RESEARCH ARTICLE

The role of plan choice in health care utilization of high-deductible plan enrollees

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Abstract

Objective: To study whether the negative association between enrollment in high-deductible plans and health care utilization is driven by reverse moral hazard or favorable selection, by examining adults with and without a choice of plans.

Data Source: 2011-2016 Medical Expenditure Panel Survey Household Component data on nonelderly adults enrolled in employer-sponsored insurance.

Study Design: Four types of plans were examined: high-deductible health plans (HDHPs), consumer-directed health plans (CDHPs), low-deductible health plans (LDHPs), and no-deductible health plans (NDHPs). Multivariate logistic regressions of various measures of health care utilization were conducted to estimate the differences in utilization across plan types among those who had a choice of plans and those who did not.

Principal Findings: Among adults with a choice of plans, HDHP enrollees had lower levels of utilization compared with those of the NDHP enrollees for any ambulatory visit, any specialist visit, and most preventive services. Among adults without any choice of plans, the differences between HDHP enrollees and NDHP enrollees were not statistically significant.

Conclusions: The differences between those with and without choice of plans in the relationship between HDHP enrollment and health care utilization might possibly be explained by favorable selection.

KEYWORDS

health care utilization, high deductible, plan choice

1 | INTRODUCTION

The prevalence of high-deductible health plans among adults enrolled in employer-sponsored insurance is increasing rapidly over time.¹ There is mounting evidence that enrollment in high-deductible health plans is associated with reduced health care utilization.² Theoretically, there may be at least two pathways through which high-deductible health plan enrollment and low health care utilization are connected. Enrollment in a high-deductible health plan may cause individuals to use less health care as they have to pay more for the initial costs. The notion that less generous insurance tends to decrease health care utilization has been referred to as reverse moral

hazard in the literature.³ However, high-deductible health plans are, generally, associated with relatively lower out-of-pocket premiums for employees, compared to other types of plans.⁴ Therefore, if employees are given a choice of health plans, then individuals expecting low health care utilization may choose a high-deductible plan over a traditional plan—a phenomenon that has been referred to as favorable selection.^{5,6} Studies that examined the impact of offering high-deductible health plan options to employees found some evidence of favorable selection—employees who chose high-deductible health plans over traditional (low or no deductible) health plans were more likely to be healthy, less likely to have any chronic health problem, and/or less likely to have had any doctor visits.⁶⁻⁸

One way of examining whether favorable selection or reverse moral hazard may play a greater role in the association between health services utilization and high-deductible plans is to study this association separately for those who had a choice of plans and those who did not. If favorable selection, rather than reverse moral hazard, is the key driving force, then we should expect a negative association between high-deductible plans and health care use among those who had a choice of plans but not among those who did not have a choice of plans. Using data from the 2007 Health Tracking Household Survey, Kullgren et al⁹ found that high-deductible health plan enrollment was associated with lower odds of smoking among employer-sponsored insurance enrollees with a choice of plans, but not among enrollees without a choice of plans. To date, there is no similar study that examines the role of plan choice in the association between high-deductible plans and health care utilization.

This study examines whether the association between enrollment in high-deductible health plans and health services utilization varies between enrollees who had a choice of plans and enrollees who did not, using data from the 2011-2016 Medical Expenditure Panel Survey Household Component (MEPS-HC). The outcomes studied in this analysis focus on ambulatory care—any ambulatory visit, any specialist visit, and preventive services including routine checkup, flu shot, blood pressure screening, blood cholesterol screening, Pap smear, and mammogram. Though preventive services are generally exempt from the deductibles in high-deductible plans,¹⁰ a large number of enrollees might not have been aware of the fact that preventive services were available at no or low cost in high-deductible health plans.¹¹

2 | DATA AND METHODS

2.1 | Data

The MEPS-HC is a nationally representative survey of the civilian noninstitutionalized population of the United States, conducted annually by the Agency for Healthcare Research and Quality. The MEPS-HC has detailed information on health insurance coverage, health care utilization, demographics, and socioeconomic status of individuals. It also has information on whether individuals who were offered employer-sponsored insurance (ESI) had a choice of plans offered by their employers. Since 2011, for individuals with private insurance coverage, the survey collects information on whether health insurance plans had annual deductibles, and if so, whether they exceeded specified amounts (eg, \$1300 for single and \$2600 for family plans as of 2016). These amounts correspond to Internal Revenue Service (IRS) thresholds for high-deductible health plans.¹² The MEPS-HC also has information, for those who report having a high-deductible health plan, on whether the plan is associated with a special account/fund that can be used to pay for medical expenses, where the special accounts are defined as “health savings accounts (HSAs), health reimbursement accounts (HRAs), personal care accounts, personal medical funds, or choice funds, and are different from flexible spending accounts.”

2.2 | Study population

This study pooled 6 years of the MEPS-HC, from 2011 to 2016, to increase precision. The sample was restricted to adults aged 27-64 who were enrolled in employer-sponsored insurance (ESI) from their or their spouses' current main job, and were not enrolled in any other public and or private health insurance ($n = 30\,273$). Adults aged 26 or younger were excluded as they could potentially get health insurance coverage not only from their own employers or the employers of their spouses, but also from their parents' health insurance coverage as dependents. This study focused on ESI enrollees, because ESI is the dominant form of private insurance in the United States, and because during the study period, the nongroup market went through major changes as a result of the Affordable Care Act (ACA).

2.3 | Outcomes

A key outcome of interest was whether the adult had any ambulatory visit, which may be an office-based or outpatient visit. Another outcome studied was whether the adult had any visit to a specialist doctor, as these visits might have been more expensive than other visits. The list of specialties included allergy/immunology, anesthesiology, cardiology, dermatology, endocrinology, gastroenterology, general surgery, geriatrics, gynecology/obstetrics, hematology, hospital residence, nephrology, neurology, oncology, ophthalmology, orthopedics, osteopathy, otorhinolaryngology, pathology, physical medicine/rehab, plastic surgery, proctology, psychiatry, pulmonary, radiology, rheumatology, thoracic surgery, and urology. Lastly, this study examined some preventive services recommended by the United States Preventive Services Task Force (USPSTF),^{13,14} MEPS-HC has information on adults' receipt and timing of these preventive services, as reported by the adults. The recommendations regarding the frequencies of these preventive services from the USPSTF were applied. Also, for each of the services, the sample was restricted to the age and gender groups for which the service was recommended. These services included flu shots (all men and women, within the prior year), blood pressure screening (all men and women, within the prior 2 years), blood cholesterol screening (men aged 35-64 years and women aged 45-64 years, within the prior 5 years), Pap smears (women with no hysterectomy, within the prior 3 years), and mammograms (women aged 40-64 years, within the prior 2 years). This study also examined whether the adult had a routine checkup (all men and women, within the prior year). Many patients and physicians believe that it is important to receive annual routine checkups, though annual checkups are not generally recommended by the USPSTF.^{15,16}

2.4 | Plan types and enrollee choice

Adults were classified into four types of health plans. Adults who had high-deductible plans that were not associated with any special fund/account were defined as having high-deductible health plans (HDHPs). Adults who had high-deductible plans that were

associated with an HSA, HRA, or a similar special fund/account were defined, following the literature,¹⁷⁻¹⁹ as having consumer-directed health plans (CDHPs). Adults who were enrolled in health plans with positive deductible levels that were below the IRS thresholds were defined as having low-deductible health plans (LDHPs). Lastly, adults enrolled in plans with no deductibles were defined as having no-deductible health plans (NDHPs). An adult was classified as having a choice of plans if the adult or the adult's spouse had an offer of employer-sponsored insurance coverage with a choice of plans, or if both the adult and the adult's spouse were eligible for coverage through their employers.

2.5 | Covariates

The multivariate regression models relied on the concept of Anderson's Behavioral Model of health services utilization.²⁰ This model posits that predisposing factors (sex, age, race/ethnicity, marital status, etc), enabling factors (education, income, health plan type, choice of plans, etc), and perceived need (self-reported physical and mental health status, etc) affect health care utilization. Therefore, the regression models controlled for sex, age, race/ethnicity, marital status, region of residence, education, poverty status (family income as a percentage of federal poverty level), and the physical and mental component summaries of the Short Form 12 (as measures of self-reported physical and mental health status). The regression models also included survey year fixed effects.

2.6 | Bivariate analyses

The first bivariate analysis compared the distribution of health plan types among adults who had a choice of plans with that among adults who did not. The second bivariate analysis compared the means of proportions of covariates across health plan types. Comparisons

were made using two-tailed *t* tests. The distributions of covariates by health plan types among adults with a choice of plans were generally similar to those among adults without a choice of plans, and therefore, only the distributions over the full sample were shown.

2.7 | Multivariate regression analyses

Multivariate logistic regression models of any ambulatory visit, any specialist visit, and receipt of each of the six preventive services were estimated. The key independent variables were the plan types, a dichotomous indicator of whether the adult had a choice of plans, and an interaction between plan types and the indicator of availability of choice of plans. All regression models controlled for the covariates described above. The estimated regression models were used to predict the outcomes for each plan type, first for all adults and then separately for those who had a choice of plans and those who did not, using the method of predictive margins. In this method, predicted probabilities of the dependent variable are calculated based on the estimated model, fixing key independent variables (eg, plan types, availability of choice of plans) at specific values (eg, HDHP, had choice of plans) for all sample members, while letting the other variables vary at their original values. Predictions were then averaged over the sample. This process is then repeated, using new fixed value for the key variables (eg, CDHP, had no choice of plans). This is a type of direct standardization that averages predicted values over the distribution of other covariates.²¹

Statistical significance of the differences in predicted outcomes between the NDHP enrollees (the reference group) and enrollees in other types of plans were assessed using two-tailed *t* tests. All analysis incorporated MEPS sample weights, and standard errors accounted for the complex survey design of the MEPS. The analyses were conducted using Stata/MP, version 15.0. All differences discussed in Results section were significant at the 5 percent level unless otherwise noted.

TABLE 1 Distribution of health plan types by availability of choice of plans, among adults aged 27-64 y enrolled in employer-sponsored insurance, 2011-2016 (n = 30 273)

Plan type	Among adults with a choice of plans ^a (n = 22 178)	Among adults without a choice of plans (n = 8095)
High-deductible health plans (HDHPs) ^b (%)	16.8 (0.6)	21.1*** (0.9)
Consumer-directed health plans (CDHPs) ^c (%)	14.8 (0.6)	10.4*** (0.6)
Low-deductible health plans (LDHPs) ^d (%)	47.0 (0.8)	47.5 (1.1)
No-deductible health plans (NDHPs) (%)	21.3 (1.1)	21.0 (1.2)

^aAn adult was classified as having a choice of plans if the adult or the adult's spouse had an offer of employer-sponsored insurance coverage with a choice of plans, or if both the adult and the adult's spouse were eligible for coverage through their employers.

^bHDHPs: high-deductible plans that are not associated with any special fund/account.

^cCDHPs: high-deductible plans that are associated with health savings accounts (HSA), health reimbursement accounts (HRAs), or similar special funds/accounts.

^dLDHPs: health plans with positive deductible levels below the IRS thresholds for high-deductible plans.

***Significantly different from the adults with choice of plans, at the 0.1% level.

Source: Medical Expenditure Panel Survey Household Component (MEPS-HC), 2011-2016. Standard errors are in parentheses and have been adjusted for the complex survey design of the MEPS. The sample is restricted to adults aged 27-64 who were enrolled in employer-sponsored insurance (ESI) from their or their spouses' current main job, and were not enrolled in any other public and or private health insurance.

3 | RESULTS

3.1 | Bivariate results

Table 1 presents the distribution of health plan types among adults enrolled in employer-sponsored insurance. Estimates are presented separately for those who had a choice of plans ($n = 22\,178$) and those who did not have a choice of plans ($n = 8095$). The proportion of adults enrolled in CDHPs was higher among adults with a choice of plans, compared with that among adults without a choice of plans (14.8 vs 10.4 percent). The proportion of adults enrolled in HDHPs was lower among those with a choice of plans, compared with that among those without a choice of plans (16.8 vs 21.1 percent). The proportions of adults with LDHPs and NDHPs among adults with a choice of plans (47.0 and 21.3 percent, respectively) were very similar to those among adults without a choice of plans (47.5 and 21.0 percent, respectively).

Table 2 presents the distributions of the demographic and health characteristics of the adults enrolled in employer-sponsored insurance by health plan types. The table also shows the statistical significance of the differences between enrollees in NDHPs and enrollees in the other types of health plans. Those enrolled in HDHPs were less likely to be female compared to the NDHP enrollees. There were no significant differences across health plans in terms of the distribution of age groups. Those enrolled in NDHPs were much less likely to be non-Hispanic white (61.6 percent)—compared with enrollees in the other three types of plan (74.0, 74.8, and 81.7 percent, for enrollees in LDHPs, HDHPs, and CDHPs, respectively). CDHP enrollees were more likely to have attended college compared to NDHP enrollees (80.3 vs 74.8 percent), whereas HDHP enrollees were less likely to have attended college compared to NDHP enrollees (72.2 vs 74.8 percent). There were similar differences across health plan types in terms of poverty level as well. The NDHP enrollees were much more likely to be living in the Northeast or West compared with enrollees in other three types of health plans. Lastly, there were no significant differences in mean physical component summary or mental component summary across health plan types.

3.2 | Multivariate regression results for any ambulatory visit and any specialist visit

Table 3 presents the predicted probabilities of any ambulatory visit and any specialist visit by health plan types, estimated from the multivariate logistic regression models. Predicted probabilities for all adults are presented first, followed by predicted probabilities separately for those who had a choice of plans and those who did not have a choice of plans. The table also shows the statistical significance of the differences in predicted probabilities between NDHPs and the other three types of plans.

Among all adults, HDHP enrollees were 3.7 percentage points less likely than the NDHP enrollees (77.9 vs 81.6 percent) to have any ambulatory visit. This difference, however, was driven by those with a choice of plans. Among those with a choice of plans, HDHP enrollees were 5.1 percentage points less likely than the NDHP enrollees

(78.2 vs 83.3 percent) to have any ambulatory visits. Among those without any choice of plans, there was no statistically significant difference in the probabilities of any ambulatory visit between NDHP enrollees and HDHP enrollees. The LDHP enrollees were also less likely to have any ambulatory visit than the NDHP enrollees, and this difference was also driven by those with a choice of plans. There were, however, no statistically significant differences in the probabilities of any ambulatory visit between CDHP enrollees and NDHP enrollees, either among all adults or within the subgroups of those with or without any choice of plans.

The patterns of differences across health plan types in the predicted probabilities of any specialist visit were similar to those in the case of any ambulatory visit. Among all adults, HDHP enrollees were 4.1 percentage points less likely than the NDHP enrollees (35.6 vs 39.7 percent) to have any specialist visit. This difference, again, was driven by those with a choice of plans. Among those with a choice of plans, HDHP enrollees were 5.1 percentage points less likely than the NDHP enrollees (36.1 vs 41.1 percent) to have any specialist visit. There was no statistically significant difference in the probabilities of any specialist visit between NDHP enrollees and HDHP enrollees, among those without any choice of plans. The LDHP enrollees were also less likely to have any specialist visit than the NDHP enrollees, and this difference was also driven by those with a choice of plans. There was, again, no statistically significant difference in the probabilities of any specialist visit between CDHP enrollees and NDHP enrollees, either among all adults or within the subgroups of those with or without any choice of plans.

The difference between those with and without a choice of plans, in the differences of predicted probabilities of any ambulatory visit between HDHP enrollees and NDHP enrollees, was 5.7 percentage points, which was statistically significant at the 1 percent level (not shown). For the predicted probability of any specialist visit, the corresponding difference in differences was 3.8 percentage points, which was statistically significant at the 10 percent level (not shown).

3.3 | Multivariate regression results for preventive services

Table 4 presents the predicted preventive services utilization, estimated from the multivariate logistic regression models. The patterns of differences in preventive services utilization across health plan types were generally similar to the cases of any ambulatory or specialist visit, with an important exception that the differences between LDHP enrollees and NDHP enrollees were not statistically significant, either among those with a choice of plans or among those without any choice of plans. Among all adults, HDHP enrollees were 3.8 percentage points less likely to have a routine checkup within the prior year (67.4 vs 71.2 percent), 3.9 percentage points less likely to have a flu shot within the prior year (42.1 vs 46.0 percent), 2.2 percentage points less likely to have a blood pressure screening within the prior 2 years (93.2 vs 95.3 percent), 2.2 percentage points less likely to have a Pap smear within the prior 3 years (91.1 vs 93.3 percent), and 4.6 percentage points less likely to have a mammogram

TABLE 2 Distribution of demographic and health characteristics of adults aged 27-64 enrolled in employer-sponsored insurance by health plan types, 2011-2016

Characteristics	High-deductible health plans (HDHPs) ^a (n = 5114)	Consumer-directed health plans (CDHPs) ^b (n = 3627)	Low-deductible health plans (LDHPs) ^c (n = 13 967)	No-deductible health plans (NDHPs) ^d (n = 7565)
Female (%)	49.7** (0.7)	51.4 (0.7)	51.6 (0.4)	52.1 (0.5)
Age (%)				
27-34	19.7 (0.8)	17.9 (1.0)	20.1 (0.6)	19.8 (0.8)
35-49	41.0 (1.3)	43.3 (1.3)	42.0 (0.8)	42.5 (0.9)
50-64	39.2 (1.4)	38.7 (1.5)	37.9 (0.9)	37.7 (1.0)
Race/ethnicity (%)				
Non-Hispanic white	74.8*** (1.2)	81.7*** (1.0)	74.0*** (0.8)	61.6 (2.0)
Non-Hispanic black	7.6*** (0.5)	5.1*** (0.5)	8.9*** (0.5)	11.8 (0.8)
Hispanic	9.3*** (0.8)	5.8*** (0.5)	9.9*** (0.7)	13.8 (0.9)
Other non-Hispanic	8.3* (0.7)	7.4** (0.7)	7.2** (0.4)	12.8 (2.0)
Education (%)				
No high school degree	3.5* (0.3)	1.9*** (0.3)	3.1*** (0.2)	4.6 (0.4)
High school degree/GED	24.4** (1.0)	17.8 (1.2)	24.1*** (0.6)	20.6 (0.8)
Some college	72.2* (1.0)	80.3*** (1.3)	72.8 (0.7)	74.8 (0.9)
Poverty level (%)				
<200% of FPL ^d	8.6 (0.6)	4.3*** (0.6)	6.9 (0.4)	7.1 (0.5)
200%-399% of FPL	32.6 (1.0)	24.6*** (1.3)	30.7 (0.7)	29.6 (1.2)
400%+ of FPL	58.9* (1.3)	71.1*** (1.4)	62.4 (0.8)	63.3 (1.3)
Region (%)				
Northeast	15.6*** (1.2)	16.8*** (1.2)	15.5*** (0.8)	31.8 (2.6)
Midwest	25.0*** (1.6)	30.1*** (1.8)	25.4*** (1.0)	13.4 (1.5)
South	41.3*** (2.1)	34.0*** (2.2)	38.3*** (1.2)	24.3 (1.9)
West	18.1*** (1.3)	19.2** (1.8)	20.9** (1.0)	30.5 (2.9)
Married (%)	73.7 (1.0)	78.5*** (1.2)	75.6*** (0.7)	71.5 (1.0)
(Mean) Physical component summary of Short Form 12	52.3 (0.2)	52.8 (0.2)	52.4 (0.1)	52.5 (0.1)
(Mean) Mental component summary of Short Form 12	52.4 (0.2)	52.6 (0.2)	52.6 (0.1)	52.7 (0.1)

Abbreviation: FPL, federal poverty level.

^aHDHPs: high-deductible plans that are not associated with any special fund/account.

^bCDHPs: high-deductible plans that are associated with health savings accounts (HSA), health reimbursement accounts (HRAs), or similar special funds/accounts.

^cLDHPs: health plans with positive deductible levels below the IRS thresholds for high-deductible plans.

^dThe reference group.

***Significantly different from the reference group at the 0.1% level.

**Significantly different from the reference group at the 1% level.

*Significantly different from the reference group at the 5% level.

Source: Medical Expenditure Panel Survey Household Component (MEPS-HC), 2011-2016. Standard errors are in parentheses and have been adjusted for the complex survey design of the MEPS. The sample is restricted to adults aged 27-64 who were enrolled in employer-sponsored insurance (ESI) from their or their spouses' current main job, and were not enrolled in any other public and or private health insurance.

within the prior 2 years (76.7 vs 81.3 percent), when compared with NDHP enrollees. These differences were largely driven by those with a choice of plans. Among those with a choice of plans, HDHP enrollees were 4.5 percentage points less likely to have a routine checkup within the prior year (67.2 vs 71.7 percent), 4.7 percentage points less likely to have a flu shot within the prior year (42.5

vs 47.2 percent), 2.6 percentage points less likely to have a blood pressure screening within the prior 2 years (93.1 vs 95.7 percent), 2.8 percentage points less likely to have a Pap smear within the prior 3 years (90.8 vs 93.6 percent), and 4.8 percentage points less likely to have a mammogram within the prior 2 year (76.5 vs 81.3 percent), when compared with NDHP enrollees. Among adults without any

TABLE 3 Predicted probabilities of any ambulatory visit and any specialist visit, of adults aged 27-64 enrolled in employer-sponsored insurance, by health plan types and by availability of a choice of plans, 2011-2016^{a,b}

Outcomes	High-deductible health plans (HDHPs) ^c (n = 5114)	Consumer-directed health plans (CDHPs) ^d (n = 3627)	Low-deductible health plans (LDHPs) ^e (n = 13 967)	No-deductible health plans (NDHPs) ^f (n = 7565)
Any ambulatory visit (%)				
All enrollees (n = 30 273)	77.9*** (0.7)	83.1 (0.8)	80.0* (0.5)	81.6 (0.6)
Enrollees with choice of plans (n = 22 178)	78.2*** (0.9)	83.9 (0.8)	80.5** (0.6)	83.3 (0.6)
Enrollees without choice of plans (n = 8095)	77.1 (1.2)	80.8 (1.8)	78.8 (0.9)	76.5 (1.4)
Any specialist visit (%)				
All enrollees (n = 30 273)	35.6*** (0.8)	42.0 (1.0)	37.7* (0.6)	39.7 (0.8)
Enrollees with choice of plans (n = 22 178)	36.1*** (1.0)	42.6 (1.2)	38.3** (0.6)	41.1 (0.8)
Enrollees without choice of plans (n = 8095)	34.0 (1.4)	40.1 (2.3)	35.8 (1.2)	35.2 (1.6)

^aThese estimates are the predictive margins from multivariate logistic regression models of the probabilities of any ambulatory visit and any ambulatory visit to a specialist. The independent variables, for both of the regression models, include indicators for health plan types, dichotomous indicator of whether the adult had a choice of plans, an interaction between plan types and the indicator of availability of choice of plans, sex, age, race/ethnicity, marital status, region of residence, education, poverty status (family income as a percentage of federal poverty level), the physical and mental component summaries of the Short Form 12 (as measures of self-reported physical and mental health status), and survey years.

^bAn adult was classified as having a choice of plans if the adult or the adult's spouse had an offer of employer-sponsored insurance coverage with a choice of plans, or if both the adult and the adult's spouse were eligible for coverage through their employers.

^cHDHPs: high-deductible plans that are not associated with any special fund/account.

^dCDHPs: high-deductible plans that are associated with health savings accounts (HSA), health reimbursement accounts (HRAs), or similar special funds/accounts.

^eLDHPs: health plans with positive deductible levels below the IRS thresholds for high-deductible plans.

^fThe reference group.

***Significantly different from the reference group at the 0.1% level.

**Significantly different from the reference group at the 1% level.

*Significantly different from the reference group at the 5% level.

Source: Medical Expenditure Panel Survey Household Component (MEPS-HC), 2011-2016. Standard errors are in parentheses and have been adjusted for the complex survey design of the MEPS. The sample is restricted to adults aged 27-64 who were enrolled in employer-sponsored insurance (ESI) from their or their spouses' current main job, and were not enrolled in any other public and or private health insurance. Sample sizes are shown in the rows and columns of the table.

choice of plans, utilization rates of routine checkup, flu shots, blood pressure screening, Pap smear, and mammogram were lower for HDHP enrollees compared to the NDHP enrollees, but the differences were smaller compared to those among adults with a choice of plans, and none of those differences were statistically significant. For all of these five preventive services, there were no statistically significant differences between NDHP enrollees and CDHP enrollees, or between NDHP enrollees and LDHP enrollees, either among all adults or within the subgroups of those with or without any choice of plans. Lastly, in case of blood cholesterol screening, there were no statistically significant differences in utilization between NDHP enrollees and enrollees in other plan types, either among all adults or within the subgroups of those with or without a choice of plans.

4 | DISCUSSION

This study examined whether the negative association between enrollment in high-deductible health plans and health services utilization was driven by enrollees who chose those plans. Among employer-sponsored insurance enrollees with a choice of plans, those

enrolled in HDHPs were less likely to have any ambulatory visit, any specialist visit, routine checkup, flu shot, blood pressure screening, Pap smear, or mammogram, compared with those enrolled in NDHPs. In contrast, among employer-sponsored insurance enrollees without any choice of plans, the differences between HDHP enrollees and NDHP enrollees were not statistically significant for any of the outcomes studied—including the probabilities of any ambulatory visit, any specialist visit, and six preventive services.

The results of this study are consistent with the possibility that favorable selection may be playing a stronger role than reverse moral hazard in lowering health care utilization of HDHP enrollees. Unobserved confounders, such as individuals' preferences and attitudes toward health risks, health insurance, and health care utilization, might explain the relationship between HDHP enrollment and lower health care use for those with choice. That is, it is possible that when individuals with a tendency toward using less health care are given a choice of health plans with different levels of deductibles, they end up choosing the high-deductible plans because of relatively lower premiums and they use less health care. If that is the case, then the results of this paper have important policy implications. In particular, the findings of this study could suggest that policy initiatives

TABLE 4 Predicted preventive services utilization of adults aged 27-64 enrolled in employer-sponsored insurance, by health plan types and by availability of a choice of plans, 2011-2016^{a,b}

Preventive services	High-deductible health plans (HDHPs) ^c (n = 5114)	Consumer-directed health plans (CDHPs) ^d (n = 3627)	Low-deductible health plans (LDHPs) ^e (n = 13 967)	No-deductible health plans (NDHPs) ^f (n = 7565)
Routine checkup within the prior year (%)				
All enrollees (n = 29 846)	67.4** (1.0)	71.2 (1.0)	70.4 (0.6)	71.2 (0.8)
Enrollees with a choice of plans (n = 21 892)	67.2** (1.2)	71.3 (1.2)	70.5 (0.6)	71.7 (1.0)
Enrollees without a choice of plans (n = 7954)	68.0 (1.7)	70.7 (2.1)	69.9 (1.0)	69.8 (1.5)
Flu shot within the prior year (%)				
All enrollees (n = 29 794)	42.1** (1.1)	46.6 (1.3)	45.7 (0.6)	46.0 (0.9)
Enrollees with a choice of plans (n = 21 831)	42.5*** (1.4)	45.8 (1.2)	47.0 (0.7)	47.2 (1.1)
Enrollees without a choice of plans (n = 7963)	41.0 (1.7)	48.9 (2.8)	41.8 (1.3)	42.3 (1.7)
Blood pressure screening within the prior 2 y (%)				
All enrollees (n = 29 913)	93.2** (0.5)	95.2 (0.5)	95.0 (0.3)	95.3 (0.3)
Enrollees with a choice of plans (n = 21 936)	93.1** (0.6)	95.8 (0.5)	95.2 (0.3)	95.7 (0.4)
Enrollees without a choice of plans (n = 7977)	93.2 (0.8)	93.5 (1.2)	94.3 (0.6)	94.2 (0.7)
Pap smear within the prior 3 y (among women with no hysterectomy) (%)				
All enrollees (n = 12 925)	91.1* (0.8)	93.1 (0.8)	92.6 (0.4)	93.3 (0.7)
Enrollees with a choice of plans (n = 9562)	90.8* (1.0)	92.9 (0.9)	93.2 (0.5)	93.6 (0.9)
Enrollees without a choice of plans (n = 3363)	91.8 (1.2)	93.5 (1.8)	91.2 (0.9)	92.4 (1.0)
Mammogram within the prior 2 y (among women aged 40 or older) (%)				
All enrollees (n = 10 226)	76.7* (1.3)	82.9 (1.3)	78.9 (1.0)	81.3 (1.2)
Enrollees with choice a of plans (n = 7363)	76.5* (1.6)	82.4 (1.6)	79.3 (1.0)	81.3 (1.4)
Enrollees without a choice of plans (n = 2863)	77.2 (2.3)	84.4 (3.0)	77.7 (1.7)	81.3 (2.0)
Blood cholesterol screening within the prior 5 y (among men aged 35 or older and women aged 45 or older) (%)				
All enrollees (n = 19 160)	92.1 (0.6)	93.3 (0.7)	93.7 (0.4)	93.5 (0.5)
Enrollees with a choice of plans (n = 13 911)	92.4 (0.7)	94.4 (0.7)	93.9 (0.4)	94.0 (0.6)
Enrollees without a choice of plans (n = 5249)	91.3 (1.1)	90.2 (2.0)	93.3 (0.7)	92.2 (1.1)

^aThese estimates are the predictive margins from multivariate logistic regression models of receipt of preventive services. The independent variables, for the regression models of all of the preventive services, include indicators for health plan types, dichotomous indicator of whether the adult had a choice of plans, an interaction between plan types and the indicator of availability of choice of plans, sex, age, race/ethnicity, marital status, region of residence, education, poverty status (family income as a percentage of federal poverty level), the physical and mental component summaries of the Short Form 12 (as measures of self-reported physical and mental health status), and survey years.

^bAn adult was classified as having a choice of plans if the adult or the adult's spouse had an offer of employer-sponsored insurance coverage with a choice of plans, or if both the adult and the adult's spouse were eligible for coverage through their employers.

^cHDHPs: high-deductible plans that are not associated with any special fund/account.

^dCDHPs: high-deductible plans that are associated with health savings accounts (HSA), health reimbursement accounts (HRAs), or similar special funds/accounts.

^eLDHPs: health plans with positive deductible levels below the IRS thresholds for high-deductible plans.

^fThe reference group.

***Significantly different from the reference group at the 0.1% level.

**Significantly different from the reference group at the 1% level.

*Significantly different from the reference group at the 5% level.

Source: Medical Expenditure Panel Survey Household Component (MEPS-HC), 2011-2016. Standard errors are in parentheses and have been adjusted for the complex survey design of the MEPS. The sample is restricted to adults aged 27-64 who were enrolled in employer-sponsored insurance (ESI) from their or their spouses' current main job, and were not enrolled in any other public and or private health insurance. Sample sizes are shown in the rows and columns of the table.

that attempt to use high-deductible health plans to curb health care expenditures may not have the intended effects. The results of this study parallel those of Kullgren et al,⁹ who concluded that lower rates of smoking among high-deductible health plan enrollees might be a reflection of individuals who chose those plans.

One might expect that those without a choice of plan would have more trouble using their plans than those who chose an HDHP, and this might result in delayed or forgone care. Yet, the results of this study did not show any such effect. One possible reason for this is that the HDHP enrollees might be initially confused about their

plans, but over the time, they might get a better understanding of their plans and start to use health care they need. The MEPS-HC does not ask about the length of time the enrollees have been on their plans. However, given that it is a nationally representative sample, it likely includes individuals who have enrolled in HDHPs fairly recently as well as those enrolled in HDHPs for a long period of time.

The Affordable Care Act (ACA) mandated that beginning on or after September 2010, all nongrandfathered private insurance plans must cover recommended preventive services without patient cost sharing.²²⁻²⁴ Therefore, one should not expect to see any significant association between deductible levels and preventive care services utilization since the data spanned 2011-2016. This study still found, among those with choice, that HDHP enrollees were less likely to use preventive care services compared to NDHP enrollees. One possible reason for this is that fewer ambulatory visits might have resulted in fewer physician referrals for checkup or screening services. However, it is also possible that those who tend to use less health care may also have a tendency to forgo preventive care, regardless of the cost.

This study did not find any significant differences in the probabilities of any ambulatory visit and any specialist doctor visits between NDHP enrollees and CDHP enrollees. It is possible that the employer contributions to the HSAs or HRAs might have helped cover some of the initial costs of care for those enrolled in the CDHPs and that might have tempered the effects of the deductible. In 2018, average annual employer contributions to HSA and HRA accounts were \$603 and \$1149, respectively, for single coverage (\$1073 and \$2288, respectively, for family coverage).⁴ MEPS-HC, however, does not have information on the amount of employer contributions to the HSAs or the HRAs (or the worker contributions to the HSAs), if any, and therefore, it is not possible to estimate the impacts of employer contributions.

There are several limitations to this study. First, this cross-sectional study is focused on examining the association between deductibles and utilization—it does not attempt to investigate the causal effects of deductibles on health care utilization. Limited sample size hinders the possibility of further in-depth analysis, particularly in the cases of preventive services. Second, health care use in the MEPS-HC is self-reported and therefore possibly subject to recall bias. Validation studies of the MEPS-HC, however, has found that while households did underreport health care utilization, behavioral analyses of health care use were largely unaffected because underreporting cut through all sociodemographic groups.^{25,26} In case of this study, if underreporting equally affects all the subgroups of the sample of ESI enrollees, for example, those with different levels of deductibles and those with and without choice of plans, then the results are less likely to be biased. Third, MEPS-HC does not have information on whether the choice sets available to the employees included plans with different levels of deductibles. However, if it were possible to identify and exclude adults with limited choices from the choice group, the negative association between HDHP enrollees and health care utilization might have been even stronger among the

remaining sample. Fourth, MEPS-HC does not have information regarding premiums associated with the choices of health plans, and employer contributions to the HSAs or HRAs (if any), thus limiting the ability to further explore the issues of possible favorable selection and reverse moral hazard. Lastly, MEPS-HC does not distinguish between high-deductible plan enrollees with HSA and high-deductible plan enrollees with HRA (or other similar special fund/account). Research has shown that employer contributions to HSA and HRA may have different effects on health care utilization and costs.²⁷

Future research on the relationship between HDHP enrollment and health care utilization should address the limitations mentioned above, so as to get a better understanding of the complexity of this relationship. The extent to which variations in health care utilization are a function of health plan characteristics vs the choices of individuals with different needs and preferences for health care is important to know in designing an efficient health care system.

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