



# Income Poor but Asset Rich: Effects of Wealth on Older Adults' Healthcare Utilization

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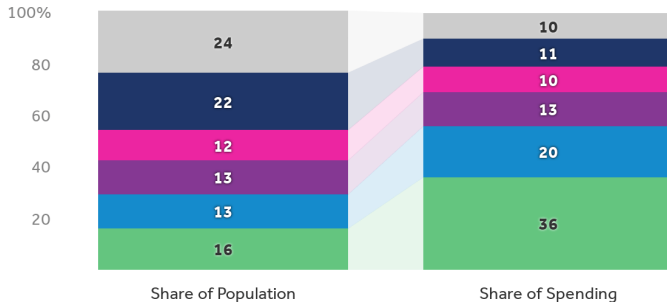
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- In this paper, we investigate the causal effect of wealth on older adults' healthcare utilization, specifically hospital and doctor services.
- We exploit the booms and busts in the U.S. housing market - a natural experiment that generated considerable gain and losses for homeowners.
- We find significant wealth effects on older individuals' healthcare utilization for home owners but not for renters.

## Share of total health spending by age group, 2016

65 and over 55 to 64 45 to 54 35 to 44 19 to 34 Under 19



Source: Kaiser Family Foundation analysis of Medical Expenditure Panel Survey

Peterson-KFF  
**Health System Tracker**

Figure 1: Health spending by age group in the US

**Table 1:** Funding sources of the elderly's personal healthcare expenditures, 2010

<i>Payer</i>	<i>Type of expenditure</i>					
	Hospitals	Professional services	Nursing home care	Retail drugs	Other	All
Out-of-pocket	1.1%	9.4%	28.2%	18.6%	27.9%	13.2%
Private insurance	13.4%	18.6%	7.8%	23.4%	3.8%	13.3%
Medicaid	6.8%	2.1%	29.7%	1.3%	21.9%	11.1%
Medicare	69.7%	64.3%	24.3%	52.8%	36.5%	54.4%
Other	9.0%	5.6%	10.0%	4.0%	10.0%	8.0%

*Source:* De Nardi et al. (2015).



- Grossman (1972): Individuals maximize a lifetime utility function of health stock and they consume healthcare to improve their stock of health over the life course
- Phelps (2013): Individuals maximize a utility function of healthcare and choose the level of healthcare based on their preferences and health need
- Andersen and Newman (2005): Demand for healthcare is determined by predisposing factors, enabling factors and need.

→ Wealth plays an important role in healthcare utilization.



- Previous literature have shown that wealth is associated with:
  - ▶ **Better health and well-being:** Schwandt (2018); Mentzakis and Moro (2009); Pool et al. (2018)
  - ▶ **More usage of long-term care:** Rodrigues et al. (2018); Costa-Font et al. (2019)
- Limitations:
  - ▶ Restrict to healthcare expenditures → difficult to explain healthcare utilization
  - ▶ Restrict to income effect → difficult to infer to ageing population
  - ▶ Restrict to association rather than causal wealth effect

→ Need to identify the causal effect of wealth on healthcare utilization.

To control for potential endogeneity, we estimate the effect of wealth on healthcare utilization using the IV estimation

$$HC_{ict} = \gamma W_{ict} + \beta_1 X_{ict} + \phi_s + \eta_t + \mu_i + \epsilon_{1ict} \quad (1)$$

$$W_{ict} = \delta Z_{ct} + \beta_2 X_{ict} + \psi_s + \theta_t + \xi_i + \epsilon_{2ict} \quad (2)$$

where

$HC_{ict}$  = Healthcare use of individual  $i$  at time  $t$

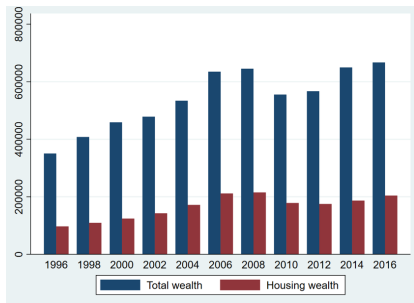
$W_{ict}$  = Log(Total wealth) or Log(Housing wealth) of individual  $i$  at time  $t$

$Z_{ct}$  = Instrumental variable

$X_{ict}$  = Demographics, household characteristics, health status

$\epsilon_{1ict}, \epsilon_{2ict}$  = Correlated error terms.





(a) Evolution of housing wealth



(b) Evolution of housing prices

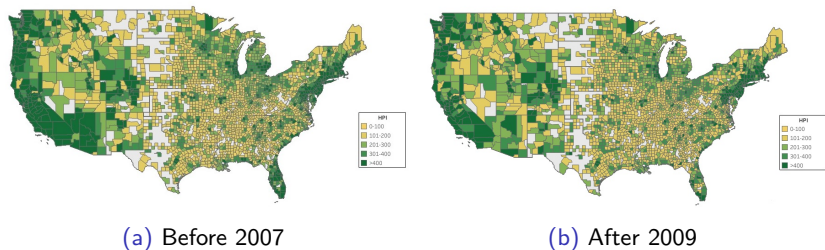


Figure 3: Housing Price Index (FHFA)



- We use the Health and Retirement Survey (HRS) during 1996 - 2014 to estimate the effect of wealth on healthcare utilization
- We restrict the sample to home-owners aged 50 and over. After excluding individuals with missing observations across all variables, we have at most 23,405 individuals across the average of 4 waves.
- A typical individual was a 69 years old Caucasian married woman with at least a high school degree who is not working. She has at least 2 or more ADL/iADL limitations and is covered by health insurance.

**Table 2: Summary statistics - Dependent variables**

	Mean	S.D	Min	Max
Any hospital admission	0.24	0.42	0	1
Number of nights in hospital	1.73	7.47	0	520
Any doctor visit	0.96	0.20	0	1
Number of doctor visits	9.75	17.57	0	900
Used any prescription drugs	0.82	0.38	0	1
Any outpatient surgery	0.22	0.41	0	1
Any dentist visits	0.73	0.45	0	1
Any special services used	0.10	0.30	0	1
Observations	118,908	–		

*Source:* Health and Retirement Study (HRS), 1996 - 2016.

Table 3: Effect of house prices on wealth

Variables	Log(Housing wealth)		Log(Total wealth)	
	(1)	(2)	(3)	(4)
Log(HPI)	0.956 <sup>***</sup> (0.015)	0.686 <sup>***</sup> (0.027)	0.674 <sup>***</sup> (0.015)	0.465 <sup>***</sup> (0.024)
Observations	113,176	113,176	113,130	113,130
F-statistic	2,075.880	3,841.821	386.677	636.448
Controls	No	Yes	No	Yes
Individual FE	Yes	Yes	Yes	Yes

Note: <sup>\*\*\*</sup>  $p < 0.01$ , <sup>\*\*</sup>  $p < 0.05$ , <sup>\*</sup>  $p < 0.1$ . Standard errors are clustered at the individual, county-time levels. Controls include demographics, health and disability, household characteristics, county unemployment rate, year FE, region FE, birthplace.

# Main findings

## Hospitalization and doctor visits



Table 4: Effect of wealth on hospitalization and doctor visits

Model	OLS	FE	IV-FE	OLS	FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)
	<b>Any hospital admission</b>			<b>Any doctor visit</b>		
Log(Total wealth)	-0.004 <sup>***</sup> (0.001)	-0.002 (0.002)	0.020 (0.024)	0.003 <sup>***</sup> (0.001)	0.000 (0.001)	-0.011 (0.011)
Log(Housing wealth)	0.001 (0.002)	0.001 (0.002)	0.014 (0.016)	0.001 <sup>*</sup> (0.001)	-0.001 (0.001)	-0.000 (0.008)
	<b>Numbers of hospital nights</b>			<b>Numbers of doctor visit</b>		
Log(Total wealth)	-0.067 <sup>***</sup> (0.022)	-0.040 (0.043)	-0.043 (0.367)	0.121 <sup>***</sup> (0.060)	0.174 (0.120)	3.443 <sup>***</sup> (0.988)
Log(Housing wealth)	0.024 (0.028)	0.019 (0.038)	-0.029 (0.249)	0.221 <sup>***</sup> (0.071)	0.303 <sup>**</sup> (0.129)	2.336 <sup>***</sup> (0.664)
Observations	118,858	113,130	113,130	118,858	113,130	113,130

Note: <sup>\*\*\*</sup>  $p < 0.01$ , <sup>\*\*</sup>  $p < 0.05$ , <sup>\*</sup>  $p < 0.1$ . Standard errors are clustered at the individual, county-year levels. Controls include demographics, health and disability, household characteristics, county unemployment rate, year FE, region FE, birthplace.

Table 5: Effect of wealth on other medical care

Model	OLS (1)	FE (2)	IV-FE (3)	OLS (4)	FE (5)	IV-FE (6)
	Prescription drugs			Outpatient surgery		
Log(Total wealth)	0.004** (0.002)	0.008*** (0.002)	0.037* (0.020)	0.004*** (0.001)	0.002 (0.002)	0.046* (0.025)
Log(Housing wealth)	0.003* (0.001)	0.010*** (0.003)	0.025* (0.025)	0.003* (0.002)	-0.002 (0.002)	0.031* (0.017)
	Dental care			Special services		
Log(Total wealth)	0.069*** (0.002)	0.014*** (0.002)	0.055*** (0.020)	0.004*** (0.001)	0.002 (0.002)	0.000 (0.017)
Log(Housing wealth)	0.061*** (0.002)	0.007*** (0.002)	0.038*** (0.013)	0.004*** (0.001)	-0.000 (0.002)	0.000 (0.011)
Observations	118,858	113,130	113,130	118,858	113,130	113,130

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors are clustered at the individual, county-year levels. Controls include demographics, health and disability, household characteristics, county unemployment rate, year FE, region FE, birthplace.



- Robustness check
  - ▶ Non-mover sample
  - ▶ First-difference model. **robust**
- Placebo tests
  - ▶ Effects of house prices on renters' wealth
  - ▶ Effects of housing wealth on healthcare utilization of renters. **placebo**
- Heterogeneity check by gender, age and insurance status **heterogeneity**
- Mechanism **mechanism**





- An increase in wealth increase the probability of prescription drug use, outpatient surgery and dental services
- Numbers of doctor visits increases in response to a positive wealth shock but there is no significant effect on numbers of nights in the hospital
- Wealth effects exists for home owners but nor for renters. Increase in wealth is not a result of individuals' worse health.

# Thank you for listening!



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Table 6: Effect of wealth on healthcare utilization - Robustness check

Model	IV-FE	IV-FD	IV-FE	IV-FD	IV-FE	IV-FD
	Non-mover	Full-sample	Non-mover	Full-sample	Non-mover	Full-sample
	<b>Any hospital admission</b>		<b>Any doctor visit</b>		<b>Prescription drug</b>	
Log(Total wealth)	0.035* (0.020)	0.063 (0.044)	0.003 (0.011)	-0.001 (0.021)	0.057*** (0.018)	0.017 (0.022)
Log(Housing wealth)	0.025* (0.014)	0.041 (0.029)	0.002 (0.008)	-0.000 (0.014)	0.041*** (0.012)	0.011 (0.015)
	<b>Outpatient surgery</b>		<b>Dental care</b>		<b>Special service</b>	
Log(Total wealth)	0.051** (0.022)	0.071 (0.049)	0.045** (0.018)	0.071 (0.033)	0.000 (0.014)	-0.003 (0.029)
Log(Housing wealth)	0.036** (0.015)	0.047 (0.032)	0.032** (0.013)	0.019 (0.022)	0.000 (0.010)	-0.002 (0.019)
	<b>Numbers of hospital nights</b>		<b>Numbers of doctor visits</b>			
Log(Total wealth)	-0.202 (0.352)	0.573 (0.699)	1.828* (0.980)	1.468 (1.639)		
Log(Housing wealth)	-0.143 (0.250)	0.377 (0.460)	1.296* (0.696)	0.967 (1.083)		
Observations	88,732	82,979	88,732	82,979	88,732	82,979

Note: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Standard errors are clustered at the individual, county-year levels. Controls include demographics, health and disability, household characteristics, county unemployment rate, year FE, region FE, birthplace. [additional](#)

Table 7: Effects of housing prices on non-property owners

Variables	Log(Total wealth)		Log(Total wealth)	
	Full sample	2006-2016	Full sample	2006-2016
Log(HPI)	-0.244 <sup>***</sup> (0.056)	0.026 (0.073)	0.063 (0.090)	0.117 (0.099)
Observations	25,276	18,467	21,487	15,754
R-squared	0.0019	0.000	0.0271	0.0272
Controls	No	No	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes

Note: <sup>\*\*\*</sup>  $p < 0.01$ , <sup>\*\*</sup>  $p < 0.05$ , <sup>\*</sup>  $p < 0.1$ . Standard errors are clustered at the individual, county-time levels. Controls include demographics, health and disability, household characteristics, county unemployment rate, year FE, region FE, birthplace. [additional](#)

Table 8: Effect of wealth on healthcare utilization - Non-property owners

Model	Hospital admission	Visited doctor	Prescription drug	Outpatient surgery	Dental care	Special service	Hospital nights	Doctor visits
Log(Total wealth)	0.022 (0.345)	0.091 (0.239)	0.062 (0.287)	-0.068 (0.383)	1.031 (1.542)	-0.149 (0.348)	-15.272 (26.115)	32.729 (76.191)
Observations	21,446	21,375	21,474	21,444	21,460	21,330	21,216	20,072

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors are clustered at the individual, county-year levels. Controls include demographics, health and disability, household characteristics, county unemployment rate, year FE, region FE, birthplace. [additional](#)

Table 9: Heterogeneous effects of wealth on healthcare utilization

Sample	Female	Male	Above 65	Below 65	Insured	Uninsured
<b>Outcomes: Any hospital admission</b>						
Log(Total wealth)	0.023 (0.032)	0.019 (0.034)	0.016 (0.038)	0.052 (0.034)	0.022 (0.026)	0.039 (0.072)
Log(Housing wealth)	0.016 (0.022)	0.013 (0.023)	0.010 (0.025)	0.036 (0.023)	0.015 (0.017)	0.035 (0.065)
<b>Outcomes: Any doctor visit</b>						
Log(Total wealth)	-0.008 (0.014)	0.008 (0.016)	-0.016 (0.016)	0.017 (0.018)	-0.001 (0.011)	-0.012 (0.086)
Log(Housing wealth)	-0.005 (0.010)	0.006 (0.011)	-0.010 (0.011)	0.012 (0.012)	-0.001 (0.007)	-0.011 (0.079)
<b>Outcomes: Prescription drugs</b>						
Log(Total wealth)	0.029 (0.025)	0.050 (0.031)	0.050* (0.026)	0.039 (0.029)	0.025 (0.021)	0.147* (0.088)
Log(Housing wealth)	0.020 (0.017)	0.034 (0.021)	0.032* (0.017)	0.027 (0.020)	0.017 (0.014)	0.135* (0.076))
<b>Outcomes: Outpatient surgery</b>						
Log(Total wealth)	0.072** (0.032)	0.010 (0.034)	0.085** (0.037)	0.005 (0.038)	0.050* (0.026)	-0.106* (0.062)
Log(Housing wealth)	0.049** (0.022)	0.007 (0.023)	0.055** (0.024)	0.004 (0.026)	0.033* (0.018)	-0.097* (0.056)
Observations	65,701	47,429	63,301	46,602	108,360	2,808

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors are clustered at the individual, county-year levels. Controls include demographics, health and disability, household characteristics, county unemployment rate, year FE, region FE, birthplace. [additional](#)

Table 10: Heterogeneous effects of wealth on healthcare utilization

Sample	Female	Male	Above 65	Below 65	Insured	Uninsured
<b>Outcomes: Dental care</b>						
Log(Total wealth)	0.080 <sup>***</sup> (0.026)	0.025 (0.028)	0.036 (0.029)	0.105 <sup>***</sup> (0.030)	0.058 <sup>***</sup> (0.020)	0.105 (0.104)
Log(Housing wealth)	0.055 <sup>***</sup> (0.018)	0.016 (0.018)	0.023 (0.019)	0.073 <sup>***</sup> (0.020)	0.039 <sup>***</sup> (0.013)	0.097 (0.096)
<b>Outcomes: Special services</b>						
Log(Total wealth)	0.012 (0.024)	-0.014 (0.022)	-0.023 (0.027)	0.014 (0.023)	-0.001 (0.018)	0.006 (0.031)
Log(Housing wealth)	0.008 (0.016)	-0.010 (0.015)	-0.015 (0.017)	0.010 (0.016)	-0.001 (0.012)	0.005 (0.029)
<b>Outcomes: Numbers of hospital nights</b>						
Log(Total wealth)	0.253 (0.519)	-0.326 (0.528)	-0.181 (0.653)	-0.280 (0.554)	-0.114 (0.397)	2.027 (1.475)
Log(Housing wealth)	0.173 (0.355)	-0.218 (0.353)	-0.117 (0.422)	-0.194 (0.386)	-0.076 (0.264)	1.865 (1.332)
<b>Outcomes: Numbers of doctor visits</b>						
Log(Total wealth)	2.953 <sup>**</sup> (1.380)	4.225 <sup>***</sup> (1.284)	3.261 <sup>**</sup> (1.656)	2.536 <sup>*</sup> (1.272)	3.611 <sup>***</sup> (1.052)	-0.818 (1.994)
Log(Housing wealth)	2.016 <sup>**</sup> (0.934)	2.827 <sup>***</sup> (0.852)	2.110 <sup>**</sup> (1.067)	1.760 <sup>**</sup> (0.870)	2.402 <sup>***</sup> (0.692)	-0.752 (1.825)
Observations	65,701	47,429	63,301	46,602	108,360	2,808

Note: <sup>\*\*\*</sup>  $p < 0.01$ , <sup>\*\*</sup>  $p < 0.05$ , <sup>\*</sup>  $p < 0.1$ . Standard errors are clustered at the individual, county-year levels. Controls include demographics, health and disability, household characteristics, county unemployment rate, year FE, region FE, birthplace.

additional

Table 11: Effects of wealth on health

Model	CESD	Obesity	Disability	Chronic conditions
Log(Total wealth)	0.003 (0.081)	-0.027* (0.016)	-0.009 (0.013)	-0.028 (0.048)
Log(Housing wealth)	0.002 (0.055)	-0.018* (0.011)	-0.006 (0.009)	-0.019 (0.032)
Observations	113,972	121,596	121,594	121,590
Model	High blood pressure	Diabetes	Cancer	Lung diseases
Log(Total wealth)	-0.013 (0.021)	0.001 (0.015)	0.021 (0.014)	-0.013 (0.011)
Log(Housing wealth)	-0.009 (0.014)	0.001 (0.010)	0.014 (0.009)	-0.009 (0.008)
Observations	121,497	121,490	121,404	121,509
Model	Heart diseases	Stroke	Psychiatric conditions	Arthritis
Log(Total wealth)	-0.034* (0.018)	0.003 (0.011)	-0.013 (0.012)	0.019 (0.020)
Log(Housing wealth)	-0.023* (0.012)	0.002 (0.008)	-0.009 (0.008)	0.013 (0.014)
Observations	121,494	121,530	121,478	121,481

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors are clustered at the individual, county-year levels. Controls include demographics, household characteristics, county unemployment rate, year FE, region FE, birthplace. additional