	-0.068	0.049	1.940	1	0.164	0.934	0.848	1.028
	No * Living on unearned income	0.047	0.025	3.534	1	0.040	1.048	0.998	1.101
Constant		-0.023	0.092	0.067	1	0.795	0.976		

Source: own analysis.

and H1f: *Renting a house/flat has a negative impact on the expenditure on pet goods* were confirmed. On the other hand, hypotheses: H1b: *Unemployment status of head of the household has a negative impact on the expenditure on pet goods*, H1c: *Household with balcony (terrace)/ garden has a positive impact on the expenditure on pet goods*, H1e: *Subjective evaluation of the material situation of the household has an impact on the expenditure on pet goods. Households that have good/very good subjective financial situation have greater chance to have expenditures on pet goods than households with bad/very bad subjective financial situation* were rejected. The second hypothesis (H2) had to be rejected as the analysis for Polish households via the education of the head of household with the highest level of education *did not confirm the impact on the expenditures on pet goods. It seems that in the Polish context, education was not statistically significant in incurring expenditure on pet goods.* H3a hypothesis: *The size of family has an impact on the expenditure on pet goods. The larger the family, the larger the probability of expenses on pet goods* had to be rejected because household's family type was not significant. On the other hand, hypothesis H3b: *Children in household (under 18) has a negative impact on the expenditures on pet goods* was confirmed.

## 5. Discussion

Children and pets can be considered as 'complementary goods' because households with children are more likely to spend on pet goods than households without children. According to Schwarz et al. (2007), there is a substitution and complementary relationship between children and pets (this relationship depends on the children's age).

Expenditure on pet goods was recorded in fewer number of households compared to the previous research, where 45% of Polish households have a pet at home. The lower percentage of households which reported expenses on pet goods may have occurred due to the fact that some Polish owners do not buy their animals special feed, animal accessories or cat litter.

The conducted analysis shows that households located in rural areas are more likely to spend on pet goods than those in the urban areas, and also that not rented households are more likely to spend on pet goods than rented households. The following findings are in line with those proposed in (Murray et al., 2010), namely that households located in rural areas are more likely to own a pet. Unfortunately, with the data from the Household Budget Surveys Central Statistical Office, it was not possible to verify whether the age of an owner may affect the expenditure on pet goods.

The assumption in (Murray et al., 2010), that renting a flat decreases the probability of owning a pet was also confirmed in the analysis – people renting houses are less likely to spend on pet goods than people owning houses. Pets are more often considered in rental policy or in economic research connected with

rental issues. According to (Graham et al., 2018), renting a flat is the key reason for relinquishment of pets. Power (2017) suggested that owning a pet is an escalating rental risk, a problem for pet owner caused by, e.g. keeping pets without the landlord's knowledge. The conducted research suggests that renting a house has a negative impact on incurring expenses on pet goods, which is in line with the previous analysis.

Although the analysis shows no link between income and the expenses on pet goods, the logistic regression model with interaction suggests that relation. Firstly, there could be demonstrated that households of employees are more likely to spend on pet goods than households of pensioners, which is consistent with  $t$  (Westgarth et al., 2007). Secondly, the likelihood of incurring expenses on pet goods is higher for households without children and for those that are not rented, in comparison to rented households with children.

Other variables such as: the level of the highest completed education by any member of the household, unemployment status of head of the household, household with balcony (terrace)/ garden, household's family type, assessment of the financial situation of the household and monthly household income (cf. e.g. Murray et al. (2010), Westgarth et al. (2007), Marsa-Sambola et al. (2016)) were not significant.

Several studies found a connection between a person's childhood interactions with pets and their adult preferences and attitudes when it comes to pet ownership. For example, (Westgarth et al., 2010) found a connection between dog ownership and prior pet ownership in a cohort study involving the mothers of 14,663 children of whether the mother had pets during her childhood was a strong predictor of pet ownership. Similarly, a strong positive correlation was found between a person's childhood experience with pets and their recorded probability of keeping pets as an adult in a small-scale survey of UK university students ( $n = 385$ ) (Paul and Serpell, 1993). The study's focus on the participants' considerations about their pet-keeping goals rather than the data documenting their actual actions is a drawback, given that the sample was made up of students. However, when the findings of many other studies (Kidd and Kidd, 1989; Serpell, 1981) were taken into account, it becomes clear that pet ownership is more common among people who previously owned a pet. A more recent analysis of dog owners' earlier experiences with owning dogs found that this prior experience was also influential in their subsequent dog acquisition practices (Tesfom and Birch, 2013). Their survey of 255 dog owners in Washington, USA, discovered that 43% of owners said their decision to adopt a dog was influenced primarily by their previous experience with owning dogs.

## 6. Limitations

First of all, the human-animal bond is the most popular variable in the literature concerning expenditure on pet goods consumption (Ellson, 2008; Jyrinki and Leipämaa-Leskinen, 2005). The human-animal bond does not only apply to

people and traditional companion animals, such as dogs and cats. People develop relationships with birds, pocket pets, reptiles, and large animals, including animals for food production (Carr, 2018). Many people believe that their pets are their soulmates. The strong emotional bond between a pet owner and a pet (pet parent, the co-consumption phenomena) means that people do not resent spending money on their 'babies'. Unfortunately, such data on the psychological and emotional context are not included in the Polish Household Budget Surveys of the Central Statistical Office.

Secondly, there are many studies that underline the connection between a person's childhood interactions with pets and their adult preferences and attitudes when it comes to pet ownership (Paul and Serpell, 1993; Westgarth et al., 2010). Moreover, there is a strong positive correlation between a person's childhood experience with pets and their recorded probability of keeping pets as an adult. These two variables are not included in the Polish Household Budget Surveys of the Central Statistical Office, and cannot be considered as a variable that may be correlated with Polish households' expenditure on pet goods.

Thirdly, people owning a pet may not buy pet goods such as pet food (instead they may buy for them meat, vegetables etc.), pet toys (in opposite they can buy for them children's toys) and cat litter (instead they can use sand). This phenomena can be popular e.g. among households with lower income, lower education level and in rural areas. This aspect was also not possible to control in the used data.

Finally, the Polish Household Budget Surveys of the Central Statistical Office (CSO, 2019) presents data per household. Therefore some variables that may have an influence on owning a pet, such as age and gender of owner, cannot be directly applied as control variables in the analysis. Moreover, the data used do not provide information about the number of pets per household.

This paper focuses on a single year, even though the data allows to take into consideration the consumption by households over many years (in two dimensions: cross-sectional and longitudinal, as part of panel component).

Nevertheless, even with these limitations of the analysis, the work is pioneering, contributing to the limited discourse in the economic literature, about the role of pets in consumption patterns observed and not only declared (as it could be done via simple surveys).

## 7. Conclusions

A logistic regression model was used to find households' characteristics (such as socio-economic, demographic and other factors), to determine if there has been expenditure on pet goods (the first detailed research question). Ten independent variables were used in order to build the model: household income, level of the highest completed education by any member of the household, household's socio-economic subgroup, unemployment status of head of the household, household with balcony (terrace)/garden, household's family type, place of residence, assessment of



the financial situation of the household, children in household, renting house/flat. Those variables were chosen based on the literature findings presented in this paper.

Pets have become family member and have a lot in common with children, as suggested in Becker's (1976) and Leibenstein's (1957) theories. The analysis showed that pets can be considered as a complementary good for children, and also as complementary good for senility. The conducted analysis had also an impact on two different fields of studies: economics of loneliness and rental studies. This article is a pioneering work because it presents the first quantitative approach that analysed the connections between owning a pet (i.e. spending on pets) and being a pensioner or renting a house.

There is a need to carry out further analysis concerning expenses on pet goods in Polish households. Those studies should focus mainly on pet goods consumption patterns in household owning a pet. It is necessary to find out if pet owners buy pet goods such as pet food, pet toys, cat litter, or if they substitute them by non-pet goods products such as meat, children's toys, sand etc.). Moreover, there is vital to develop the methodology on how to conduct studies that will contain the intangible measures such as: the human-animal bond, a person's childhood interactions with pets, and their adult preferences and attitudes when it comes to pet ownership, as well as their influence on the expenditure on pet goods consumption.

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## KONSUMPCJA DÓBR DLA ZWIERZĄT WŚRÓD POLSKICH GOSPODARSTW DOMOWYCH

**Streszczenie:** Niniejszy artykuł stanowi rozszerzenie rozważań Beckera i Leibensteina na temat rodziny, koncentrując się na dodatkowym członku gospodarstwa domowego (zwierzęciu domowym) w analizie konsumpcji. Praca wykorzystuje po raz pierwszy podejście analityczne do badania konsumpcji dóbr dla zwierząt w odniesieniu do teorii mikroekonomicznych na podstawie polskich danych zastanych. Przeanalizowano charakterystyki gospodarstw domowych, które wpływają na wydatki na produkty dla zwierząt domowych. W tym celu wykorzystano Polskie Badania Budżetów Gospodarstw Domowych z 2018 roku. Wyniki modeli regresji logistycznej sugerują, że grupa społeczno-ekonomiczna gospodarstwa domowego, miejsce zamieszkania, dziecko w gospodarstwie domowym oraz to, czy gospodarstwo wynajmuje dom/mieszkanie, mają wpływ na określenie prawdopodobieństwa posiadania zwierzęcia domowego wśród polskich gospodarstw domowych. Ponadto przeprowadzono analizę interakcji między istotnymi zmiennymi. Więź emocjonalna pomiędzy właścicielem zwierzęcia a pupilem nie mogła zostać uwzględniona w analizie, co stanowi jej główne ograniczenie. Pomimo to praca jest pionierska, gdyż pokazuje ilościowe podejście do ekonomii gospodarstwa domowego, które podkreśla potrzebę rozszerzenia ekonomicznych teorii rodziny Beckera i Leibensteina o nowego członka – zwierzę domowe.

**Słowa kluczowe:** posiadanie zwierząt domowych, wydatki konsumpcyjne, ekonomia gospodarstwa domowego.

## Appendix A

**Table A1.** The detailed frequency distribution of households according to the expenditure on pets

Characteristics	Categories	With expenditure on pet goods	With no expenditure on pet goods
Level of the highest completed education by any member of household	Higher	39.64%	60.36%
	Secondary	39.97%	60.01%
	Primary/Without	39.99%	60.03%
Household's socio-economic group	Employee	44.76%	55.24%
	Living on unearned income	36.57%	63.43%
	Pensioner	33.51%	66.49%
Unemployment status of head of the household	No	39.84%	60.16%
	Yes	41.00%	59.00%
Household with balcony (terrace)/garden	No	39.29%	60.71%
	Yes	39.99%	60.01%
Household's family type	Couple with children	40.92%	59.08%
	Couple without children	39.03%	60.97%
	One-person	39.74%	60.26%
	Other	40.02%	59.98%
Place of residence	>500k	33.71%	66.29%
	100k-199k	35.93%	64.07%
	200k-499k	34.40%	65.60%
	20k-99k	33.67%	66.33%
	Rural	44.83%	55.17%
Subjective evaluation of the financial situation of the household	Bad	35.50%	64.50%
	Good	40.95%	59.05%
	Not good but not bad	39.67%	60.33%
Children in household	No	40.64%	59.36%
	Yes	36.06%	63.94%
Renting house/flat	No	36.76%	63.24%
	Yes	45.83%	54.17%

Source: own analysis.