Assessing the Impact of Health Savings Accounts on Insurance and Coverage Costs

Stephen T Parente, Ph.D.

Roger Feldman, Ph.D.

Jean Abraham, Ph.D.

Jon B Christianson, Ph.D.

University of Minnesota

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Corresponding Author: Stephen T. Parente, Ph.D., Assistant Professor, Department of Finance, Carlson School of Management, University of Minnesota, 321 19th Ave., Rm. 3-149, Minneapolis, MN 55455, 612-624-1391, sparente@csom.umn.edu, www.ehealthplan.org

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Introduction

Consumer directed health plans (CDHPs) are attracting attention from consumers, employers, and policy-makers. CDHPs are high-deductible health insurance plans coupled with a tax-advantaged account, which can be used to pay for eligible medical expenses. If an enrollee spends all of the dollars in the health spending account during a given year, she then spends her own money until the health insurance plan deductible requirement is met.

The 2003 Medicare Modernization Act (MMA) gave a huge boost to CDHPs by approving tax-advantaged health savings accounts (HSAs) for certain high-deductible health insurance plans. Section 1201 (and subsequent guidance by the Treasury Department) approved a new form of health plan known as a "Health Savings Account" or HSA. Beginning on January 1, 2004, most non-elderly individuals can purchase a health plan with an annual deductible of at least $1,000 for an individual and $2,000 for a family, coupled with a tax-advantaged account to which both the employer and the enrollee may contribute. Total annual contributions can be as large as the plan's deductible amount (up to $5,000 for an individual and $10,000 for a family). Contributions to the HSA, as well as interest and investment earnings in the HSA, are not taxable, and unlike previous designs, the HSA is fully portable so an individual may use it without being dependent on the provisions of a particular employer. In response to MMA, mainstream insurers such as Blue Cross and Blue Shield plans and UnitedHealth Group have hurried to offer HSAs.

Research Questions

The purpose of this project is to examine the potential impact of Health Savings Accounts (HSAs) on increasing the number of Americans, and especially those with low incomes, with health insurance. The research questions of this examination are:

- What is the expected take-up rate of HSAs in the individual market from the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA)?

- What is the impact of the Administration's proposed HSA subsidies?
    - Take-up rate of HSAs
    - Impact on the uninsured
    - Cost of the subsidy

- What is the impact of other possible subsidy designs?

Background

Congress recently enacted and the President signed into law the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA)[1]. The MMA contains a number of significant changes to the Medicare program, including the introduction of a prescription drug

[1] P.L. 108-173

benefit and the use of competitive bidding to determine which plans (and at what prices) will be allowed to participate in the Medicare program.

The MMA also establishes Health Savings Accounts (HSAs), which are tax-advantaged savings vehicles that can be used to pay for medical expenses incurred by individuals and their dependents.[2] Prior to MMA, employers were able to provide their employees either Flexible Spending Accounts (FSAs) or Health Reimbursement Accounts (HRAs), which paid for qualified medical expenses out of pre-tax wage income. In addition, employees in small firms, the self-employed, and others purchasing insurance in the non-group market could establish a tax-advantaged Medical Savings Account (MSA), which could be used in connection with a high-deductible insurance plan.

In general, HSAs are similar to MSAs in that both accounts are tax-advantaged and must be used in combination with a high-deductible insurance policy. HSAs, however, are more expansive than MSAs, in that eligibility is not limited to employees of small firms and the self-employed. Larger employers can now offer an HSA, which was not the case previously with MSAs.

HSAs are likely to increase the range of health insurance options available to individuals. To date, however, very little is known about whether HSAs will be popular with individuals seeking private insurance coverage in general, and more specifically, with low-income individuals who might have very limited access to alternative sources of health insurance.

This project builds upon an existing effort supported by The Robert Wood Johnson Foundation. The objective of this analysis is to produce estimates of coverage and costs of alternative policy proposals for reducing the uninsured through the use of HSA subsidies. This is being accomplished by: (1) developing an analytic database that uses information from the 2001 Medical Expenditure Panel Survey (MEPS) as well as the Contractor's existing employer-based data files; (2) estimating a health plan choice model; and (3) using these results to perform a micro-simulation of HSA take-up.

Data & Analytic Approach

Three data sources were used to complete this analysis. These data sources and the steps taken to prepare the database are described in Figure 1. The data sources include:

1. The 2001 Medical Expenditure Panel Survey (MEPS) developed and supported by the Agency for Healthcare Research and Quality (AHRQ).

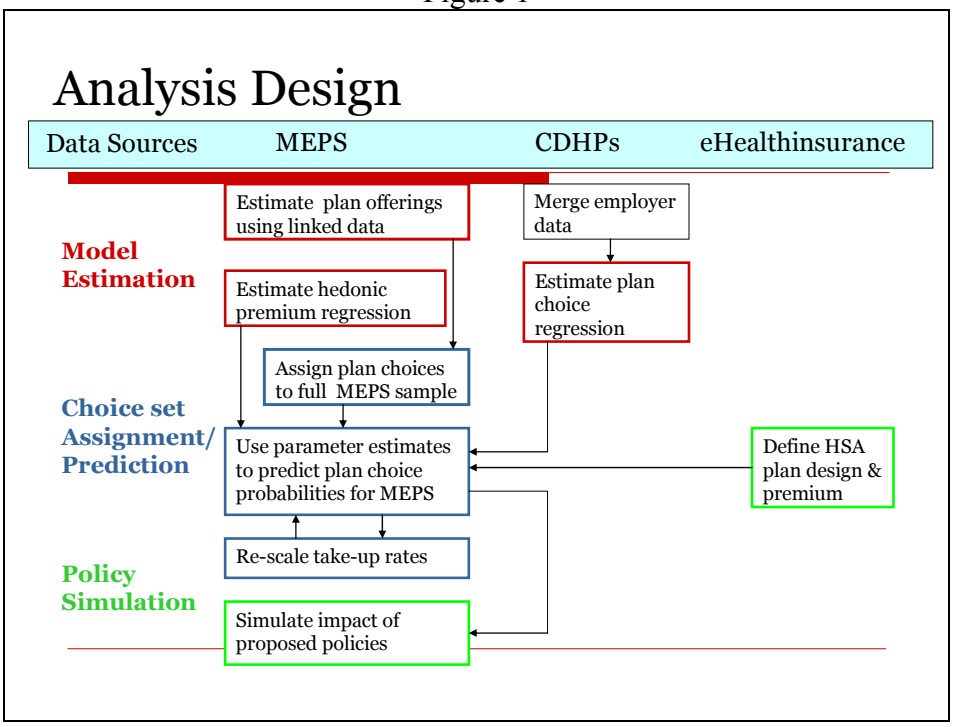
2. Health plan choice data from three large employers participating in a Robert Wood Johnson Foundation (RWJF)-funded study on Consumer Directed Health Plans (CDHPs).

3. Premium data for individual health insurance policies from the eHealthinsurance.com web site.

[2] See Section 1201 of the MMA.

These data sources were used for three major analysis tasks as outlined in Figure 1: Model estimation; Choice Set Assignment/Prediction; and Policy Simulation. As illustrated in this figure, often more than one database was required to complete the task. Integral to this analysis was the use of consumer directed health plan data from three large employers working with the study investigators. Below, we provide greater detail on database attributes, use of the databases, and the analytic methods used.

Figure 1

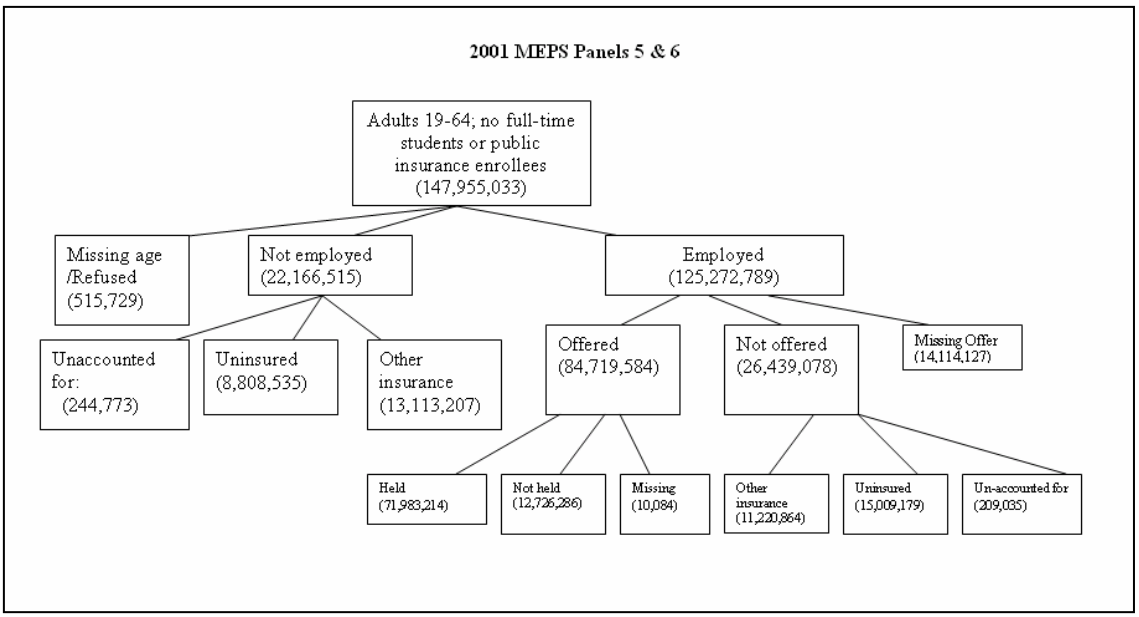


Database Descriptions

Medical Expenditure Panel Survey (2001):

The Medical Expenditure Panel Survey is an annual survey of the non-institutionalized, civilian population in the U.S. For this project, we use the 2001 MEPS Household Component (HC), which is a public-use file containing detailed demographic, health status, employment, insurance, medical care utilization and expenditure information on individuals. We restrict our attention to individuals who are 19-64 years of age, not enrolled in public insurance programs, and not full-time students. Our full sample has 16,282 individuals. When weighted to produce population estimates, this corresponds to 147,955,033 non-elderly adults in the United States. A breakdown of the 19-64 population for 2001 is provided in Figure 2.

Figure 2



Consumer Directed Health Plan data (2001-2003):

The project investigators had access to de-identified data on the selection of health plans by employees, as well as their demographics. For this analysis, data from three large employers representing approximately 80,000 covered lives of information (including dependents) were available. Two of the three employers were national firms with substantial populations of employees; one was a large employer located in Minnesota. Each of these employers has offered a CDHP along with other traditional managed care plnas. For the CDHP plans, each employer has received a take-up rate ranging between 4% and 15% in their first year offered.

eHealthInsurance Data (2005 HSA premiums):

We used the eHealthinsurance.com web site to sample premiums for Health Savings Accounts. The web site provides a monthly estimated premium cost based on county of location, age, family size, and health history. [3]For individual contracts, we assumed a single, non-smoking male age 40. For family contracts, we assumed the policyholder was a non-smoking, 40 year old, married man with a spouse and two children under the age of 10. As a robustness check, we randomly sampled fifty other large metropolitan statistical areas around the U.S., and found that only two did not offer an HSA policy and moreover, that most policies had comparable premiums.

Model Estimation

The model estimation had several steps. As a first step, we pooled the data from the three employers offering CDHPs to estimate a conditional logistic plan choice model similar to our

[3] For our first round of simulations we used Santa Clara County, California, as the geographic location. For our reported results we use premiums based on a sample taken from 100 metro areas.

earlier work (Parente, Feldman and Christianson, 2004). Conceptually, we used a choice model based on utility maximization, where utility is considered to be a function of personal attributes such as age, gender, income, and family status; health plan attributes such as the tax-adjusted, out-of-pocket premium and the deductible amount; and the interaction of personal and plan attributes. Personal characteristic variables were entered into the model as interactions of plan attribute variables. The coefficient estimates produced by this model represent the utility of each plan attribute to an employee.

In the second step we used the estimated choice-model coefficients to predict health plan choices for individuals in the MEPS-HC. In order to complete this step, it was necessary first to assign the number and types of health insurance choices that are available to each respondent in the MEPS-HC. For this purpose we turned to the smaller, but more-detailed MEPS Household Component-Insurance Component linked file, which contained the needed information.

The steps taken to estimate this predictive model are highlighted in Figure 1. More detail of how these steps were executed is described below.

Estimate plan offerings using the MEPS linked data:

The MEPS "linked" Household Component-Insurance Component data file is a random sample of individuals who reported being employed and offered health insurance in Round 1 of the Household Component survey. These individuals were asked to provide contact information regarding their place of employment. Employers of these individuals were surveyed to provide detailed information about the number and types of plans that they offered to eligible workers. For each offered plan (up to four plans for private establishments and all plans for government organizations), an employer was asked to include the total premium, employee and employer shares of the total premium, and plan characteristics including hospital and physician coinsurance, hospital and physician copayments, and deductibles for individual and family coverage.

Since the linked sample only represents a subset of all offered workers in the Household Component, we checked the representativeness of the linked sample using a binary logistic regression and found:

- Individuals in professional services and public administration were more likely to link than those in agriculture, mining, entertainment/recreation, personal services, and active military.

- Midwesterners were more likely to link relative to westerners.

- Whites were less likely to link relative to persons of "other" race.

- Government workers had a higher response rate than private-sector workers.

The link process was a function of the following variables: age, sex, race, marital status, dependents, geographic region, metropolitan (MSA) location, government employment,

establishment size, industry category, wage income, and chronic illness (defined as a binary variable).

The linked data have 3,127 individuals and 7,802 plan-person observations. We do not have good information on response rates because we do not know what fraction of offered workers in MEPS was considered for the linked survey. In absolute terms, it appears that approximately 36% of offered workers linked.

Approximately 40% of linked workers have one plan offered to them, 19.7% have two plans offered, 11.8% have three plans, and the remaining 29.5% have four or more plans from which to choose. These percentages are not representative of the national proportions of workers who have one, two, three, and four or more plans offered to them because of the over-representation of government workers, who commonly have more offered plans than private-sector workers.

To predict the number and type of plans offered, we followed two steps:

1. Used the MEPS linked insurance file to estimate a model for the number and types of health plans offered to eligible workers (age 19-64, non public enrollees, non full-time students).

More specifically, we estimated an ordered probit model with the dependent variable taking the values of 1, 2, 3, or 4+ plans. The model included the following explanatory variables: age, male, white, black, marry, total number dependents, wage income, union member, works for government, establishment size, whether the establishment has more than one location, northeast, midwest, south, and MSA. The total number of observations was 2,891 and the R^2 was .12.

2. Apply the model estimates to the MEPS-HC full sample to predict the number of plans for all respondents who were offered insurance by an employer.

Using the model estimates, for each individual who reported being offered employer group coverage in the MEPS-HC, we predicted the probability of each outcome (1, 2, 3, 4+ plans offered). We then identified the category that had the maximum probability among the four options.

We used a specific decision rule to assign the number of plans to each individual It included using both the category with the highest predicted probability as well as the individual's direct response to a question asked in the MEP-HC about whether he/she had a choice of plans. If he/she was reported not having a choice of plans, then the individual was assigned one plan. If he/she reported having plan choice, then the assigned number of plans reflected the outcome with the highest predicted probability among the 2, 3, and 4 plan options.

The types of plans were based on the distribution of plan offerings from the linked sample, conditional on the total number of plans offered. For example, individuals who

had one plan offered to them were most likely to be offered a Preferred Provider Organization (PPO) plan.[4] So, we assigned a PPO to those with one offered plan. The other assignments were as follows:

2 plans: PPO and HMO
3 plans: 2 PPOs and 1 HMO
4+ plans: 3 PPOs and 1 HMO

Estimate Hedonic Premium Regression:

One challenge we faced was how to designate specific plan attributes (e.g., coinsurance rate, deductible, etc.) for the assigned plan choices. We used summary statistics from the MEPS linked insurance file to identify the median characteristics of plans by type (PPO versus HMO) as well as coverage type (single versus family). To predict the premium that would be associated with a particular bundle of attributes, we estimated "hedonic" premium models. The specific equation used was:

Total premium = f(hospital coinsurance, physician coinsurance, and deductible).

The estimates for HMOs used patient co-payments (dollar payments per unit of service) rather than the physician coinsurance rate.

These equations were estimated separately by coverage type, plan type, and establishment size (e.g., single-coverage PPO offered by establishments with <50 workers). The model estimates were then used with the summary statistics to predict premiums for each plan, coverage type, and establishment size category (< 50; 50-200; >200) combination.

Finally, to obtain the employee's out-of-pocket premium cost, we multiplied predicted total premiums by the average proportion paid by employees for single and family coverage. We did not feel that the sample sizes were large enough reliably to perform this multiplication separately by coverage type and establishment size.

Estimate Plan Choice Regression:

We pooled plan choice data from the three employers offering CDHPs to specify a conditional logistic regression model similar to our earlier work (Parente, Feldman and Christianson, 2004). Conceptually, we use a choice model based on utility maximization, where utility is considered to be a function of personal attributes such as health status, health plan attributes such as the out-of-pocket premium, and the interaction of premium and health status, formally stated as:

$Uij = f(Zj, Yi, Xij)$

[4] MEPS follows the unconventional notation of "Mixed" provider organization for PPO, "Exclusive" provider organization for HMO, and "Any" provider organization for conventional open access fee-for-service plan. Relatively few of the latter plans were represented in the data; therefore we did not assign a conventional plan to any worker with an employment-based offer.

Where i is the decision-making employee choosing among:

- j = health plan choices,
- Yi = employee personal attributes,
- Zj = health plan attributes and
- Xij = interactions between alternative-specific constants and personal attributes.

A very important constraint in our modeling was that any plan attribute used in the model from the employer data also had to be available in the MEPS data to permit a simulation. As a result, the key variables used in the plan choice model were:

- SCALEDPREM After tax premium paid by the employee
- CLB The amount of money in the employee's health reimbursement account (HRA), if any.
- CUB The difference between the employee's plan deductible and the HRA.
- COIN Coinsurance rate
- AGE Employee's age (years)
- FEM Employee's gender (1=female, 0=male)
- FAM Employee has a 2-person or family contract=1, else =0
- INC Employee's annual wage income.

Also included in the regression were alternative-specific constants (intercepts) for each of the possible health plan choices. These intercepts are used to capture plan-specific features not represented by other identifiers of plan design. They are also included as interaction terms with age, gender, family status and income. The intercept terms include:

- PPO_L PPO Low (e.g., restrictive network, high co-pay, 15% coinsurance)
- PPO_M PPO Medium (e.g., better network, lower co-pay and coinsurance)
- PPO_H PPO High (e.g., open network, lowest co-pay, no coinsurance)
- HRA Health Reimbursement Account CDHP
- HSA_E Employer-sponsored HSA, modeled on higher premium cost HRA
- HSA_S Employee-paid HSA, no employer contribution, modeled on lower premium cost HRA
- HMO Health Maintenance Organization

The final plan choice regression results are presented as Table 1. The reference category for the regression was PPO_M based on its market dominance.

Table 1
Conditional Logistic Regression
Adjusted R-square: ~.363

Variable	Coefficient	Standard Error	T-Statistic	P-value
SCALEDPREM	-1.7299	0.0665	-25.9996	<.0001
CLB	0.6179	0.0974	6.3407	<.0001
CUB	-0.8502	0.0272	-31.2867	<.0001
COIN	-7.5675	0.5300	-14.2794	<.0001
PPO_M	0.1153	0.0860	1.3404	0.1801
PPO_H	-1.0210	0.1311	-7.7887	<.0001
HRA	-1.9816	0.1646	-12.0383	<.0001
HSA_S/E*	-1.7031	0.1252	-13.6042	<.0001
HMO	1.9338	0.1048	18.4506	<.0001
SCALEDPREM * FAM	1.1067	0.0721	15.3418	<.0001
PPO_M * AGE	-1.5547	0.1673	-9.2926	<.0001
PPO_H * AGE	0.5609	0.2917	1.9228	0.0545
HRA * AGE	-2.0759	0.3506	-5.9217	<.0001
HSA_S/E * AGE	-2.5626	0.2410	-10.6318	<.0001
HMO * AGE	-3.9740	0.1946	-20.4199	<.0001
PPO_M * INC	-0.0005	0.0006	-0.8201	0.4122
PPO_H * INC	0.0038	0.0014	2.6689	0.0076
HRA * INC	0.0100	0.0009	11.6295	<.0001
HSA_S/E * INC	0.0102	0.0006	17.5883	<.0001
HMO * INC	-0.0017	0.0007	-2.3806	0.0173
PPO_M * FEM	0.0852	0.0369	2.3100	0.0209
PPO_H * FEM	-0.1566	0.0617	-2.5373	0.0112
HRA * FEM	-0.1665	0.0776	-2.1456	0.0319
HSA_S/E * FEM	-0.0278	0.0514	-0.5399	0.5893
HMO * FEM	-0.1892	0.0435	-4.3506	<.0001
PPO_M * FAM	0.0218	0.0690	0.3154	0.7525
PPO_H * FAM	0.3809	0.0773	4.9275	<.0001
HRA * FAM	-0.2979	0.1140	-2.6132	0.0090
HSA_S/E * FAM	0.0067	0.1144	0.0586	0.9533
HMO * FAM	-0.3651	0.0909	-4.0175	<.0001

N=28,737
* HSA_S/E we used the HSA coefficients for a individual version where the employee pays all (S) and the employer offered version where the premium and account is heavily subsidized.

Choice Set Assignment and Prediction

Assign Plan Choices to Full MEPS Sample:

We used the three data sources to develop two sets of plan choice predictions for the simulation: one set of data for workers with insurance offers and a second set for individuals who do not have employer offers of coverage. This second set includes both uninsured individuals, as well as those who take up non-group policies One group of individuals that we exclude from the simulation are non-offered individuals who reported having employer group coverage through

another household member. Below we outline the analytic steps taken to develop the individuals' choice sets for the simulations.

1. *Workers With Offers*

   We started with the original four choices predicted earlier, including three PPOs and an HMO. Since a worker was assigned between one and four plans, we needed to make some assumptions for each.
   - 4 choices: Low PPO, Medium PPO, High PPO, HMO
   - 3 choices: Low PPO, High PPO, HMO
   - 2 choices: Medium PPO, HMO
   - 1 choice: Medium PPO

   Here, low, medium, and high refer to the cost and quality of the plans (e.g., low implies low cost and lower quality).

   To these choices we added four additional options:
   - Self-financed (full cost) HSA – Additional choice for all workers
   - Turned down health coverage – Additional choice for all workers
   - Employer sponsored HSA – Available to all workers in establishments with >500 employees, not available to other workers
   - Employer sponsored HRA – Available to all workers in establishments with >500 employees, not available to other workers

2. *Individuals Without an Insurance Offer*

   Individuals who did not have health insurance offered to them at work or who were not employed, faced five health plan choices regardless of income, age or gender:
   - High PPO
   - Medium PPO
   - Low PPO
   - Self-financed HSA
   - Uninsured

Use Parameter Estimates to Predict Plan Choice Probabilities:

With a total set of possible choices for workers with insurance offers and individuals without insurance offers, we used the plan choice regression results to predict plan choice probabilities for each MEPS-HC sample respondent.[5]

However, before we could predict the probabilities, we needed to develop some specific assumptions about benefit plan design and premiums for individual plans. To get premium estimates, we used MEPS linked insurance data to develop a hedonic price model to predict

[5] We converted HMO co-pays to actuarially-equivalent coinsurance rates for predicting the HMO enrollment probability.

premiums for individual plans. We worked with the same hedonic plan regressions described above, except that for individuals without offers of coverage, we used the premium model for the smallest establishment size category, based on the assumption that this most closely represents an individual policy in terms of the loading charge for plan administrative costs. Once we estimated the premiums we inflated them by from 2001 prices to 2005 prices based medical insurance price inflation during the period.

The plan characteristics that we used to define the three PPOs (low, median, and high) came from the 2002 HIAA/eHealthinsurance.com survey of plans purchased in the individual market. Roughly speaking, we used the 25^{th}, 50^{th}, and 75^{th} percentiles of coinsurance and deductibles for assigning the plan characteristics.

We also recognized that premiums in the individual market vary a lot by a person's age. This survey included a table of average premiums by age cohort. We created an index using the information on this table. The index was set equal to 1.0 for the age group corresponding to the median age of adults in our sample (35-39). Older individuals, who had higher premiums, had index values that were greater than 1.0. Younger individuals, who had lower premiums, had index values less than 1.0. The index values ranged from .59 to 2.18 for single coverage policies and .453 to 1.65 for family coverage policies. Finally, we adjusted all premiums to 2005 dollars.

Rescale Take-up Rates

One significant issue with our simulation is that we were not able to predict whether or not an individual would take-up insurance in the employer-offered market or be uninsured in the individual market. We faced this limitation because the CDHP employer data only includes information on offered workers who held coverage.

To address this issue, we needed to calibrate our model to accurately reflect both the actual percentage of people who turn down employer offers and the actual percentage of people in the individual market who are uninsured. To obtain more accurate estimates, we completed these calibrations by four quartiles of income and then compared our results to national, non-take-up and uninsurance rates. We also applied the national population weights to the calibrated model to represent the entire adult population, excluding full-time students, those with public insurance, and individuals with employer-based coverage through another household member. This fairly tedious process was performed for each re-estimation and/or modification of the conditional logistic regression.

Policy Simulation

To complete the simulations, two final steps remained. The first was to generate 2005 HSA premiums and benefit designs. The second was to specify the various simulation proposals.

Define HSA Plan Design and Premium:

Starting in 2004, we assumed that all individuals in the non-group ("individual") market would have access to an HSA. We relied on the eHealthinsurance.com website

(www.eHealthinsurance.com) for current information on HSA premiums and plan characteristics. We collected information on two HSA policies offered in the largest two cities across every state. Next, we estimated a hedonic premium equation that allowed us to predict the premium for different HSA designs. For all of the simulations, except one (described below), we used an HSA with a $1,000 spending account and a $3,500 deductible for single coverage and $2,000/$7,000 for families. The average monthly premium for our prototype HSA for a 40-year old non-smoking single male was $102.78 per month; for a 40-year old married male (also a non-smoker) with a spouse and two children under the age of ten, the monthly premium was $226.97.

The HSA premiums used in our simulations are the sum of the catastrophic policy price plus a $1,000 account. For example, a $6,500 HSA premium in our simulation for a family policy would be based on a $5,500 premium for a catastrophic insurance policy and a $1,000 HSA.

Benefit differences in HSAs can be large. For example, below we list two different HSA options, a high a low deductible HSA plan in Santa Clara County, CA, that we found on eHealthinsurance.com:

HSA Option #1

Single Coverage:

- $1,000 HSA Account
- $3,500 Deductible
- $2,500 'Donut Hole' (DH starts at $1,001 of expenditure - ends at $3,500)
- 0% Coinsurance
- Premium includes catastrophic and $1,000 HSA Account.
- Thus, 100% catastrophic coverage starts at $3,501

Family Coverage:

- $1,000 HSA Account
- $7,000 Deductible
- $6,000 'Donut Hole' (DH starts at $1,001 of expenditure - ends at $7,000)
- 0% Coinsurance
- Premium includes catastrophic and $1,000 HSA Account.
- Thus, 100% catastrophic coverage starts at $7,001

HSA Option #2

Single Coverage:

- $1,000 HSA Account
- $2,600 Deductible
- $1,600 'Donut Hole' (DH starts at $1,001 of expenditure - ends at $2,600)
- 0% Coinsurance
- Premium includes catastrophic and $1,000 HSA Account.

Family Coverage:

- $1,000 HSA Account
- $2,600 Deductible
- $1,600 'Donut Hole' (DH starts at $1,001 of expenditure - ends at $2,600)
- 0% Coinsurance
- Premium includes catastrophic and $1,000 HSA Account.

HSA premiums were age-adjusted using the same method described above to rescale individual PPO plan coverage. Note, the premiums used in the predictions included an annual payment of $1,000 into an HSA for both the single and family policies. We chose $1,000 because it was the lowest amount for a family coverage personal care account in our analysis of employer HRAs and a low to moderate amount for a single coverage personal care account.

Finally, it is important to note that for the Offered-turned down population, we have not explicitly taken account of whether these individuals have employer group coverage through another source (e.g., a working spouse). From the MEPS data, we do know that approximately 25% of those who turn down an offer of employer coverage are uninsured.

Also, in our take-up estimates, we have excluded all non-offered individuals who reported having employer group coverage from their partner through the offered-group market. This group represents approximately 29 million insured individuals.

National Simulation Overview

The total possible health plan choices available to individuals for simulations are described in Figures 3 and 4. Several policy parameters can be examined. For example:

- We can *add* different tax subsidies for purchase of individual HSA plans
- We can *vary* the characteristics of the HSA (e.g. make the 'donut hole' larger or smaller)
- We could *remove* the tax subsidy for employee or employer-paid premiums in the employer-offered market

We proceeded with a 'baseline' simulation, which simply reflects the current state of HSAs defined under the 2003 MMA legislation. Following that, we simulated the impact of several policy proposals to subsidize HSA premiums and obtained national estimates of the change in estimated plan take-up rates in both the employer group and individual markets, the reduction in the number of uninsured in the individual market, and the associated cost to the federal government in 2005 dollars for each.

Figure 3

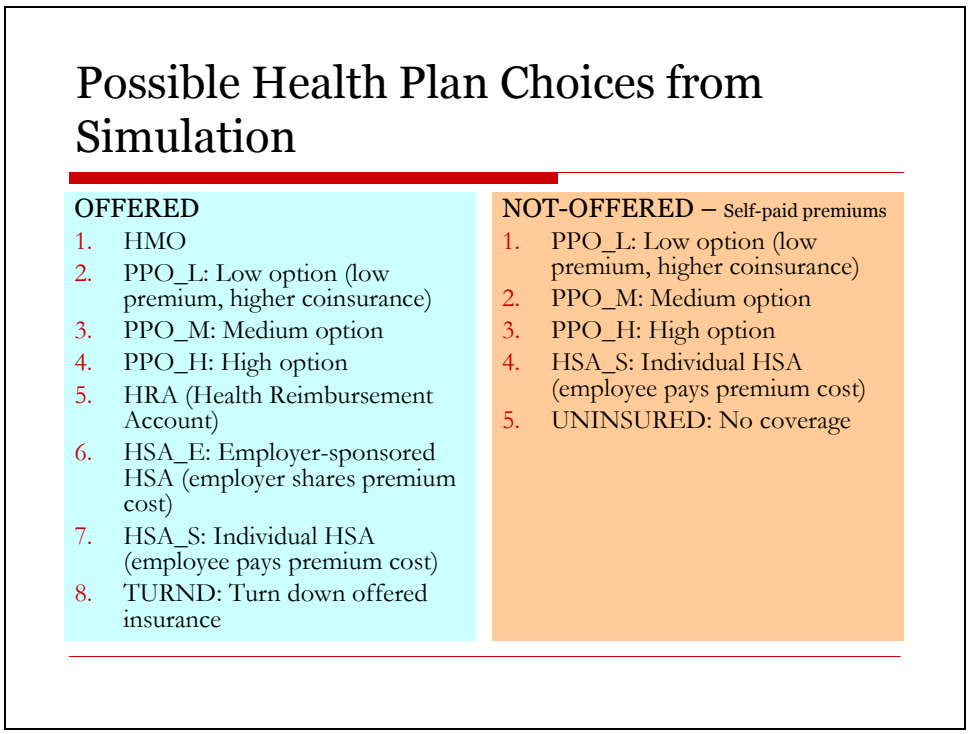
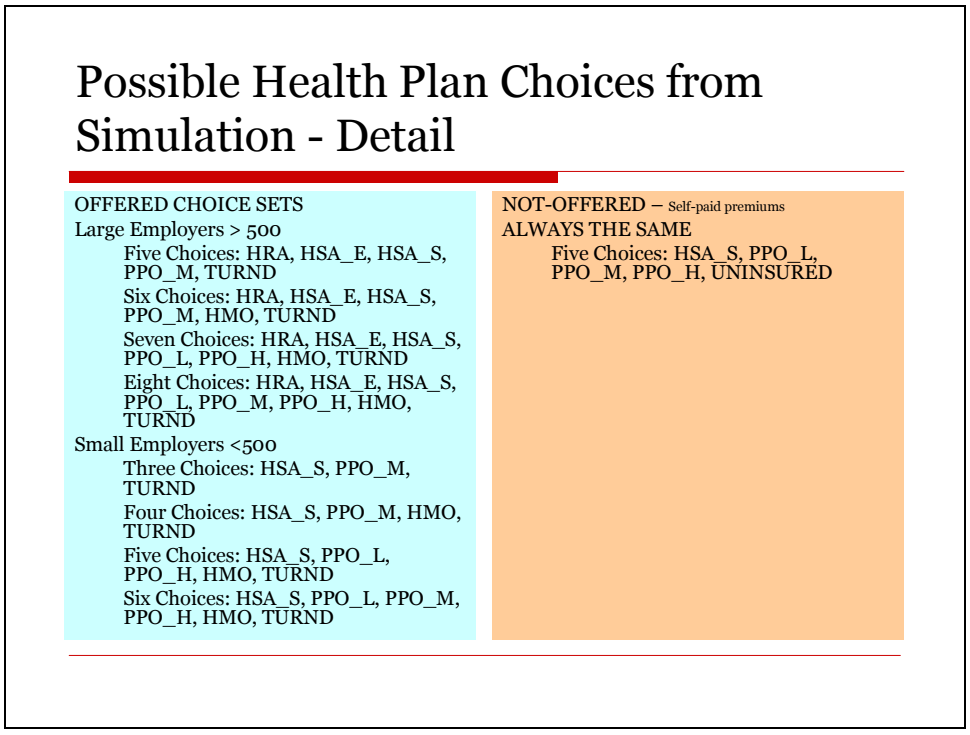


Figure 4



Results

The following are the results of the simulation model. We focus most of our discussion on changes in the individual market, since employers' adoption of HSAs is still small and because the majority of the uninsured population does not have an offer of employer coverage. We begin in Figure 5 with a national simulation of the baseline effect from MMA for calendar year 2005. Four additional simulations are described.

Baseline:

In the Baseline simulation we see a non-trivial take-up of HSAs by 2005 without any additional change in health policy. Specifically, we estimate that take-up for HSA in the individual market should be 3.2 million people. We attribute this impact to the relatively lower premium of HSAs compared with a PPO and the high price elasticity associated with coinsurance.

Figure 5

Baseline Impact of MMA 2003

	Plan Choice	Baseline (unsubsidized) Population %	Baseline (unsubsidized) Project Pop.
INDIVIDUAL MARKET	HSA-Full Price	9%	3,155,982
	PPO_High $$	13%	4,651,023
	PPO_Low $$	1%	310,041
	PPO_Medium $$	4%	1,426,040
	Uninsured	74%	27,273,018
EMPLOYER INSURANCE OFFERED MARKET	HMO	31%	26,295,237
	HRA	2%	1,811,281
	HSA-Shared Prem	1%	530,882
	HSA-Full Price	0%	332,249
	PPO_High $$	7%	5,930,246
	PPO_Low $$	2%	1,571,384
	PPO_Medium $$	41%	34,949,793
	Turned Down	16%	13,298,512

NOTE: Population is 19-64, non public insurance

Administration's proposal:

In 2004, to encourage the purchase of HSAs, the Administration proposed to change the tax law providing significant tax credits to lower income workers.

Using the U.S. Department of the Treasury Blue Book published in February, 2004, we changed the simulation model to effectively 'spline' or segment the premiums depending on income. We used $1,000 and $556 tax credits with incomes at $15,000 and $20,000 respectively. No tax credit applied once income was at $30,000. These parameters were used to develop ratios to permit a sliding scale of tax credits with two kinks at $15,001 and $20,001. We also modeled the tax credit applying to dependents (starting at $500) at higher income breaks associated with families.[6] The results of the simulation are shown in Figure 6.

The total, annual subsidy cost is approximately $8.1 billion with a 10.7% reduction in the uninsured (to 24.3 million). Interestingly, the subsidy also yields HSA take-up in the offered market, representing $1.2 billion of the subsidy cost.

Figure 6

Sim#1: Administration's* Proposal

Plan Choice	Unsubsidized Population %	Simulation Population %	Unsubsidized Project Pop.	Simulation Project Pop.	% Change		Subsidy Cost
INDIVIDUAL							
HSA-Full Price	9%	19%	3,155,982	6,971,694	120.9%	$	6,900,791,439
PPO_High $$	13%	11%	4,651,023	4,017,191	-13.6%	$	-
PPO_Low $$	1%	1%	310,041	263,278	-15.1%	$	-
PPO_Medium $$	4%	3%	1,426,040	1,215,872	-14.7%	$	-
Uninsured	74%	66%	27,273,018	24,348,069	-10.7%	$	-
OFFERED							
HMO	31%	31%	26,295,237	26,232,550	-0.2%	$	-
HRA	2%	2%	1,811,281	1,803,079	-0.5%	$	-
HSA-Shared Prem	1%	1%	530,882	528,590	-0.4%	$	-
HSA-Full Price	0%	1%	332,249	861,387	159.3%	$	1,174,289,915
PPO_High $$	7%	7%	5,930,246	5,921,970	-0.1%	$	-
PPO_Low $$	2%	2%	1,571,384	1,569,135	-0.1%	$	-
PPO_Medium $$	41%	41%	34,949,793	34,627,195	-0.9%	$	-
Turned Down	16%	16%	13,298,512	13,175,679	-0.9%	$	-

NOTE: Population is 19-64, non public insurance. *Proposal as interpreted from February, 2004 U.S. Treasury Blue Book.

Low income buy-in subsidy:

Given that one of the policy objectives of the subsidy proposal is to reduce the proportion of uninsured in the U.S., we simulated an even more generous policy that effectively subsidizes the

[6] We have based subsidy eligibility on individuals' wage income rather than household income, since we do not observe household income in the CDHP employer database. As a result, this will lead to a lower HSA premium for a larger number of individuals than would otherwise be the case and potentially over-estimate the magnitude of the HAS take-up response.

total or partial cost of the premium (including the $1,000 HSA contribution) for lower income individuals. Specifically, we defined the HSA premium as:

- $0 for individuals with annual wage income of $15,000 or less
- 50% of the premium for individuals having $25,000 to $45,000 in wage income.
- 25% of the premium for individuals having $40,000 to $60,000 in wage income.

The results of this simulation are presented in Figure 7. This proposal results in a greater share of the previously-uninsured population having coverage. However, the cost is significantly higher at $12.2 billion annually, of which $10.8 billion is for the individual market population. Once again, the model predicts that many in the offered population find the incentive attractive and are willing to take up an HSA as well.

Figure 7

Sim #2: Low-income Buy-in Subsidy

Plan Choice	Unsubsidized Population %	Simulation Population %	Unsubsidized Project Pop.	Simulation Project Pop.	% Change		Subsidy Cost
INDIVIDUAL							
HSA-Full Price	9%	24%	3,155,982	8,814,552	179.3%	$	10,832,553,072
PPO_High $$	13%	10%	4,651,023	3,840,600	-17.4%	$	-
PPO_Low $$	1%	1%	310,041	240,992	-22.3%	$	-
PPO_Medium $$	4%	3%	1,426,040	1,142,829	-19.9%	$	-
Uninsured	74%	62%	27,273,018	22,777,131	-16.5%	$	-
OFFERED							
HMO	31%	31%	26,295,237	26,210,822	-0.3%	$	-
HRA	2%	2%	1,811,281	1,798,914	-0.7%	$	-
HSA-Shared Prem	1%	1%	530,882	528,097	-0.5%	$	-
HSA-Full Price	0%	1%	332,249	1,036,512	212.0%	$	1,387,115,890
PPO_High $$	7%	7%	5,930,246	5,920,098	-0.2%	$	-
PPO_Low $$	2%	2%	1,571,384	1,568,187	-0.2%	$	-
PPO_Medium $$	41%	41%	34,949,793	34,506,258	-1.3%	$	-
Turned Down	16%	16%	13,298,512	13,150,696	-1.1%	$	-

Income < 15K, free; 25K to 45K, 50% off; 40K to 60K, 25% off

NOTE: Population is 19-64, non public insurance

Full subsidy for HSA premium for entire adult population:

In the third simulation, we increased the level of subsidy and simply have the price of an HSA be zero. In effect, this proposal is a complete subsidy for all HSA designs. As seen in Figure 8, this proposal achieves a 47% reduction in the uninsured. However, the cost to do so is $69.2 billion annually.

Given that we are simulating a complete subsidy for HSA insurance and also offering $1,000 'for free' as part of the premium to start the individual's HSA account, it is surprising that take-up is not higher. However, when the same analysis was proposed using HSA Option #2 which has a smaller 'donut hole' but larger premium, the take-up rate is much greater, with only 3.8 million uninsured remaining. However, the cost of the full subsidy with HSA Option #2 is approximately $211 billion dollars.

Full subsidy for HSA premium for the non-working, non-public insurance population:

As a final simulation targeted at workers without jobs, we created a simulation where anyone who was not employed received a full subsidy for the HSA, regardless of income. The result, shown in Figure 9, is lower take-up than the Administration's proposal. Also, in terms of the per person reduction in uninsured per subsidy dollar, this policy approach it is less efficient than Sim #1 or Sim #2.

Figure 8

Sim #3: Full Subsidy for HSAs

Plan Choice	Unsubsidized Population %	Simulation Population %	Unsubsidized Project Pop.	Simulation Project Pop.	% Change		Subsidy Cost
INDIVIDUAL							
HSA-Full Price	9%	53%	3,155,982	19,464,040	516.7%	$	52,302,405,014
PPO_High $$	13%	6%	4,651,023	2,165,844	-53.4%	$	-
PPO_Low $$	1%	0%	310,041	119,097	-61.6%	$	-
PPO_Medium $$	4%	2%	1,426,040	613,960	-56.9%	$	-
Uninsured	74%	39%	27,273,018	14,453,162	-47.0%	$	-
OFFERED							
HMO	31%	30%	26,295,237	25,480,910	-3.1%	$	-
HRA	2%	2%	1,811,281	1,697,603	-6.3%	$	-
HSA-Shared Prem	1%	1%	530,882	505,483	-4.8%	$	-
HSA-Full Price	0%	7%	332,249	5,694,864	1614.0%	$	16,911,914,862
PPO_High $$	7%	7%	5,930,246	5,804,413	-2.1%	$	-
PPO_Low $$	2%	2%	1,571,384	1,534,310	-2.4%	$	-
PPO_Medium $$	41%	37%	34,949,793	31,684,081	-9.3%	$	-
Turned Down	16%	15%	13,298,512	12,317,920	-7.4%	$	-

NOTE: Population is 19-64, non public insurance

Figure 9

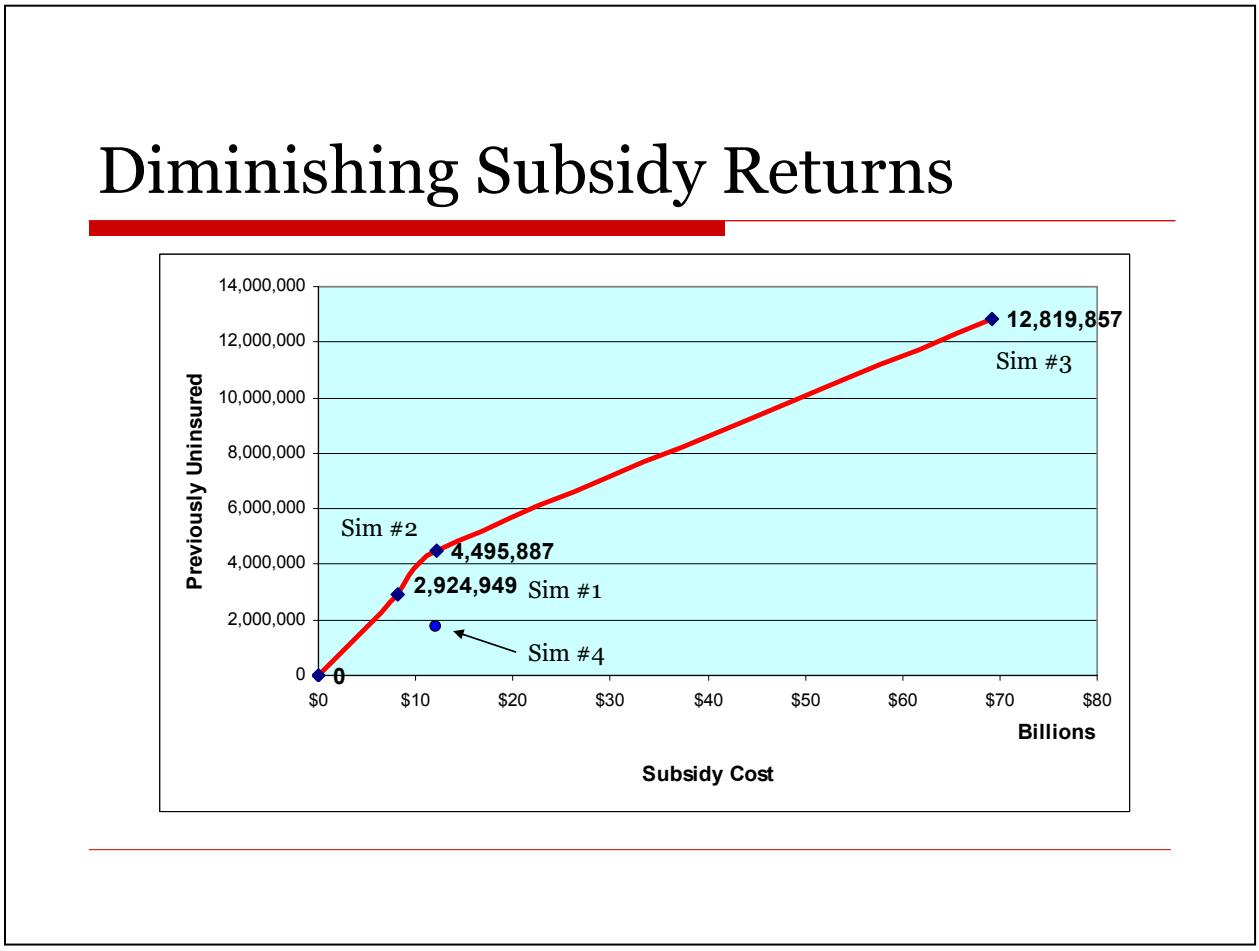
Sim #4: Full Subsidy for Non-working

Plan Choice	Unsubsidized Population %	Simulation Population %	Unsubsidized Project Pop.	Simulation Project Pop.	% Change		Subsidy Cost
INDIVIDUAL							
HSA-Full Price	9%	19%	3,155,982	6,858,372	117.3%	$	11,234,374,712
PPO_High $$	13%	12%	4,651,023	4,266,913	-8.3%	$	-
PPO_Low $$	1%	1%	310,041	279,884	-9.7%	$	-
PPO_Medium $$	4%	3%	1,426,040	1,281,403	-10.1%	$	-
Uninsured	74%	66%	27,273,018	24,129,531	-11.5%	$	-
OFFERED							
HMO	31%	31%	26,295,237	26,295,237	0.0%	$	-
HRA	2%	2%	1,811,281	1,811,281	0.0%	$	-
HSA-Shared Prem	1%	1%	530,882	530,882	0.0%	$	-
HSA-Full Price	0%	0%	332,249	332,249	0.0%	$	-
PPO_High $$	7%	7%	5,930,246	5,930,246	0.0%	$	-
PPO_Low $$	2%	2%	1,571,384	1,571,384	0.0%	$	-
PPO_Medium $$	41%	41%	34,949,793	34,949,793	0.0%	$	-
Turned Down	16%	16%	13,298,512	13,298,512	0.0%	$	-

NOTE: Population is 19-64, non public insurance

The results of the four simulations can be compared in terms of their 'efficiency' to reduce the number of uninsured using subsidies targeted at HSA purchases. Figure 10 shows the comparative results of the four simulations and the diminishing returns to subsidy investment. This graph will be useful to benchmark future simulations to see if they can be more efficient (i.e. above the current diminishing-returns curve).

Figure 10



Conclusions

Using a combination of public and private data sources focused on the impact of consumer directed health plans generally and HSAs more specifically, we find that the national adoption of these plans might be significant.

Untouched, the impact of the 2003 MMA could lead to approximately 3.2 million HSA covered lives among the U.S. population between the ages of 19-64 who are not students and not enrolled in public health insurance programs. The Administration's February 2004 Blue Book subsidy

plan will double HSA take-up and reduce the uninsured by 2.9 million at a tax cost of $8.1 billion, an average cost of $2,761 per person newly insured.

A full subsidy of HSA premiums yields the best-case reduction of uninsured by 47%, (about a 12.8 million person reduction) at a cost of $69.2 billion annually, an average cost of $5,399 per person. Finally, offering a free HSA to the non-working, non-public population reduces the uninsured, but less efficiently than income-targeted subsidies.

The next step for analysis will be to simulate the impact of additional policy proposals. In addition, we will continue to refine and test the model and further map the diminishing return point of subsidy to find opportunities for greater impact per dollar spent.

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