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Abstract:

Objective: This paper measures large out-of-pocket expenses by health condition, income, and elderly status, and estimates changes in them between 2010 and 2013.

Data Source: The paper uses nationally-representative household survey data.

Study Design: Logistic regression estimates the probabilities of high expenses by demographic groups in the two study years. Households have large out-of-pocket expenses when these exceed 5% or alternatively 10% of income.

Data Collection/Abstraction Method: The study uses 99.5% of the 344,000 individuals in the two samples.

Principle Findings: Despite favorable conditions, the large numbers of Americans exposed to high out-of-pocket expenditures has not declined much.

Conclusions: The magnitude of financial risk and trends in them underscore the need to monitor the ACA's success in reducing Americans' exposure to large medical bills.

Keywords: out-of-pocket, insurance, financing equity, Affordable Care Act

Overview

Studies show that greater out-of-pocket (OOP) requirements reduce the use of health care; some also trace these obligations to poorer health outcomes or more expensive alternatives, especially among the poor, elderly and those in poor health (Eaddy et al. 2012; Tamblyn et al. 2001; Soumerai et al. 1994; Goldman et al. 2010; Chandra, Gruber, and McKnight 2010; Soumerai et al. 1991; Heisler et al 2010). Large OOP expenses also commonly lead to financial difficulties and, in extreme cases, bankruptcy (Himmelstein et al. 2009; Kogan et al. 2010; Commonwealth Fund 2011; Cunningham 2011). For these reasons, a central goal of the Patient Protection and Affordable Care Act (ACA) has been to expand the coverage and improve the design of health insurance to decrease the incidence of large out-of-pocket medical expenses. This paper provides a more complete appraisal of the size of this risk by examining nationally representative cross-sectional samples of the US's civilian, non-institutionalized population in 2010 and 2013. The study estimates the probability that Americans will have high medical expenses by calculating this risk by citizens' age, income, and health status, while at the same time also investigating the most recent trends in these risks.

The paper's results provide a benchmark for assessing the future success of policy measures intending to improve Americans' protection from large medical expenses. According to the White House, the ACA has already begun limiting health care costs and improving Americans' financial protection from large health care bills (White House 2013). Research had already detected expansions in insurance coverage traceable to the ACA provisions (Sommers et al. 2013; Scott et al. 2014). Strong income growth over the period 2010-2013 could also be expected to reduce citizens' exposure to the financial difficulty of paying their medical bills. By using data from 2010 and 2013, the paper both assesses current risk levels and analyzes whether

these trends have succeeded in reducing Americans' exposure to the risk of high medical expenses.

II. Data and Methods

Data

The study employs logistic regression analysis using households' medical spending to estimate the probability that those in different demographic groups will assume large medical bills, where "large" is defined relative to income. Separate probabilities are calculated for different demographic groups by assessing OOP expenditure levels based on individuals' income, elderly status, and health conditions. By pooling 2010 and 2013 annual cross-sectional household data from the US Census Bureau's Current Population Survey's Annual Social and Economic Supplement (CPS-ASEC),[1] the study estimates not just current risk factors for different demographic groups, but also trends over this three-year period. Rising income, stagnating health costs (Lowrey 2013), and increasing insurance coverage all suggest that, all else equal, Americans' protection from the risk of high medical expenses should be diminishing.

The CPS-ASEC contains excellent household data on out-of-pocket (OOP) spending, which Caswell and O'Hara (2010) show to be comparable in quality to that provided by the Medical Expenditure Panel Survey (MEPS). The CPS-ASEC also has an advantage over the MEPS in that it contains many more observations; in 2010, it covers 204,983 individuals, and in 2013 139,415. Crucial for this study, the CPS-ASEC also has significantly better and more accurate data on household income.[2] Here we use all observations from the 2010 and 2013 CPS-ASEC waves, except for those whose disposable income is equal to or below zero (n=1,893), leaving 99.5% of the observations (n=342,505). All estimations weight individual observations

by their sample weight to reflect the national population. Table 1 provides summary statistics for the data set, separated by year.

Table 1 here

Definitions

OOP Expenses: Household OOP spending is measured by the expenses incurred at the household level for health care, and includes deductibles, co-insurance requirements, copayments, and all other health expenses not covered by insurance (which for the uninsured would include everything). It does not include spending on health insurance premiums.

Household Income: Income is used to capture household resources available to meet OOP expenses; for this purpose, we use household disposable income, which is income after accounting for both government taxes and social transfers.

High Medical Expenses: High medical expenses occurs when a household's OOP expenses exceed a share of its disposable income. Researchers typically use a 5% or 10% threshold (Law et al. 2013; Collins et al. 2014; Sanmartin et al. 2014; Cunningham 2009; Schoen et al. 2014), and this paper measures "high spending" using both measures. All individuals in the same household are assigned the same spending ratio, and thus each has the same indicator (either 1 or 0) for high medical expenses. This binary indicator for high spending is the dependent variable used in the logistic regressions described below.

Independent variables. To measure the probability of high OOP spending for individuals within different demographic groups, the paper distinguishes individuals by their income, health status, and elderly standing, and estimates the probability for different

demographic groups distinguished by these three characteristics. Comparisons between 2010 and 2013 are among groups with identical traits, thus allowing a more precise national comparison over time that takes account of changing risk factors within the population. For income, each individual in the two years (2010 and 2013) is assigned to a year-specific income quintile based on their equivalized household disposable income (disposable income divided by the square root of household size). All members of the same household receive identical values of equivalized household disposable income, and thus are in the same income quintiles. Since income rose over the period 2010 to 2013, those in a particular quintile in 2013 should on average have higher income relative to those in the same quintile three years earlier (see Table 1).

Elderly individuals are identified as those age 65 and older, and are indicated by an elderly dummy variable. The health status of individuals is similarly captured by a "poor health" dummy variable, where individuals are labeled in poor health if in the CPS-ASEC they self-identified as either in poor or fair health (where the other three options were good, very good, and excellent health).[3] By this criteria, 11.8% of the population in 2010 were in poor health compared with 11.7% in 2013 (Table 1).

Method

The dependent variable, high health expenses, is a binary variable. To estimate the probability of this taking the value of 1 based on an individual's health status, elderly standing, and income quintile, logistic regression is used, with high spending alternatively measured as exceeding 5% and 10% of disposable income. Each of the two regressions are based on all observations for both years, and each independent variable is entered twice: once for all observations, and a second time interacted with a 2013 dummy variable so that it assumes the

value of zero for observations in 2010. The coefficients on this second set of interaction variables are used to determine if the probability of high expenses in 2013 for a distinct demographic group differed from the estimated 2010 probability.

The probability of high expenses (P) for those in demographic group *i* is calculated separately for each of the two measures of high spending, based on the estimated ß coefficients from the logistic regression, which also allows distinguishing between estimates from 2010 and those from 2013. The exact formula to estimate the probability *P* is as follows (Long 1997):

$$(1)\ P_i = \frac{\exp(ß_0 + ß_1 Q1_i + ß_2 Q1_{2013i} + \ldots . ß_7 Q5_i + ß_8 Q5_{2013i} + ß_9 Eld_i + ß_{10} Eld_{2013i} + ß_{11} PH_i + ß_{12} PH_{2013i})}{1 + \exp(ß_0 + ß_1 Q1_i + ß_2 Q1_{2013i} + \ldots . ß_7 Q5_i + ß_8 Q5_{2013i} + ß_9 Eld_i + ß_{10} Eld_{2013i} + ß_{11} PH_i + ß_{12} PH_{2013i})}.$$

In (1), *Q1-Q5* are dummy variables related to the income quintile (with Q1 the lowest and Q3 the reference), *Eld* is an indicator variable for the elderly, and *PH* is also an indicator variable for those in poor health. A 2013 subscript indicates the variable takes the value of zero for individuals in the 2010 sample, and their observed value if he or she is in the 2013 sample. In this study, all variables in (1) are indicator variables, and thus take the value of 1 or 0. Hence, from (1) a nonelderly person in 2010, in the first income quintile, and not in poor health would have the estimated probability of large health expenses of:

$$(2)\ P(elderly, Q1, nonpoor\ health, 2010) = \frac{\exp(ß_0 + ß_1)}{1 + \exp(ß_0 + ß_1)}.$$

Individuals with the same characteristics in 2013 would have an estimated probability of:

$$(3)\ P(elderly, Q1, nonpoor\ health, 2013) = \frac{\exp(ß_0 + ß_1 + ß_2)}{1 + \exp(ß_0 + ß_1 + ß_2)}.$$

Any difference between (3) and (2) provides a gauge of whether the risk of high expenses for members of this demographic group changed between the period 2010 and 2013.

III. Results

From (1) we calculate the probability of individuals in both 2010 and 2013 having large health expenses based on their income, health status, and elderly standing. Table 2 presents these estimations—columns 1 and 2 for the probability of spending in excess of 5% of disposable income, and columns 3 and 4 for 10%. The shaded values in the 2013 columns (2 and 4) indicate that the calculated probability in 2013 is higher than it was in 2010. All differences between 2010 and 2013 in Table 2 are significant at the 1% level of significance (see an online Supplemental Appendix for greater detail).

Table 2 here

With regard to levels of exposure to high costs, the results predictably reveal that the risk is highest among the poor, the elderly, and those in poor health. Among those with all three characteristics, more than one-in-two have high expenses using the 5% threshold, and more than one-in-three using the 10% threshold. Not surprisingly, all probabilities decline as income increases, as health improves, and as one moves from the elderly to the nonelderly. Yet even among those not in poor health, not elderly, and with income in the middle quintile, we estimate a considerable 21% probability of spending more than 5% of income on OOP medical expenses, and a sizeable 8% chance of spending over 10% (Table 2).

Moving to trends in risks, nearly all demographic groups had a slightly higher probability in 2013 than they did in 2010 of spending at least 5% of income on OOP expenses (columns 1 and 2). Moreover, increases in this risk are especially pronounced among the poor where the risk was already the highest; for instance among the elderly population in good health and with

disposable income in the bottom quintile, the probability of large medical expenses grew from 34.8% in 2010 to 37.1% in 2013.

Trends in OOP spending in excess of 10% of income are slightly more encouraging (columns 3 and 4). Among those in poor health, only nonelderly citizens in the bottom quintile had a higher risk in 2013 (25.5%) than they did in 2010 (24.5%). Among those not in poor health, the probability of large expenses grew or remained about the same for those in the bottom two quintiles, while the risk of large expenses declined for those in the top 60% of incomes. Overall we see some improvement in financial protection, although the improvement is most pronounced at the top of the income distribution where the absolute risk is the lowest, while improvements in protection were weakest (or even falls) among those at the bottom of the income distribution where the risk is already the largest.

IV. Conclusions

Rising incomes, slower growth in health care expenditures, and an expansion in insurance coverage offer propitious signs that the financial burden of OOP expenses is declining. The paper, however, finds an upward trend in the risk of spending more than 5% of income on medical care among nearly all demographic groups. For spending above the 10% of income threshold, overall we find a downward trend among the upper end of the income distribution, and mixed but much less encouraging trends among the bottom 40% of incomes. While the paper does not seek to explain these trends, one reason for why more Americans are spending at least 5% of their income on OOP expenses could be the shift occurring toward higher deductible insurance plans (Collins et al. 2014), reflecting a trend toward exchanging lower premiums for higher OOP expenses. The mixed results based on the 10% threshold is likely at least partly

attributable to the fact that income growth was more robust at the top end of the income distribution, which made OOP expenses more affordable for this group.

A key purpose of the ACA is to improve citizens' protection from the risk of large expenditures associated with consuming medical care and health products. With the full implementation of the ACA, we should soon see its full potential to provide this greater degree of financial protection. The maximums on out-of-pocket expenditures it introduces should significantly reduce the risk of catastrophic health care costs (Gruber and Perry 2011). However, it will still permit the running-up of large medical bills, amounts which could easily exceed 20% of poor and middle class incomes (Goodnough and Pear 2014; Rosenthal 2014; Associated Press 2014). This study establishes a benchmark of OOP's financial burden on different populations. The magnitude of financial risk revealed here, coupled with some doubts over the ACA's ability to dramatically reduce Americans' exposure to large medical bills, underscore the importance of monitoring the nation's progress in improving the manner in which we distribute health care's financial burden.

Notes

[1] CPS-ASEC data was retrieved from the Luxembourg Income Study website. Definition of disposable income is according to LIS's definition which is based on international standards.

[2] Previous studies of high OOP expenditures have often resulted in inconsistent estimates (source). At least part of the explanation for these differences is the accuracy of income data, and/or wide variation in how income is defined.

[3] Self-reported *or* reported by a household member involved in the survey.

TABLE 1: Descriptive Statistics

	2010	2013
Avg Income	$63,837	$70,131
Avg Equivalized. Income	$36,300	$39,993
Q1 Boundary	$16,206	$17,105
Q2 Boundary	$25,049	$26,405
Q3 Boundary	$35,684	$37,714
Q4 Boundary	$50,903	$54,514
Percent:		
Elderly	12.8%	14.2%
Poor Health	11.8%	11.7%
OOP> 5%	20.9%	22.3%
OOP> 10%	9.3%	9.6%
Number obs.	*203,799*	*138,706*

Notes: Income is disposable income. OOP=out-of-pocket. Dollar amounts in current dollars.

TABLE 2: Probability of High Health Expenditures By Demographic Group and Year

	5% Threshold		10% Threshold	
	2010	**2013**	**2010**	**2013**
Elderly in Poor Health				
Q1	50.1%	50.9%	34.5%	34.4%
Q2	46.3%	46.2%	26.1%	24.7%
Q3	43.9%	41.5%	21.1%	19.3%
Q4	36.3%	36.6%	13.6%	12.4%
Q5	22.7%	22.7%	6.5%	5.2%
Nonelderly in Poor Health				
Q1	38.7%	40.0%	24.5%	25.5%
Q2	35.1%	35.6%	17.9%	17.6%
Q3	32.8%	31.3%	14.1%	13.5%
Q4	26.3%	27.1%	8.8%	8.4%
Q5	15.6%	15.8%	4.1%	3.5%
Elderly in Good health				
Q1	34.8%	37.1%	21.5%	22.4%
Q2	31.4%	32.8%	15.5%	15.3%
Q3	29.3%	28.8%	12.2%	11.6%
Q4	23.2%	24.7%	7.6%	7.2%
Q5	13.5%	14.3%	3.5%	2.9%
Nonelderly in Good Health				
Q1	25.0%	27.5%	14.4%	15.8%
Q2	22.3%	23.9%	10.2%	10.5%
Q3	20.6%	20.6%	7.9%	7.9%
Q4	15.9%	17.4%	4.8%	4.8%
Q5	8.9%	9.7%	2.2%	1.9%

Note: All differences are significant at the 1 percent level of significance. Shaded numbers indicate that the probability in 2013 was higher than in 2010.

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