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Does time to Medicare eligibility affect the likelihood of being uninsured?

Esra Eren Bayindir
Department of Economics, Ipek University

Mehmet Yigit Gurdal
Department of Economics, Bogazici University

Ismail Saglam
Department of Economics, Ipek University

Abstract

This paper aims to determine the relation between the ages of the near-elderly patients admitted to the hospital in the United States and the estimated likelihood of their being uninsured. We use Nationwide Inpatient Sample from 1998-2005 to examine the effect of age on insurance type of patients controlling for demographics, diagnosis and comorbidities of the patients. We find that the likelihood that near-elderly patients are uninsured continuously declines until the early ages of 60 but the trend is reversed for the last few years preceding Medicare coverage. In addition, compared to those covered by Medicaid or private insurance, the uninsured patients are more likely to be admitted into hospitals as emergency cases.

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Contact: Esra Eren Bayindir - ebayindir@ipek.edu.tr, Mehmet Yigit Gurdal - mehmet.gurdal@boun.edu.tr, Ismail Saglam - isaglam@ipek.edu.tr.
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1. Introduction

Almost all individuals in the United States become eligible for Medicare, a government-provided health insurance, upon reaching the age of 65 years while near-elderly population (ages of 55 to 64 years) experience gaps in health insurance coverage (see Baker and Sudano 2005, and Johnson 2007).[1] Thus, elderly adults have easier access to health care, and consequently they have higher utilization of health care services, as reported by Card et al. (2008). Oppositely, uninsured individuals amongst near-elderly adults are less likely to have access to health care and hence they have higher risk adjusted rates of decline in their overall health as well as higher risk-adjusted mortality rates (see for example Baker et al. 2001, Baker et al. 2002, and McWilliams et al. 2004).

In 2004, nearly 10 percent of near-elderly adults who were uninsured were retired, the rest being full-time or part-time workers, disabled, homemakers, or unemployed (see Johnson 2007). Several studies (for example Gruber and Madrian 1995, Gustman and Steinmeier 1994, Karoly and Rogowski 1994, and Madrian 1994) consider the relationship between health insurance and retirement, while Rust and Phelan (1997) and Lumsdaine et al. (1994) particularly study the effect of Medicare eligibility on the retirement decision. Using data from the Retirement History Survey on men without pensions, Rust and Phelan (1997) show that Medicare explains almost all of the excess spike in the retirement rate at age 65 when the other relevant factors have been controlled for. In contrast, using proprietary firm administrative data on both men and women, Lumsdaine et al. (1994) find that Medicare has little effect on age at retirement.

The previous literature explores the relationship between Medicare eligibility and the prospect of being uninsured indirectly and partially through the channel of the retirement decision. In this paper, we attempt to study the same relationship directly, as we explore whether the dramatic changes in health care brought by Medicare eligibility are also likely to affect demand by near-elderly adults for medical services and health insurance during years prior to coverage by Medicare. According to AARP Public Policy Institute analysis of March 2011 Current Population Survey (see Smolka et al. 2012), 65% of the near-elderly relied, in 2010, on employer-insured health insurance, 12% on public insurance (Medicare, Medicaid, Veterans Administration), 7% on other private (individual market) insurance, while 15% were uninsured. Before the Affordable Care Act (ACA) came into effect (in 2014), some individuals were not able to buy coverage in the individual market because insurers turned down their application mostly due to their health status or claims experience. Thus, getting out of the individual market with an intention to reentering in the future was risky. On the other hand, remaining to be insured in the same market was additionally costly as adults grew older, since most insurers charged (even after the implementation of Affordable Care Act) higher premiums based on an applicant's age (as well as health). For example, AHIP Center for Policy and Research (2009) reports that the average premium in the individual insurance market is $4,127 for age 50 to 54, $4,895 for age 55 to 59 and $5,755 for age 60 to 64. Naturally, one can predict that

[1] Baker and Sudano (2005) show that in a nationally representative sample of 6065 US adults 51-57 years old, the percentage who were uninsured in 2000 was as high as 8.2%, while the percentage who were uninsured at least once during the period 1992-2000 was 23.3%. In a more recent study, Johnson (2007) shows that the percentage of individuals among all adults aged 55 to 64 years was 12% in year 2004.

near-elderly patients may have an incentive to become or remain uninsured in the run-up to Medicare eligibility in the hope of saving money and fixing their health problems once they are covered by Medicare; and that the implied deferral of treatments may boost the cost of Medicare. Such behavior would, indeed, imply that time to Medicare eligibility is a relevant decision variable: one would expect that the probability of being uninsured monotonically increases with age (up to age 64). To this end, we consider the relation between the ages of the near-elderly patients admitted to the hospital in the United States and the estimated likelihood of their being uninsured. We show that this likelihood continuously declines until the early ages of 60; but the trend is reversed for the past few years preceding Medicare coverage. In addition, compared to those covered by private insurance, the uninsured patients are more likely to be admitted into hospitals as emergency cases.

The organization of the remainder of the paper is as follows: Section 2 introduces data and methodology, Section 3 presents our results, and finally Section 4 contains discussion and concluding remarks.

2. Data and Methodology

In our study, we use Nationwide Inpatient Sample (NIS) from 1998-2005. NIS includes a 20% sample of general medical and surgical acute care community hospitals, excluding military, uncategorized federal and prison hospitals. Out of around 38 states that participate in NIS each year, we drop the states that did not report patient's race and we use data from 29 states. To estimate the probability of being uninsured, we only consider the records of privately insured and uninsured patients.

Table I
Summary Statistics

Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
Female	0.405	0.491	Black	0.108	0.310
Charlson Score	0.920	0.838	Hispanic	0.064	0.245
Age55	0.081	0.273	Asian	0.009	0.094
Age56	0.081	0.274	Native American	0.003	0.054
Age57	0.245	0.430	Other race	0.023	0.150
Age58	0.079	0.269	Income1st quartile	0.132	0.339
Age59	0.079	0.270	Income2nd quartile	0.252	0.434
Age60	0.080	0.271	Income3rd quartile	0.267	0.443
Age61	0.079	0.270	Income4th quartile	0.349	0.476
Age62	0.124	0.329	Emergency	0.475	0.499
Age63	0.078	0.267	Prob. full time	0.513	0.130
Age64	0.075	0.264	Prob. part time	0.108	0.012
Uninsured	0.106	0.307	Prob. retired	0.224	0.134
White	0.793	0.405	Prob. unemployed	0.020	0.004
Number of obs.	2556842				

Table I reports the summary statistics of our sample. Out of 2,556,842 patient records, 10.6 percent have no insurance and 40.5 percent are female. We also use Current Population Survey from 1998-2005 to calculate the probabilities of employment status of

patients. Additionally, in Table II we report the age distribution for the uninsured near-elderly adults. We see that 9.41% of 55 year-old inpatients are uninsured in our dataset whereas the fractions (almost) continuously decreases to 7.81% at age 61 (except the spike at age 57) and stays higher than that level afterwards.

Given the data, we consider the following logit model to estimate the probability of being uninsured:

$$E[U_{it}] = F\Big(\beta_0 + \beta_1 A_{it} + \beta_2 C_{it} + \beta_3 EMERG_{it} + \beta_4 A_{it} * EMERG_{it} + \beta_5 Y_t + \beta_6 S_{it}\Big), \quad (1)$$

where $i = 1, \ldots, 2556842$ represents the inpatient, $t = 1998, \ldots, 2005$ denotes the year, and $E[U_{it}]$ is the probability that inpatient i is uninsured in year t. In the same equation, $A = \langle age55, \ldots, age63 \rangle$ is a vector of indicator variables for ages between 55 and 63 (age 64 is the reference category), C is a vector of variables representing inpatient characteristics including gender, race (white, black, hispanic, asian, native american or other race), major diagnostic category, Charlson Score of the inpatient, income quartile associated with the inpatient's zipcode and estimated probabilities of employment status of the inpatient. Finally, $EMERG$ is the dummy showing whether inpatient's admission type is emergency, and Y and S are indicator variables for year and state, respectively. We allowed the effect of being an emergency patient to differ by age by including the interactions of age dummies and emergency admission.

Table II
Age Distribution of the Uninsured Near-Elderly Adults

Age	Frequency	%
55	19,455	9.41
56	18,926	9.08
57	99,215	15.85
58	16,695	8.29
59	16,264	8.05
60	16,187	7.94
61	15,753	7.81
62	35,339	11.17
63	16,461	8.3
64	15,991	8.32
Total	270,286	10.57

We include in the above model the employment status probabilities of the inpatient as controls. As we do not directly observe the employment status of inpatients, we calculate the probability of employment status using Current Population Survey given inpatients' reported age, gender, year of admission and state. Mean values of the estimated probabilities of employment status by age are reported in Table III. It can be observed that probabilities of being full time employed decreases with age, whereas probability of being retired increases with age as expected. On the other hand, probability of being unemployed decreases with age though at a lower rate compared to probability of being full time employed.

Table III
Mean Values of the Estimated Probabilities of Employment Status by Age

Age	Full Time Employed	Retired	Unemployed
55	0.666	0.085	0.025
56	0.638	0.105	0.024
57	0.622	0.117	0.023
58	0.593	0.146	0.023
59	0.563	0.174	0.022
60	0.513	0.224	0.021
61	0.476	0.264	0.020
62	0.380	0.361	0.015
63	0.312	0.441	0.015
64	0.274	0.494	0.013

A second question we ask in this study is whether a patient's admission to the hospital for emergency care, rather than urgent or elective care, depends on the prospect that he or she is uninsured or privately insured. To answer this question, we use the following logit model:

$$E[EMERG_{it}] = F\left(\beta_0 + \beta_1 I_{it}^P + \beta_2 A_{it} + \beta_3 C_{it} + \beta_4 Y_t + \beta_5 S_{it}\right), \tag{2}$$

where I^P is the indicator variable for whether the inpatient is privately insured.

3. Results

Estimating equation (1), we report in Table IV that the probability of being uninsured decreases up to the age of 61 and afterwards it increases and then stays constant, when controlled for year as well as inpatients' characteristics involving gender, race, income level, major diagnostic category, and state. This finding would suggest that as inpatients become closer to age 65, they are more likely to decline purchasing health insurance.

To control whether the decision of (not) purchasing health insurance is related to the employment status of inpatients, we have also included probabilities of being unemployed, full time employed, part time employed and retired in our estimations. Even though the observed shape of (the implied curve of) the probability of being uninsured with respect to age is preserved, this inclusion has resulted in multicollinearity and led to insignificant coefficients for the age variables because of the high correlation between the ages and the calculated probabilities of employment status of inpatients.[2]

Among the near-elderly inpatients, the probability of being uninsured is the highest at age 55. The said probability decreases up to the age of 61 on average, and up to the age of 62 for inpatients whose admission type is not emergency. On average, the probability of being uninsured for a 61 year-old inpatient is 9% less than for a 64 year-old inpatient, whereas this probability does not differ significantly across ages 62 through 64, holding other factors constant.

[2]We have also included cohort dummies and found that although the same relationship between age and probability of being uninsured is preserved, age coefficients became insignificant. Results are available from the authors upon request.

Table IV
Logit Regressions of Prob(being uninsured)

Variable	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE
Age55	1,089 ***	0,013	1,084 ***	0,013	1,059 ***	0,020	0,9316	0,2727
Age56	1,057 ***	0,012	1,053 ***	0,012	1,021	0,020	0,9115	0,2531
Age57	0,994	0,011	0,986	0,011	0,841 ***	0,014	0,8587	0,2285
Age58	0,967 ***	0,012	0,964 ***	0,012	0,956 **	0,019	0,8493	0,2112
Age59	0,942 ***	0,011	0,941 ***	0,011	0,920 ***	0,018	0,8338	0,1926
Age60	0,938 ***	0,011	0,938 ***	0,011	0,919 ***	0,018	0,8492	0,1663
Age61	0,914 ***	0,011	0,916 ***	0,011	0,907 ***	0,018	0,8408	0,1404
Age62	1,006	0,011	1,011	0,011	0,896 ***	0,016	0,9630	0,0858
Age63	0,994	0,012	0,996	0,012	1,013	0,020	0,9798	0,0400
Female	1,035 ***	0,005	1,039 ***	0,005	1,040 ***	0,005	1,0391 ***	0,0053
Charlson Score	0,965 ***	0,001	0,969 ***	0,001	0,968 ***	0,001	0,9689 ***	0,0014
Black	2,061 ***	0,013	1,862 ***	0,012	1,865 ***	0,012	1,8614 ***	0,0116
Hispanic	3,047 ***	0,020	2,831 ***	0,019	2,826 ***	0,019	2,8315 ***	0,0188
Asian	2,900 ***	0,061	2,783 ***	0,058	2,782 ***	0,058	2,7828 ***	0,0584
Native American	1,329 ***	0,050	1,467 ***	0,054	1,496 ***	0,055	1,4674 ***	0,0543
Other race	2,002 ***	0,025	1,829 ***	0,023	1,811 ***	0,023	1,8291 ***	0,0232
Income1	2,794 ***	0,020	2,852 ***	0,021	2,868 ***	0,021	2,8521 ***	0,0206
Income2	2,226 ***	0,014	2,251 ***	0,014	2,252 ***	0,014	2,2509 ***	0,0142
Income3	1,491 ***	0,010	1,488 ***	0,010	1,489 ***	0,010	1,4883 ***	0,0098
Emergency			2,141 ***	0,010	1,899 ***	0,034	2,1410 ***	0,0103
Emergency*Age55					1,040	0,025		
Emergency*Age56					1,051 **	0,026		
Emergency*Age57					1,279 ***	0,025		
Emergency*Age58					1,016	0,025		
Emergency*Age59					1,038	0,026		
Emergency*Age60					1,034	0,026		
Emergency*Age61					1,017	0,026		
Emergency*Age62					1,207 ***	0,026		
Emergency*Age63					0,972	0,024		
Prob. full time							0,9366	0,3416
Prob. part time							0,5921	0,4137
Prob. retired							0,6159	0,5549
Prob. unemployed							0,0449 *	0,0783
Number of obs.	2556842		2556842		2556842		2556842	
Pseudo R2	0,1191		0,1344		0,1347		0,1344	

NOTE: *, ** and *** denote significance at the 90%, 95% and 99% confidence levels, respectively. Major diagnostic category dummies, state and year fixed effects are included in all of the specifications. Standard errors (SE) are heteroscedasticity robust.

Our findings show that inpatients living in low income locations have higher probability of being uninsured while whites among all race groups have the lowest estimated probability. Besides, females and patients whose admission types are emergency are also significantly more likely to be uninsured and inpatients with more serious health conditions (measured by higher Charlson score) are also significantly less likely to be uninsured, showing that patients with more serious health problems are less likely to take the risk of being uninsured. We have also included major diagnostic category dummies in the analysis and found that they all have statistically significant effects on the probability of being uninsured, with the exception of pregnancy and childbirth which are expected to be very rare in the near-elderly population. In addition, the effects are always negative for all major diagnostic category dummies, except for alcohol/drug use or induced mental disorders not surprisingly.

Table V
Logit Regressions of Prob(being admitted as an emergency patient)

Variable	Odds Ratio	SE
Private	0.467***	0.002
Female	1.009***	0.003
Charlson Score	0.984***	0.001
Income1	0.901***	0.004
Income2	0.885***	0.003
Income3	0.973***	0.004
Black	1.901***	0.009
Hispanic	1.631***	0.010
Asian	1.236***	0.019
Native American	0.639***	0.016
Other race	1.494***	0.014
Age dummies	yes	
Major diagnostic category dummies	yes	
Year Fixed Effects	yes	
State Fixed Effects	yes	
Number of observations	2556842	
Pseudo R2	0.12	

NOTE: *** denotes significance at the 99% confidence level. Standard errors (SE) are heteroscedasticity robust.

Finally, we estimate equation (2) to answer whether being admitted as an emergency case depends on whether the inpatient is privately insured or uninsured. In Table V above, we observe that privately insured inpatients are 53% less likely to be admitted as emergency cases than uninsured inpatients, holding other factors constant.

4. Discussion and Concluding Remarks

In this paper, we have studied the relation between the ages of the near-elderly patients admitted to the hospital in the United States and the estimated likelihood of their being uninsured. We show that near-elderly people become more and more likely to purchase private health insurance up to age 61-62, and less likely afterwards. Moreover, we find that uninsured inpatients are much more likely than privately insured inpatients to be admitted as emergency cases.

The decision of any individual to purchase a health insurance depends on the monetary cost of the insurance as well as the individual's estimations of his/her health risks over the period covered by the insurance. As a near-elderly adult becomes older and get closer to being covered by Medicare, the mean health insurance premium he/she has to pay increases in line with the rise in the health risks.[3] Besides, conditional upon that an individual has no health insurance till the last few years preceding Medicare eligibility and that he/she has not had any serious diseases before, the beliefs of this individual that

[3]A survey by AHIP Center for Policy and Research (2005) shows that national average premiums in 2004 is 11% higher for the age group 60-64 than for the age group 55-59.

he/she would survive without health insurance for a few additional years become stronger as he/she becomes older.[4] Thus, he/she may delay going to the hospital till the age of 65 years and more frequently end up being admitted into the hospital as an emergency case.

While the lower demand of a near-elderly individual for a health insurance during the last few years before Medicare eligibility is clearly economically rationalizable in terms of the beliefs of this individual about his/her future health risks, such an individualistic view is short-sighted and suboptimal when the future, as well as societal, costs are also taken into consideration. For instance, McWilliams et al. (2009, 2007) show that uninsured near-elderly adults are also more likely to require higher number of doctor visits and hospitalizations and need costlier care when covered by Medicare after 65 years of age. As a policy implication of their findings, McWilliams et al. (2009, 2007) suggest that the cost of expanding health coverage to earlier ages than 65 years can be partially off-set by reductions in later spending.

A recent debate on health insurances views Medicare spending economically unsustainable for the American society over the next several decades (see, for example, Aaron 2010, and White 2003). Alternative approaches to Medicare reform include proposals recommending an increase in the age of eligibility for Medicare to protect the federal budget (see, for example, Kaiser Family Foundation 2011, and Neuman et al. 2011). However, the findings of McWilliams et al. (2009, 2007) about the future adverse economic and health consequences of the lack of insurance of near-elderly adults, coupled with our finding that near-elderly adults are less likely to buy health insurances between the ages of 62-64 years, recommend the otherwise. In fact, our findings may suggest an additional reason for the U.S., as well as other countries, to adopt a universal health coverage system (like Obamacare) since however early the eligibility age for a Medicare plan is, there might always be some *ineligible* adults who would strategically opt out of their private health insurances with the intention of making additional savings or consumption and might experience some adverse health consequences eventually.

Apparently, our study has some limitations. The patient data used in the analysis comes from Nationwide Inpatient Sample, hence we only observe inpatients. Therefore the sample used in the analysis is not a representative sample of the near elderly population; however it is a representative sample of the near elderly population that is sick enough to be admitted to the hospital. Even though the results cannot be generalized to the whole near elderly population, we get important insights regarding the effects of universal coverage from insurance choices of the inpatients. However, we should also admit that a behavior where individuals "strategically" opt-out of their health insurances in the run-up to Medicare eligibility is absolutely more relevant for the healthy adults. But, our sample, by its very nature, is more representative of the unhealthy for whom opting out would carry a much larger risk. Thus, it is likely that the age effects within our estimations are picking up the impact of co-variates to age like employment status, income and wealth in addition to the impact of strategic motives.

[4]The existence of adverse selection in health insurance is well established in the literature (see, for example, Van de Ven 1987, Altman et al. 1998, and Cutler and Zeckhauser 1998). Our finding that amongst all near-elderly people, the oldest quartile, which naturally has the most serious health problems, is also the most likely to continue to decline purchasing health insurance may point to the potential benefits of future research to study dynamic incentive problems in health care markets.

Another limitation is that some of the variables on patient socioeconomic status and job characteristics that determine the decision of being insured such as marital status, size of the employer, years on the job and spouse's employment status, could not be included in the model due to lack of data. Moreover, since we do not directly observe the employment status of the inpatients in the main dataset, we had to estimate the probabilities of being employed using patient characteristics such as age, race, and location. Thus, we do not have a very precise measure of employment status. With this limitation, we have found that the effect of age on probability of being uninsured becomes insignificant once we include the estimated probabilities of employment status as controls. Clearly, employment status can be expected to be an important determinant of purchasing insurance. However, estimated probabilities of being full time employed monotonically decreases with age whereas the relationship between age and probability of being uninsured is U-shaped, suggesting that decision of purchasing insurance does not solely depend on employment status. Indeed, people might be strategically not purchasing insurance as they get closer to be covered by Medicare.

We believe that future work might obtain more general and persuasive results if our study could be replicated with a representative sample of the near elderly population and if socioeconomic status and job characteristics of the individual and spouse could be included in our model.

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