Estimating the Effects of Healthcare on Retirement Savings

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Abstract

Health care insurance has been an integral part of political discourse in the United States this year and has resurfaced as a controversial topic under the current COVID-19 pandemic. Rampant income inequality and the struggles of saving made investigating the impact of health care on retirement an intriguing project. We made a linear regression of total retirement savings against several explanatory variables based on data from almost 180,000 persons from the 2019 Annual Social and Economic Supplements study conducted by the census. Our study revealed that having any type of health insurance has a positive effect on retirement savings. Further investigation will be required to explore historic data and address other unexplored variables.

Introduction

With a global pandemic plaguing the world, healthcare has become an increasingly important part of people's lives. Access to healthcare can have an impact on many aspects of life; here, the impact of healthcare on retirement savings is considered along with a few other explanatory variables. In a wide variety of studies there is a clear consensus that health care has some effect on retirement. Quantifying the magnitude of this effect is difficult due to data limitations and generalizations necessary to conduct research in the social sciences. The Brookings Institute studied this effect from 1990-1996 (Gruber,Burtless,Madrian) concluding that those with private insurance had lower retirement savings due to the acceptance of lower pay to avoid periods of unemployment resulting in loss of coverage.

The Handbook for Labor Economics (Currie, Madrian) dedicates an entire section to the relationship between health and retirement savings. They discuss the relationship between private insurance and employer provided insurance. Having employer provided insurance will lead to a better bundle for the employee due to the larger budget constraint offered by the employer. There appears to be a trade-off between the income provided and the health insurance package

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available. This means that the employee will have more income to put into their retirement savings. In a paper published in the NCBI, similar questions are raised about retirement and health insurance. "Employer-Sponsored Health Insurance for Early Retirees: Impacts on Retirement, Health, and Health Care" finds that those with retiree health insurance spend 20 percent less on average on out of pocket medical expenses than those without retiree insurance (Strumpf).

Retirement savings can be composed of an array of accounts and sources. One may be enrolled in various retirement plans (e.g. 401K or Roth IRAs), have alternative pension sources or repurpose savings for retirement. The dependent variable for the purpose of our research was a sum of total pension funds, retirement income, interest income for retirement, social security earnings, and survivors' income. Health care insurance is nuanced due to the variety of available plans and providers. Madrian and Curry discuss the influence of Medicare, employment-provided health insurance, mandated continued coverage, and private insurance on retirement decisions and the available funds at the time of retirement. Realizing that retirement savings are overdetermined by more than just the health insurance, our independent variables include: the status of any health coverage at all, status of government coverage, status of private coverage, availability of employment-based coverage, the status of employment-based coverage through another member of the household, status of employment-based coverage, status of premiums paid for by employed (if applicable), direct-purchase coverage status, marketplace coverage, subsidized marketplace coverage, unsubsidized marketplace coverage, non-marketplace coverage, Medicaid coverage, Medicare coverage, CHAMPVA coverage, VACARE coverage, total medical out of pocket expenditures, value of out of pocket expenditure for premiums, out of pocket expenditures on over-the-counter healthcare, health status, longest job class of worker, total income, marital status, total earnings, military service or lack thereof, and capital gains.

We expect varying levels of quality and availability of insurance will correspond with higher retirement savings due to reduced out-of-pocket medical expenditures, potentially higher wages, and improved access to financial literacy.

Data and Methods

The data used for this paper is from the census bureau, it is the 2019 Annual Social and Economic Supplements. We were planning on using data from more than just 2019 but the census had those files only available in a .dat file making it impossible to clean with the available resources. After cleaning data we used a linear regression of a combination of dummy variables and explanatory variables to indicate the relationship between health insurance and retirement savings. We used the Breusch-Pegan test to check for heteroskedasticity and F-statistics to assess collinearity. The statistical significance of our analysis was based on the t-values of each variable, any T-value large than |+/-2| were considered statically significant. Also, the Durbin-Watson Test was applied to test for autocorrelation.

The following linear regression model was developed:

```
ret_tot = newdata$PNSN_VAL + newdata$RINT_VAL1 + newdata$RINT_VAL2 +
          newdata$SS_VAL + newdata$SRVS_VAL + newdata$ANN_VAL

logret = log(ret_tot)

model1 = lm(logret ~ newdata$COV + newdata$PEAFEVER + newdata$PEIO1COW +
              newdata$PEARNVAL + newdata$PTOTVAL + newdata$CLWK +
              newdata$NOW_PUB + newdata$DEPPRIV + newdata$DEPGRP +
              newdata$GRP + newdata$HIPAID + newdata$DIR +
              newdata$DEPMRK + newdata$DEPMRKS + newdata$DEPMRKUN +
              newdata$DEPNONM + newdata$CAID + newdata$CHAMPVA +
              newdata$VACARE + newdata$MOOP + newdata$MOOP2 +
              newdata$PHIP_VAL + newdata$PHIP_VAL2 + newdata$PMED_VAL +
              newdata$POTC_VAL + newdata$HEA + newdata$MCARE +
              newdata$CAP_VAL + newdata$A_MARITL, newdata)
```

After eliminating insignificant explanatory variables, a second linear regression model was developed:

```
model2= lm(logret ~ newdata$COV + newdata$PEARNVAL +
             newdata$PTOTVAL + newdata$CLWK + newdata$NOW_PUB +
             newdata$DEPPRIV + newdata$DEPGRP + newdata$GRP +
             newdata$HIPAID + newdata$DIR + newdata$CAID +
             newdata$MOOP + newdata$PHIP_VAL + newdata$PMED_VAL +
             newdata$POTC_VAL +  newdata$HEA + newdata$MCARE +
             newdata$A_MARITL, newdata)
```

All insignificant variables were eliminated in the second iteration of the linear regression model (model2). This will be further explained in the discussion. It is also important to note that both linear models involved log-level regressions.

Results

Our initial regression included a larger list of variables. After running this first regression we found that a number of variables were statistically insignificant. We ran a second log level regression without the statistically insignificant variables to simplify analysis. We refer to this as model2 in our code.

List of eliminated variables: PEAFEVER, PEIO1COW, DEPMRK, DEPMRKS,DEPMRKUN, DEPNONM, CHAMPVA, VACARE, MOOP2, PHIP_VAL2, CAP_VAL. Please refer to our variables document for a guide to each variable.

Our intercept value of 2.42 indicates the positive value of retirement savings, in the absence of the included explanatory variables. This appears to be rational, as people are likely to have residual savings when they retire even if they are not enrolled in a health insurance plan. The status of any health coverage at all (COV) had a positive coefficient of 0.805 with a significant t-value of 21.47. This

aligns with our hypothesis for a positive relationship between retirement savings and health insurance. According to our regression, there is an 81% increase in savings when a person has health insurance coverage compared to a lack thereof. This has drastic implications for public policy and the ripple-effect of access and provision of health insurance. This reinforces the retirement security and overall financial security that accompanies health insurance. Total persons earnings (PEARNVAL) has a negative coefficient of $-2.62 * 10^{-5}$ with a t-value of -71.28. Although this coefficient is negative, it indicates a very miniscule decline in retirement savings. Hence, the result is surprising, but it may just be a factor that is unique to our dataset.

Unlike PEARNVAL, total persons income (PTOTVAL) had a $2.79 * 10^{-5}$ coefficient with a t-value of 96.49. Essentially, every additional dollar in total income would lead to a 0.00279% increase in retirement savings. While health care and income are not compared with one another for the purposes of this study, we see that one's income has relatively limited explanatory power for the retirement savings of an individual in this case. This also supports the study presented in the Handbook of Labor Economics, as individuals were willing to sacrifice a higher-paying job for the purpose of securing or maintaining a health insurance plan. The coefficient value of 0.676 for the longest job class of worker (CLWK) and a t-value of 127.79 showed a strong positive correlation between a government job and retirement savings. Compared to a private or self-employed career, 67.6% higher retirement savings were observed for people employed by the government.

Corresponding to the apparent favorability of government jobs, the coefficient value of 0.183 for the status of government coverage (NOW_PUB) and a t-value of 4.2 indicated a strong positive correlation between government health care coverage and retirement savings. Savings were 18.3% higher compared to someone who is not enrolled in a government health care coverage. In contrast to NOW_PUB, the status of private coverage (DEPPRIV) coefficient value of -0.1885 and a t-value of -4.86 illustrates a negative correlation between private health care coverage and retirement savings. Savings were 18.9% lower compared to someone who is not enrolled in a private health care coverage. The coefficient value of 0.222 for the status of employment-based coverage from a member of the household (DEPGRP) and a t-value of 4.58 showed a strong positive correlation between employment-based coverage in the household and retirement savings. Savings were 22.1% higher compared to someone from a household without any employment-based coverage.

Given that employment based coverage is the most common type of health coverage, it was not surprising that the coefficient for the status of employment-based coverage (GRP) was 0.124 with a t-value of 3.87. Those with employment-based coverage are likely to have 12.4% higher retirement savings than those without such coverage.

Surprisingly, when employers did not pay all premiums (HIPAID), retirement savings were 12.7% higher (coefficient = 0.128, t-value = 4.69). Direct purchase coverage (DIR) had a very statistically significant negative relationship with retirement savings holding a T-value of -8.704. This result aligns with the

result that Strumpf discusses in her paper. Direct purchase coverage is a type of private insurance an employer can purchase themselves. Without the higher budget constraint provided by an employer, those with direct purchase coverage have a lesser bundle resulting in lower retirement savings by 31.8% than those without direct purchase insurance.

Another variable we considered was access to Medicaid. Medicaid unsurprisingly had a negative relationship with retirement savings. Our regression found that those with Medicaid saved 57.2% percent less than those without Medicaid with a T-value of -14.2. This makes sense when you consider that Medicaid is only provided to those with extremely low income. When you look at the positive relationship between income and retirement savings it makes sense that Medicaid has a negative effect on retirement savings.

An interesting find in this research was the positive effect that Medical out of pocket expenses had on retirement savings. When retirement savings increases by 17% medical out of pocket expenses increase by 1 dollar. A potential explanation is that maybe people with low income and no retirement savings do not go to the doctor or the hospital for fear of medical out of pocket expenses. Several studies have found results that contradict our data and we believe that this finding is specific to this data set.

The value of total premiums paid by an individual did however have a negative impact on retirement savings. A 1 dollar increase in insurance premiums leads to a 17 percent decrease in retirement savings. While this relationship matches those found in Strompf's paper, it does seem to be overinflated. This is due to the small sample size of our data and the lack of data over time. The cost of non premium health insurance has a negative effect on retirement savings. Our regression finds that for every 1 dollar increase in non premium health costs, there is an 18% decrease in retirement savings with a t-value of -16. This follows research from the Brookings institute which found that as costs of copays etc. increase, there is less income saved for retirement.

Cost of over the counter drugs had an extremely similar effect as the cost of non premium health insurance. Our regression finds that for every 1 dollar increase in over the counter medical supplies, there is an 18% decrease in retirement savings with a t-value of -16. This makes sense because the less money spent on over the counter medical supplies means there is more disposable income to be put into a retirement savings account. We also considered how overall personal health affected retirement savings. This had an extremely significant value, if a person was in bad health they saved 93 percent less than a person with good to excellent health. Similar to Medicaid, we also looked at the effects of Medicare. We found a highly significant 25% increase in retirement savings for those who have Medicare. This is kind of self explanatory because those covered by Medicare are over 65 and likely retired or planning to retire. Therefore, their retirement savings will be at a high in their lifetime. A married person had 15% higher retirement savings than those who are unmarried. This makes sense because if you are married you are both more likely to have a higher income and better insurance.

Based on the larger than 3 F-statistic, we can assume that all of these variables

are jointly significant. Furthermore, the Breusch-Pagan test revealed a p-value of $2.2 * 10^{-16}$, which is less than 0.05. Hence, we can infer that heteroskedasticity is present. Unfortunately, due to the paucity of past years' data, we cannot rectify this with the addition of more variables or more data points. The Durbin-Watson test for autocorrelation revealed a DW value of 1.76, which indicates positive autocorrelation. While historic records were not accessed for this research, it is possible that the presence of multiple dummy variables, that are inherently correlated led to this positive autocorrelation. For example, a person's total earnings and income likely have high levels of correlation. We recognize these issues, but due to time constraints and availability of data we have to accept them as a feature of this paper. In the end, many of these relationships have been confirmed by other peer reviewed papers and may just have an over inflated affect due to these inconsistencies. We did run a tobit model instead of a linear regression to reduce the presence of heteroskedasticity to an acceptable level but due to the time constraints on this project the interpretation of this model was too complicated to complete in the allotted time frame.

Table 1: Results

	Dependent variable:
	logret
COV	0.808^{***}
	(0.038)
PEARNVAL	-0.00002^{***}
	(0.00000)
PTOTVAL	0.00003^{***}
	(0.00000)
CLWK	0.676^{***}
	(0.005)
NOW_PUB	0.183^{***}
	(0.044)
DEPPRIV	-0.188^{***}
	(0.039)
DEPGRP	0.222^{***}
	(0.048)
GRP	0.124^{***}
	(0.032)
HIPAID	0.128^{***}

	(0.027)
DIR	-0.319^{***}
	(0.037)
CAID	-0.573^{***}
	(0.040)
MOOP	0.189^{***}
	(0.012)
PHIP_VAL	-0.189^{***}
	(0.012)
PMED_VAL	-0.189^{***}
	(0.012)
POTC_VAL	-0.189^{***}
	(0.012)
HEA	-0.093^{***}
	(0.016)
MCARE	2.503^{***}
	(0.045)
A_MARITL	0.160^{***}
	(0.016)
Constant	2.421^{***}
	(0.044)
Observations	106,268
R^2	0.572
Adjusted R^2	0.571
Residual Std. Error	2.332 (df = 106249)
F Statistic	$7{,}872.761^{***}$ (df = 18; 106249)
Note:	*p<0.1; **p<0.05; ***p<0.01

Discussion

Existing literature on the topic covers a wide range of variables that come to similar conclusions as our regression. We successfully concluded that there is a positive relationship between having health care and retirement savings. This is

an increasingly important topic as we navigate a pandemic and the way that affects a person's ability to save. Class of worker, personal health, Medicare, any access to coverage, and total income were particularly interesting when analyzing this model. It is agreed in all of the aforementioned literature that having some kind of coverage increases your retirement savings. The Gruber, Burtless, and Madrian paper found that people are more likely to retire at 65 so that they do not have to pay for private insurance before they qualify for medicare. The positive correlation between Medicare and retirement savings tells us that most people with Medicare are retiring so if one wanted to raise or lower the retirement age we could change the cutoff age for Medicare. The most important variable in our opinion is the generally positive correlation between having coverage and retirement savings. This finding was confirmed by all three academic papers we have cited and has been widely accepted. This has strong policy implications related to universal health care. Obamacare has been criticized by the current administration, yet it has a positive effect on people's ability to save for not just retirement but other critical investments——homes, for example. The class of worker which we assigned as a dummy variable (1 for all government employees and 0 for all non-government employees) had an overwhelmingly positive effect meaning that the pension, and health care plans offered by the government allow people to retire comfortably. An important variable that we omitted due to the lack of available data, was the number of people who had post retirement insurance. In Strompf's paper there is a strong connection between people's desire to retire but their inability due to the lack of post retirement healthcare provided by an employer. If we were to continue this research, not only would we attempt to acquire more data, but we would also analyze the tobit model in an attempt to reduce heteroscedasticity.

Conclusion

At the beginning of this journey, we set out to discover if healthcare affected retirement savings. We found that having any kind of insurance has a positive effect on retirement savings. Along with a few other explanatory variables, like general health, access to medicare, and class of worker, we were able to analyze the policy implications that this could have in the future like the continuation of Obamacare. We recognize that our model has heteroskedasticity and autocorrelation so our results may be over- or under-inflated, several other peer-reviewed works have come to similar conclusions.

References

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