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The Price of Pet Ownership: Reduced Labour Mobility?

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Working Paper in Economics 3/22

January 2022

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Abstract

Pets are an important part of many peoples' lives. Studies of the mental, physical and emotional benefits of pet ownership have been extensively discussed in the literature. However, the costs of pet ownership have received less attention. We investigate whether pet ownership decreases the incomes of pet owners by reducing labour mobility. Answering this question may help people to better understand the full range of costs and benefits of pet ownership, as well as pointing to broader labour market efficiency issues. Using data from the 2018 General Social Survey, we investigate the relationship between income and pet ownership, controlling for a rich set of covariates. We include interactions between pet ownership and education, pet ownership and housing tenure, and pet ownership and race, to further investigate this relationship. Overall, we find initial support for our hypothesis that pet ownership decreases labour mobility, and consequently income. These negative effects are larger for highly educated workers, renters and African Americans.

Keywords

Pet ownership
Labour mobility
Mincer wage regression

JEL Classification

J39; J69

Acknowledgements

This work was inspired through real-life experiences and discussions with Ashleigh Ngow. We thank Ashleigh and her cat Mini as well as Mark Holmes, who provided some initial thoughts that helped guide the direction of this research.

1. Introduction

Pets are a fundamental part of many people's lives. From cats and dogs to fish or horses; there are a plethora of species that humans have domesticated and built relationships with. Today, owning a pet is more common than not. In the United States of America, 60% of people own a pet, with dogs being the most common (Applebaum, 2020). The bond between a pet and its owner is powerful and unique. Often, pets are treated as family and pet owners form strong emotional connections with their pets (Sharkin and Knox, 2003). These connections provide important psychosocial support, and pet ownership is consequently linked with improved mental and physical wellbeing and higher levels of life satisfaction (Bao and Schreer, 2016; Jennings, 1997; McNicholas et al., 2005; Serpel, 1991). The benefits of pet ownership have been extensively researched, particularly for vulnerable people and at-risk individuals (Anderson et al., 1992; Jennings, 1997; Thompson et al. 2014). However, studies rarely consider the potential socioeconomic trade-offs associated with pet ownership. What do owners give up for their pets?

In this paper, we investigate the relationship between pet ownership and income. Inherently, pet owners have lower discretionary income (than similar non-pet owners) because they face greater expenses (for example, veterinary bills, food, litter and pet insurance). However, could pet ownership also decrease gross income? We hypothesise that owning a pet decreases a worker's mobility, which limits their access to higher-income employment opportunities. Similar to having children (de Luis Carnicer et al. 2004), owning a pet may decrease the mobility of a worker and their ability to pursue job opportunities in new areas. Renters with pets may find it more difficult to move because landlords often impose restrictions on pet ownership (Power, 2016). Moreover, the act of relocating a pet incurs significant financial costs and there may be practical barriers to relocation (Global Pet Relocation, 2021). Search models of the labour market recognise the importance of matching a worker to a job vacancy (Rogerson et al., 2005). If a worker is less mobile, they have less bargaining power in negotiating wages with potential employers (and *ceteris paribus*, should receive a lower wage). Thus, we would expect pet owners to have lower incomes than equivalent non-pet owners. Understanding this research question has wider implications, beyond helping people to better appreciate the costs and benefits of pet ownership. As Schioppa and La Sapienza (1991) show, labour mobility issues feed into labour market mismatching, which restricts economic growth and efficiency. If pet ownership decreases labour market mobility, then pet ownership may reduce economic growth. This may be of interest to policy makers who could design policy to reduce barriers to mobility among pet owners and thus increase the efficiency of the labour market.

To understand the relationship between pet ownership and wage income (which, in theory, is driven by labour mobility), we add a measure of pet ownership into a standard Mincer wage regression, using data from the US General Social Survey (GSS). We include a rich set of control variables and consider interactions between pet ownership and other key explanatory variables to further explore this relationship. As far as we are aware, this is the first study to investigate the relationship between pet ownership and wage income, with links to labour mobility. In the next section, we discuss the data and our econometric methodology. In the third section, we summarise the results and discuss their implications, while the fourth section concludes.

2. Data and methodology

We use data from the 2018 wave of the U.S. General Social Survey (GSS). The GSS is a large representative survey of U.S. adults, which has been conducted by the National Opinion Research Centre (NORC) biannually since 1972. It has been widely used across the social sciences to answer a range of theoretical and applied questions (for example, see Burt, 1984; Blocker and Eckberg, 1997). GSS data cover an extensive array of topics and include a wide range of demographic variables, making it highly useful for research in economics. The GSS employs multi-stage probability sampling methods, and survey weights are available to researchers (to ensure the data are representative of U.S. adults aged 18 years old and above). The GSS includes unique modules in different years of the survey and often employs a split design, whereby randomly selected groups of respondents see different modules (NORC, 2019). In the 2018 round, the GSS included a module with questions pertaining to pet ownership. Applebaum (2020) took a first look at the point estimates from the data and describe the GSS data as being the best available cross-sectional data on pet ownership in the U.S. (largely because alternative data sources had limited demographic variables and undisclosed sampling designs). Unfortunately, the GSS only includes pet ownership questions for the 2018 round (as a special module), so panel data analysis methods cannot be employed. The final sample size for the GSS survey in 2018 was 2,348 (however, only 1,147 respondents answered the pet ownership module). Moreover, due to the split-design of the GSS, a limited number of respondents saw questions on the number of hours worked in a week ($N = 1381$) and housing tenure ($N = 1552$). The final sample size of respondents who were working and saw the pet ownership questions is 661.

We employ a standard Mincer wage regression, where the dependent variable is the log of real wage income (\$USD, base year = 1986). Our key independent variable of interest is the number of pets owned. The number of pets is highly skewed to the right and right-censored at twenty. We further winsorise this variable to the 95th percentile at the upper bound to prevent any leveraging bias caused by a small number of extreme values. We include important control variables for models predicting income (Mincer, 1958), including labour market experience (age minus twenty years) and its square, gender, race, and education (completed school years). Furthermore, thanks to the richness of the GSS data, we include several other covariates (to make selection on observables more plausible, reduce the bias in our regression models, and increase statistical power). Specifically, we control for the number of children, marital status, weekly hours worked, mental health, and housing tenure for each respondent (all of which may influence income so would generate omitted variable bias if excluded). We also include regional controls (seven regions) to control for some regional heterogeneity. All models use robust standard errors to account for heteroskedasticity. We also use probability sampling weights to ensure the data are representative of U.S. adults. Our initial econometric specification is as follows:

$$\ln(\text{real income})_i = \beta_0 + \beta_1 \text{Pets}_i + \beta_2 \text{Educ}_i + \beta_3 \text{Exp}_i + \beta_4 \text{Exp}_i^2 + \boldsymbol{\gamma} \mathbf{Z}_i + \varepsilon_i \quad (1)$$

where Pets_i is the number of pets individual i owns, Educ_i is the number of completed school years for individual i , Exp_i is labour market experience (age minus twenty years) for individual i , \mathbf{Z}_i is a vector of control variables, and ε_i is an idiosyncratic error term.

We then consider an interaction between the number of pets and education. Literature suggests that labour mobility, the job vacancy rate and labour market matching are fundamentally different between high-skilled and low-skilled workers (Ghayad and Dickens, 2012; Holzer, 1994). This leads to the following specification:

$$\ln(\text{real income})_i = \beta_0 + \beta_1 \text{Pets}_i + \beta_2 \text{Educ}_i + \beta_3 \text{Pets} * \text{Educ}_i + \beta_4 \text{Exp}_i + \beta_5 \text{Exp}_i^2 + \boldsymbol{\gamma} \mathbf{Z}_i + \varepsilon_i \quad (2)$$

We also estimate a separate model with an interaction between pet ownership and housing tenure (owning or renting and other). This model allows us to investigate whether differences in tenure impact the marginal effect of pet ownership on real income (as labour mobility may be significantly reduced for people who do not own their home and have pets). The Oswald hypothesis suggests that homeowners are less mobile than renters (Cochrane and Poot, 2020). In contrast, we suspect that renters' mobility may be reduced with pet ownership due to landlord imposed restrictions on pets (Power, 2016). This third econometric model is specified as:

$$\ln(\text{real income})_i = \beta_0 + \beta_1 \text{Pets}_i + \beta_2 \text{Tenure}_i + \beta_3 \text{Pets} * \text{Tenure}_i + \beta_4 \text{Educ}_i + \beta_5 \text{Exp}_i + \beta_6 \text{Exp}_i^2 + \boldsymbol{\gamma} \mathbf{Z}_i + \varepsilon_i \quad (3)$$

where Tenure_i is the housing tenure for individual i .

Finally, we estimate a separate model with an interaction between pet ownership and race ("white", "black" or "other"). This model allows us to investigate whether race impacts the marginal effect of pet ownership on real income. We hypothesise that pet ownership may have a greater negative influence on African Americans' mobility. African Americans face well-documented discrimination in housing markets which, when coupled with pet ownership, may adversely impact rental and accommodation opportunities (Fischer and Massey, 2004; Ondrich et al., 1999). Moreover, several studies show that geographical mobility varies by race and ethnicity (Carlsson and Eriksson, 2014; Ondrich et al., 1999; South and Deane, 1993). As we expect pet ownership to influence income through the mechanism of labour mobility, this is a relevant and interesting interaction. This fourth econometric model is specified as:

$$\ln(\text{real income})_i = \beta_0 + \beta_1 \text{Pets}_i + \beta_2 \text{Race}_i + \beta_3 \text{Pets} * \text{Race}_i + \beta_4 \text{Educ}_i + \beta_5 \text{Exp}_i + \beta_6 \text{Exp}_i^2 + \boldsymbol{\gamma} \mathbf{Z}_i + \varepsilon_i \quad (4)$$

where Race_i is the race of individual i .

Our modelling enables us to investigate the correlation between pet ownership and real income, with the hypothesis that pet ownership restricts labour mobility and thereby lowers wage income. We also run each of our models with a dummy variable for pet ownership. This allows us to examine the correlation between pet ownership and income at the extensive margin and serves as a robustness check. We also examined but did not find strong evidence of non-linearity in the correlation between pet ownership and the log of income. Given the dataset and variables available, we could not find a convincing instrumental variable for pet ownership. As such, if pet ownership is endogenous, OLS will be biased. We acknowledge this limitation and include a rich set of control variables to reduce the risk of OLS bias.

3. Results and Discussion

We present summary statistics for the untransformed dependent variable (real income), independent variable (number of pets) and control variables in Table 1. We present summary statistics for the full sample, the model sample and the sub-sample of respondents who completed the housing tenure questions. The average number of pets in our sample was 1.7, and real income is positively skewed, with an average of 27,076 USD (1986 dollars) which is equivalent to 62,065 USD (in 2018 dollars). Upon examining each set of summary statistics, there are no obvious biases in the sub-samples.

Table 1. Summary statistics for variables of interest

Variable	Full sample (N = 578)		Model sample (N = 557)		Tenure sample (N = 198)	
	Mean	Stdev	Mean	Stdev	Mean	Stdev
Real Income (\$, 1986 USD)	27,076	29,123	26,968	29,073	29,873	31,435
Number of pets	1.73	2.76	1.73	2.79	1.70	2.70
Has any pets	61.07%	48.80%	61.04%	48.81%	60.10%	49.09%
Education (school years)	14.25	2.78	14.25	2.74	14.35	2.74
Experience	24.58	13.55	24.47	13.64	28.56	13.93
Number of children	1.72	1.61	1.68	1.58	1.82	1.59
Hours worked a week	42.50	14.82	42.52	14.85	42.98	16.16
Male	53.98%	49.88%	53.86%	49.90%	58.08%	49.47%
Female	46.02%	49.88%	46.14%	49.90%	41.92%	49.47%
Black	16.61%	37.25%	16.52%	37.17%	18.18%	38.67%
White	71.63%	45.12%	71.81%	45.03%	70.20%	45.85%
Other race	11.76%	32.25%	11.67%	32.13%	11.62%	32.12%
Own home	65.50%	47.66%	64.55%	47.96%	65.15%	47.77%
Rent home	34.50%	47.66%	35.45%	47.96%	34.85%	47.77%
Married	46.02%	49.88%	45.42%	49.83%	48.99%	50.12%
Widowed	2.77%	16.42%	2.69%	16.20%	4.55%	20.88%
Divorced	18.69%	39.01%	19.03%	39.29%	18.69%	39.08%
Separated	4.15%	19.97%	4.13%	19.91%	3.03%	17.19%
Never married	28.37%	45.12%	28.73%	45.29%	24.75%	43.26%
Trailer	4.84%	21.49%	4.49%	20.72%	5.05%	21.95%
One family house	67.65%	46.82%	67.86%	46.74%	67.68%	46.89%
Unit	5.02%	21.85%	5.21%	22.24%	4.04%	19.74%
Three-four family house	1.04%	10.14%	1.08%	10.33%	2.02%	14.10%
Row house	5.36%	22.55%	5.57%	22.95%	4.04%	19.74%
Apartment	16.09%	36.78%	15.80%	36.51%	17.17%	37.81%

Note: For brevity, we do not include summary statistics for the aggregated regional dummy variables.

We report our main OLS modelling results in Table 2 and the results for the binary pet ownership variable in Table 3. The first columns in both tables show the results for the basic model, the second columns include the education interaction, the third columns include the housing tenure interaction, and the final columns reports results for the race interaction model. In the basic model, the number of pets in a household is statistically insignificant after controlling for other covariates. However, when we include an interaction between education

and pet ownership, we can see that the main effect coefficient on pet ownership becomes statistically significant, and that the marginal effect of pet ownership on income varies significantly by education level. The coefficient on the interaction term is significant at the 1% significance level and reveals that as education (school years) increases, the marginal effect of pet ownership on income decreases. We depict this varying relationship in Figure 1, which shows the marginal effect of pets owned on the natural log of real income for varying education levels (with 90% confidence intervals). At low levels of education, pet ownership has a positive and statistically insignificant positive with real income, while at high levels of education, pet ownership is significantly negatively correlated with real income.

Table 2. OLS regression results for regressions of real income on number of pets

Ln (real income, 1986 USD)	(1)	(2)	(3)	(4)
Number of pets	-0.0452 (0.0304)	0.163 (0.125)	-0.00227 (0.0465)	-0.0195 (0.0320)
Education (school years)	0.111*** (0.0185)	0.135*** (0.0225)	0.0974*** (0.0272)	0.115*** (0.0187)
African American	-0.00822 (0.133)	0.000251 (0.132)	0.00611 (0.210)	0.171 (0.144)
Other Race	-0.456*** (0.147)	-0.443*** (0.148)	-0.0947 (0.258)	-0.384** (0.168)
Female	-0.360*** (0.0880)	-0.366*** (0.0878)	-0.508*** (0.175)	-0.388*** (0.0874)
Experience	0.0560*** (0.0141)	0.0577*** (0.0140)	0.0466** (0.0211)	0.0571*** (0.0139)
Experience^2	-0.000772*** (0.000255)	-0.000796*** (0.000252)	-0.000539* (0.000323)	-0.000791*** (0.000252)
Weekly hours worked	0.0216*** (0.00366)	0.0214*** (0.00355)	0.0171*** (0.00519)	0.0220*** (0.00362)
Widowed	-0.259 (0.328)	-0.274 (0.325)	-1.004*** (0.378)	-0.264 (0.329)
Divorced	-0.190 (0.117)	-0.199* (0.117)	-0.0128 (0.157)	-0.212* (0.117)
Separated	-0.0122 (0.168)	0.0209 (0.175)	0.456 (0.396)	-0.00674 (0.170)
Never married	-0.536*** (0.127)	-0.530*** (0.127)	-0.574** (0.259)	-0.542*** (0.126)
Number of children	-0.102*** (0.0360)	-0.101*** (0.0349)	-0.138** (0.0618)	-0.0982*** (0.0369)
Mental health score	-0.00246 (0.00563)	-0.00270 (0.00568)	0.00285 (0.00941)	-0.00210 (0.00564)
Renting			-0.259 (0.206)	
Number of pets*Education		-0.0149* (0.00848)		
Number of pets*Renting			-0.144 (0.0937)	
Number of pets*African American				-0.237** (0.1000)
Number of pets*Other race				-0.0439 (0.126)
Constant	7.066*** (0.441)	6.691*** (0.473)	7.277*** (0.716)	6.936*** (0.445)
Regional controls	YES	YES	YES	YES
Dwelling type controls	NO	NO	YES	NO
Observations	557	557	189	557
R-squared	0.411	0.415	0.487	0.421

Note: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3. OLS regression results for supplementary analyses with a binary pets variable

Ln (real income, 1986 USD)	(1) Basic	(2) Educ interact	(3) Tenure interact	(4) Race interact
Owens a pet	-0.0369 (0.0925)	-0.0424 (0.500)	0.0288 (0.187)	0.117 (0.104)
Education (school years)	0.115*** (0.0183)	0.115*** (0.0231)	0.0936*** (0.0275)	0.113*** (0.0177)
African American	0.0316 (0.133)	0.0315 (0.134)	-0.00892 (0.213)	0.332** (0.163)
Other Race	-0.408*** (0.148)	-0.408*** (0.147)	-0.121 (0.268)	-0.179 (0.176)
Female	-0.359*** (0.0887)	-0.359*** (0.0886)	-0.509*** (0.169)	-0.368*** (0.0869)
Experience	0.0571*** (0.0141)	0.0571*** (0.0142)	0.0487** (0.0198)	0.0591*** (0.0139)
Experience^2	-0.000783*** (0.000255)	-0.000783*** (0.000255)	-0.000564* (0.000309)	-0.000801*** (0.000251)
Weekly hours worked	0.0214*** (0.00364)	0.0214*** (0.00364)	0.0178*** (0.00504)	0.0222*** (0.00358)
Widowed	-0.298 (0.330)	-0.298 (0.330)	-0.955** (0.382)	-0.328 (0.370)
Divorced	-0.194* (0.112)	-0.194* (0.111)	0.00434 (0.155)	-0.210* (0.109)
Separated	-0.0195 (0.166)	-0.0196 (0.166)	0.280 (0.349)	-0.0309 (0.161)
Never married	-0.530*** (0.126)	-0.530*** (0.126)	-0.570** (0.253)	-0.499*** (0.123)
Mental health score	-0.00297 (0.00567)	-0.00297 (0.00566)	0.00244 (0.00923)	-0.00257 (0.00571)
Number of children	-0.108*** (0.0380)	-0.108*** (0.0380)	-0.134** (0.0637)	-0.0986** (0.0386)
Renting			-0.0447 (0.276)	
Owens a pet*Education		0.000385 (0.0330)		
Owens a pet*Renting			-0.578* (0.314)	
Owens a pet*African American				-0.754*** (0.252)
Owens a pet*Other race				-0.358 (0.278)
Constant	6.925*** (0.456)	6.929*** (0.508)	7.126*** (0.697)	6.817*** (0.443)
Regional controls	YES	YES	YES	YES
Dwelling type controls	NO	NO	YES	NO
Observations	557	557	189	556
R-squared	0.407	0.407	0.493	0.420

Note: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

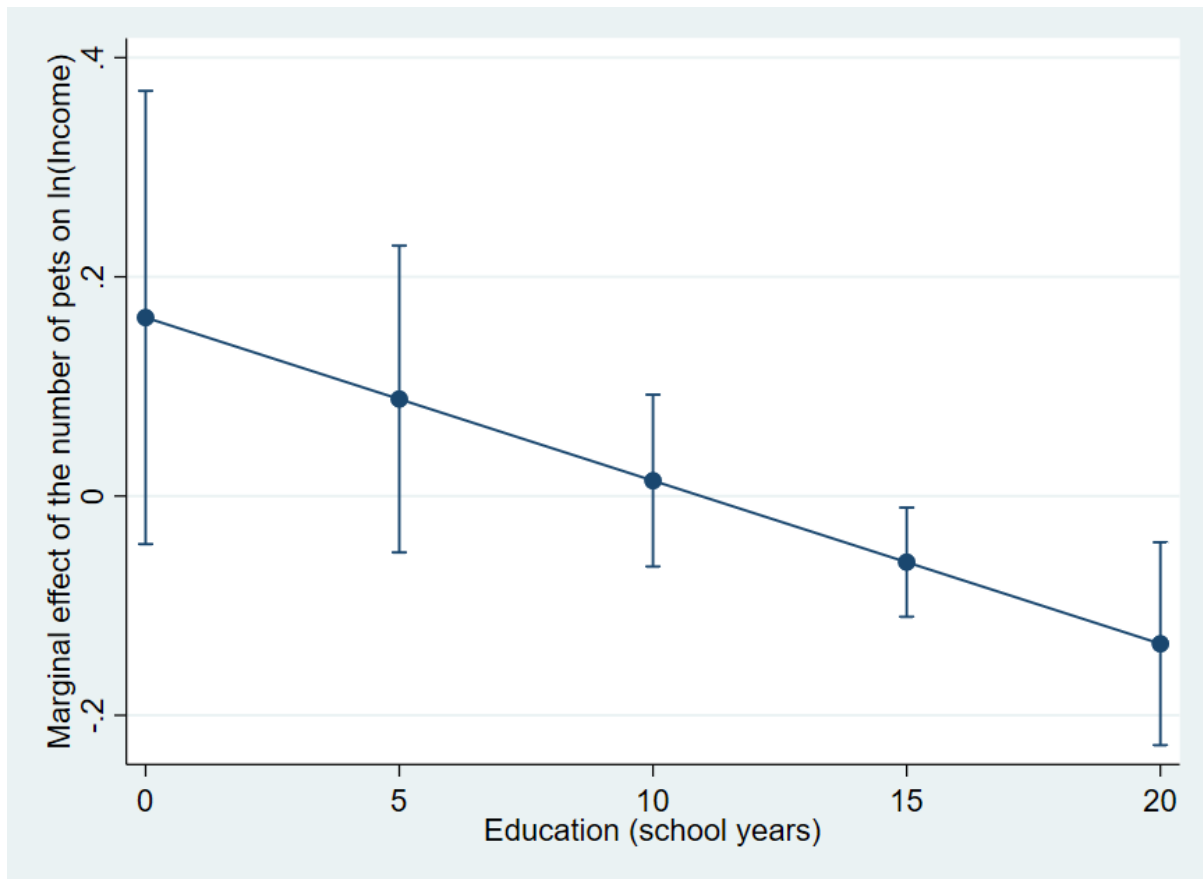


Figure 1. Plot of the marginal effect of pet ownership on the log of real income by education

We propose possible interpretations for these results in line with the literature. First, there may be fewer mobility issues and mobility-related opportunities for income gain for low-skilled workers. Studies show that high-skilled workers are more geographically mobile and move more often for work (Amior, 2015; Machin et al., 2012; Malamud and Wozniak, 2012). Amior (2015) confirm that a majority of high-income workers cite moving for “job reasons”. Moretti (2011) argues that this is because there are smaller geographical wage differentials for low-skilled workers (relative to high-skilled workers) and thus there is less financial motivation for low-skilled workers to relocate. Therefore, if pet ownership restricts mobility, the effect on work opportunities may be smaller for low-skilled workers (Amior, 2015).

Second, at low levels of completed education, owning a pet may garner social attributes (such as compassion, improved mental health, better social skills) that are desirable to employers (and that more educated people would gain through their time at school) (Bao and Schreer, 2016; Jennings, 1997; McNicholas et al., 2005). Therefore, real income may be higher for uneducated (zero school years) individuals who have pets than those who don’t. The combination of these two effects – the effect of pet ownership on mobility, and the effect of pet ownership on desirable labour market skills, could explain our results. Future research should explore these mechanisms in greater detail and may elucidate why our results do not hold at the extensive margin (Table 3).

Further considering the role of mobility, when we include controls and interactions for housing tenure (owning or renting), the correlation between pet ownership and real income is

insignificant for home-owners, but negative and almost significant for renters. For those renting, owning an additional pet is associated with 13.4% lower real income, *ceteris paribus*. Despite this coefficient being statistically insignificant at conventional levels, it is pertinent to consider how the marginal effect of renting on real income changes with differing levels of pet ownership. Figure 2 illustrates that renting with pets significantly reduces real income (and does so to a greater extent as the number of pets rises). Moreover, at the extensive margin (Table 3), pet ownership is associated with 43.9% lower real income on average (and is statistically significant).

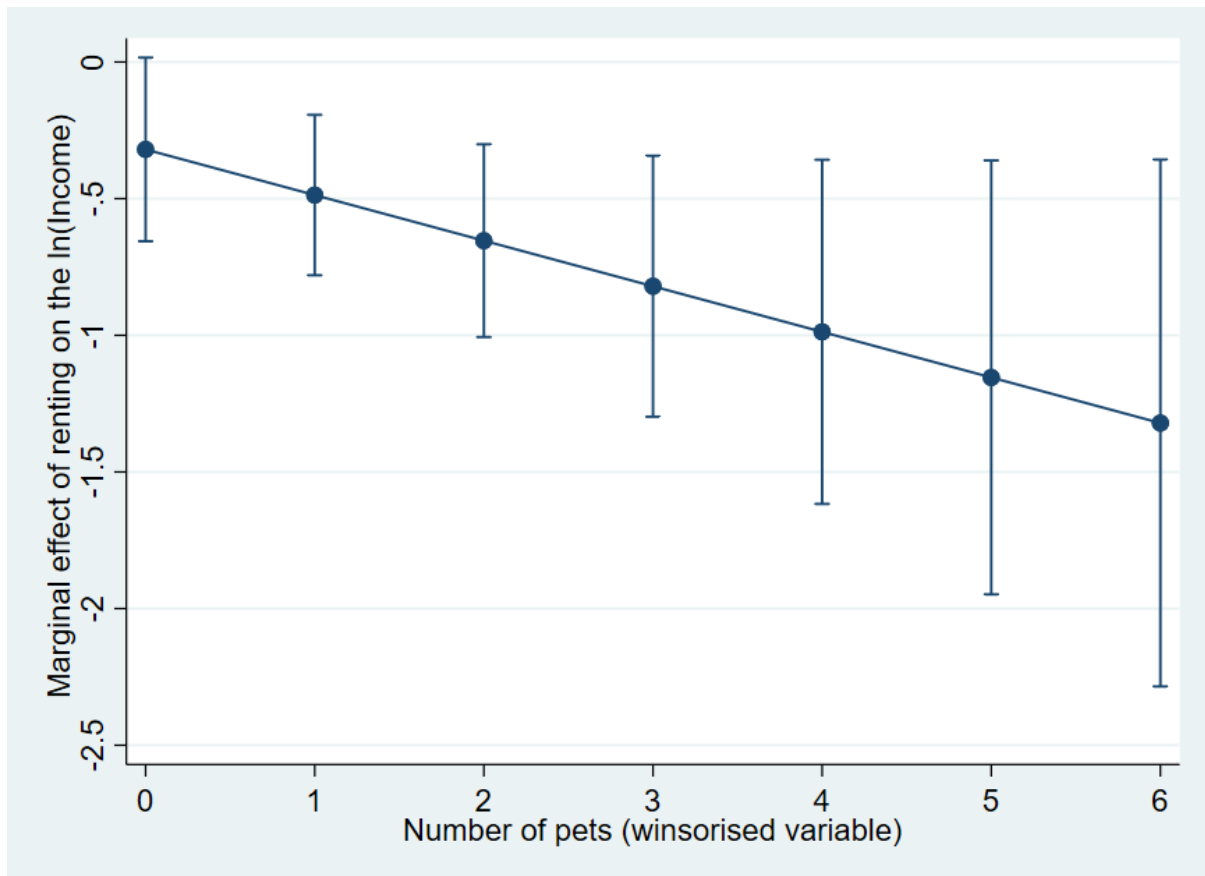


Figure 2. Plot of the marginal effect of renting on the log of real income by differing levels of pet ownership

We suggest that renters (relative to homeowners) face greater mobility restrictions from pet ownership and may have lower incomes as a result. Many landlords impose restrictions on pet ownership (Graham et al., 2018; Power, 2016). Graham et al. (2020) survey renters with pets and find that they make considerable compromises when looking for rental properties in order to keep their pets. In particular, dog owners struggle to find rental accommodation (Graham et al., 2020), which is particularly pertinent given that dogs are the “pet of choice” in the US (Applebaum, 2020). In contrast, the Oswald Hypothesis suggests that homeowners may be generally less mobile than renters (Cochrane and Poot, 2020). However, we don’t expect pet ownership to reduce homeowners’ mobility, because they do not face the same restrictions on pet ownership that renters do. Thus, these results again suggest that a negative relationship between income and pet ownership for workers who are less mobile.

In our final model, the coefficient on pet ownership is negative and significant for African Americans and insignificant for Whites and people of other races. On average, for African Americans, an additional pet is associated with 21.1% lower real income, *ceteris paribus*. On average, at the extensive margin (Table 3), pet ownership is associated with 53.0% lower income, *ceteris paribus*. This supports our initial hypothesis that the combination of racial biases and pet ownership may significantly reduce African Americans' labour mobility and their subsequent wage income (Fischer and Massey, 2004; Ondrich et al., 1999). We suspect the potential effects may be concentrated in the rental housing market, as noted above. In our smaller sample (those who saw the housing tenure questions), almost twice as many African Americans are renters (58.9%) compared to Whites (32.8%). Therefore, mobility issues associated with pet ownership may have disproportionate impacts on minority populations.

4. Conclusions

Overall, our results provide some initial support for the claim that pet ownership reduces labour mobility and negatively impacts workers' earnings potential (particularly for highly educated workers, renters, and African Americans). However, our analysis has some key limitations. First, we do not generate causal estimates for the relationship between pet ownership and wage income. Pet ownership (and other explanatory control variables) is likely to be endogenous to some extent and this would introduce bias into our OLS estimates. Moreover, the data on pet ownership is limited to a single cross-section in the GSS, and the range of pet ownership variables is limited. We also cannot determine how long each individual has owned a pet for. This may be an issue because the impact on labour mobility may differ depending on how long a worker has owned pets. For instance, long-term pet owners may be more reluctant to give up their pets to enable a work-related move. The sample size limitation is most relevant for our analysis of housing tenure and pet ownership. Further exploration of these issues, perhaps with a large-scale bespoke survey, is warranted.

In spite of these limitations, this exercise is a useful first exploration of the correlations between pet ownership and wage income in the US. Our findings improve our understanding of the costs and benefits of pet ownership and the tradeoffs pet owners make for their pets. We show that pet ownership is negatively associated with real income for highly educated individuals, renters, and African Americans. We argue that these correlations may be driven by mobility constraints associated with pet ownership. We also find that pet ownership is positively correlated with real income for uneducated workers and this may suggest that pet ownership garners desirable social attributes that are valuable in the labour market.

The full range of costs and benefits of pet ownership are still being identified. We have contributed to this literature through an examination of the labour market impacts of pet ownership. While pet owners will undoubtedly assert that their pets are worth it, understanding these dynamics could help policy makers improve labour mobility and labour market outcomes for pet owners.

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