

The Impact of Health Status and Use of Health Care Services on Disenrollment From HSA-Eligible Health Plans

By Paul Fronstin, Ph.D., Employee Benefit Research Institute, and M. Christopher Roebuck, Ph.D., RxEconomics, LLC

AT A GLANCE

This study examines whether disenrollment from health savings account (HSA)-eligible health plans is associated with risk selection, such that once enrolled in an HSA-eligible health plan, less-healthy enrollees are more likely to disenroll from the health plan than healthier enrollees. Such a phenomenon contributes to adverse selection and death spirals. The paper focuses on the presence of health conditions and use of health care services as key determinants of disenrollment.

Key findings:

- Overall, 5 percent of HSA-eligible health plan enrollees in 2013 and 2014 switched to a different type of health plan in 2014 and 2015.
- Among those disenrolling from an HSA-eligible health plan in 2014, 6 percent were enrolled in an HMO or EPO, and 94 percent were enrolled in a PPO or POS plan.
- There is evidence that individuals who disenrolled from HSA-eligible health plans were more likely to have certain health conditions than those who remained enrolled in the HSA-eligible health plan.
 - Among individuals with no health conditions, 4.2 percent disenrolled from the HSA-eligible health plan.
 - Five percent of individuals with dyslipidemia disenrolled, along with 5.3 percent among those with hypertension or depression, 5.6 percent among those with diabetes, and 6.1 percent among individuals with schizophrenia/bipolar disorder.
- Individuals with multiple conditions were even more likely to disenroll.
 - Disenrollment was 7.1 percent among those with a combination of hypertension, dyslipidemia, and diabetes. When depression is added to those conditions, disenrollment jumps to 8.2 percent. Among individuals with those conditions and others, disenrollment was 13.4 percent.
- Individuals with claims related to childbirth were twice as likely as those with no health conditions to disenroll from HSA-eligible health plans. They were predicted to disenroll at a rate of 8.4 percent.
- Individuals with ulcerative colitis and those with metastatic cancer were more likely than those with no conditions to disenroll. Otherwise, there was no statistically significant difference in disenrollment rates between individuals with rare and costly chronic conditions and those with no conditions. However, newly diagnosed individuals with rheumatoid arthritis or multiple sclerosis were more likely to disenroll from the HSA-

eligible health plans as compared to individuals with no conditions. Predicted disenrollment rates were 6.2 percent for individuals with rheumatoid arthritis and 7.3 percent for those with multiple sclerosis.

- Use of health care services was a statistically significant predictor of disenrollment from HSA-eligible health plans. However, the magnitude of the impact was quite small. For instance, 4.2 percent of individuals who used no health care disenrolled from HSA-eligible health plans, whereas 4.4 percent of those at median use disenrolled, and 5.2 percent of those at the 90th percentile of use disenrolled.
- Disenrollment from HSA-eligible health plans, which includes a disproportionate number of individuals with health conditions, increases employer spending on health coverage by 2.5 to 3.2 percent.

Paul Fronstin is director of the Health Research and Education Program at the Employee Benefit Research Institute (EBRI). M. Christopher Roebuck is president and CEO of RxEconomics, LLC. Any views expressed in this report are those of the authors and should not be ascribed to the officers, trustees, or other sponsors of EBRI, Employee Benefit Research Institute-Education and Research Fund (EBRI-ERF), or their staffs. Neither EBRI nor EBRI-ERF lobbies or takes positions on specific policy proposals. EBRI invites comment on this research.

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Introduction

Both the number of health savings accounts (HSAs) and enrollment in HSA-eligible health plans have grown significantly since HSAs first became available in 2004. In 2017, enrollment in HSA-eligible health plans ranged from 21.4 million to 33.7 policyholders and their dependents (Fronstin 2018). The number of employers with 500 or more employees offering an HSA-eligible health plan or health reimbursement arrangement (HRA) has increased from 23 percent to 61 percent between 2010 and 2016 (Figure 1). And the number of HSAs reached 22 million at the end of 2017.¹

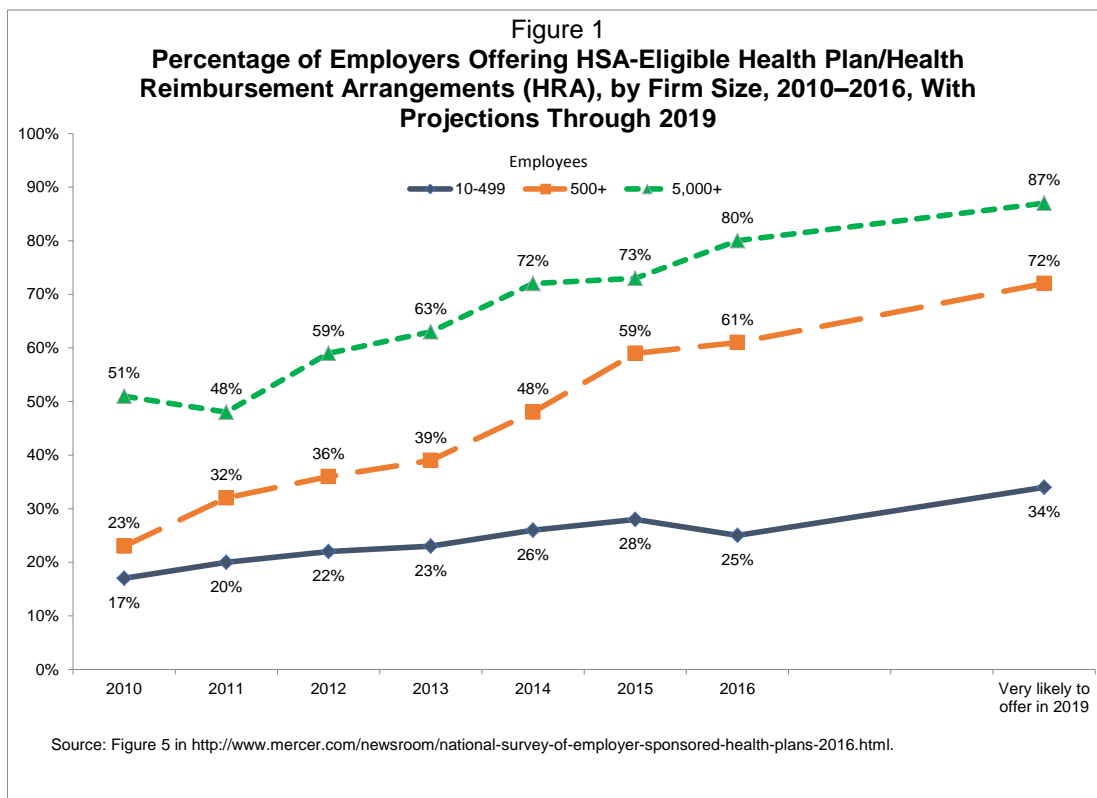
While the size of the HSA-eligible health plan marketplace has grown substantially in the past 15 years, it could be much larger today if individuals were not disenrolling from those plans. Disenrollment may be responsible for what appears to be the recent stalled growth in the size of the HSA-eligible health plan marketplace (Fronstin 2018). We are unaware of any research on the determinants of disenrollment.

Understanding what drives enrollment and disenrollment into and out of HSA-eligible health plans is important to plan sponsors and policy makers, since enrollment in these kinds of plans is still expected to grow. In 2016, 25 percent of employers with 10–499 employees and 61 percent of employers with 500 or more employees offered an HSA-eligible health plan or HRA, collectively known as consumer-directed health plans (CDHPs) (Figure 1). By 2019, 34 percent of employers with 10–499 employees and 72 percent of employers with 500 or more employees said they were very likely to offer such a health plan. However, only 9 percent of employers with 500 or more workers offered an HSA-eligible health plan or an HRA as the only plan option in 2016.²

Background:

In 2003, the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) included a provision that created health savings accounts (HSAs) and HSA-eligible health plans. HSA-eligible health plans have deductibles that are higher than what individuals are used to seeing in more traditional types of health insurance. In 2018, HSA-eligible health plans were required to have deductibles of at least \$1,350 for employee-only coverage and \$2,700 for family coverage. In addition, maximum out-of-pocket amounts cannot exceed \$6,650 for employee-only coverage and \$13,300 for family coverage. Certain primary preventive services — typically those deemed to prevent the onset of disease — can be and often are exempt from the deductible and covered in full. Otherwise, all health care services must be subject to the plan deductible.

Individuals enrolled in HSA-eligible health plans are eligible to open and fund a health savings account (HSA), a tax-exempt trust or custodial account that is funded with contributions and assets that an individual can use to pay for health care expenses. Individuals with HSAs benefit from a triple-tax advantage: Employee contributions to the account are deductible from taxable income, any interest or other capital earnings on assets in the HSA build up tax free, and distributions for qualified medical expenses from the HSA are excluded from taxable income to the employee.



When the Patient Protection and Affordable Care Act (ACA) passed in 2010, the increase in employer adoption of HSA-eligible health plans was expected to accelerate. Health insurance premiums were anticipated to increase because of various provisions in the ACA.³ These premium increases along with the excise tax on high-cost health plans (the so-called “Cadillac Tax”) were expected to cause more employers to offer HSA-eligible health plans. The outlook for HSA-eligible health plans remains strong, as employers continue to grapple with efforts to manage the rising cost of providing health benefits. Furthermore, public policy changes may also drive future growth. On July 11, 2018, the House Ways and Means Committee approved a number of health-related tax bills, including the Increasing Access to Lower Premium Plans and Expanding Health Savings Accounts Act of 2018. The Act, which would increase statutory limits on annual HSA contributions, was passed by the U.S. House of Representatives July 25, 2018. The bills would also lower the excise tax on distributions for non-qualified expenses, create a grace period for opening an HSA, and make it easier for spouses to make catch-up contributions. In addition, some services and benefits related to the management of chronic diseases could be excluded from the deductible.

A consistent finding in the research literature on CDHPs (discussed in more detail below) is that HSA-eligible health plans and HRAs introduce positive risk selection when workers are given a choice of plans.⁴ Namely, healthier individuals are more likely to choose a CDHP, which in turn raises the health risk in the other plans. Risk selection is critical in employment-based health plans because it influences who is enrolled in a plan and, therefore, the cost of a health plan. For example, if all healthy employees choose one plan and all sick employees choose a second plan, then the difference in plan costs will be large and these large differences in cost will likely prompt differences in employee contributions, which will cause even further risk selection. This process can lead to the well-known phenomenon of the “death spiral,” where a health plan eventually becomes so costly that it is no longer worth offering. If employees are very sensitive to differences in premiums, then this selection can be problematic in terms of offering more than one type of health plan. On the other hand, if employees are not very sensitive to differences in premiums, then it is more likely that a firm can offer a variety of plans. The upshot is that the responsiveness of employees to changes in premiums is an important determinant of the stability of a firm’s health plan offerings.

Examples of Adverse Selection and Death Spirals

Buchmueller and Feldstein (1997 and 1998) looked at the effect of moving to a fixed contribution at the University of California (UC). Before 1994, UC set its contribution equal to the cost of the health plan with the largest membership, but in 1994, UC reduced the employer premium contribution to the amount charged by the least costly plan available statewide. This policy led to increases in employee premiums in higher cost plans and a high degree of plan switching by UC employee. Ultimately, it drove one plan out of the UC internal market. Of those employees whose premiums did not increase between 1993 and 1994, roughly 5–6 percent switched plans.

Similarly, Cutler and Reber (1998) examined changes that took place at Harvard University. In 1995, Harvard moved to a fixed contribution for health benefits. Contributions were set at 85 percent of the least-costly policy for employees earning below \$45,000 a year, 80 percent for employees earning between \$45,000 and \$70,000 a year, and 75 percent for employees earning more than \$70,000 a year. Non-union employees experienced the change in 1995, while union employees were not affected until 1996, which allowed the researchers to look at a treatment group (the 1995 non-union workers) and a control group (the 1996 union workers). The study found evidence of adverse selection: Younger employees were found to be more likely to switch to less costly plans than older employees. This resulted in a 16 percent premium increase in the high-cost plan in 1996. Non-random disenrollment continued. Within three years, the high-cost plan was no longer offered because of adverse selection.

The purpose of this *Issue Brief* is to examine the determinants of disenrollment from HSA-eligible health plans. If disenrollment from HSA-eligible health plans is associated with risk selection, then it may contribute to adverse selection and death spirals as much as initial plan choice. The paper focuses on the presence of health conditions and use of health care services as key determinants of disenrollment.

Data and Methods

Data

This study makes use of the Truven Health Analytics MarketScan® Commercial Claims and Encounters Databases (copyright © Truven Health Analytics, all rights reserved) for the years 2013, 2014, and 2015. Using the full Commercial Claims and Encounters Database, we constructed an analytical dataset of individuals less than 65 years of age with employment-based health coverage. The unit of analysis was the policyholder, and these enrollees were included if they were full-time employees with continuous eligibility in each (but not necessarily every) calendar year. Insurees were excluded if they did not have both medical and pharmacy coverage, or if their health plan type was capitated or non-basic/major medical. After imposing these criteria, approximately 9 million policyholders remained, each with 1 to 3 years of eligibility. Next, given the primary focus of the paper, we retained only those policyholders who were enrolled in an HSA-eligible health plan in any of the 3 study years. This resulted in a study sample size of 422,808 unique policyholders: 242,359 who were trackable from 2013-2014 and 309,143 who were trackable from 2014-2015.

Variables

The sole dependent variable in the ensuing analyses was disenrollment from the HSA-eligible health plan, where the employee was enrolled in an HSA-eligible health plan in a given year (i.e., 2013 or 2014) and not enrolled in an HSA-eligible health plan in the following year (i.e., 2014 or 2015). A robust vector of demographic, insurance plan, and

health status independent variables was created by year. Gender, age, and geographic region were captured. Additionally, enrollment information and claims data on all spouses, children, and other dependents of the policyholder were accessed to determine whether the policyholder had individual or family coverage in each year. A dichotomous variable for having a covered spouse and a count of the number of children/other dependents were also constructed. It is worth noting that unlike for the policyholder; spouses, children, and other dependents were not required to have complete year eligibility (i.e., to accommodate intra-year qualifying events like marriage and childbirth).

Since we hypothesized that health status would likely be correlated with HSA-eligible health plan disenrollment, we included three sets of such measures. First, we derived the Charlson Comorbidity Index (Charlson, et al. 1987) (Deyo, Cherkin and Ciol 1992) (Quan, et al. 2005), which is widely used in the extant literature as a gauge of general health status. For families, we retained the maximum score among all members linked to the policyholder.

Second, we generated a vector of indicator variables for the presence of health conditions using diagnosis codes. Specifically, an individual was considered to have a given condition if he/she had 1 or more inpatient, or 2 or more outpatient (on different dates) claims with an associated Candidate International Classification of Diseases (ICD-9-CM or ICD-10, beginning in 2015) codes (see Appendix Figure 1). Conditions included congestive heart failure, hypertension, dyslipidemia, diabetes, asthma/chronic obstructive pulmonary disease (COPD), depression, schizophrenia/bipolar disorder, rheumatoid arthritis, multiple sclerosis, Crohn's disease, ulcerative colitis, psoriasis, non-metastatic cancer, and metastatic cancer. In addition, an indicator for childbirth was created based also on diagnosis codes on mother's claims for deliveries. These flags were coded to indicate if any family member had the condition.

Third, measures of health services utilization were also constructed. Specifically, the numbers of inpatient hospital days, emergency department visits, specialist physician visits, primary care physician visits, and prescription drug fills were summed for all family members.

Methods

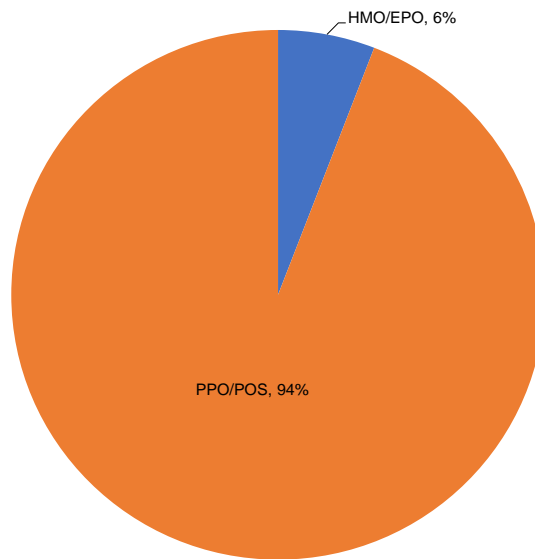
We examined the relationship between HSA-eligible health plan disenrollment in 2014 and 2015 as a function of the independent variables in 2013 and 2014, respectively. For each of the 2 years, a probit model was specified for each of the 3 sets of health status measures (i.e., 6 cross-sectional models). Coefficients are reported in Appendix Figure 2, and marginal effect estimates calculated at the mean of all regressors are reported in Appendix Figure 3.

The 2015 models were re-estimated on the sub-sample of policyholders with 2013 and 2014 data (i.e., continuous eligible in all 3 study years). In contrast to the cross-sectional models, these contained the change (from 2013 to 2014) in all independent variables. These models with first-differenced right-hand side variables provide additional insight, as they measure the impact of changing family constellation, health status, and health services utilization on subsequent HSA-eligible health plan disenrollment. Coefficients are reported in Appendix Figure 4, and marginal effect estimates calculated at the mean of all regressors are reported in Appendix Figure 5.

Findings

Overall, 5 percent of HSA-eligible health plan enrollees in 2013 and 2014 switched to a different type of health plan in 2014 and 2015. Among those disenrolling from the HSA-eligible health plan in 2014, 6 percent were enrolled in an HMO or EPO and 94 percent were enrolled in a PPO or POS plan (Figure 2). Sample means for the entire sample are shown in Figure 3. They are shown separately by disenrollment status as well. Statistical significance of differences in means across HSA-eligible health plan disenrollment status was assessed using the Kruskal-Wallis equality of populations test (Kruskal and Wallis 1952). In the remainder of the paper, only the findings for disenrollment between 2013 and 2014 are presented. The findings for disenrollment between 2014 and 2015 were substantially similar and are reported in Appendix Figure 6.

Figure 2
Health Plan Choice, Among 5 Percent of Individuals Who
Disenrolled From HSA-Eligible Health Plan
Between 2013 and 2014



Figures 4–6 show how the presence of health conditions varies by disenrollment status. There is evidence that individuals who disenrolled from HSA-eligible health plans were more likely to have certain health conditions than those who remained enrolled in the HSA-eligible health plan. Those who disenrolled were more likely than those who remained to have common chronic health conditions such as hypertension, dyslipidemia, and diabetes. While the differences are statistically significant, they are not large. For instance, 13.2 percent of HSA-eligible health plan disenrollees had hypertension, while 11.5 percent of those who remained had it (Figure 4). Similarly, 6.2 percent of disenrollees had diabetes compared to 5.2 percent among those who remained in the HSA-eligible health plan. There was no difference in the prevalence of asthma/COPD, depression, or schizophrenia/bipolar disorder between those who disenrolled and those who remained in the HSA-eligible health plan.

There were also no differences in the prevalence of individuals with rare chronic conditions, such as rheumatoid arthritis (RA), Crohn's disease, ulcerative colitis, psoriasis, and multiple sclerosis (MS), by enrollment status (Figure 5). Similarly, there were no differences in the percentage of cancer patients by enrollment status (Figure 6).

When it comes to use of health care services, there were differences in the percentage of individuals giving birth by enrollment status. Individuals who disenrolled from HSA-eligible health plans were twice as likely as those who remained to have a claim for childbirth (3.1 percent vs. 1.6 percent) (Figure 7). Figure 8 also shows that those who disenrolled from HSA-eligible health plans used more inpatient services, used more prescription drugs, and had more emergency department visits than those who remained. However, the differences were generally small, and in the case of emergency room visits, the magnitude of the difference was not meaningful.

There was no difference in use of primary care physician office visits by disenrollment status. And, those who disenrolled from the HSA-eligible health plan used slightly fewer specialist physician office visits than those who remained.

Figure 3
Variable Means by Disenrollment Status

Variable	N=	From 2013 to 2014			
		Total	Remained in HSA-Eligible Health Plan	Disenrolled From HSA-Eligible Health Plan	
		242,359	229,953	12,406	
Male		65%	65%	65%	
Age		41.9	42.0	40.6	***
Region					
Northeast		16%	16%	20%	***
Midwest		24%	24%	18%	***
South		36%	35%	47%	***
West		24%	25%	15%	***
Unknown Region		0.01%	0.01%	0.01%	
Individual Coverage		36%	36%	41%	***
Has Covered Spouse		49%	49%	44%	***
Number of Other Covered Dependents		1.0	1.0	0.8	***
Charlson Comorbidity Index [^]		0.26	0.26	0.28	**
Health Conditions~					
Congestive Heart Failure		0.2%	0.2%	0.3%	
Hypertension		12%	11%	13%	***
Dyslipidemia		16%	16%	17%	**
Diabetes		5%	5%	6%	**
Asthma/COPD		5%	5%	5%	
Depression		6%	6%	7%	
Schizophrenia/Bipolar		1%	1%	1%	
Rheumatoid Arthritis		1%	1%	1%	
Multiple Sclerosis		0.2%	0.2%	0.2%	
Crohn's Disease		0.3%	0.3%	0.2%	
Ulcerative Colitis		0.3%	0.2%	0.3%	
Psoriasis		0.4%	0.4%	0.5%	
Non-Metastatic Cancer		3%	3%	3%	
Metastatic Cancer		0.2%	0.2%	0.3%	
Childbirth (in post year)		2%	2%	3%	***
Health Services Utilization†					
Inpatient Hospital Days		0.33	0.33	0.35	*
Emergency Department Visits		0.54	0.54	0.54	**
Specialist Physician's Office Visits		3.6	3.7	3.4	***
Primary Care Physician's Office Visits		4.2	4.3	4.1	
Prescription Drug Fills		21.1	21.0	22.0	**

Notes: Statistical significance between those who remained in and disenrolled from the HSA-eligible health plan denoted as follows: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$, are based on Kruskal-Wallis equality of populations test of differences in mean value by disenrollment status.

[^]Maximum index score among all covered family members.

~Among all covered family members.

†For all covered family members.

Figure 4
Presence of Common Chronic Health Conditions, by Disenrollment Status

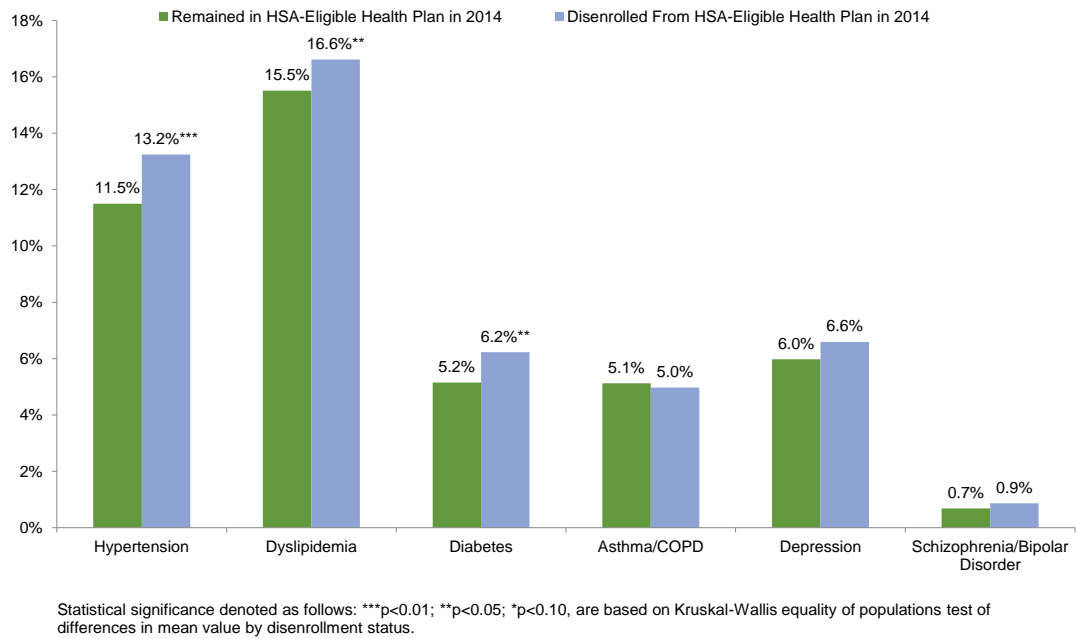
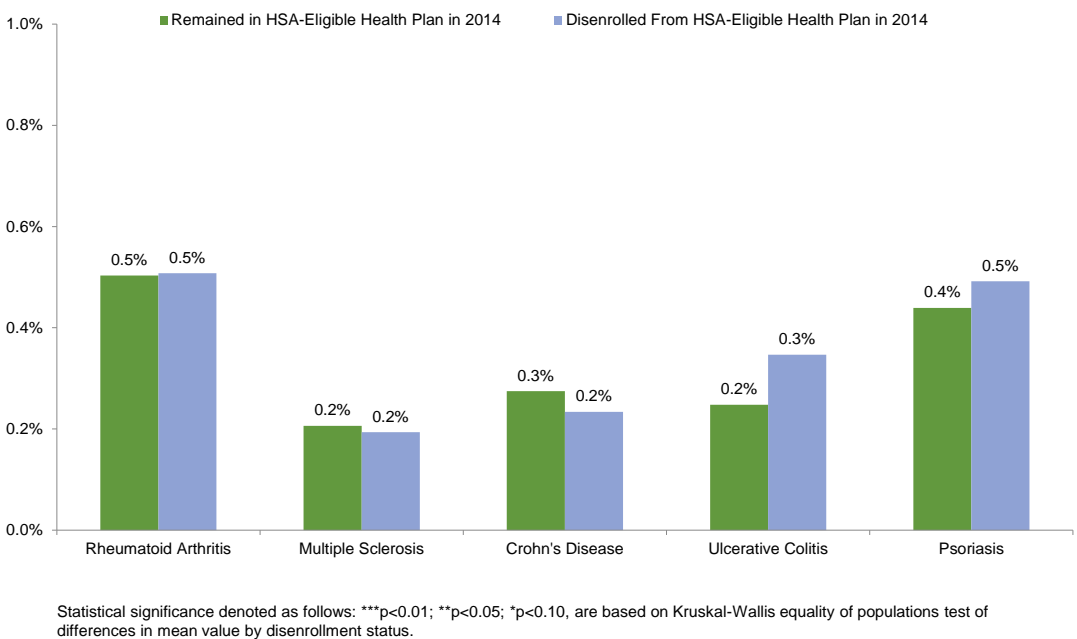
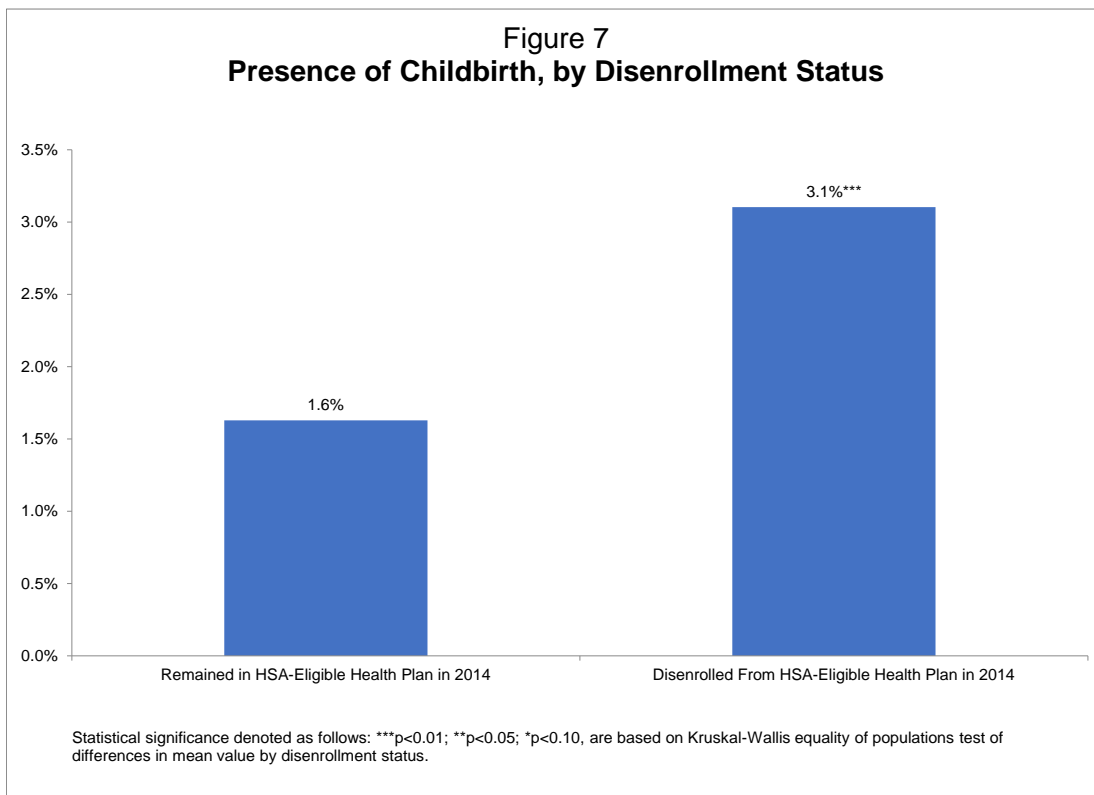
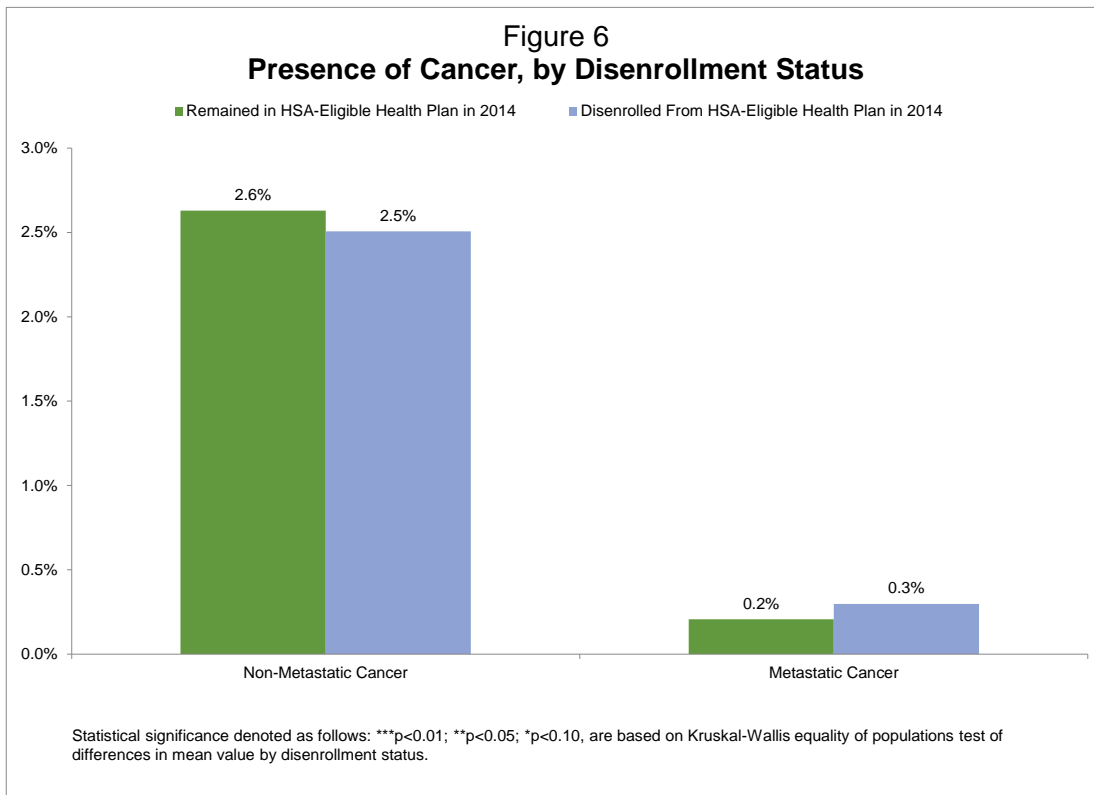
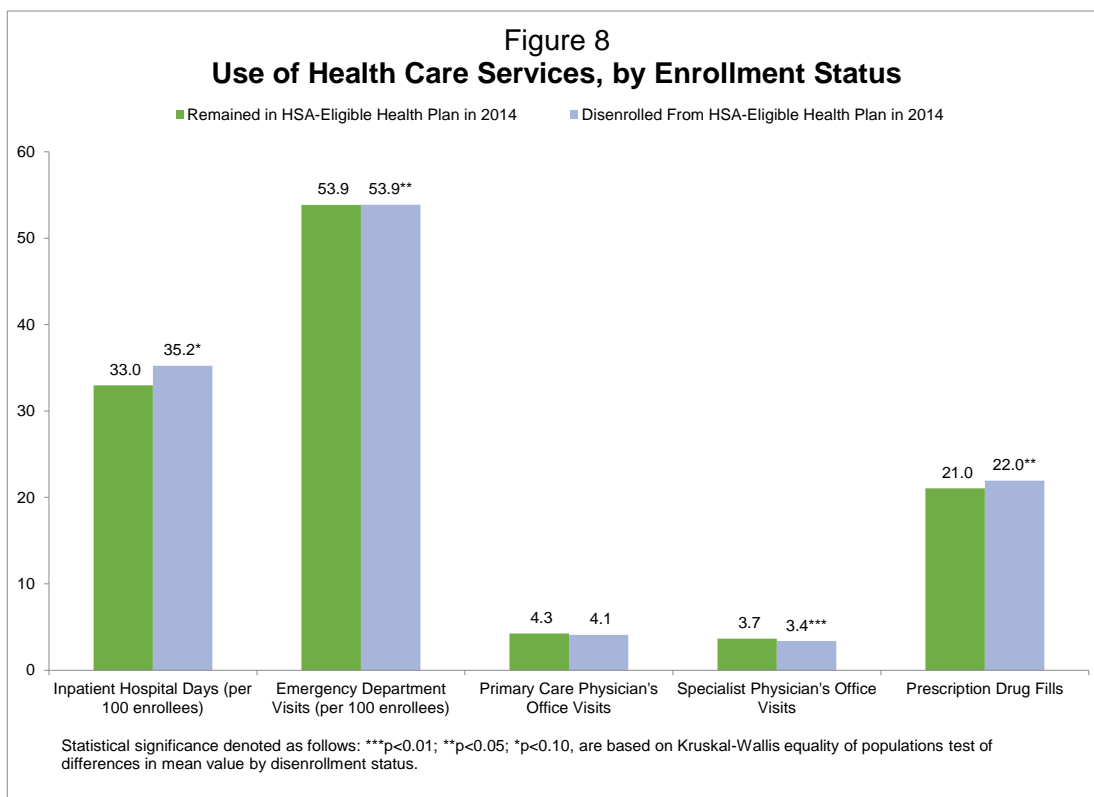


Figure 5
Presence of Rare Chronic Health Conditions, by Disenrollment Status







Findings From Probit Regression Equations

Predicted probabilities of disenrollment by more common health condition are presented in Figure 9. The predictions were generated from the regressions presented in the Appendix, which were evaluated at the means of the non-health condition variables. Just over 4 percent of individuals with no health conditions were predicted to disenroll from the HSA-eligible health plan, according to the regression model. In general, the regressions show that the presence of the various health conditions is a strong predictor of disenrollment, resulting in higher disenrollment. Specifically, 5.6 percent of individuals with diabetes, 5.3 percent with depression or hypertension, and 5 percent of those with dyslipidemia were likely to disenroll from HSA-eligible health plans.

Individuals with multiple conditions were even more likely to disenroll. Disenrollment is likely for 7.1 percent of those with a combination of hypertension, dyslipidemia and diabetes. When depression is added to those conditions, predicted disenrollment jumps to 8.2 percent. Among individuals with all of the conditions in Figure 9, likelihood of disenrollment is 13.4 percent.

Figure 10 shows the probabilities of disenrollment among individuals with less prevalent conditions, which are often very costly to treat. The predicted probability of disenrollment associated with childbirth is also included in Figure 10 given the high associated costs. Individuals with claims related to childbirth were twice as likely as those without childbirth or any other health conditions to disenroll from HSA-eligible health plans: They were predicted to disenroll at a rate of 8.4 percent. Similarly, individuals with ulcerative colitis and those with metastatic cancer were materially more likely than those with no conditions to disenroll. Otherwise, there was no statistically significant difference in predicted disenrollment rates between individuals with other chronic conditions and those with no conditions.

The findings from the first-order difference model yielded different findings. The first-order difference model was used to identify individuals newly diagnosed with less prevalent chronic conditions. The model identified individuals enrolled in an HSA-eligible health plan in 2013 and 2014 who were diagnosed with these less prevalent chronic conditions in 2014. Unlike the cross-sectional models, we found that individuals newly diagnosed with rheumatoid arthritis or multiple sclerosis were more likely to disenroll from the HSA-eligible health plan in 2015 as compared to individuals with no conditions, and the differences were statistically significant. Predicted disenrollment rates were 6.2 percent for rheumatoid arthritis and 7.3 percent for multiple sclerosis in the first-order difference models. (These findings not shown in a figure).

Figure 9
Predicted Probabilities of Disenrollment From HSA-Eligible Health Plan, by More Common Health Condition

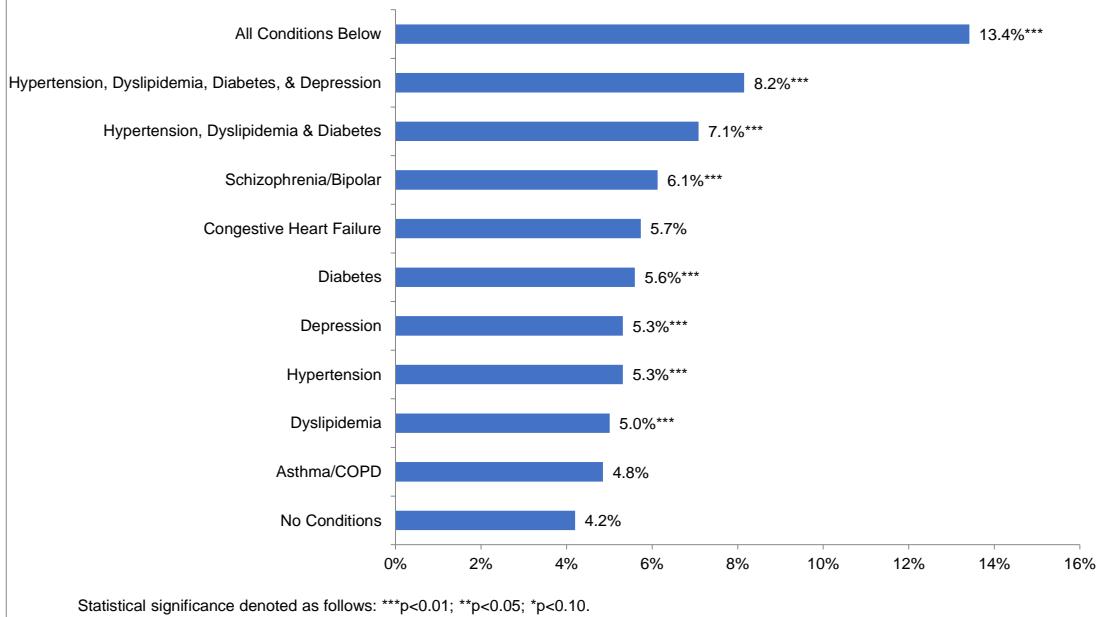
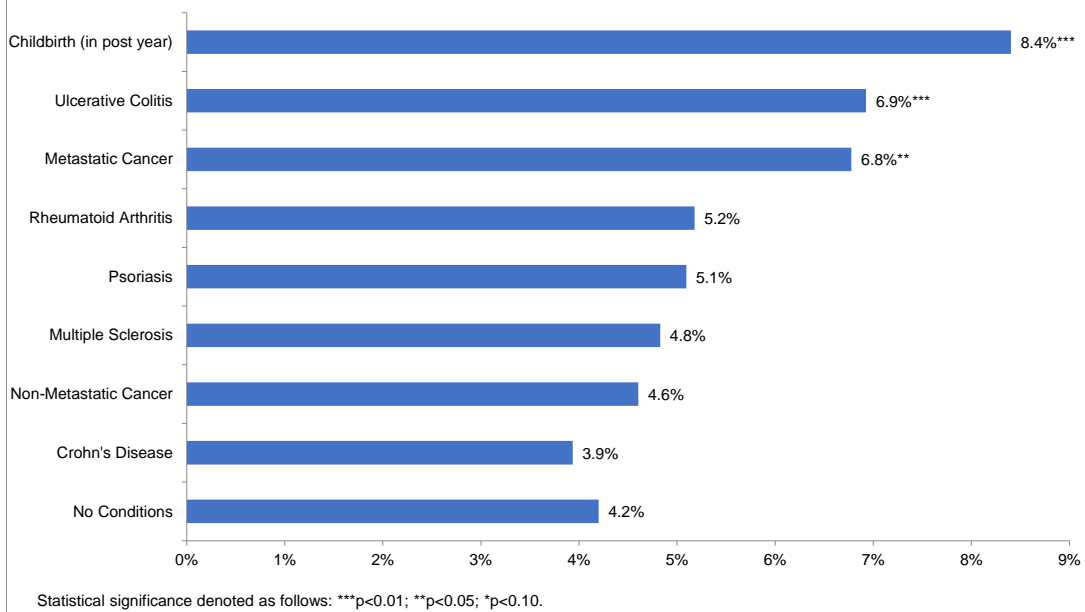
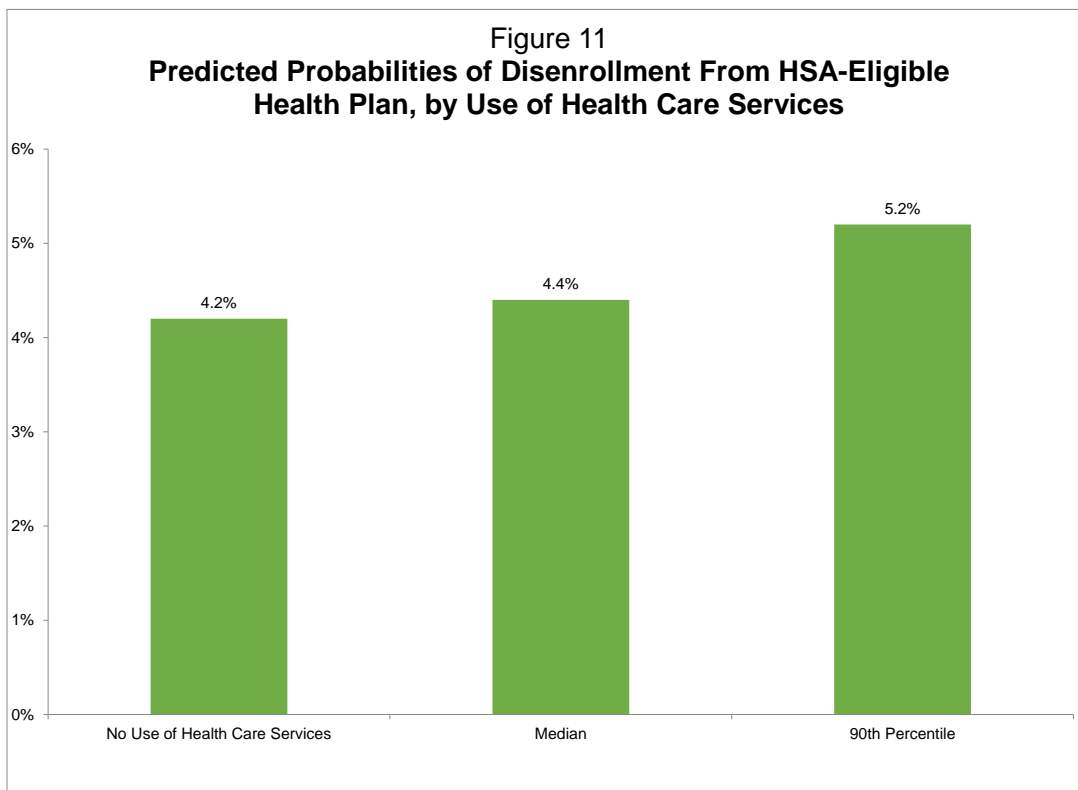


Figure 10
Predicted Probabilities of Disenrollment From HSA-Eligible Health Plan, by Childbirth and Less Common Health Condition





Overall, in examining how the use of inpatient services, emergency department visits, primary care and specialist office visits, and prescription drug fills impact disenrollment from HSA-eligible health plans, we found that while the estimated coefficients on the models were statistically significant, the magnitude of the impact was quite small. For instance, 4.2 percent of individuals who used no health care were predicted to disenroll from HSA-eligible health plans, whereas 4.4 percent of those at median use and 5.2 percent of those at the 90th percentile of use were predicted to do so (Figure 11).

Financial Implications of Adverse Selection

Our research and the research of others have found that HSA-eligible health plans attract healthier enrollees and cause fewer healthier enrollees to disenroll from the HSA-eligible health plan. We estimate that this disproportionate disenrollment of individuals with the various health conditions examined in the paper increases employer spending on health coverage by 2.5 to 3.2 percent. We made a number of oversimplifying assumptions in generating this estimate.

To generate the 2.5 percent estimate, it was assumed that disenrollees did not increase their use of services in their new health plan. However, previous research has found that new HSA-eligible health plan enrollees reduce their use of health care services and reduce overall spending; therefore, it is reasonable to expect disenrollees to increase their use of health care services when they move from HSA-eligible health plans to HMOs and PPOs because of lower patient cost-sharing in HMOs and PPOs. In Fronstin and Roebuck (2013), we found that adopting an HSA-eligible health plan reduced total spending by 4–8 percent over the longer term. If we assume that disenrollees increased their use of health care services by four percent in their new health plan, employer health care costs will increase by 2.9 percent. If we assume an 8 percent increase in use of health care services, employer spending would increase by 3.2 percent.

As shown above, 6 percent of disenrollees enrolled in an HMO and 94 percent enrolled in a PPO. We assume that those who enroll in an HMO choose one without a deductible and 20 percent coinsurance. Those who enroll in a PPO choose one with 20 percent coinsurance after the deductible. Average deductibles for PPOs and HSA-eligible health plans from the 2014 Kaiser Family Foundation Annual Employer Survey were used.⁵ Finally, we assumed that about one-third of disenrollees had employee-only coverage and two-thirds had family coverage. This is a key assumption as cost increases were higher among individuals with employee-only coverage. If we assumed a 50-50 split, cost

increases would have ranged from 2.9 to 3.7 percent. We did not account for any offsets from higher employee premium payments.

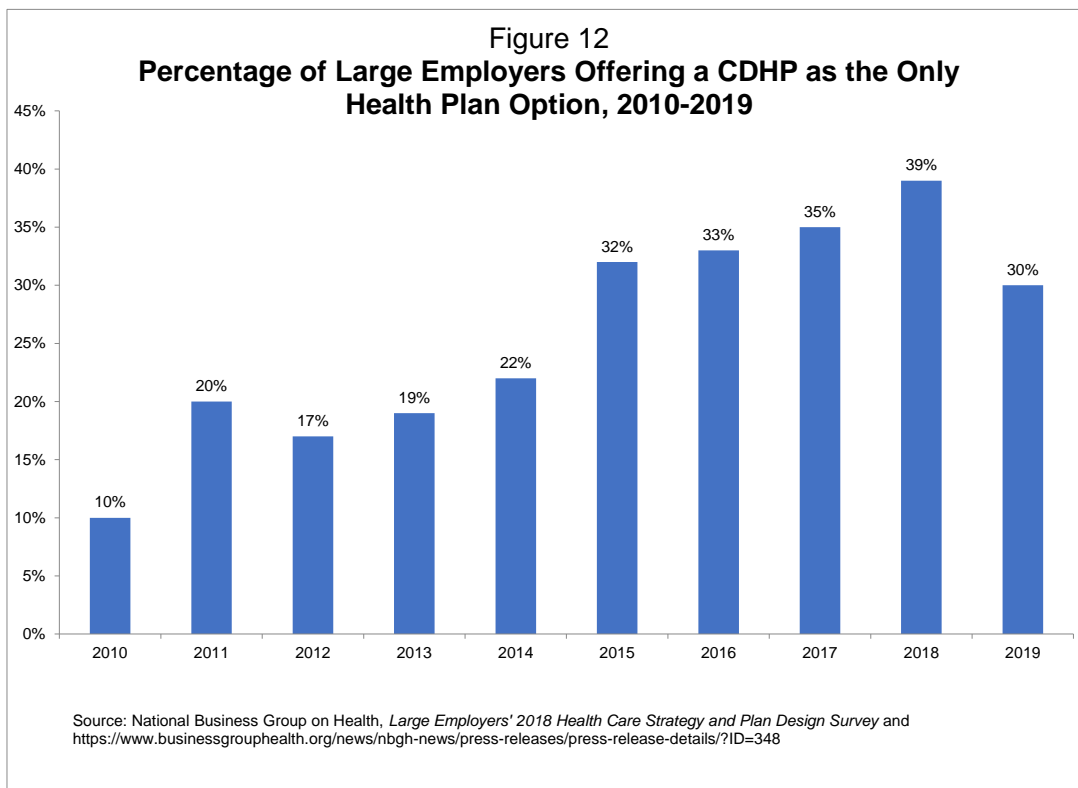
Implications for Plan Sponsors and Public Policy

There are ways for employers to mitigate adverse selection if offering a choice of health plans is something that the employer desires to do. Strategically setting the employee share of the premium can be an effective way to avoid risk selection. Larger premium differentials between more and less generous plans will drive healthier employees to the less generous plan and less-healthy employees to the more generous plan. Minimizing premium differentials will therefore reduce risk selection. Similarly, offering a choice of only higher-deductible plans, some with HSAs and some without them, will reduce risk selection. Employers can also use contributions to HSAs to reduce risk selection. Employer contributions that are based on healthy behaviors may steer less-healthy employees to the more generous plan, if they are less likely to qualify for those employer contributions. Finally, the easiest way to avoid risk selection is to offer only one health plan.

Public policy could contribute to risk selection in employment-based health plans, depending on how employers respond. On July 11, 2018, the House Ways and Means Committee approved a number of health-related tax bills with the intention of expanding the number of employers offering HSA-eligible health plans and the number of people covered by them.⁶ If growth in the HSA-eligible health plan marketplace occurs in an environment where workers have a choice of plans, employers will need to take steps to minimize risk selection. However, risk selection could be mitigated to the degree that policymakers allow first dollar coverage for the treatment of diseases outside of the deductible in HSA-eligible health plans.

At least one survey indicates that large employers seem to understand that offering only one type of health plan minimizes risk selection. Between 2010 and 2018, the percentage of large employers offering a CDHP as the only plan option increased from 10 percent to 39 percent (Figure 12). However, the same survey expects it to fall to 30 percent in 2019, which raises questions as to why employers would back off of full replacement. It is possible that they think offering a choice of health plan is valuable and that they think they can mitigate risk selection. And it should be recognized that there is conflicting evidence on the degree to which employers have adopted CDHPs as the only plan option. A different survey, which included midsized companies, indicates that about 15 percent of midsized and large employers offer only a CDHP, among those offering a CDHP.⁷

Risk selection may be mitigated by a number of other factors. For instance, perhaps surprisingly, in the cross-sectional model, individuals with high cost conditions, such as rheumatoid arthritis, psoriasis, multiple sclerosis, and Crohn's disease were not more likely to disenroll from HSA-eligible health plans as compared to individuals with no conditions. This may be due to the fact that these individuals are likely to reach their out-of-pocket maximum regardless of the health plan chosen. The results from the first difference model where we found that individuals newly diagnosed with RA and MS were more likely to disenroll may be due to newly diagnosed individuals being less likely to understand that they are likely to reach their maximum out-of-pocket limit. Similarly, risk selection may have been mitigated in our study by deductibles in non-CDHPs, as there is evidence that deductibles have been increasing in those plans as well. The percentage of workers with employee-only coverage and a deductible increased from 55 percent to 81 percent between 2006 and 2017.⁸ Deductibles for employee-only coverage increased from \$473 in 2006 to \$1,046 in 2017 in PPOs, and from \$352 in 2006 to \$1,175 in 2017 in HMOs.⁹



Conclusion and Limitations

In this paper, we examined the relationship between health status, use of health care services, and disenrollment from HSA-eligible health plans. Our expectation was that less-healthy individuals would be more likely than healthier individuals to disenroll from HSA-eligible health plans. We found evidence that individuals who disenrolled from HSA-eligible health plans were more likely to have certain health conditions than those who remained enrolled in the HSA-eligible health plan. We found even higher disenrollment rates among individuals with multiple conditions. And while use of health care services was a statistically significant predictor of disenrollment from HSA-eligible health plans, the magnitude of the impact was quite small.

There are some limitations to the data used for our analysis. First, while we have a relatively large claims dataset, we do not know if individuals had a choice of other plans. Presumably some of the individuals in our sample did not have a choice of plans, and therefore were not be able to easily disenroll from their HSA-eligible health plan. This may be reducing the percentage of individuals who disenrolled.

Second, we do not know if individuals voluntarily disenrolled from their HSA-eligible health plan. It is possible that those who disenrolled were required to choose a different type of health plan either because their employer dropped the HSA-eligible health plan or because a worker changed jobs, which required a change in health plan. One could argue, however, that a job change could be related to the availability of health plan options. Further research should explore whether workers change jobs because of the health plan choices available and whether this is associated more with individuals with health conditions.

Third, plan type was pre-coded in the Truven data. It is possible that some health plans were categorized incorrectly. Similarly, some of those health plans may also have high deductibles, even though they are not coded as such. PPOs and HMOs often have deductibles of \$1,000 or more for individual coverage.

Fourth, we do not have data on the HSAs linked to the HSA-eligible health plans. For instance, we do not know employer contributions to HSAs nor account balances. To the degree that less-healthy individuals, especially the newly diagnosed, built up a balance in their HSA, they may have been less likely to disenroll from the HSA-eligible health plan, as their HSA balance could be used towards their deductible.

Finally, we did not allow for the possibility of switching from an HSA-eligible health plan to an HRA or the possibility of disenrollment from HRAs. We initially examined switching in and out of HRAs but found that three-quarters of the HRA disenrollments resided in a single state. We were concerned that these data would skew our results if the large number of disenrollments were due to an employer that discontinued its HRA.

Our findings, however, clearly suggest that disenrollment from HSA-eligible health plans due to health status may contribute much less to potential death spirals than plan sponsor design decisions such as those described above. This has important implications for both the way employers offer health plans as well as for public policy.

Appendix Figure 1 Diagnosis Codes for Chronic Conditions		
Condition	ICD-9-CM Codes	ICD-10-CM Codes
Childbirth	644.21 645.11 645.21 649.81 648.82 650.x 651.01 651.11 651.21 651.31 651.41 651.51 656.4x 669.70 669.71	O6.01x - O6.02x O4.80 O4.81 O75.82 O80.x O30.x O31.11X0 O82.x O36.4x
Congestive Heart Failure	428.x	I50.x
Hypertension	401.x - 405.x	I10.x - I15.x
Dyslipidemia	272.0x - 272.4x	E78.x - E78.5x
Diabetes	250.x	E10.x - E11.x
Asthma or Chronic Obstructive Pulmonary Disease	491.0x - 493.2x 493.81 493.82 493.9x 496.x	J41.x - J45.x
Depression	300.4x 296.2x - 296.3x 311.x 309.0x - 309.1x 309.28	F32.x - F32.8x F33.x - F33.7x F33.9 F34.1 F43.21 F43.23
Schizophrenia or Bipolar	295.x 296.1x	F20.x F30.x - F31.x F25.9 F39
Rheumatoid Arthritis	714.x	M05.x - M06.x
Multiple Sclerosis	340.x	G35.x
Crohn's Disease	555.x	K50.x
Ulcerative Colitis	556.x	K51.x
Psoriasis	696.x	L40.x
<i>Notes:</i> ICD-9-CM = International Classification of Diseases, 9th Revision, Clinical Modification ICD-10-CM = International Classification of Diseases, 10th Revision, Clinical Modification		

Appendix Figure 2						
Estimated Coefficients From Multivariate Probit Models of Disenrollment From HSA-Eligible Health Plan						
Variable	Disenrollment in 2014			Disenrollment in 2015		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Male	0.0174*	0.0180*	0.0223**	-0.1383***	-0.1361***	-0.1341***
Age	-0.0050***	-0.0057***	-0.0058***	-0.0010**	0.00	-0.0013***
Midwest	-0.2594***	-0.2584***	-0.2657***	0.0377***	0.0370***	0.0340**
South	0.01	0.01	0.00	0.1397***	0.1387***	0.1342***
West	-0.3223***	-0.3194***	-0.3235***	-0.1129***	-0.1134***	-0.1187***
Unknown Region	0.00	0.00	0.00	0.03	0.04	0.02
Individual Coverage	-0.1070***	-0.0892***	-0.0999***	-0.0298*	-0.02	-0.0288*
Has Covered Spouse	-0.1018***	-0.1201***	-0.1193***	-0.1553***	-0.1678***	-0.1629***
Number of Other Covered Dependents	-0.0627***	-0.0576***	-0.0663***	-0.0283***	-0.0246***	-0.0286***
Charlson Comorbidity Index	0.0396***			0.0392***		
Congestive Heart Failure	0.11			0.11		
Hypertension	0.0843***			0.0291**		
Dyslipidemia	0.0538***			0.00		
Diabetes	0.1056***			0.1403***		
Asthma/COPD	0.03			0.0429**		
Depression	0.0795***			0.0349**		
Schizophrenia/Bipolar	0.1467***			0.1094***		
Rheumatoid Arthritis	0.06			0.06		
Multiple Sclerosis	0.03			0.11		
Crohn's Disease	-0.07			-0.06		
Ulcerative Colitis	0.2089***			0.1846***		
Psoriasis	0.05			0.07		
Non-Metastatic Cancer	0.01			0.00		
Metastatic Cancer	0.1975**			-0.01		
Childbirth (in post year)	0.3166***			0.3604***		
Inpatient Hospital Days	0.00			0.0030**		
Emergency Department Visits	0.0085**			0.0190***		
Specialist Physician's Office Visits	-0.0045***			0.0020**		
Primary Care Physician's Office Visits	0.0023**			-0.0051***		
Prescription Drug Fills	0.0019***			0.0010***		
Constant	-1.2077***	-1.2167***	-1.1952***	-1.5152***	-1.5490***	-1.5053***

Notes: Statistical significance denoted as follows: ***p<0.01; **p<0.05; *p<0.10.

Appendix Figure 3						
Marginal Effect Estimates From Multivariate Probit Models of Disenrollment From HSA-Eligible Health Plan						
Variable	Disenrollment in 2014			Disenrollment in 2015		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Male	0.0017*	0.0017*	0.0021**	-0.0125***	-0.0123***	-0.0121***
Age	-0.0005***	-0.0005***	-0.0006***	-0.0001**	-0.0001	-0.0001***
Midwest	-0.0248***	-0.0245***	-0.0253***	0.0034***	0.0033***	0.0031**
South	0.0009	0.0009	0.0001	0.0126***	0.0125***	0.0121***
West	-0.0308***	-0.0303***	-0.0308***	-0.0102***	-0.0102***	-0.0107***
Unknown Region	0.0000	0.0000	0.0000	0.0025	0.0035	0.0021
Individual Coverage	-0.0102***	-0.0085***	-0.0095***	-0.0027*	-0.0014	-0.0026*
Has Covered Spouse	-0.0097***	-0.0114***	-0.0113***	-0.0141***	-0.0151***	-0.0147***
Number of Other Covered Dependents	-0.0060***	-0.0055***	-0.0063***	-0.0026***	-0.0022***	-0.0026***
Charlson Comorbidity Index	0.0038***			0.0036***		
Congestive Heart Failure	0.0107			0.0096		
Hypertension	0.0080***			0.0026**		
Dyslipidemia	0.0051***			-0.0001		
Diabetes	0.0100***			0.0126***		
Asthma/COPD	0.0030			0.0039**		
Depression	0.0075***			0.0031**		
Schizophrenia/Bipolar	0.0139***			0.0098***		
Rheumatoid Arthritis	0.0059			0.0050		
Multiple Sclerosis	0.0026			0.0096		
Crohn's Disease	-0.0065			-0.0051		
Ulcerative Colitis	0.0198***			0.0166***		
Psoriasis	0.0051			0.0067		
Non-Metastatic Cancer	0.0005			0.0004		
Metastatic Cancer	0.0187**			-0.0007		
Childbirth (in post year)	0.0300***			0.0325***		
Inpatient Hospital Days	0.0001			0.0003**		
Emergency Department Visits	0.0008**			0.0017***		
Specialist Physician's Office Visits	-0.0004***			0.0002**		
Primary Care Physician's Office Visits	0.0002**			-0.0005***		
Prescription Drug Fills	0.0002***			0.0001***		

*Notes: Reported are marginal effect estimates from probit models calculated at the means of all independent variables. Statistical significance denoted as follows: ***p<0.01; **p<0.05; *p<0.10.*

Appendix Figure 4			
Estimated Coefficients From Multivariate Probit Models of Disenrollment From HSA-Eligible Health Plan, First Differenced Models			
Variable	Disenrollment in 2015		
	Model 1	Model 2	Model 3
Male	0.00	0.00	0.00
Age	0.00	0.00	0.00
Midwest	-0.14	-0.14	-0.14
South	-0.07	-0.07	-0.07
West	-0.09	-0.09	-0.09
Individual Coverage	0.00	0.00	0.00
Has Covered Spouse	0.0761**	0.0701**	0.0834***
Number of Other Covered Dependents	0.0318**	0.0580***	0.02
Charlson Comorbidity Index	0.0192***		
Congestive Heart Failure	0.06		
Hypertension	0.02		
Dyslipidemia	0.0389***		
Diabetes	0.0931***		
Asthma/COPD	-0.01		
Depression	0.00		
Schizophrenia/Bipolar	0.04		
Rheumatoid Arthritis	0.1416**		
Multiple Sclerosis	0.2206**		
Crohn's Disease	0.08		
Ulcerative Colitis	0.09		
Psoriasis	0.02		
Non-Metastatic Cancer	0.0654**		
Metastatic Cancer	0.01		
Childbirth (in post year)	0.1903***		
Inpatient Hospital Days			0.0032***
Emergency Department Visits			0.00
Specialist Physician's Office Visits			0.0028***
Primary Care Physician's Office Visits			0.0022*
Prescription Drug Fills			-0.0014***
Constant	-1.7019***	-1.7054***	-1.6996***

Notes: Statistical significance denoted as follows: ***p<0.01; **p<0.05; *p<0.10.

Appendix Figure 5			
Marginal Effect Estimates From Multivariate Probit Models of Disenrollment From HSA-Eligible Health Plan, First Differenced Models			
Variable	Disenrollment in 2015		
	Model 1	Model 2	Model 3
Male	0.0000	0.0000	0.0000
Age	0.0000	0.0000	0.0000
Midwest	-0.0134	-0.0135	-0.0134
South	-0.0063	-0.0063	-0.0063
West	-0.0088	-0.0085	-0.0087
Individual Coverage	0.0000	0.0000	0.0000
Has Covered Spouse	0.0071**	0.0066**	0.0078***
Number of Other Covered Dependents	0.0030**	0.0054***	0.0019
Charlson Comorbidity Index	0.0018***		
Congestive Heart Failure		0.0052	
Hypertension		0.0014	
Dyslipidemia		0.0036***	
Diabetes		0.0087***	
Asthma/COPD		-0.0006	
Depression		0.0002	
Schizophrenia/Bipolar		0.0039	
Rheumatoid Arthritis		0.0133**	
Multiple Sclerosis		0.0207**	
Crohn's Disease		0.0079	
Ulcerative Colitis		0.0080	
Psoriasis		0.0017	
Non-Metastatic Cancer		0.0061**	
Metastatic Cancer		0.0011	
Childbirth (in post year)		0.0178***	
Inpatient Hospital Days			0.0003***
Emergency Department Visits			0.0002
Specialist Physician's Office Visits			0.0003***
Primary Care Physician's Office Visits			0.0002*
Prescription Drug Fills			-0.0001***
Notes: Reported are marginal effect estimates from probit models calculated at the means of all independent variables. Statistical significance denoted as follows: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.			

Appendix Figure 6
Variable Means, by Disenrollment Status

Variable	N=	From 2014 to 2015			
		Total	Remained in HSA-Eligible Health Plan	Disenrolled From HSA-Eligible Health Plan	
Male		64%	64%	55%	***
Age		43.0	43.0	42.4	***
Region					
Northeast		16%	16%	14%	***
Midwest		24%	24%	24%	
South		35%	34%	43%	***
West		25%	26%	19%	***
Unknown Region		0.02%	0.02%	0.02%	
Individual Coverage		37%	36%	44%	***
Has Covered Spouse		48%	48%	38%	***
Number of Other Covered Dependents		1.0	1.0	0.8	***
Charlson Comorbidity Index [^]		0.31	0.30	0.34	**
Health Conditions~					
Congestive Heart Failure		0.3%	0.3%	0.3%	
Hypertension		14%	14%	15%	
Dyslipidemia		19%	19%	18%	
Diabetes		6%	6%	8%	***
Asthma/COPD		6%	6%	6%	
Depression		7%	7%	7%	
Schizophrenia/Bipolar		1%	1%	1%	
Rheumatoid Arthritis		1%	1%	1%	
Multiple Sclerosis		0.2%	0.2%	0.3%	
Crohn's Disease		0.3%	0.3%	0.2%	
Ulcerative Colitis		0.3%	0.3%	0.4%	
Psoriasis		1%	1%	1%	
Non-Metastatic Cancer		3%	3%	3%	
Metastatic Cancer		0.3%	0.3%	0.3%	
Childbirth (in post year)		2%	2%	3%	***
Health Services Utilization [†]					
Inpatient Hospital Days		0.33	0.33	0.39	
Emergency Department Visits		0.55	0.55	0.57	***
Specialist Physician's Office Visits		3.7	3.7	3.6	
Primary Care Physician's Office Visits		4.1	4.1	3.6	***
Prescription Drug Fills		22.5	22.5	22.3	*

Notes: Statistical significance between those who remained in and disenrolled from the HSA-eligible health plan denoted as follows: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$, are based on Kruskal-Wallis equality of populations test of differences in mean value by disenrollment status.

[^]Maximum index score among all covered family members.

~Among all covered family members.

[†]For all covered family members.

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Endnotes

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- ¹ See <http://devenir.com/wp-content/uploads/2017-Year-End-Devenir-HSA-Market-Research-Report-Executive-Summary.pdf>
- ² See Figure 6 in <http://www.mercer.com/newsroom/national-survey-of-employer-sponsored-health-plans-2016.html>
- ³ See http://www.realclearhealth.com/articles/2016/11/16/the_acas_impact_on_employer-provided_health_benefits_110255.html
- ⁴ See Buchmueller (1998), Bundorf (2012), Buntin, et al. (2011), Fronstin and Roebuck (2013), Fronstin, Sepulveda and Roebuck (2013a), and Fronstin, Sepulveda and Roebuck (2013b).

⁵ See www.kff.org/report-section/ehbs-2014-section-seven-employee-cost-sharing/

⁶ See <https://www.ebri.org/docs/default-source/fast-facts/ff-311-hsa-30july18.pdf>

⁷ Calculated from Figure 6 in <https://www.mercer.com/newsroom/mercero-national-health-survey-employers-finding-new-ways-to-hold-the-line-on-health-benefit-cost-growth.html>

⁸ See Figure 7.2 in <https://www.kff.org/report-section/ehbs-2017-section-7-employee-cost-sharing/>

⁹ See Figure 7.8 in <https://www.kff.org/report-section/ehbs-2017-section-7-employee-cost-sharing/>