Effects of Income and Government Assistance on Rent Expenditures

Stella Depuydt
Drake University
Majors: Sustainability & Resilience, Economics, Spanish
Minor: Data Analytics

April 28, 2024

ABSTRACT: This research paper examines the impact of various factors on rent expenditure using data from the Bureau of Labor Statistics (BLS) Consumer Expenditure Survey. The analysis employs a logarithmic regression model to explore how income, family size, age, government assistance, and residence in public housing projects or urban areas affect rental expenditures. The results indicate that income has a significant positive effect on rent expenditures, with a 1% increase in income associated with a 0.339% increase in rent. Additionally, the analysis shows that households receiving government assistance tend to have lower rental expenditures, while those in public housing projects experience higher rental expenditures. These findings align with existing literature on housing affordability and financial burdens (e.g., Hanna et al., 2012; Cohen & Wardrip, 2011; Olsen, 2003), providing valuable insights for policymakers and individuals interested in housing affordability and highlighting the importance of considering a range of factors that influence rent expenditures.

KEYWORDS: rent expenditure, returns on income, government assistance, public housing

INTRODUCTION

In recent decades, household housing expenditures have been a significant indicator of both the financial well-being of households and overall changes in the economy. Understanding the factors that influence housing expenditure, especially for renters, is not only important for policymakers but also aids in providing insights into consumer behavior and the state of the economy. This study investigates the relationship between rental expenditure and income, government assistance and public housing projects, characteristics of the oldest individual in the household, and location variables. To address the nature of this relationship, this paper utilizes data from the Bureau of Labor Statistics (BLS) Consumer Expenditure Survey and employs a logarithmic regression model to analyze the impact of these variables on rental housing expenditure. This analysis allows for a thorough examination of how these variables interact to shape rental housing expenditure trends, offering valuable insights for policymakers, researchers, and individuals who rent their homes. The findings of this study have implications for policymakers seeking to design effective housing policies and public assistance programs.

LITERATURE REVIEW

Since housing expenditure makes up a significant portion of household budgets, affordable housing is essential for individuals. It also benefits communities because it contributes to economic stability and social well-being; people with affordable rent can stay in that housing for longer periods and have more disposable income to spend in other ways that stimulate the local economy (Cohen & Wardrip, 2011). Households that

spend more than 30% of their income on housing are considered to have a “rent burden,” which can lead to financial strain and limited ability to meet other essential needs (Hanna, Yuh, & Chatterjee, 2012). This burden is particularly prevalent in large cities and the Western region of the United States. The data analyzed in this study are from the 1992,1995, 1998, 2001, 2004, and 2007 cross-sectional datasets for the U.S. Survey of Consumer Finances sponsored by the Federal Reserve Board (Bucks et al., 2009), and the focus was on whether households had a high financial obligations ratio. The number of households dealing with rent burden has increased significantly since the 1980s, with 33.3% of households experiencing this challenge in 2022 (U.S. Bureau of Labor Statistics, 2023). This trend emphasizes the growing financial pressures faced by many households.

Affordable housing policies are crucial, as highlighted by the Bureau of Labor Statistics, which reported that average household expenditure in 2022 increased by 9.0% to reach $72,967 (U.S. Bureau of Labor Statistics, 2023). Rent expenditure also rose notably by 6.5% in the same period. These trends underscore the evolving nature of housing expenditure and its impact on household budgets. Housing programs are essential for enhancing housing consumption and improving living standards. However, research suggests that some programs may yield more effective outcomes than others (Olsen, 2003). Despite this, housing programs generally provide significant benefits to recipients, even though the cost to taxpayers may exceed the subsidy provided. This aspect significantly influences the ability to accumulate wealth. A study indicates that homeownership itself, rather than simply saving over time, leads to greater future household net wealth (Di et al., 2007). This finding emphasizes the role of

homeownership in wealth accumulation and its implications for household financial stability.

DATA

The data used to address the research question comes from the Bureau of Labor Statistics' Consumer Expenditure Survey (CE), specifically from the Public Use Microdata (PUMD) files. CE data are collected quarterly by the Census Bureau for BLS in two surveys: the Interview Survey for major and/or recurring items and the Diary Survey for more minor or frequently purchased items. The data used in this paper comes from the Interview Survey, and the PUMD files provide this information for individual respondents without any information that could reveal the identity of respondents. This data is well-suited to answering the question of how income affects rent expenditures because the data includes information on respondent expenditure, income, and demographics in the United States. The Interview Survey is a cross-sectional survey in which approximately 6,000 usable interviews are produced over the course of four quarters for each year. This study only uses data collected for the 2022 calendar year. The unit of observation is the individual household, referred to as a consumer unit (CU).

The data analyzed in this study comes from two files: FMLI and RNT. Each quarter of the year has its own FMLI file, so they were appended together before being merged with the RNT file. After all missing variables were dropped, 4,035 observations were remaining. Several respondents who reported negative incomes were also excluded from the analysis. The age variable was generated by selecting the highest

value between the “Age of reference person” variable and the “Age of spouse” variable. The given rent variable was rent for the first quarter of the year, so a yearly rent variable was generated by multiplying the original rent variable by four.

TABLE 1: VARIABLE DEFINITIONS

Variable	Definition	Formula
Rent	Total rent paid over four quarters	Quarterly rent variable x 4
Income	Total amount of family income after estimated taxes in the last 12 months	
Gov. Assistance	Are housing costs lower because the Federal, State, or local government is paying part of the costs?	1 = yes, 0 = no
Public Housing	Is residence in a public housing project (owned by a local housing authority or other local public agency)?	1 = yes, 0 = no
Family Size	Number of members in the consumer unit	
Age	Age of the oldest person in the consumer unit	
Urban	Is the consumer unit located in an urban area?	1 = yes, 0 = no
Metropolitan	Does the consumer unit reside inside a Metropolitan Statistical Area (MSA)?	1 = yes, 0 = no
Northeast	Northeastern region of the United States	1 = yes, 0 = no
Midwest	Midwestern region of the United States	1 = yes, 0 = no
South	Southern region of the United States	1 = yes, 0 = no
West	Western region of the United States	1 = yes, 0 = no

SOURCE: BLS Consumer Expenditure Survey Interview 2022, Quarters 1-4. Accessed March 25th, 2024

TABLE 2: DESCRIPTIVE STATISTICS

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Rent	4,035	15,758.44	9,943.34	12	48,928
Income	4,035	58,032.39	46,905.47	117	515,419.60
Gov. Assistance	4,035	0.063	0.242	0	1
Public Housing	4,035	0.0002	0.016	0	1
Family Size	4,035	2.153	1.475	1	13
Age	4,035	46.164	18.289	16	87
Urban	4,035	0.960	0.197	0	1
Metropolitan	4,035	0.950	0.217	0	1
Northeast	4,035	0.188	0.391	0	1
Midwest	4,035	0.164	0.370	0	1
South	4,035	0.303	0.460	0	1
West	4,035	0.345	0.475	0	1

SOURCE: BLS Consumer Expenditure Survey Interview 2022, Quarters 1-4. Accessed March 25th, 2024

The average consumer unit size was 2.15, and the average oldest member of a consumer unit was 46.2 years old with a standard deviation of 18.3 years, indicating a wide age range within the sample, potentially reflecting different life stages and needs. The average income was $58,032.39, but it is important to note that the maximum recorded income was $515,419.60. This indicates significant income disparity within the sample population. The average yearly rent was $15,758.44, which is a monthly cost of $1,313.20. The range of rents, from $12 to $48,928, shows a considerable variation in housing costs among the sample. Approximately 6.3% of the sample received some form of government assistance, and about 0.02% lived in a public housing project. Interviewees comprised a predominantly urban sample, shown by about 96% of respondents living in urban areas and 95% living in Metropolitan Statistical Areas (MSAs), areas with a high population density and close economic ties throughout.

METHODOLOGY

The relationship between rent expenditures and income of the consumer unit was estimated with the following equation:

$$ln(Rent) = \beta 1 + \beta 2\ ln(Income) + \beta 3\ ln(Controls) + \varepsilon$$

The outcome variable is rent expenditures, the treatment variable is consumer unit income, and the control variables are: family size, age of the oldest CU member, whether or not they receive government assistance, whether they live in a public housing project, if they live in an urban or rural area, if they live in an MSA, and in which region they live.

In the equation, any nonbinary value is in natural log form to optimize interpretability and help capture any nonlinear relationships between variables. The equation helps answer the research question because it provides a framework for assessing the relationship between rent, income, and the other variables included. Including variables for government assistance, public housing projects, and location categories helps control for other factors that could influence the amount of money spent on rent, such as free or discounted housing and regional differences in rental costs. Regarding the regional dummy variables, the Northeast is the omitted region, so the coefficients of the other regions measure the (percent) difference from the Northeast.

Since income is not randomized, its coefficient may not have a causal interpretation. However, the other control variables have been included in the regression to mitigate this limitation. There is a risk of omitted variable bias in this regression

equation because there could be an important variable not included in the regression. Several demographic variables that were omitted were race and sex variables for respondents. That could have affected the districts the individuals lived in and therefore impacted rent expenditure. Other variables that were not available in the dataset but could have had an impact are the quality/age of housing, number of bedrooms in the unit, neighborhood characteristics, and supply and demand dynamics of the housing market in 2022.

RESULTS

In the first regression, the only variables compared are the log of income and the log of rent. The result is that a 1% increase in income causes an increase in rent of 0.3%. This estimate addresses the question of how income increases affect an increase in rental expenditure. This makes sense because an increase in income usually leads to an increased standard of living, which may include a larger or nicer apartment. This value is statistically different from zero at 5% because the p-value is 0.000, meaning that the effect of an increase in income on rent is statistically significant.

TABLE 3: ESTIMATES OF EFFECT OF INCOME ON HOUSING EXPENDITURES

	(1)	(2)	(3)	(4)
Log of Income	.339	0.321	0.238	0.215
	(0.013)	(0.014)	(0.013)	(0.012)
Log of Family Size		0.051	0.062	0.058
		(0.019)	(0.017)	(0.016)
Log of Age		-0.06	.081	0.077
		(0.025)	(0.025)	(0.023)
Government Assistance			-0.638	-0.664
			(0.058)	(0.057)
Public Housing project			0.308	0.121
			(0.016)	(0.019)
Urban				0.29
				(0.104)
Metropolitan				0.341
				(0.090)
Midwest				-0.252
				(0.03)
South				-0.105
				(0.26)
West				0.15
				(0.023)
Adjusted R-square	0.209	0.211	0.222	0.321
Number of observations	4573	4573	4102	4035

Dependent variable is log of rent. Standard errors robust to heteroskedasticity are shown in parentheses.

The second regression adds the log of age and the log of family size to the equation. The effect of family size is positive, with a 1% increase in family size causing a 0.051% increase in housing expenditure. In the case of a couple with no children, the addition of a family member would cause a 50% increase in family size, which would cause a rent increase of 2.55%. Although a small difference, this could be due to the

need to rent a larger apartment with an extra bedroom. In contrast, the log of age variable has a negative effect on the log of rent. A 1% increase in the age of the oldest member of the house causes a 0.06% decrease in rent. This could be because more young people rent houses and apartments, and as they grow older, many shift to buying their own homes. Both values are statistically significant at the 5% level.

The third regression adds two dummy variables for housing assistance: one variable that represents government assistance of any kind and another variable that signifies that the respondent lives in any kind of urban housing project. If the household receives government assistance, the log of rent decreases by 0.638. This is statistically different from zero at 5% because the p-value is 0.000, meaning that the effect of government assistance on rent is statistically significant. It is important to note that rent expenditures in this case likely only include the renter's share, not the total amount paid to the landlord. This clarification helps explain why government assistance significantly lowers rent expenditures for the household. Conversely, if the household is part of a public housing project, the log or rent increases by 0.308. This is also statistically significant because the p-value is 0.000. It makes sense that government assistance would relieve the burden of rent, and although it is puzzling that living in a housing project has the opposite effect, it is important to note the small number of CUs in this study that reported to utilize public housing: 0.02% of the sample. With more data, the effect of public housing could be clearer.

The fourth regression adds location variables to control for respondents located in urban areas, MSAs, and for each of the four regions. Living in an urban area was shown to increase rent, although the coefficient was not statistically significant. Renting

a unit in an MSA also had a positive relationship with the log of rent. This makes sense because most rental units and apartment buildings are in cities. Since the Northeast is the omitted region, coefficients of the other regions measure the percentage difference from the Northeast. Rent expenditures are, on average, about 25% lower in the Midwest than in the Northeast. In the South, they are approximately 11% lower, and in the West, they are 15% higher. This holds true to the Midwestern and Southern regions having a lower cost of living (including the costs of housing) than the Northeastern and Western regions.

These results carry meaningful takeaways for policymakers working in housing policy and aiming to improve housing affordability. The observed result that government assistance significantly reduces rental expenditure in households highlights the continued relevance of housing subsidies in supporting low-income households. Similarly, differences revealed by the regional and family size variables accentuate the need for geographically tailored policy approaches rather than one-size-fits-all solutions. For example, rent burden and relief programs may need to be adjusted regionally to account for varying baseline rental costs. The statistically significant impact of income on rent expenditure suggests that income growth alone may not sufficiently alleviate housing strain without complementary support programs, especially during times of rapid economic inflation.

CONCLUSIONS

Based on the analysis conducted in this study, multiple conclusions can be drawn regarding the relationship between rental expenditures and factors such as income,

government assistance, public housing projects, demographics, and location variables. Firstly, income has a significant impact on rental expenditure, with a 1% increase in income associated with a 0.339% increase in rental expenditure. Secondly, family size also influences rental expenditures, with larger families tending to spend more on rent. Thirdly, government assistance plays a significant role in determining rental expenditure, with households receiving assistance experiencing a decrease in rental expenditure. However, the limited data on public housing showed that living in a public housing project leads to an increase in rental expenditures, which warrants further investigation and ideally, a larger sample size. Lastly, location variables such as living in urban areas and certain regions are associated with higher rental expenditures, highlighting the importance of location in shaping housing costs.

The findings of this study contribute to the broader understanding of housing economics and affordability as well as the critical role of government assistance in alleviating rent burdens. As rental costs continue to increase, particularly in high-demand areas, these insights can guide the development of more targeted and region-specific housing policies. The regression model used in this study, though limited by its cross-sectional design, provides valuable insights that can inform more targeted and effective housing interventions. Through demonstrating that rental expenditures are shaped by a combination of income, demographic, and locational factors, conclusions from this study suggest that housing policies must be multidimensional — addressing not only income support but also regional housing supply, demographic needs, and systemic barriers to affordable living.

While the conclusions of this study offer important insights, it is vital to consider the limitations of this analysis when interpreting the results. One key limitation is the potential for omitted variable bias, particularly due to the exclusion of variables such as race, sex, quality of housing, neighborhood characteristics, and number of bedrooms. Quality and amenities in housing are particularly likely to influence consumer decisions and could alter the observed relationships. Additionally, the use of cross-sectional data prevents us from identifying causal effects or observing changes over time. The reliance on self-reported survey data may also introduce reporting bias, especially regarding income or rent amounts. Furthermore, the extremely small percentage of respondents living in public housing (0.02%) limits the analysis and findings related to that subgroup.

Despite the limitations, the findings of this study provide insights for policymakers aiming to design effective future housing policies. Additionally, these conclusions raise questions regarding the impact of omitted variables and the reasons behind the increased rental expenditures among public housing project residents, necessitating further research for a comprehensive understanding of the factors influencing rental expenditures in the United States.

Future research could build on this study by incorporating panel data to examine trends in rental expenditures over time and to better isolate causal relationships. Additionally, expanding the questionnaire to include more detailed housing quality and amenity indicators could be beneficial in capturing the full range of factors that influence rental costs, such as building condition, access to utilities, proximity to transportation, and neighborhood safety. Further exploration into the ways that different forms of

government assistance (e.g., Section 8 vouchers vs. cash assistance) influence rent expenditures could also help with clearer and more targeted policy recommendations.

REFERENCES

Cohen, R., & Wardrip, K. (2011). The economic and fiscal benefits of affordable housing. Planning Commissioners Journal. 83. https://plannersweb.com/wp-content/uploads/2012/07/501.pdf

Di, Z. X., Belsky, E., & Liu, X. (2007). Do homeowners achieve more household wealth in the long run? Journal of Housing Economics. 16(3–4), 274–290. https://www.sciencedirect.com/science/article/pii/S1051137707000423?casa_token=TrWUdDeeFTMAAAAA%3AWPXByKrt6_DmAs60B0yXsvTFf1jRRmnwDDH2Z1zAdda37cKHNsva1Y2hJRQbq 9RFbTTW4a2FCh4#aep-abstract-id5

Hanna, Sherman & Yuh, Yoonkyung & Chatterjee, Swarn. (2012). The Increasing Financial Obligations Burden of U.S. Households: Who is Affected? International Journal of Consumer Studies. 33. https://www.researchgate.net/publication/256019883_The_Increasing_Financial_Obligatio ns_Burden_of_US_Households_Who_is_Affected

Olsen, E. O. (2003, January). Housing programs for low-income households. https://www.nber.org/system/files/chapters/c10259/c10259.pdf

U.S. Bureau of Labor Statistics. (2022). *PUMD data files*. U.S. Bureau of Labor Statistics. https://www.bls.gov/cex/pumd_data.htm

U.S. Department of Labor. (2023, September 8). *Consumer Expenditures - 2022. U.S.* (News Release USDL-23-2035) Bureau of Labor Statistics. https://www.bls.gov/news.release/pdf/cesan.pdf

DATA APPENDIX

The data used to address the research question comes from the Bureau of Labor Statistics' Consumer Expenditure Survey (CE), specifically from the Public Use Microdata (PUMD) Interview files. The data was analyzed using STATA, and the two files used are FMLI and RNT for the 2022 cycle. Each quarter of the year has its own FMLI file, so they were appended together before being merged with the RNT file. Several respondents who reported negative incomes were also excluded from the analysis. The age variable was generated by selecting the highest value between the "Age of reference person" variable and "Age of spouse" variable. The given rent variable was rent for the first quarter of the year, so a yearly rent variable was generated by multiplying the original rent variable by four. The regressions were computed using the regress command.

The regional binary variables are divided into four regions by the Bureau of Labor Statistics. The Northeastern region includes the following states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania. The Midwestern region includes the following states: Indiana, Illinois, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. The Southern region includes the following states: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, and Texas. The Western region includes the following states: Arizona, Colorado, Idaho, New Mexico, Montana, Utah, Nevada, Wyoming, Alaska, California, Hawaii, Oregon, and Washington.

Data and Stata code used to compute the estimates are available from the author on request.