# Employer Sponsored Insurance Actuarial Values and Sensitivity Analysis

## Technical Appendix

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# I. Introduction

Actuarial Research Corporation (ARC) performed an analysis of employer sponsored actuarial values (AV) for the Department of Labor's (DOL) Employee Benefits Security Administration (EBSA). The goal of the project was to support EBSA in its research of the effect of out-of-network coverage on actuarial values for employer sponsored health insurance plans.

In recent years, EBSA has increased its oversight regarding the accuracy of provider directories and concerns regarding "ghost networks" - provider networks that are so limited in terms of their ability to serve and treat patients, that participants must go outside their health plan's in-network providers, resulting in additional costs. By conducting an analysis of what a health plan purports to cover for a given population versus what that population can expect the plan to cover, EBSA can quantify this disparity and examine if specific characteristics of the plan sponsor influence the extent of these differences.

To do this, ARC used the 2021 Merative™ MarketScan® Commercial Database,[1] in combination with other sources, to compare actual coverage to expected coverage. By using both in-network and out-of-network parameters on the claims in the MarketScan data, ARC has measured the change in actuarial value by variables of interest including size of employer, sector, plan type, geographic region, premiums, and funding type.

ARC acquired and analyzed a variety of data sources that describe employer plan cost-sharing, both in summary and at the plan level, as well as microdata with claims and utilization for persons with employer sponsored health insurance.[2] These analytic data files were incorporated into a claims repayment micro-simulation model (ARC Ratebook) to calculate AVs for employer sponsored insurance using both in-network and out-of-network plan specifications and claims. A sensitivity analysis was also conducted on the resulting in-network and out-of-network actuarial values to test for statistically significant differences.

This technical appendix provides more granular details on the ARC Ratebook, claims data processing, and the in-network and out-of-network plan parameter imputation process.[3] We also include a section with detailed graphs and tables that supplement the findings reported in the main report

[1] Merative and MarketScan are trademarks of Merative Corporation in the United States, other countries, or both.
[2] Data sources include the following: 2021 Merative™ MarketScan® Commercial Database (MarketScan) and Benefit Plan Data, 2018-2021 Medical Expenditure Panel Survey- Household Component (MEPS-HC), 2020-2021 Bureau of Labor Statistics (BLS) National Compensation Survey (NCS) (unpublished estimates from the Bureau of Labor Statistics, National Compensation Survey), the 2021 KFF Employer Health Benefits Survey (EHBS), and 2021 RWJF HIX Compare Small Group Data.
[3] In addition, the claims data section includes an extended description of the MarketScan Commercial Claims versus MEPS claims data since this will be the basis for future Auxiliary Data AVs.

# II. ARC Ratebook

## A. Overview

ARC evaluated the richness of private health insurance plans against a nationally representative population where spending on medical services is controlled to levels consistent with the CMS projections of the National Health Expenditure Accounts (NHEA), through a claims-repayment program, known as the "ARC Ratebook." This evaluation produced a measure known as "actuarial value" (or AV), as a single number representing a plan's richness on a scale of zero to one. This section describes, in detail, the methodology behind the ARC Ratebook – the tool used to calculate the AVs.

Illustrative employer sponsored health insurance plans were evaluated using employer sponsored private insurance spending data for the under 65 population.[4] These health insurance plans were based on those in the 2021 KFF Employer Health Benefits Survey (EHBS) and weighted to be nationally representative of plans using the in-network plan parameters. Data from other sources were used in two ways: to supplement the in-network parameters, when missing in the EHBS and to create a set of out-of-network parameters for the plans.

The resulting health insurance plans were evaluated using data consistent with national estimates of employer-sponsored private insurance spending for the under 65 population for calendar year 2021 from the NHEA, by simulating how each plan would cover the spending and utilization for each person and determining the insurance plan payment and each person's cost-sharing amount. For each plan, the final product is the ratio of the spending by the plan to total spending (plan plus person) by the group. This ratio is known as the plan's actuarial value.

For this work, the ARC Ratebook used the 2021 MarketScan Commercial Database as the underlying spending and utilization database. Prior versions were based on claims and utilization from multi-year spending and use from the Agency for Health Care Quality's (AHRQ) Medical Expenditure Panel Survey – Household component (MEPS-HC). Both the prior (MEPS-HC) and new (MarketScan) versions of the Ratebook relied on the underlying data being controlled to levels of spending on employer sponsored insurance consistent with the Centers for Medicare and Medicaid Services (CMS) National Health Expenditure Accounts for CY 2021 and used a service distribution based on both the NHEA and the MarketScan data.

The next section describes the specific methodology for how the Ratebook simulates insurance plan claims payments applying beneficiary cost-sharing to each claim for the illustrative employer sponsored plans, for both in-network and out-of-network plans.

## B. Methodology

At the person level, the model simulated a claims payment process for each plan by first applying service specific copays to applicable services. These services included the following:

[4] Employer sponsored insurance plans refer to health plans that are both fully insured (purchased from an insurance company) as well as self- or level-funded. The nomenclature used is based on the partition of health insurance spending found in the CMS National Health Expenditure Accounts.

- Inpatient hospital copay (either per day or per admission)
- Emergency room copay - imputed
- Outpatient hospital copay
- Primary care copay
- Specialist copay
- Prescription drug copays for generic, brand, and specialty drugs
- Inpatient mental health/substance use disorder copay (per day) – imputed
- Outpatient mental health/substance use disorder copay (per visit) - imputed
- Single and family deductibles
- Coinsurance rate
- Per person and family out of pocket maximums
- Plan benefit maximum.

Some of the services noted above were imputed to the plan data due to their absence in the EHBS data.[5]

Prior versions of the ARC Ratebook were less detailed, due mainly to limitations in both the MEPS-HC survey data (in particular for survey size and scope) and variables missing from the EHBS (selected in-network services as well as any out-of-network plan parameters). Modifications made to the ARC Ratebook that were specific to this project included the addition of plan parameters for emergency room care and inpatient and outpatient mental health and substance use disorder coverage, as well as upgrades to the program itself to measure the effects of these new parameters.

The ARC Model is a "claims repayment" model, in that we simulate how the insurance plan would pay for the services used by each person. What this means is that copays are applied to each office visit (or prescription), coinsurance is calculated as a percent of total spending, and total out-of-pocket spending is compared to the plan limits. At the person level, service specific copays were applied to applicable services with the overall plan variables (such as deductible, coinsurance, out-of-pocket maximum, and benefit maximum) paid next. Next, family limits on deductibles, out-of-pocket maximums and benefit maximums were checked against the person results and family spending was adjusted.

As a final step, we retained the person's weight, total spending, plan spending, and out-of-pocket spending for each person so that the average over the entire population could be calculated at the end of the process for each plan.

## C. An Example

Actuarial values are a population specific concept. While a plan may pay 82% of covered charges on average over a standard population, it may pay either more or less for each person involved depending on their level of spending (if any) and their use of specific services. It is only when the population is large enough, and representative of the desired group, that the actuarial value is a reliable measure of plan richness.

An example of how a simplified plan (with cost-sharing parameters of a $50 ER copay, $10 physician copay, $500 deductible, 20% coinsurance, and $5,000 OOP max) pays claims for three persons is shown in Table 1, below. This

[5] See Section II.B for a description of this imputation process.

example is for illustrative purposes only and does not calculate a result consistent with that for a population-wide actuarial value.

***Table 1: Illustrative Actuarial Value Calculation***

| | Person 1 | Person 2 | Person 3 | Total (3 People) |
|---|---|---|---|---|
| **Total Spend** | $200.00 | $30,000.00 | $150.00 | $30,350.00 |
| **Spending by Service** | 3 office visits ($60, $70, $50) $20 in other charges | 2 ER visits ($2,000, $3,000), $20,000 in hospital spending, 2 office visits ($1,000, $200), $3,800 in other charges | $150 in lab spending | |
| **Office Copay (Person Pays)** | $30.00 ($10 * 3) | $20.00 ($10 * 2) | n/a | |
| **ER Copay (Person Pays)** | n/a | $100.00 ($50 * 2) | n/a | |
| **Deductible plus Coinsurance (Person Pays)** | $20 | $500 + (20% * $23,300) = $5,160 | $150 | |
| **Total Person Paid before OOP Max** | $50 | $5,280 | $150 | |
| **Total Person Paid after OOP Max** | $50 | $5,000 | $150 | |
| **Total Plan Paid** | $150 | $25,000 | $0 | $25,150 |
| **Percent Plan Paid** | 75% | 83% | 0% | 83% |

In this example, the lowest spender (person 3) only spent on services that were covered under the deductible and thus faced their entire cost ($150) paid out of pocket. Person 1 spent slightly more money ($200 vs. $150) but most of this was for office visits where they only faced a $10 copay for each visit. Thus, for them the plan paid $150 while they paid only $50. Person 2 was a high user and while they had significant out of pocket spending, it was capped by the plan out of pocket maximum, resulting in the plan paying 83% of their costs. On average, because their spending dominates the comparison, the plan appears to be quite rich (paying 83%), though it paid nothing for one person and just 75% for another.

# III. Detailed Data Processing

This section describes the details of how we processed the claims data and other data required for specifying plan parameters, for both in-network and out-of-network plans.

## A. Claims Data

As an initial step, we summarized claims data from the individual events to the person level to be consistent with the ARC Ratebook. In addition, we needed to ensure the service categories in the claims data were aligned at the appropriate level required to evaluate the plans in the model.

The primary source of claims data was the 2021 MarketScan Databases, which

> ".....captures person-specific clinical utilization, expenditures, and enrollment across inpatient, outpatient, prescription drug, and carve-out services. The data comes from a selection of large employers, health plans, and government and public organizations. The MarketScan Research Databases link paid claims and encounter data to detailed patient information across sites and types of providers and over time. The Commercial Database contains data from active employees, early retirees, COBRA continues, and dependents insured by employer sponsored plans (that is, individuals not eligible for Medicare)."[6]

We organized claims data into files as follows: inpatient admissions, facility header, inpatient services, outpatient services, outpatient pharmaceutical, annual enrollment summary, and enrollment detail. With this as our framework, the summary of the MarketScan claims data proceeded as described below.

## 1. Define Universe, Enrollee Extract, and Create Weights

We began with the annual enrollment file, with the universe for this work defined as non-retired persons under age 65 with employer sponsored insurance defined based on the employee status (EESTATU) variable. Specifically, records with employee status (EESTATU) set to values of active (full time, part time or seasonal), COBRA, surviving spouse/dependent, or 'other' were kept, and those records coded as retirees (both under and over 65) or on long term disability were removed. The resulting data extract had 19.064 million records. We further refined the data parameters, keeping records only for those individuals that had mental health or substance use disorder coverage not "carved out" in the current MarketScan data year.[7] This ensured mental health claims were included when available, avoiding the possibility that some users appeared to have no usage based on omissions in the claims record. This reduction brought our sample universe from 19.064 million records down to 17.215 million records. In subsequent sections, we refer to this as the MarketScan sample universe.

Data on the enrollee file extract included family size (calculated), family ID, enrollee ID, plan type, industry, and geographic location, as well as individual age, sex, and relationship to employee.

The resulting enrollment file was tabulated by age-group, sex, MSA status, census region and policy holder versus spouse/dependent and compared to counts of persons with ESI from the March 2022 (CY 2021) Current Population Survey. This allowed for the creation of person level weights to reproduce the national population with non-retiree ESI (approximately 165 million lives). The stratification used was based on how Merative constructed their national weights, which were not included in the Commercial Claims Database.[8]

## 2. Add Claims and Utilization Data

Once we had defined our universe, the claims (spending) and utilization (stays, visits, drug scripts) data were summarized at the person level from the inpatient event, outpatient event, and prescription drug files and then recoded to match the categories used in the ARC Ratebook to evaluate plan richness. Non-spender records were

[6] Merative™ MarketScan® Research Databases. Commercial Database & Medicare Database User Guide, Data Year 2021. (p.1) Data Website Accessed: Merative MarketScan Research Databases.
[7] Carve out meaning coverage by carriers other than the primary health insurance provider.
[8] Merative™ MarketScan® Research Databases. Commercial Database & Medicare Database User Guide, Data Year 2021. (p.1) Data Website Accessed: Merative MarketScan Research Databases.

created for those persons in universe with records on the enrollment file (but no claims in the service files), so that each service specific extract file matched the enrollment extract universe as described above.

### *a) Inpatient*

As noted previously, MarketScan has separate files for inpatient and outpatient claims. Starting with the inpatient admissions file, records were divided into three categories using the Major Diagnostic Category (MDC) variable: mental health (MDC=19), alcohol/drug use (MDC=20), and all others. Within each of these categories, hospital days and admissions were summed for each person, and total spending (both plan and out of pocket) was summed separately for the hospital (HOSPPAY) and physician (PHYSPAY) components of the claim.

### *b) Outpatient*

Claims in the outpatient file were categorized using place of service (STDPLAC) values per the table below.

***Table 2: Classification of Outpatient Service Categories***

| Place of Service (Code) | Outpatient Category (Description) |
|---|---|
| 23 | Emergency Room |
| 11 | Office |
| 19 | Outpatient Hospital (on/off campus) |
| 21 | Inpatient* |
| 81 | Lab |
| (all other values) | Other |
| *Though on the outpatient file, these claims were considered as inpatient services. | |

Office visits (STDPLAC=11) were treated separately from outpatient hospital services. The non-office-visit categories above were further split by Facility or Professional services using the FACPROF variable. Visits were summed at the date of service level.

### *c) Prescription Drug*

The ARC Ratebook evaluates prescription drugs that are generic, brand or specialty. To map drug claims to those types of prescription drugs, and exclude over-the-counter, only records with the generic drug indicator (GENIND) variable set to values of 1 through 5 (single source brand, multi-source brand (no generic), multi-source brand (generic available), multi-source generic, and single-source generic) were kept. Over the counter and other/unknown records were excluded. Both multi-source and single-source generics were mapped to the generic tier. To partition the remaining MarketScan drug claims between brand and specialty drugs, we looked at the distribution of total dollars and dollars per script for plausible break points between the two types of drugs. Drugs mapped to “brand” were those that were labelled single source brand, if the cost was under $200 per script, and multi-source brand drugs with no generic equivalent. Specialty drugs were identified as those single source brand with costs of $200 per script or greater and multi-source brands with generics available.

### *d) Assembling into ARC Ratebook Format*

The MarketScan inpatient hospital dataset included information on hospital admissions that we partitioned into three classes: mental health admissions, substance use disorder admissions, and all other admissions. For each type, we utilized data on the number of admissions, number of days, hospital payments and payments to physicians. All but the latter mapped to the hospital (facility) fields in the ARC Ratebook. Inpatient physician payments, although appearing on the inpatient file, were not considered to be a facility charge and were thus mapped to an implicit "residual physician" category, which is part of total physician spending but not included in any of the outpatient fields.

The outpatient hospital dataset included information on spending (total payments) and utilization (visits) for emergency room, outpatient hospital, and physician office visits. In addition, there was a small amount of spending on the outpatient file that was identified as inpatient hospital charges, and these amounts were added to inpatient hospital (facility) spending created from the inpatient dataset. Physician office spending, identified by the place of service variable (STDPLAC = 11), was first refined by dropping non-medical records which were considered out of scope based on the provider type variable STDPROV (Dental Tech, Optometrist, Optician, Acupuncturist, Spiritual Healers, Vision Center). Then physician office spending was partitioned by type of visit: preventive, primary care, or specialty. Preventive visits were identified using the Medstat Service Sub-Category Code variable (SVCSCAT), then by primary care and specialty visits were identified using the provider type variable (STDPROV). Primary care and specialty visits were further partitioned based on whether they were visits for mental health, substance use disorder, or all other visits (using the MDC variable as with inpatient). Codes that were used to partition by type of visit are shown in Table 3, below.

***Table 3: Mapping of Physician Visits, by Type***

| Type of Visit | Description of Visit Type Values | Mental Health | Substance Use Disorder | All Other |
|---|---|---|---|---|
| Preventive | SVCSCAT =<br>21124 Physician Specialty OP Preventive Visits<br>21224 Physician Non-Specialty OP Preventive Visits<br>22324 Professional OP Preventive Visits<br>30524 MH Physician OP Preventive Visits<br>30624 MH Professional OP Preventive Visits<br>31524 SA Physician OP Preventive Visits<br>31624 SA Professional OP Preventive Visits | N/A | N/A | N/A |
| Primary Care | STDPROV =<br>204 Internal Medicine (NEC)<br>240 Family Practice<br>245 Geriatric Medicine<br>320 Obstetrics & Gynecology<br>360 Preventative Medicine<br>400 Pediatrician (NEC)<br>825 Nurse Practitioner | MDC=19 | MDC=20 | All Other MDC values |

| Type of Visit | Description of Visit Type Values | Mental Health | Substance Use Disorder | All Other |
|---|---|---|---|---|
| Specialty Care | STDPROV < 600 (all physician categories)<br>or<br>STDPROV =<br>845 Physician Assistant<br>850 Therapy (Physical)<br>860 Psychologist | MDC=19 | MDC=20 | All Other MDC values |

If an office visit did not fall into one of these categories, the service was not subject to a copay (e.g., lab work) and was moved to other (residual) physician or other professional using the SVCSCAT variable.

As noted above, the MarketScan prescription drug data had been extracted into a dataset with spending and number of scripts for generic, brand, and specialty drugs. These variables were used directly in the ARC Ratebook.

## 3. Controlling to National Health Expenditure Levels

The three extracts described in the section above (inpatient, outpatient, prescription drug) were combined into a single-person level file for claims and utilization. After this analytic file was created, it was tabulated and compared at the service level to ARC estimates of private health spending for persons with active (non-retiree) employer sponsored insurance, consistent with the National Health Expenditure Accounts. Only slight adjustments were necessary, and the resulting (weighted) per capita covered expense in the data is $5,637, which is consistent with the latest NHEA projections. The service split relies mainly on that found in the MarketScan data, with 45% of spending attributable to hospital services, 33% to physician and other professionals, and 22% to prescription drugs.

This controlling, or benchmarking, step is performed to ensure that the results are representative of U.S. health insurance coverage, spending, and use for this population. It also allows us to use this data in conjunction with other datasets (such as the Auxiliary Data Tool) that provide national estimates.

## 4. Additional Variations on the Dataset

### *a) Net Pay*

In addition to the dataset created above, which focused on total spending (MarketScan variable “PAY”), we also examined plan payments (MarketScan variable “NETPAY”) to calculate overall rate of insurance payments. This was done as a validation step to determine whether average plan payments in the MarketScan data would

approximate the overall actuarial value of the employer plans under analysis and might only underestimate to the extent there was out-of-network usage.[9]

Aggregating MarketScan claims for all services, excluding prescription drugs, produced an overall net paid percentage on the claims data of 84.8%, similar to the 84.2% calculated actuarial value resulting from the ARC Ratebook modeling (83.9% when excluding drug coverage). A higher percentage of hospital facility claims were paid as compared to physician and other professional claims, which is, again, consistent with our actuarial value calculation as modeled using the ARC Ratebook and lends credence to those results of average plan AVs aligning with observable benefits paid by plans.

### *b) Out-of-Network*

We examined the variables that provide information on out-of-network usage, which were present on the MarketScan inpatient and outpatient services files, including mental health and substance use disorders. A longer discussion, including tables on in-network versus out-of-network usage appears in Section IV.D. Model Validation in the main report, as well as in Section IV.A. of this Technical Appendix. Overall, approximately 98% of gross payments for inpatient services were in-network, but for inpatient mental health and substance use disorder claims, only 83% were in-network. The in-network payment rates (net paid by plans to overall gross covered amounts) were 93% for all inpatient services and 90% for mental health and substance abuse, and lower for out-of-network (80% and 83% respectively). Outpatient net payments for mental health and substance abuse disorder services were markedly lower.

## 5. Spending Summary and Comparison to MEPS-HC

We also examined the data differences and how the multi-year (2018-2021) MEPS-HC database was adjusted to provide a basis for comparison of the results of the AVs calculated using the MarketScan data, as another measure of validation. The original version of the ARC Ratebook was based on a multi-year database with spending and utilization taken from the MEPS-HC. Our examination of the MarketScan claims provided further insights on how we may be able to modify the underlying MEPS-HC data for continued use with the ARC Ratebook after the MarketScan DUA expires, as actuarial values are part of ARC's imputations in the CPS Auxiliary Data for the Department. This provides for additional opportunities to evaluate health insurance coverage against a national benchmark.

Approximately 14% of persons in the MarketScan sample universe are non-users. Mean spending is approximately 6.4 times that of the median, with the mean falling between the 80$^{th}$ and 90$^{th}$ percentile. The distribution of spending for all services combined is shown in Table 4, below, with the distribution of spending by broad service category (hospital, physician (including other professionals) and prescription drugs found in Table 5. Actuarial value calculations depend not only on spending averages, but also on the distribution of spending, as these distributions provide insight to how much of total, and service specific, spending may be covered by a

[9] Note that this analysis does not discuss net payment for prescription drugs due to the heterogeneity and complication of certain payment mechanisms, including the application of discounts, rebates or other price concessions, and coordination of benefits.

particular plan. It is helpful to know not just that average spending is, for example, $5,000 per person but also what proportion of persons have no spending, or spending past $7,500, $10,000 or even $25,000.

***Table 4: Distribution of spending, MarketScan Sample Universe as basis for ARC Ratebook***

| Percentile | Threshold of spending |
|---|---|
| 0% | $0 |
| 5% | $0 |
| 10% | $0 |
| 20% | $92 |
| 30% | $277 |
| 40% | $529 |
| 50% | $883 |
| 60% | $1,443 |
| 70% | $2,437 |
| 80% | $4,506 |
| 90% | $10,928 |
| 95% | $22,430 |
| 100% | $7,640,016 |
| Mean | $5,637 |

***Table 5: Distribution of Spending by Major Service Category, MarketScan Sample Universe as basis for ARC Ratebook***

| Percentile | Threshold of Spending | | |
|---|---|---|---|
| | Hospital | Physician + Other Professionals | Prescription Drugs |
| 0% | $0 | $0 | $0 |
| 5% | $0 | $0 | $0 |
| 10% | $0 | $0 | $0 |
| 20% | $0 | $25 | $0 |
| 30% | $0 | $187 | $0 |
| 40% | $0 | $354 | $7 |
| 50% | $0 | $568 | $35 |
| 60% | $0 | $861 | $81 |
| 70% | $121 | $1,319 | $149 |
| 80% | $722 | $2,154 | $353 |
| 90% | $3,394 | $4,120 | $1,261 |
| 95% | $9,692 | $6,874 | $3,831 |
| 100% | $7,514,916 | $2,586,863 | $6,049,494 |
| Mean | $2,536 | $1,878 | $1,224 |

In creating an updated database for comparison to a single year of MarketScan data, records for persons with non-retiree employer sponsored insurance were taken from four years of MEPS-HC data files (2018-2021) consolidated into a single database, and their weights were divided by 4. The spending distributions were compared to those observed in the 2021 MarketScan data and adjusted in order to be more representative, as well as controlled to be consistent with ESI spending for 2021, in the National Health Expenditure Accounts. These adjustments included the proportion of persons with and without spending and the mean spending by service category. In the next sections, we describe the adjustments made to the MEPS-HC data to have it be more representative of actual use and spending for persons with ESI, based on what we have learned from our analysis of the MarketScan claims. These adjustments should allow a more accurate calculation of actuarial values for projects, such as the CPS Auxiliary Data, that ARC produces for the Department.

### *a) Non-Users*

Non-users made up approximately 14% of the MarketScan database used in this analysis. In the MEPS-HC extract, non-users made up approximately 19% of the population, resulting in a higher mean spend per user relative to the overall mean as well as changing the shape of the distribution – both of which can affect the actuarial values calculated based on the data. Before adjusting levels of spending, we sought to reweight the MEPS-HC based file by age and sex to reduce the number of non-spenders. Persons were tabulated by whether they had any spending and if there was any spending in their family. Only the weights of persons in families with spending were adjusted – a slight increase in the weights of these persons (spenders and non-spenders alike) was offset by a decrease in the weights of non-spenders. Spenders increased to approximately 86% of the population, and the average per capita for this group dropped by approximately 6% as a result due to the reweighting. The probability of use was not adjusted at a service level.

### *b) Adjusting the Means*

Once the users and non-users were adjusted on the MEPS based file, the mean spending by broad service category (hospital, physician, and prescription drug) were adjusted to bring the MEPS-HC data closer to MarketScan. Per capita spending was adjusted from $4,315 to $5,635, to match the means in the NHEA-consistent controlled MarketScan database. Spending was adjusted by service category, and utilization by collapsed service category for those services where visit data existed. Factors applied to spending and utilization are shown in the table below.

***Table 6: MEPS-HC Adjustments by Service Category***

| Service | Spend Adjust | Use Adjust |
|---|---|---|
| Inpatient | 1.216 | 0.800 |
| Outpatient | 2.217 | 1.909 |
| Emergency Room | 1.172 | 1.077 |
| Physician Non-Office | 2.279 | n/a |
| Primary Care Office Visits | 1.504 | 2.571 |
| Specialty Care Office Visits | 1.278 | 2.686 |
| Preventive Office Visits | 0.339 | 0.505 |
| RX – Generic | 1.082 | 1.061 |
| RX – Brand | 1.288 | 1.477 |

### *c) Distributional Differences in the Data*

Even with the adjustments made to the MEPS-HC data (based on the much larger MarketScan set) distributional differences remained between the two data sets. Some of these differences may have to do with the relative use by service, even after service specific means and the overall proportion of users had been adjusted. Examples of these are shown in the tables below.

Differences in the overall distribution appear only at the very high end of the tail (95% and higher), where for example, the maximum spend on the MEPS-HC based file was just over 135 times the mean, while the MarketScan data had a substantially longer tail with the maximum spend was over 1300 times the mean. Differences in the distributions by service were present at most levels of spending. The high spending at the tails can influence actuarial value results, particularly how out-of-pocket maximums impact AVs on a population level.

***Table 7: Relationship to the Mean (All Services): MarketScan Sample Universe vs. MEPS-HC Based Sample Universe***

| Percentile | MEPS-HC Based | MarketScan Based |
|---|---|---|
| 0% | 0.000 | 0.000 |
| 5% | 0.000 | 0.000 |
| 10% | 0.000 | 0.000 |
| 20% | 0.011 | 0.016 |
| 30% | 0.031 | 0.049 |
| 40% | 0.063 | 0.094 |
| 50% | 0.113 | 0.157 |
| 60% | 0.204 | 0.256 |
| 70% | 0.377 | 0.432 |
| 80% | 0.770 | 0.799 |
| 90% | 2.080 | 1.938 |
| 95% | 4.426 | 3.979 |
| 100% | 163.948 | 1,355.253 |

***Table 8: Relationship to the Mean (by Service): MarketScan Sample Universe vs. MEPS-HC Based Sample Universe***

| Percentile | Hospital | | Physician | | Prescription Drug | |
|---|---|---|---|---|---|---|
| | MEPS-HC Based | MarketScan Based | MEPS-HC Based | MarketScan Based | MEPS-HC Based | MarketScan Based |
| 0% | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 5% | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 10% | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 20% | 0.000 | 0.000 | 0.015 | 0.013 | 0.000 | 0.000 |
| 30% | 0.000 | 0.000 | 0.053 | 0.100 | 0.000 | 0.000 |

| Percentile | Hospital | | Physician | | Prescription Drug | |
|---|---|---|---|---|---|---|
| | MEPS-HC Based | MarketScan Based | MEPS-HC Based | MarketScan Based | MEPS-HC Based | MarketScan Based |
| 40% | 0.000 | 0.000 | 0.108 | 0.188 | 0.000 | 0.005 |
| 50% | 0.000 | 0.000 | 0.187 | 0.303 | 0.010 | 0.029 |
| 60% | 0.000 | 0.000 | 0.313 | 0.458 | 0.040 | 0.066 |
| 70% | 0.000 | 0.048 | 0.526 | 0.703 | 0.106 | 0.121 |
| 80% | 0.169 | 0.285 | 0.947 | 1.147 | 0.295 | 0.289 |
| 90% | 1.166 | 1.339 | 2.210 | 2.194 | 1.144 | 1.031 |
| 95% | 4.275 | 3.822 | 4.260 | 3.660 | 3.503 | 3.130 |
| 100% | 331.078 | 2,963.706 | 306.564 | 1,377.449 | 374.410 | 4,943.704 |

## B. Health Insurance Plan Parameters

Plan parameters were assembled to line up with those used by the ARC Ratebook as listed in Section II.A in the main report. The primary source for plan parameters is the Employer Health Benefits Survey (EHBS) published annually by KFF. To align with the 2021 claims data, the 2021 EHBS was used, which included data for both private and public sector employer plans, although the public sector plans excluded federal health benefit plans and included only state and local plans. The EHBS contains several weights that represent employers, workers and covered workers in the plans (participants). We used the covered worker weights, which resulted in a plan universe of 75.9 million ESI policy holders, roughly consistent with the number of policy holders on the CPS. The data lacks a few in-network variables of interest and does not contain out-of-network plan parameters. To adjust for this, the data was supplemented with parameters from the Bureau of Labor Statistics' National Compensation Survey (NCS), HIX Compare Small Group Data by the Robert Wood Johnson Foundation, and Merative™ MarketScan® Benefit Plan Data.

### 1. Descriptive Statistics from the EHBS

The following tables provide statistics on the counts and percentages of the descriptive variables from the EHBS that are used in the analysis, including size of employer, industry, sector, plan type, region, premiums, funding, and union status, weighted by plan weight (weighted employees in plans). They are presented to provide an understanding of the weighted population underlying the health insurance plans and to demonstrate how the EHBS includes a roughly nationally representative sample for the data collected.[10]

[10] Note that the EHBS sample does not include the federal government – public sector is for state and local governments only.

*Table 9.a: EHBS Participants by Size of Employer*

| | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| **3-9 Workers** | 3,179,218 | 4% | 3,179,218 | 4% |
| **10-24 Workers** | 4,373,483 | 6% | 7,552,701 | 10% |
| **25-49 Workers** | 4,340,390 | 6% | 11,893,091 | 16% |
| **50-199 Workers** | 9,980,335 | 13% | 21,873,425 | 29% |
| **200-999 Workers** | 11,750,560 | 15% | 33,623,985 | 44% |
| **1,000-4,999 Workers** | 42,307,654 | 56% | 75,931,639 | 100% |

*Table 9.b: EHBS Participants by Industry*

| | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| **Agriculture/Mining/ Construction** | 3,955,863 | 5% | 3,955,863 | 5% |
| **Manufacturing** | 8,011,271 | 11% | 11,967,134 | 16% |
| **Transport/Communications/ Utilities** | 7,241,371 | 10% | 19,208,505 | 25% |
| **Wholesale** | 3,945,528 | 5% | 23,154,033 | 30% |
| **Retail** | 5,629,230 | 7% | 28,783,263 | 38% |
| **Finance** | 5,768,460 | 8% | 34,551,722 | 46% |
| **Service** | 24,487,917 | 32% | 59,039,640 | 78% |
| **State/Local Government** | 5,407,485 | 7% | 64,447,125 | 85% |
| **Health Care** | 11,484,515 | 15% | 75,931,639 | 100% |

*Table 9.c: EHBS Participants by Sector*

| | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| **Private Sector** | 70,524,154 | 93% | 70,524,154 | 93% |
| **Non-Federal Public Sector** | 5,407,485 | 7% | 75,931,639 | 100% |

*Table 9.d: EHBS Participants by Type of Health Insurance Plan*

| | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| **HMO** | 12,403,314 | 16% | 12,403,314 | 16% |
| **PPO** | 35,335,093 | 47% | 47,738,408 | 63% |
| **POS** | 6,636,276 | 9% | 54,374,684 | 72% |
| **HDED** | 21,556,955 | 28% | 75,931,639 | 100% |

*Table 9.e: EHBS Participants by Region*

| | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| **Northeast** | 15,807,105 | 21% | 15,807,105 | 21% |
| **Midwest** | 19,840,794 | 26% | 35,647,900 | 47% |
| **South** | 24,618,549 | 32% | 60,266,448 | 79% |
| **West** | 15,665,191 | 21% | 75,931,639 | 100% |

*Table 9.f: EHBS Participants by Total Annual Premiums for Single Coverage*

| | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| **Less than $5,000** | 5,105,881 | 7% | 5,105,881 | 7% |
| **$5,000 - LT $7,500** | 31,840,558 | 42% | 36,946,440 | 49% |
| **$7,500 - LT $10,000** | 30,056,463 | 40% | 67,002,902 | 88% |
| **$10,000 +** | 8,928,737 | 12% | 75,931,639 | 100% |

*Table 9.g: EHBS Participants by Health Insurance Plan Funding*

| | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| **Fully Insured** | 22,045,382 | 29% | 22,045,382 | 29% |
| **Self-Insured / Level-Funded** | 53,886,258 | 71% | 75,931,639 | 100% |

*Table 9.h: EHBS Participants by Union*

| | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| **Firm Has Union Workers** | 26,698,118 | 35% | 26,698,118 | 35% |
| **Firm Has No Union Workers** | 49,233,522 | 65% | 75,931,639 | 100% |

As shown in the tables above, participants were more concentrated in larger employer sizes (Table 9.a). The percent of plan participants by industry varied, ranging from 5% in both Agriculture/Mining/ Construction and Wholesale to 32% in Service (Table 9.b). The majority of participants were in the private sector (93%) and in self-insured (71%) plans (Table 9.c and Table 9.g). Almost half of plan participants were covered by PPOs (47%), while 28% are in high deductible plans, 16% are in HMOs and 9% are in POS plans (Table 9.d).

Participants were relatively evenly distributed across regions (Table 9.e). Most participants had annual premiums for single coverage that ranged between $5,000 and $10,000 (Table 9.f), and almost two-thirds (65%) of plan participants were in firms with no union workers (Table 9.h).

## 2. In-Network Plan Parameters

In-network actuarial value calculation is the standard method of analysis and the baseline for this study. The in-network parameters used were from the Employer Health Benefits Survey (EHBS) published annually by KFF.[11] The EHBS looks at trends in employer-sponsored health coverage and collects data about plan attributes of the largest HMO, PPO, POS, and high deductible plan offered. By survey definition, an HMO does not cover non-emergency services out-of-network, and a high deductible plan must have a deductible greater than $1,000 (single) or $2,000 (family).

To reduce the EHBS data collection survey burden, plan parameters from some services are collected only for the largest plan offered. The data is restructured from employer level to plan level, and values for deductible (single and family), coinsurance, out of pocket maximum (single and family), and benefit maximum are summarized as well as service specific copays for inpatient hospital (per admission and per day), outpatient, specialist, primary care, preventive, and coverage for generic, brand, and specialty drugs. In addition to plan parameters, the survey collects premium, region, funding, plan type, size of employer, sector, and industry Information used in this analysis.

The 2021 EHBS in-network parameters are supplemented by other data sources, where the EHBS lacks data, particularly for emergency room, inpatient mental health, and outpatient mental health and substance use disorder. The primary supplemental source is the 2021 HIX Compare Small Group data, which had information on these services. The database is large, however, containing four quarters of data with much overlap, so ARC chose to use the fourth quarter data. ARC had to identify unique plans, which required a simplified process of matching the plan data fields with a unique year, state, carrier, metal level, plan type, network ID, and plan ID. The fourth quarter HIX data contains 21,535 “unique” unweighted records for plan types PPO, HMO, POS, and Exclusive Provider Organization (EPO). Three in-network variables are added using this data: emergency room (ER) copay, inpatient mental health copay (also used for inpatient SUD copay), and outpatient mental health copay (also used for outpatient SUD copay).

We examined various methods for imputing the plan parameters and decided to use a regression-based model by plan type based on the level of the plan deductible. The HIX data plan types do not align with those found in the EHBS. HIX categorized plans as either PPO, HMO, POS, or EPO and did not specifically identify high deductible plans.[12] Given this discrepancy, ARC created HIX groupings based on a combination of plan type and deductible value. Four categories were created (Regression groups): 1) HMO/ EPO with deductible < $1,400, 2) HMO/ EPO with deductible >=$1,400, 3) PPO/ POS with deductible <$1,400, 4) PPO/ POS with deductible >=$1,400. These categories are labeled regression groups 1 through 4 in the following sections. Note that high deductible plans in the EHBS are all mapped to regression group 4.

### *a) ER Copay*

The 2021 EHBS plan parameter file does not contain data for in-network emergency room copays. To impute an ER copay, ARC began by creating HIX groupings based on plan type and deductible value (labeled regression groups), since plan types do not align with the EHBS data. ARC then ran a frequency tabulation of ER copay by

[11] The EHBS does not contain information on out-of-network parameters.
[12] EHBS includes EPOs with HMOs.

regression group, calculating that 15.2%, 55.71%, 21.1%, and 57.8% respectively of plans did not have a separate ER copay, but rather had an associated overall plan cost-sharing (deductible, coinsurance). Thus, the first step to imputing an ER copay was to determine whether an ER copay exists. A random number generator was used and if the value was less than the group probability, an ER copay was not imputed. For the inverse case, an ER copay was imputed.

If a plan was deemed subject to an ER copay, a linear regression model was then used to predict the copay's magnitude. The independent variables used included deductible, out-of-pocket maximum, coinsurance, and where available, inpatient hospital copay. Eight separate models were used (4 regression groups, with and without inpatient hospital copay). For regression group 1, the "with inpatient hospital copay" model predicted values of $123 to $390 with a mean of $279, whereas the actual values ranged from $75 to $800, with a mean of $295. While some variation was lost at the tails, the model produced reasonable values. Implementing the "with inpatient hospital copay" model for regression group 1 on the 2021 EHBS data resulted in a range of copays from $66 to $362 with an unweighted mean of $200. Given the EHBS represents all employer sponsored plans whereas the HIX contains small group plan parameters, we expected to find richer coverage on the EHBS. The 8 models used are shown in the table below.

***Table 10: In-network Cost-Sharing for Emergency Room - Regression Results***

| **Coefficient** | **With Inpatient Hospital Copay** | | | | **No Inpatient Hospital Copay** | | | |
|---|---|---|---|---|---|---|---|---|
| **Regression Group** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** |
| Constant | 65.832 | -209.150 | 135.650 | 164.960 | 239.235 | 255.238 | 234.400 | 257.143 |
| Deductible | 0.147 | 0.019 | 0.014 | 0.031 | 0.048 | 0.020 | 0.015 | 0.023 |
| Coinsurance | -0.468 | -0.060 | -1.875 | -0.143 | -2.098 | -1.618 | -2.396 | -1.436 |
| OOP Max | 0.009 | 0.062 | 0.021 | 0.008 | 0.014 | 0.016 | 0.018 | 0.012 |
| In Hosp | 0.123 | 0.207 | 0.204 | 0.079 | N/A | N/A | N/A | N/A |

Limitations to this modeling include limitations on the functional form of the model and multicollinearity. The dependent variable (ER copay) is not linear, nor is it categorical. The data is clustered at round values (approximately every $50) but has 40 different values in the HIX data. We approximated the model using a linear fit despite this limitation. In addition, by definition, deductible and out of pocket maximum must be correlated (OOP max is >=deductible and capped at $8550 for CY 2021). Other variables also may be correlated. Despite these limitations, the results were plausible and the $R^2$ values were reasonable when including inpatient hospital as an independent variable.

### *b) Inpatient Mental Health Copay*

Inpatient mental health and inpatient substance use disorder in-network copays differ in the HIX data for only one plan in the entire database. Therefore, ARC did not impute separate values for substance use disorder. Inpatient mental health copays were tabulated by the same regression categories used for ER imputations. In most cases, the inpatient mental health copay was equal to the inpatient copay but not always. Probabilities of having an inpatient mental health copay were calculated by whether an inpatient copay existed as shown in

Table 11. A random number generator was used to determine if a copay existed and whether that copay would match the inpatient copay. (Cumulative probabilities were compared to the random generated value).

***Table 11: Imputing Inpatient Mental Health - Probabilities***

| **Regression Group** | **1** | **2** | **3** | **4** | **Total** |
|---|---|---|---|---|---|
| MH, other same | 2961 | 668 | 982 | 759 | 5370 |
| MH, other different | 37 | 2 | 0 | 0 | 39 |
| MH -9, other copay | 7 | 43 | 17 | 73 | 140 |
| MH copay, other -9 | 2 | 1 | 2 | 2 | 7 |
| both 0 or -9 | 1632 | 5046 | 1828 | 7449 | 15955 |
| Total Records | 4639 | 5760 | 2829 | 8283 | 21511 |
| (24 cases lack a regression category because the deductible is missing) | | | | | |
| if inpatient copay >0 | 3005 | 713 | 999 | 832 | 5549 |
| Same copay | 98.54% | 93.69% | 98.30% | 91.23% | 96.77% |
| different- impute | 1.23% | 0.28% | 0.00% | 0.00% | 0.70% |
| no copay | 0.23% | 6.03% | 1.70% | 8.77% | 2.52% |
| if inpatient <=0 | 1634 | 5047 | 1830 | 7451 | 15962 |
| impute: | 0.12% | 0.02% | 0.11% | 0.03% | 0.04% |

When imputation was required, linear regression models were used (similar to ER copay) with and without inpatient hospital by regression category, as shown in Table 12 below. The models in italics below were insufficient for use given the very low R squared values, however they were not required as there were no cases that fell into those regression groups. The results of the random number generator created only 2 cases where imputation was necessary.

***Table 12: Imputing Inpatient Mental Health - Regression Results***

| | **With Inpatient Hospital Copay** | | | | ***Without Inpatient Hospital Copay*** | | | |
|---|---|---|---|---|---|---|---|---|
| **Regression Group** | **1** | **2** | **3** | **4** | **1** | ***2*** | **3** | ***4*** |
| Constant | 5.024 | 21.517 | 0 | 0 | 215.676 | *678.452* | 425.396 | *608.158* |
| Deductible coefficient | 0.013 | 0.002 | 0 | 0 | -0.322 | *0.035* | -0.118 | *0.024* |
| Coinsurance coefficient | 0.260 | -0.069 | 0 | 0 | 3.183 | *-0.996* | 3.870 | *-0.532* |
| OOP max coefficient | 0.001 | -0.003 | 0 | 0 | 0.040 | *-0.053* | -0.040 | *-0.047* |
| In Hospital coefficient | 0.967 | 0.983 | 1 | 1 | N/A | *N/A* | N/A | *N/A* |
| R squared | 0.968 | 0.982 | 1 | 1 | 0.259 | *0.079* | 0.324 | *0.058* |

## *c) Outpatient Mental Health Copay*

Similar to inpatient mental health, plan parameters for in-network outpatient mental health and substance use disorder values aligned so separate values were not imputed for substance use disorder. This one variable (outpatient mental health) captures cost-sharing for both. For many cases, outpatient mental health copays are

equal to the primary care copay. In other cases, it is equal to the specialty copay, and finally for a few cases, it is independent of either copay. Thus, the assignment was completed again using random number generators compared against probabilities by regression category as previously defined beginning with primary care copay matching. If unassigned, next, specialty copay matching was probabilistically assigned. Probabilities are not cumulative as they were in the inpatient modeling.

Table 13 below shows the probabilities for imputing outpatient mental health. For regression group 1, the steps were the following: if the random number generated was less than 0.899, we used the primary care copay. Otherwise, we drew a second random number which, if less than 0.629, we used the specialty copay. Otherwise, we drew a third random number and if that was less than 0.171, we imputed the copay.

***Table 13: Imputing Outpatient Mental Health - Probabilities***

| **Regression Group** | **1** | **2** | **3** | **4** |
|---|---|---|---|---|
| Copay same as Primary Care | 89.9% | 79.3% | 80.4% | 79.0% |
| Else Copay same as Specialty Care | 62.9% | 32.8% | 32.0% | 37.7% |
| Else Copay Imputed | 17.1% | 5.5% | 6.3% | 1.3% |

For the few remaining cases where the copay was imputed, we performed an imputation using regression analysis on the HIX data. The model that imputed the copay is shown in Table 14. Outpatient mental health copay was the dependent variable in the regression modeling. Independent variables included primary care copay (or specialty copay if primary is -9), deductible, coinsurance, and out of pocket maximum. Five cases were given copay values using the regression models.

***Table 14: Imputing Outpatient Mental Health – Regression Results***

| **Regression Group** | **1** | **2** | **3** | **4** |
|---|---|---|---|---|
| Constant | 0.04 | (5.82) | 3.18 | 0.04 |
| Deductible coefficient | 0.00 | 0.00 | 0.00 | (0.00) |
| Coinsurance coefficient | (0.08) | 0.05 | (0.10) | (0.09) |
| OOP max coefficient | 0.00 | 0.00 | 0.00 | 0.00 |
| Primary care coefficient | 0.87 | 0.75 | 0.88 | 0.95 |
| R squared | 0.67 | 0.48 | 0.72 | 0.61 |

## 3. Out-of-Network Plan Parameters

All PPO, POS, and HDED plans have out-of-network coverage and parameters have been added using HIX (primary source), BLS NCS tables (deductible values), and MarketScan Benefit Plan Design (BPD) Database.[13] HMOs only contain out-of-network plan parameters for emergency room cost-sharing. The sections below describe the process for adding out-of-network plan parameters.

[13] MarketScan Research Databases Benefit Plan Design Database User Guide, Data Year 2021.

### *a) Emergency Room*

All plans cover emergency room (ER) care out-of-network with either copay or coinsurance. For HMOs, there is no other out-of-network coverage. In all cases, ER cost-sharing for out-of-network equaled the in-network cost-sharing. This was supported by the HIX in- and out-of-network plan parameters for emergency room (100% of coinsurance matches, 100% of copays match) as well as those in the Merative BPD (100% of copays match).

To convert ER specific coinsurance rates to copays (for the ARC Ratebook to evaluate) we used overall spending from the MarketScan sample universe as well as the approximate average ER cost per day found in the data ($500). Overall spending was used to create continuance tables, which are summarized spending tabulations that contain values for spending at or above specific thresholds. For example, at a $100 threshold, the continuance table gives us the proportion of population at or above that level (pop), the proportion of total spending at or above that level (exp), and finally the proportion of spending at or above that level not including spending below that level (k). This k value, along with the coinsurance and deductible, can give us an adjusted coinsurance that allows us to calculate an equivalent copay for plan evaluation. These tables let us adjust ER specific coinsurance for the presence of an in-network deductible (to which ER spending would also be subject). An example is as follows:

For a plan with an in-network deductible of $250 and 20% coinsurance, we calculated the following ER copay:

- Copay = $500 * (1 – ((1-coinsurance)*k(ded))
- If Deductible is $250, then spending at or above that level (k(250)) = 0.96527 (continuance table lookup)
- 20% person-level coinsurance means the plan pays 80% after the deductible. This total percent can be approximated by a benefit rate of 0.80 * 0.96527 = 0.772216
- Adjusted per person coinsurance (to allow for this deductible) is 1.0 – 0.7722116 = 0.227784
- Thus, the copay for this plan, based on $500 average ER cost, would be 0.227784 * 500 = $113.89

### *b) Deductible*

The EHBS in-network deductible was used to split the data into quartiles (Q1 through Q4 in the table below). The data was further segmented by source of funding (self, fully, unknown[14]), employer size (<=50, >=200, other), and sector (public vs private). The custom tabulations of the NCS data, shown below in Tables 15 and 16, were provided by BLS and were used to create multipliers for each group. The deductible was then determined based on the in-network value and multiplier for that cell as determined from the BLS NCS data. The BLS data used are custom tabulations of unpublished estimates from the 2020 private sector and 2021 public sector National Compensation Survey. The multipliers used are not inconsistent with similar tabulations from the HIX data. Based on the data in Table 15, below, for a private sector plan falling in the second quartile (Q2), under size 100, and self-insured, the out-of-network deductible would be 1.82 times the in-network deductible. Corresponding multipliers for out-of-network deductibles for state/local government plans can be found in Table 16.

[14] For the imputations, if funding status was not known, the employer proxy was not used, and unknown was retained. An employer-level proxy was used in the actuarial value analysis.

***Table 15: Multipliers for Out-of-network Deductibles, by Mean Value in Quartile, Private Sector***

| In-network | Private Sector | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Size <100 | | | Size 100+ | | | All Sizes | | |
| | Self | Fully | Both | Self | Fully | Both | Self | Fully | Both |
| Q1 | 2.54 | 2.32 | 2.86 | 2.94 | 2.97 | 3.10 | 2.56 | 3.19 | 3.13 |
| Q2 | 1.82 | 2.25 | 2.63 | 1.89 | 2.22 | 2.42 | 1.98 | 2.05 | 2.31 |
| Q3 | 1.77 | 1.89 | 2.00 | 2.00 | 1.76 | 2.24 | 1.92 | 1.84 | 2.22 |
| Q4 | 1.75 | 1.65 | 1.71 | 1.84 | 1.95 | 1.91 | 1.81 | 1.77 | 1.90 |

***Table 16: Multipliers for Out-of-network Deductibles, by Mean Value in Quartile, State/Local Government***

| In-network | State/Local Government | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Size <100 | | | Size 100+ | | | All Sizes | | |
| | Self | Fully | Both | Self | Fully | Both | Self | Fully | Both |
| Q1 | 1.88 | 3.52 | 2.86 | 3.93 | 2.68 | 4.52 | 3.19 | 2.41 | 3.72 |
| Q2 | 1.47 | 1.52 | 1.91 | 1.75 | 2.11 | 2.05 | 1.64 | 1.99 | 1.90 |
| Q3 | 1.86 | 1.83 | 2.36 | 1.86 | 2.05 | 2.05 | 1.87 | 1.97 | 2.33 |
| Q4 | 1.69 | 1.68 | 1.88 | 1.76 | 1.71 | 1.84 | 1.74 | 1.75 | 1.84 |

### *c) Out-of-Pocket (OOP) Maximum*

By definition, the out-of-pocket maximum must be greater than or equal to the deductible because it includes spending under that deductible. The PPO and POS HIX data was combined and tabulated with a split at an in-network deductible of $1,400. An out-of-pocket maximum is not required for out-of-network services, but 95.3% and 93.5% of plans, respectively, did have an OOP maximum. A random number generator was used to assign whether an OOP maximum exists.

The out-of-pocket maximum varies as a multiplier of the in-network maximum. Approximately 20% of the time the out-of-network maximum was equal to the in-network maximum, 50% of the time it was double, 15% of the time about triple and 15% of the time quadruple or more (average value of 4.5 used). The multiplier values have no meaningful correlation to in-network OOP maximum amount, so a random number generator is used to assign the multiplier. Finally, it was tested against the out-of-network deductible to ensure it was greater.

### *d) Coinsurance*

Most plans that include out-of-network coverage also have higher plan level coinsurance for most services. BLS provided some tabulations comparing in- and out-of-network coinsurance. Cell sizes, however, were small, thus HIX was used as the primary source, but the result was not inconsistent with the NCS unpublished estimates. Plans with an in-network deductible less than $1400 had plan coinsurance 97.1% of the time to cover services. Plans with a larger in-network deductible utilized out-of-network plan coinsurance 94.8% of the time. Copays for each service for the remaining plans will be added in a later step. It is assumed that plans that offer coinsurance in-network were unlikely to offer copays for out-of-network services. Thus, the small percentage that were subject to out-of-network copays was taken only from the subset of plans that had copays for in-network

primary, specialty, outpatient, inpatient, and outpatient mental health. A random number generator was used to assign a yes/no value to determine whether coinsurance would be imputed.

The coinsurance value was imputed using transition matrices based on out-of-network coinsurances found in HIX cross tabulated by the in-network coinsurance. The out-of-network coinsurance was limited to greater than or equal to the in-network coinsurance. Separate transition matrices were used by deductible amount (less than $1400 versus greater than or equal to $1400). The in-network coinsurance is shown in the rows and the out-of-network coinsurance in the columns of Tables 17 and Table 18.

Cumulative probabilities were then calculated and compared against a random number generator. A final quality control step compared the out-of-network coinsurance to the in-network value to verify it was larger. Four cases within the EHBS had in-network coinsurance values larger than 70% and the out-of-network value was therefore recoded to be equal to the in-network value.

The transition matrices used are shown below and can be applied as demonstrated in the following example for assigning out of network coinsurance: A plan with a $1,000 deductible and 20% in-network coinsurance would have, based on Table 17, a 10% probability of being assigned a 30% out-of-network coinsurance, a 35% probability of being assigned a 40% out-of-network coinsurance and, finally, a 55% probability of being assigned a 50% out-of-network coinsurance.

***Table 17: Transition Matrix for PPO and POS plans with In-Network Deductibles Less than $1400***

| | **Out-of-Network Coinsurance** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **In-Network coinsurance** | **20** | **30** | **35** | **40** | **45** | **50** | **60** | **70** |
| **unknown** | 20% | 25% | 0% | 5% | 0% | 50% | 0% | 0% |
| **10** | 30% | 20% | 5% | 5% | 0% | 40% | 0% | 0% |
| **15** | 0% | 0% | 0% | 25% | 0% | 75% | 0% | 0% |
| **20** | 0% | 10% | 0% | 35% | 0% | 55% | 0% | 0% |
| **25** | 0% | 0% | 0% | 0% | 50% | 50% | 0% | 0% |
| **30** | 0% | 5% | 0% | 10% | 0% | 85% | 0% | 0% |
| **35** | 0% | 0% | 0% | 0% | 20% | 80% | 0% | 0% |
| **40** | 0% | 0% | 0% | 10% | 0% | 90% | 0% | 0% |
| **45** | 0% | 0% | 0% | 0% | 0% | 100% | 0% | 0% |
| **50** | 0% | 0% | 0% | 0% | 0% | 100% | 0% | 0% |

***Table 18: Transition Matrix for PPO and POS Plans with In-Network Deductibles Greater Than or Equal to $1400***

| | **Out-of-Network Coinsurance** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **In-Network coinsurance** | **20** | **30** | **35** | **40** | **45** | **50** | **60** | **70** |
| **unknown** | 15% | 20% | 0% | 5% | 0% | 60% | 0% | 0% |
| **5** | 5% | 0% | 10% | 30% | 0% | 55% | 0% | 0% |

| | Out-of-Network Coinsurance | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **In-Network coinsurance** | **20** | **30** | **35** | **40** | **45** | **50** | **60** | **70** |
| **10** | 0% | 30% | 0% | 25% | 0% | 45% | 0% | 0% |
| **15** | 0% | 0% | 5% | 75% | 0% | 20% | 0% | 0% |
| **20** | 0% | 5% | 0% | 30% | 0% | 65% | 0% | 0% |
| **25** | 0% | 0% | 0% | 0% | 33% | 67% | 0% | 0% |
| **30** | 0% | 0% | 0% | 5% | 0% | 90% | 5% | 0% |
| **35** | 0% | 0% | 0% | 0% | 0% | 100% | 0% | 0% |
| **40** | 0% | 0% | 0% | 5% | 0% | 90% | 5% | 0% |
| **45** | 0% | 0% | 0% | 0% | 0% | 100% | 0% | 0% |
| **50** | 0% | 0% | 0% | 0% | 0% | 95% | 5% | 0% |
| **60** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 100% |
| **70** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 100% |

### *e) Service Specific Copays*

#### (1) Preventive

Preventive services demonstrate a different pattern when compared to other service specific copays. Plans with out-of-network service-specific copays also have out-of-network copays for preventive services. This cannot be calculated as a multiplier of the in-network copay since, in all cases, the in-network preventive care copay is $0. There are a few plans that offer out-of-network preventive care with a $0 copay (9% of those with less than a $1,400 in-network deductible and 2% for those with an in-network deductible greater than or equal to $1400). These cases were assigned using a random number generator. We then compared that result to the respective probabilities. For most cases that had a copay for preventive care, the value of the out-of-network primary care copay was used, and that imputation is described in the following section ("All Other Services").

#### (2) All Other Services

For the remaining cases that used out-of-network copays instead of coinsurance (2.7% and 5.1% for the deductible levels, respectively), the copay was calculated using multipliers against the in-network copay, since only plans with in-network copays were targeted.[15] The multipliers were created using the ratio of the HIX out-of-network copay to the in-network copay. Separate multipliers (shown in Table 19) were used for specialty and primary care office visits, outpatient hospital, inpatient hospital, and inpatient and outpatient mental health.

To demonstrate, a plan with a $10 in-network primary care copay would have a 13% likelihood of being assigned a $10 out-of-network primary care copay (a multiplier of 1.0, per Table 19), a 14% (27%-13%) likelihood of being assigned a $15 copay (multiplier of 1.5), a 30% (57%-37%) likelihood of being assigned a $20 copay (multiplier 2.0), and finally a 43% likelihood of being assigned a $30 copay (multiplier of 3.0). If the random number drawn in this example was 0.48, then the primary care copay multiplier would be 2.0, since that row had a cumulative probability of up to 57% (but over 27% - the threshold for the 1.5 multiplier).

[15] There were no instances where it was not applicable due to using coinsurance for a service rather than a copay.

***Table 19: Multipliers for Out-of-Network Services by Cumulative Probabilities***

| | Cumulative Probabilities | | | | | |
|---|---|---|---|---|---|---|
| **Multiplier** | **Inpatient Copay** | **Outpatient Copay** | **Primary Copay** | **Specialty Copay** | **Outpatient MH Copay** | **Inpatient MH Copay** |
| 1.0 | 30% | 60% | 13% | 13% | 17% | 5% |
| 1.5 | 96% | 94% | 27% | 75% | 30% | 94% |
| 2.0 | 98% | 98% | 57% | 84% | 61% | 97% |
| 3.0 | 100% | 100% | 100% | 100% | 100% | 100% |

## *f) Prescription Drugs*

Out-of-network drug copays for retail drugs were not considered at this time, for two primary reasons. First, drug networks are typically established by the contracted Pharmacy Benefit Manager (PBM) and do not present the same access issues as either hospital or professional provider networks. For example, 98% of members in the Express Scripts network are within 5 miles of a preferred pharmacy.[16] Second, out-of-network coverage for non-retail (physician and hospital administered) drugs have implicitly been accounted for in the cost-sharing for inpatient and outpatient services.

[16] Awsumb, J. "Three Ways to Optimize a Pharmacy Network", May 25, 2022. Evernorth Health Services. Accessed at https://www.evernorth.com/articles/learn-about-pharmacy-networks.

# IV. Supplemental Tables and Figures

## A. Network Spending and Payments

The following series of tables display inpatient and outpatient spending from the MarketScan data, based on type of plan and network status (in-network vs. out-of-network status), and expand upon the tables found in the main report. Claims with negative payments were excluded. Claims with unknown network status were excluded. As noted previously, mental health and substance abuse claims were defined by MDCs 19 and 20. All amounts were weighted based on the weights derived for the ESI under 65 population as described previously, and dollars were weighted and rounded to the nearest whole dollar.

As shown in Table 20, 98% of all inpatient spending was considered in-network and paid at approximately 93%, while the out-of-network inpatient spending was paid at 80%. This varied by plan type, with the largest differences observed among basic/major medical plans (small number of claims), POS and HDHPs. The out-of-network gross and net payments do not reflect additional balance billing. The gross out-of-network amounts may thus be understated, and the net out-of-network payment may thus be overstated.

***Table 20: Gross and Net payments by Plan Type and Network Payment Status, All Inpatient Claims***

| Plan Type | Network Status | Gross Covered Payments | Percent | Net Payments | Percent | Net / Gross | Ratio in/out |
|---|---|---|---|---|---|---|---|
| 1. Basic/ Major Medical | In-Network | $451,950 | 98% | $320,750 | 98% | 0.71 | 127% |
| | Out-of-Network | $11,420 | 2% | $6,360 | 2% | 0.56 | |
| 2.Comprehensive | In-Network | $4,398,143,161 | 97% | $4,163,494,651 | 97% | 0.95 | 115% |
| | Out-of-Network | $145,913,048 | 3% | $119,794,400 | 3% | 0.82 | |
| 3.EPO | In-Network | $1,970,478,905 | 99% | $1,860,186,340 | 99% | 0.94 | 100% |
| | Out-of-Network | $29,252,701 | 1% | $27,503,801 | 1% | 0.94 | |
| 4. HMO | In-Network | $32,059,964,091 | 99% | $28,912,313,248 | 99% | 0.90 | 107% |
| | Out-of-Network | $433,898,020 | 1% | $364,582,345 | 1% | 0.84 | |
| 5. POS | In-Network | $34,223,542,245 | 98% | $32,351,957,253 | 98% | 0.95 | 120% |
| | Out-of-Network | $677,696,829 | 2% | $534,627,339 | 2% | 0.79 | |
| 6. PPO | In-Network | $105,886,825,431 | 98% | $99,648,642,411 | 98% | 0.94 | 117% |
| | Out-of-Network | $1,915,802,977 | 2% | $1,546,787,602 | 2% | 0.81 | |
| 7. POS with Capitation | In-Network | $197,052,228 | 98% | $191,873,842 | 98% | 0.97 | 107% |
| | Out-of-Network | $3,270,996 | 2% | $2,973,921 | 2% | 0.91 | |
| 8. CDHP | In-Network | $18,929,729,133 | 98% | $17,755,000,653 | 99% | 0.94 | 116% |
| | Out-of-Network | $322,685,337 | 2% | $260,370,214 | 1% | 0.81 | |
| 9. HDHP | In-Network | $28,522,531,498 | 98% | $26,513,615,739 | 98% | 0.93 | 122% |
| | Out-of-Network | $630,607,114 | 2% | $481,778,120 | 2% | 0.76 | |
| Unknown | In-Network | $3,130,179,798 | 99% | $2,915,507,786 | 99% | 0.93 | 115% |
| | Out-of-Network | $28,867,254 | 1% | $23,325,193 | 1% | 0.81 | |

| Plan Type | Network Status | Gross Covered Payments | Percent | Net Payments | Percent | Net / Gross | Ratio in/out |
|---|---|---|---|---|---|---|---|
| Total-Plan | In-Network | $229,318,446,490 | 98% | $214,312,591,923 | 98% | 0.93 | 116% |
| | Out-of-Network | $4,187,994,276 | 2% | $3,361,742,935 | 2% | 0.80 | |
| **Grand Total-Plan-Network** | | **$233,506,440,766** | **100%** | **$217,674,334,858** | **100%** | **0.93** | |

The pattern is similar for mental health and substance use disorder claims, as shown below in Table 21.

***Table 21: Gross and Net payments by Plan Type and Network Payment Status, MH/SUD Inpatient Claims***

| Plan Type | Network Status | Gross Covered Payments | Percent | Net Payments | Percent | Net / Gross | Ratio in/out |
|---|---|---|---|---|---|---|---|
| 1. Basic/ Major Medical | In-Network | $75,014 | 87% | $56,029 | 90% | 0.75 | 134% |
| | Out-of-Network | $11,420 | 13% | $6,360 | 0% | 0.56 | |
| 2.Comprehensive | In-Network | $182,987,960 | 87% | $170,412,367 | 88% | 0.93 | 109% |
| | Out-of-Network | $28,484,202 | 13% | $24,245,533 | 12% | 0.85 | |
| 3.EPO | In-Network | $76,810,249 | 89% | $70,247,627 | 89% | 0.91 | 100% |
| | Out-of-Network | $9,246,530 | 11% | $8,441,134 | 11% | 0.91 | |
| 4. HMO | In-Network | $1,216,375,363 | 96% | $1,100,448,357 | 96% | 0.90 | 99% |
| | Out-of-Network | $55,370,550 | 4% | $50,584,876 | 4% | 0.91 | |
| 5. POS | In-Network | $1,592,439,431 | 79% | $1,434,401,859 | 81% | 0.90 | 114% |
| | Out-of-Network | $418,437,192 | 21% | $330,068,609 | 19% | 0.79 | |
| 6. PPO | In-Network | $4,106,628,757 | 82% | $3,689,052,322 | 83% | 0.90 | 108% |
| | Out-of-Network | $883,633,862 | 18% | $738,021,114 | 17% | 0.84 | |
| 7. POS with Capitation | In-Network | $10,695,699 | 85% | $10,390,333 | 86% | 0.97 | 106% |
| | Out-of-Network | $1,916,846 | 15% | $1,761,298 | 14% | 0.92 | |
| 8. CDHP | In-Network | $728,814,473 | 82% | $646,259,182 | 82% | 0.89 | 106% |
| | Out-of-Network | $163,940,818 | 18% | $137,109,098 | 18% | 0.84 | |
| 9. HDHP | In-Network | $1,275,597,888 | 82% | $1,133,736,073 | 84% | 0.89 | 111% |
| | Out-of-Network | $278,161,339 | 18% | $222,091,164 | 16% | 0.80 | |
| Unknown | In-Network | $124,417,601 | 91% | $109,131,585 | 91% | 0.88 | 107% |
| | Out-of-Network | $12,614,371 | 9% | $10,321,138 | 9% | 0.82 | |
| Total-Plan | In-Network | $9,314,767,421 | 83% | $8,364,079,704 | 85% | 0.90 | 109% |
| | Out-of-Network | $1,851,805,710 | 17% | $1,522,643,965 | 15% | 0.82 | |
| **Grand Total-Plan-Network** | | **$11,166,573,130** | **100%** | **$9,886,723,669** | **100%** | **0.89** | |

Table 22 shows gross and net payments by plan type and network status for all outpatient claims. Overall, outpatient claims were largely in-network (3% net out-of-network) and the ratio of net payments to gross

covered payments (a proxy for outpatient AV) was 81%. This net to gross ratio, however, was 82% for in-network versus 68% out-of-network.

Turning to psychotherapy and mental health / substance use disorder services (Tables 23 and 24), we observed lower net/gross ratios of 72% and 77%, respectively. Outpatient psychotherapy showed the largest differential with 86% of net payments in-network but only 81% of gross payments in-network. This highlights the payment differential of 77% of in-network paid (net/gross) versus 53% out-of-network paid.

***Table 22: Gross and Net payments by Plan Type and Network Payment Status, All Outpatient Claims***

| Plan Type | Network Status | Gross Covered Payments | Percent | Net Payments | Percent | Net / Gross | Ratio in/out |
|---|---|---|---|---|---|---|---|
| 1. Basic/ Major Medical | In-Network | $3,274,768 | 86% | $2,419,868 | 88% | 0.74 | 114% |
| | Out-of-Network | $515,093 | 14% | $333,264 | 12% | 0.65 | |
| 2.Comprehensive | In-Network | $9,908,144,701 | 94% | $8,155,249,585 | 94% | 0.82 | 109% |
| | Out-of-Network | $668,168,058 | 6% | $505,798,000 | 6% | 0.76 | |
| 3.EPO | In-Network | $5,103,165,979 | 99% | $4,316,720,091 | 99% | 0.85 | 94% |
| | Out-of-Network | $63,354,130 | 1% | $56,777,600 | 1% | 0.90 | |
| 4. HMO | In-Network | $68,211,516,406 | 98% | $56,048,215,028 | 98% | 0.82 | 91% |
| | Out-of-Network | $1,160,916,180 | 2% | $1,046,138,157 | 2% | 0.90 | |
| 5. POS | In-Network | $72,141,996,547 | 95% | $60,914,815,369 | 96% | 0.84 | 136% |
| | Out-of-Network | $3,732,689,906 | 5% | $2,323,337,803 | 4% | 0.62 | |
| 6. PPO | In-Network | $234,702,453,045 | 96% | $194,772,506,523 | 97% | 0.83 | 121% |
| | Out-of-Network | $9,553,437,997 | 4% | $6,525,558,430 | 3% | 0.68 | |
| 7. POS with Capitation | In-Network | $396,182,527 | 95% | $368,547,545 | 97% | 0.93 | 173% |
| | Out-of-Network | $21,115,918 | 5% | $11,372,214 | 3% | 0.54 | |
| 8. CDHP | In-Network | $42,539,342,637 | 96% | $33,280,886,491 | 97% | 0.78 | 122% |
| | Out-of-Network | $1,659,454,768 | 4% | $1,063,549,126 | 3% | 0.64 | |
| 9. HDHP | In-Network | $68,603,439,673 | 96% | $51,723,841,543 | 96% | 0.75 | 118% |
| | Out-of-Network | $3,214,783,572 | 4% | $2,056,020,826 | 4% | 0.64 | |
| Unknown | In-Network | $7,096,849,023 | 97% | $5,842,345,157 | 98% | 0.82 | 107% |
| | Out-of-Network | $187,094,736 | 3% | $143,875,337 | 2% | 0.77 | |
| Total-Plan | In-Network | $508,703,090,538 | 96% | $415,423,127,332 | 97% | 0.82 | 120% |
| | Out-of-Network | $20,261,015,265 | 4% | $13,732,427,492 | 3% | 0.68 | |
| **Grand Total-Plan-Network** | | **$528,964,105,802** | **100%** | **$429,155,554,824** | **100%** | **0.81** | |

***Table 23: Gross and Net payments by Plan Type and Network Payment Status, Outpatient Psychotherapy Claims***

| Plan Type | Network Status | Gross Covered Payments | Percent | Net Payments | Percent | Net / Gross | Ratio in/out |
|---|---|---|---|---|---|---|---|
| 1. Basic/ Major Medical | In-Network | $202,507 | 100% | $146,634 | 100% | 0.72 | 72% |
| | Out-of-Network | $434 | 0% | $434 | 0% | 1.00 | |
| 2.Comprehensive | In-Network | $199,546,384 | 75% | $138,212,267 | 78% | 0.69 | 120% |
| | Out-of-Network | $66,495,272 | 25% | $38,516,706 | 22% | 0.58 | |
| 3.EPO | In-Network | $83,766,164 | 97% | $67,120,417 | 99% | 0.80 | 234% |
| | Out-of-Network | $2,942,580 | 3% | $1,006,462 | 1% | 0.34 | |
| 4. HMO | In-Network | $1,334,069,181 | 99% | $1,149,195,143 | 99% | 0.86 | 125% |
| | Out-of-Network | $16,737,064 | 1% | $11,520,525 | 1% | 0.69 | |
| 5. POS | In-Network | $1,873,666,773 | 72% | $1,531,990,069 | 79% | 0.82 | 149% |
| | Out-of-Network | $736,107,419 | 28% | $404,834,247 | 21% | 0.55 | |
| 6. PPO | In-Network | $4,686,376,304 | 81% | $3,642,535,164 | 86% | 0.78 | 145% |
| | Out-of-Network | $1,077,316,462 | 19% | $575,868,054 | 14% | 0.53 | |
| 7. POS with Capitation | In-Network | $9,611,839 | 90% | $8,957,831 | 93% | 0.93 | 159% |
| | Out-of-Network | $1,124,949 | 10% | $658,654 | 7% | 0.59 | |
| 8. CDHP | In-Network | $681,417,077 | 79% | $470,714,881 | 84% | 0.69 | 142% |
| | Out-of-Network | $182,626,508 | 21% | $89,019,335 | 16% | 0.49 | |
| 9. HDHP | In-Network | $1,246,209,144 | 78% | $794,412,152 | 83% | 0.64 | 133% |
| | Out-of-Network | $343,613,360 | 22% | $164,584,307 | 17% | 0.48 | |
| Unknown | In-Network | $149,088,047 | 86% | $110,198,171 | 88% | 0.74 | 117% |
| | Out-of-Network | $23,809,410 | 14% | $15,099,195 | 12% | 0.63 | |
| Total-Plan | In-Network | $10,263,750,913 | 81% | $7,913,336,095 | 86% | 0.77 | 145% |
| | Out-of-Network | $2,450,773,025 | 19% | $1,301,107,485 | 14% | 0.53 | |
| **Grand Total-Plan-Network** | | **$12,714,523,939** | **100%** | **$9,214,443,580** | **100%** | **0.72** | |

***Table 24: Gross and Net payments by Plan Type and Network Payment Status, Outpatient MH/SUD Claims***

| Plan Type | Network Status | Gross Covered Payments | Percent | Net Payments | Percent | Net / Gross | Ratio in/out |
|---|---|---|---|---|---|---|---|
| 1. Basic/ Major Medical | In-Network | $316,795 | 95% | $209,852 | 95% | 0.66 | 89% |
| | Out-of-Network | $15,149 | 5% | $11,317 | 5% | 0.75 | |
| 2.Comprehensive | In-Network | $566,742,848 | 78% | $426,657,820 | 79% | 0.75 | 108% |
| | Out-of-Network | $157,954,724 | 22% | $110,109,073 | 21% | 0.70 | |
| 3.EPO | In-Network | $215,234,688 | 96% | $180,796,498 | 96% | 0.84 | 102% |
| | Out-of-Network | $8,357,562 | 4% | $6,879,077 | 4% | 0.82 | |

| Plan Type | Network Status | Gross Covered Payments | Percent | Net Payments | Percent | Net / Gross | Ratio in/out |
|---|---|---|---|---|---|---|---|
| 4. HMO | In-Network | $4,034,526,833 | 98% | $3,488,675,445 | 98% | 0.86 | 105% |
| | Out-of-Network | $84,386,943 | 2% | $69,788,666 | 2% | 0.83 | |
| 5. POS | In-Network | $4,707,492,322 | 76% | $3,929,780,685 | 81% | 0.83 | 131% |
| | Out-of-Network | $1,446,970,072 | 24% | $922,007,663 | 19% | 0.64 | |
| 6. PPO | In-Network | $12,662,665,721 | 84% | $10,210,674,703 | 86% | 0.81 | 123% |
| | Out-of-Network | $2,451,279,499 | 16% | $1,606,910,865 | 14% | 0.66 | |
| 7. POS with Capitation | In-Network | $21,252,480 | 77% | $19,595,116 | 81% | 0.92 | 121% |
| | Out-of-Network | $6,245,752 | 23% | $4,746,042 | 19% | 0.76 | |
| 8. CDHP | In-Network | $2,161,214,904 | 82% | $1,591,103,154 | 84% | 0.74 | 114% |
| | Out-of-Network | $463,207,808 | 18% | $298,304,078 | 16% | 0.64 | |
| 9. HDHP | In-Network | $3,892,968,395 | 82% | $2,727,877,264 | 84% | 0.70 | 112% |
| | Out-of-Network | $845,816,027 | 18% | $529,638,180 | 16% | 0.63 | |
| Unknown | In-Network | $426,530,204 | 89% | $335,488,604 | 90% | 0.79 | 112% |
| | Out-of-Network | $50,233,716 | 11% | $35,434,890 | 10% | 0.71 | |
| Total-Plan | In-Network | $28,688,628,394 | 84% | $22,910,649,289 | 86% | 0.80 | 123% |
| | Out-of-Network | $5,514,452,103 | 16% | $3,583,818,533 | 14% | 0.65 | |
| **Grand Total-Plan-Network** | | **$34,203,080,497** | **100%** | **$26,494,467,823** | **100%** | **0.77** | |

# B. Descriptive Statistics of Results

## 1. Detailed Actuarial Value Tabulations

The series of tables below show the cross tabulations between actuarial values and each of the descriptor variables for all plan types (including PPO, POS and HDED and HMO). We also show AVs calculated for plan types excluding HMOs, as the lack of out-of-network coverage beyond emergency room shows a different story. These tables expand upon those found in the main report and illustrate the differences in actuarial values in total and by service. They also show differences between the in-network and out-of-network plan parameters and provide a set of tables that can be referenced or incorporated into future work.

### *a) Summary Statistics including HMOs*

*Table 25.a: Average In-Network and Out-of-Network AVs by Employer Size (All Plans)*

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **3-9 Workers** | 0.825 | 0.877 | 0.757 | 0.821 | 0.548 | 0.645 | 0.429 | 0.531 |
| **10-24 Workers** | 0.822 | 0.876 | 0.729 | 0.855 | 0.551 | 0.644 | 0.430 | 0.545 |
| **25-49 Workers** | 0.831 | 0.882 | 0.736 | 0.871 | 0.599 | 0.702 | 0.467 | 0.591 |
| **50-199 Workers** | 0.835 | 0.880 | 0.751 | 0.870 | 0.579 | 0.670 | 0.457 | 0.578 |
| **200-999 Workers** | 0.845 | 0.888 | 0.767 | 0.875 | 0.609 | 0.703 | 0.484 | 0.608 |
| **1,000-4,999 Workers** | 0.847 | 0.893 | 0.787 | 0.847 | 0.542 | 0.627 | 0.430 | 0.542 |
| **All** | 0.842 | 0.888 | 0.772 | 0.855 | 0.561 | 0.650 | 0.444 | 0.559 |

Average in-network actuarial values increased slightly as employer size increased across each AV category. Average out-of-network actuarial values were consistently lower and did not show a linear trend as employer size increases (Table 25.a).

As shown in Table 25.b, State/Local Government had the highest AV across each sector for both in-network and out-of-network values.

*Table 25.b: Average In-Network and Out-of-Network AVs by Industry (All Plans)*

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Agriculture/Mining/ Construction** | 0.827 | 0.879 | 0.732 | 0.865 | 0.601 | 0.703 | 0.467 | 0.596 |
| **Manufacturing** | 0.836 | 0.883 | 0.760 | 0.855 | 0.632 | 0.725 | 0.506 | 0.635 |
| **Transportation/Communications/Utilities** | 0.853 | 0.902 | 0.801 | 0.831 | 0.520 | 0.602 | 0.413 | 0.518 |
| **Wholesale** | 0.800 | 0.866 | 0.734 | 0.765 | 0.529 | 0.622 | 0.408 | 0.523 |
| **Retail** | 0.842 | 0.884 | 0.777 | 0.857 | 0.485 | 0.567 | 0.380 | 0.477 |
| **Finance** | 0.850 | 0.902 | 0.774 | 0.861 | 0.612 | 0.700 | 0.491 | 0.618 |
| **Service** | 0.841 | 0.885 | 0.766 | 0.866 | 0.550 | 0.638 | 0.434 | 0.546 |
| **State/Local Government** | 0.866 | 0.902 | 0.805 | 0.886 | 0.621 | 0.721 | 0.491 | 0.613 |

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Health Care** | 0.845 | 0.887 | 0.780 | 0.857 | 0.545 | 0.629 | 0.434 | 0.544 |
| **All** | 0.842 | 0.888 | 0.772 | 0.855 | 0.561 | 0.650 | 0.444 | 0.559 |

Average in-network and out-of-network actuarial values were slightly higher in the public sector compared to the private sector (Table 25.c). As previously reported, HMO's had higher average in-network AVs and lower average out-of-network AVs compared to other plan types (Table 25.d).

***Table 25.c: Average In-Network and Out-of-Network AVs by Sector (All Plans)***

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Private Sector** | 0.840 | 0.887 | 0.769 | 0.853 | 0.557 | 0.645 | 0.441 | 0.555 |
| **Non-Federal Public Sector** | 0.866 | 0.902 | 0.805 | 0.886 | 0.621 | 0.721 | 0.491 | 0.613 |
| **All** | 0.842 | 0.888 | 0.772 | 0.855 | 0.561 | 0.650 | 0.444 | 0.559 |

***Table 25.d: Average In-Network and Out-of-Network AVs by Plan Type (All Plans)***

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **HMO** | 0.883 | 0.925 | 0.852 | 0.843 | 0.028 | 0.063 | 0.000 | 0.000 |
| **PPO** | 0.849 | 0.885 | 0.789 | 0.865 | 0.687 | 0.777 | 0.566 | 0.689 |
| **POS** | 0.839 | 0.887 | 0.762 | 0.859 | 0.688 | 0.803 | 0.541 | 0.675 |
| **HDED** | 0.809 | 0.872 | 0.700 | 0.845 | 0.623 | 0.733 | 0.470 | 0.632 |
| **All** | 0.842 | 0.888 | 0.772 | 0.855 | 0.561 | 0.650 | 0.444 | 0.559 |

*Table 25.e: Average In-Network and Out-of-Network AVs by Region (All Plans)*

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Northeast** | 0.859 | 0.910 | 0.793 | 0.854 | 0.556 | 0.641 | 0.446 | 0.551 |
| **Midwest** | 0.829 | 0.879 | 0.749 | 0.849 | 0.617 | 0.716 | 0.483 | 0.620 |
| **South** | 0.832 | 0.877 | 0.755 | 0.859 | 0.597 | 0.690 | 0.473 | 0.596 |
| **West** | 0.857 | 0.893 | 0.807 | 0.859 | 0.440 | 0.513 | 0.348 | 0.432 |
| **All** | 0.842 | 0.888 | 0.772 | 0.855 | 0.561 | 0.650 | 0.444 | 0.559 |

Average actuarial values were relatively stable by region and by funding (Table 25.e / Table 25.g) and tended to be higher for more expensive annual premiums for single coverage (Table 25.f).

*Table 25.f: Average In-Network and Out-of-Network AVs by Annual Premiums for Single Coverage (All Plans)*

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Less than $5,000** | 0.814 | 0.874 | 0.718 | 0.838 | 0.535 | 0.634 | 0.409 | 0.525 |
| **$5,000 - LT $7,500** | 0.828 | 0.877 | 0.749 | 0.849 | 0.567 | 0.661 | 0.441 | 0.566 |
| **$7,500 - LT $10,000** | 0.855 | 0.897 | 0.795 | 0.860 | 0.547 | 0.631 | 0.438 | 0.545 |
| **$10,000 +** | 0.865 | 0.907 | 0.805 | 0.869 | 0.605 | 0.687 | 0.497 | 0.602 |
| **All** | 0.842 | 0.888 | 0.772 | 0.855 | 0.561 | 0.650 | 0.444 | 0.559 |

*Table 25.g: Average In-Network and Out-of-Network AVs by Funding (All Plans)*

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Fully Insured/ Not Level-Funded** | 0.845 | 0.888 | 0.767 | 0.878 | 0.501 | 0.589 | 0.388 | 0.492 |
| **Self-Insured or Level-Funded** | 0.841 | 0.888 | 0.774 | 0.846 | 0.586 | 0.675 | 0.467 | 0.586 |

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **All** | 0.842 | 0.888 | 0.772 | 0.855 | 0.561 | 0.650 | 0.444 | 0.559 |

***Table 25.h: Average In-Network and Out-of-Network AVs by Union Status (All Plans)***

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Firm Has Union Workers** | 0.858 | 0.903 | 0.804 | 0.850 | 0.520 | 0.601 | 0.413 | 0.518 |
| **Firm Has No Union Workers** | 0.833 | 0.880 | 0.754 | 0.858 | 0.584 | 0.677 | 0.461 | 0.582 |
| **All** | 0.842 | 0.888 | 0.772 | 0.855 | 0.561 | 0.650 | 0.444 | 0.559 |

Average in-network actuarial values for union workers were slightly higher compared to firms with no union workers; however average actuarial values for union workers were slightly lower when looking out-of-network (Table 25.h).

## *b) Summary Statistics Excluding HMOs*

The tables shown below typically follow a similar pattern, when excluding HMO types. Average in-network actuarial values typically increased slightly as employer size increased across each AV category. Average out-of-network actuarial values were consistently lower and did not show a linear trend as employer size increases (Table 26.a).

***Table 26.a: Average In-Network and Out-of-Network AVs by Employer Size (Excluding HMOs)***

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **3-9 Workers** | 0.831 | 0.871 | 0.750 | 0.875 | 0.679 | 0.792 | 0.537 | 0.665 |
| **10-24 Workers** | 0.822 | 0.876 | 0.728 | 0.856 | 0.641 | 0.745 | 0.505 | 0.639 |
| **25-49 Workers** | 0.828 | 0.882 | 0.728 | 0.872 | 0.663 | 0.774 | 0.520 | 0.658 |
| **50-199 Workers** | 0.833 | 0.881 | 0.747 | 0.869 | 0.656 | 0.756 | 0.521 | 0.658 |
| **200-999 Workers** | 0.840 | 0.885 | 0.759 | 0.872 | 0.671 | 0.771 | 0.536 | 0.673 |
| **1,000-4,999 Workers** | 0.834 | 0.881 | 0.764 | 0.848 | 0.668 | 0.764 | 0.536 | 0.674 |

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | **Total** | **Hospital** | **Physician** | **RX** | **Total** | **Hospital** | **Physician** | **RX** |
| **All** | 0.834 | 0.881 | 0.756 | 0.858 | 0.666 | 0.765 | 0.531 | 0.668 |

As shown in Table 26.b, State/Local Government had the highest AV across each sector for in-network AVs and most out-of-network AVs.

***Table 26.b: Average In-Network and Out-of-Network AVs by Industry (Excluding HMOs)***

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | **Total** | **Hospital** | **Physician** | **RX** | **Total** | **Hospital** | **Physician** | **RX** |
| **Agriculture/Mining/ Construction** | 0.828 | 0.883 | 0.726 | 0.868 | 0.649 | 0.758 | 0.506 | 0.647 |
| **Manufacturing** | 0.835 | 0.882 | 0.760 | 0.854 | 0.683 | 0.781 | 0.549 | 0.689 |
| **Transportation/ Communications/Utilities** | 0.830 | 0.885 | 0.760 | 0.824 | 0.660 | 0.754 | 0.531 | 0.666 |
| **Wholesale** | 0.812 | 0.857 | 0.734 | 0.839 | 0.643 | 0.749 | 0.501 | 0.643 |
| **Retail** | 0.826 | 0.866 | 0.744 | 0.873 | 0.642 | 0.741 | 0.511 | 0.642 |
| **Finance** | 0.840 | 0.896 | 0.759 | 0.853 | 0.698 | 0.793 | 0.563 | 0.709 |
| **Service** | 0.834 | 0.880 | 0.751 | 0.864 | 0.664 | 0.764 | 0.528 | 0.666 |
| **State/Local Government** | 0.858 | 0.896 | 0.789 | 0.883 | 0.694 | 0.802 | 0.552 | 0.689 |
| **Health Care** | 0.835 | 0.876 | 0.766 | 0.854 | 0.652 | 0.745 | 0.524 | 0.656 |
| **All** | 0.834 | 0.881 | 0.756 | 0.858 | 0.666 | 0.765 | 0.531 | 0.668 |

Average in-network and out-of-network actuarial values were slightly higher in the public sector compared to the private sector (Table 26.c).

*Table 26.c: Average In-Network and Out-of-Network AVs by Sector (Excluding HMOs)*

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Private Sector** | 0.832 | 0.880 | 0.753 | 0.856 | 0.663 | 0.762 | 0.529 | 0.667 |
| **Non-Federal Public Sector** | 0.858 | 0.896 | 0.789 | 0.883 | 0.694 | 0.802 | 0.552 | 0.689 |
| **All** | 0.834 | 0.881 | 0.756 | 0.858 | 0.666 | 0.765 | 0.531 | 0.668 |

Excluding HMO's, we see PPO and POS plans had higher average AVs compared to HDED plans (Table 26.d).

*Table 26.d: Average In-Network and Out-of-Network AVs by Plan Type (Excluding HMOs)*

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **PPO** | 0.849 | 0.885 | 0.789 | 0.865 | 0.687 | 0.777 | 0.566 | 0.689 |
| **POS** | 0.839 | 0.887 | 0.762 | 0.859 | 0.688 | 0.803 | 0.541 | 0.675 |
| **HDED** | 0.809 | 0.872 | 0.700 | 0.845 | 0.623 | 0.733 | 0.470 | 0.632 |
| **All** | 0.834 | 0.881 | 0.756 | 0.858 | 0.666 | 0.765 | 0.531 | 0.668 |

Average actuarial values were relatively stable by region (Table 26.e).

*Table 26.e: Average In-Network and Out-of-Network AVs by Region (Excluding HMOs)*

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Hospital | Physician | RX | Total | Hospital | Physician | RX |
| **Northeast** | 0.857 | 0.905 | 0.784 | 0.869 | 0.697 | 0.794 | 0.565 | 0.698 |
| **Midwest** | 0.826 | 0.878 | 0.743 | 0.847 | 0.659 | 0.763 | 0.517 | 0.664 |
| **South** | 0.828 | 0.873 | 0.748 | 0.859 | 0.657 | 0.757 | 0.523 | 0.659 |
| **West** | 0.833 | 0.874 | 0.762 | 0.860 | 0.658 | 0.750 | 0.533 | 0.661 |
| **All** | 0.834 | 0.881 | 0.756 | 0.858 | 0.666 | 0.765 | 0.531 | 0.668 |

In general, average AVs tended to be higher for more expensive annual premiums for single coverage (Table 26.f) and for those where the firm had union workers (Table 26.h). By funding status, there was no discernable pattern of average actuarial values (Table 26.g).

***Table 26.f: Average In-Network and Out-of-Network AVs by Annual Premiums for Single Coverage (Excluding HMOs)***

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | **Total** | **Hospital** | **Physician** | **RX** | **Total** | **Hospital** | **Physician** | **RX** |
| **Less than $5,000** | 0.821 | 0.875 | 0.713 | 0.876 | 0.634 | 0.746 | 0.489 | 0.627 |
| **$5,000 - LT $7,500** | 0.821 | 0.871 | 0.735 | 0.851 | 0.649 | 0.752 | 0.508 | 0.652 |
| **$7,500 - LT $10,000** | 0.842 | 0.885 | 0.772 | 0.859 | 0.679 | 0.774 | 0.549 | 0.683 |
| **$10,000 +** | 0.863 | 0.905 | 0.804 | 0.866 | 0.703 | 0.793 | 0.581 | 0.704 |
| **All** | 0.834 | 0.881 | 0.756 | 0.858 | 0.666 | 0.765 | 0.531 | 0.668 |

***Table 26.g: Average In-Network and Out-of-Network AVs by Funding (Excluding HMOs)***

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | **Total** | **Hospital** | **Physician** | **RX** | **Total** | **Hospital** | **Physician** | **RX** |
| **Fully Insured/ Not Level-Funded** | 0.833 | 0.881 | 0.743 | 0.873 | 0.653 | 0.758 | 0.513 | 0.651 |
| **Self-Insured or Level-Funded** | 0.834 | 0.881 | 0.761 | 0.852 | 0.670 | 0.767 | 0.538 | 0.675 |
| **All** | 0.834 | 0.881 | 0.756 | 0.858 | 0.666 | 0.765 | 0.531 | 0.668 |

***Table 26.h: Average In-Network and Out-of-Network AVs by Union Status (Excluding HMOs)***

| | In-Network Actuarial Values | | | | Out-of-Network Actuarial Values | | | |
|---|---|---|---|---|---|---|---|---|
| | **Total** | **Hospital** | **Physician** | **RX** | **Total** | **Hospital** | **Physician** | **RX** |
| **Firm Has Union Workers** | 0.841 | 0.888 | 0.775 | 0.846 | 0.673 | 0.768 | 0.541 | 0.678 |
| **Firm Has No Union Workers** | 0.831 | 0.877 | 0.747 | 0.863 | 0.662 | 0.763 | 0.526 | 0.664 |
| **All** | 0.834 | 0.881 | 0.756 | 0.858 | 0.666 | 0.765 | 0.531 | 0.668 |

## 2. Distributions of Actuarial Values

Beyond the slight differences in means seen in Section V.A.1.a of the main report, the distribution of actuarial values between the MEPS and MarketScan data sets also varied slightly as shown in Table 27.a – Table 27.c. The actuarial values converged in the higher percentiles, and the mean AV is very close to median in both data sets. This distributional variance held when looking at AV by funding type and plan type, though the effect was slightly less pronounced for both HMOs and high deductible plans. Actuarial values for HMO plans were more similar throughout the distribution, and high deductible actuarial values calculated with the MarketScan data were slightly lower throughout.

***Table 27.a: Distribution of In-Network Actuarial Values: MarketScan vs. MEPS as claims***

| Percentile | MarketScan AV | MEPS AV |
|---|---|---|
| 0% | 0.539 | 0.553 |
| 5% | 0.742 | 0.765 |
| 10% | 0.765 | 0.784 |
| 20% | 0.788 | 0.809 |
| 30% | 0.808 | 0.824 |
| 40% | 0.825 | 0.841 |
| 50% | 0.842 | 0.856 |
| 60% | 0.857 | 0.871 |
| 70% | 0.877 | 0.890 |
| 80% | 0.898 | 0.910 |
| 90% | 0.922 | 0.933 |
| 95% | 0.947 | 0.957 |
| 100% | 0.992 | 1.000 |
| Mean | 0.842 | 0.857 |

***Table 27.b: Distribution of In-Network Actuarial Values: Comparison by Funding***

| | Fully Insured | | Self-Insured / Level-Funded | |
|---|---|---|---|---|
| | MarketScan | MEPS | MarketScan | MEPS |
| 0% | 0.539 | 0.553 | 0.540 | 0.562 |
| 5% | 0.741 | 0.755 | 0.742 | 0.767 |
| 10% | 0.760 | 0.779 | 0.767 | 0.787 |
| 20% | 0.786 | 0.804 | 0.789 | 0.810 |
| 30% | 0.806 | 0.823 | 0.808 | 0.824 |
| 40% | 0.823 | 0.840 | 0.827 | 0.842 |
| 50% | 0.841 | 0.859 | 0.842 | 0.854 |
| 60% | 0.864 | 0.878 | 0.856 | 0.870 |
| 70% | 0.885 | 0.899 | 0.874 | 0.887 |

| | Fully Insured | | Self-Insured / Level-Funded | |
|---|---|---|---|---|
| | MarketScan | MEPS | MarketScan | MEPS |
| 80% | 0.902 | 0.913 | 0.894 | 0.907 |
| 90% | 0.942 | 0.953 | 0.913 | 0.926 |
| 95% | 0.973 | 0.981 | 0.935 | 0.945 |
| 100% | 0.987 | 0.996 | 0.992 | 1.000 |
| Mean | 0.845 | 0.861 | 0.841 | 0.856 |

***Table 27.c: Distribution of In-Network Actuarial Values: Comparison by Plan Type***

| | HMO | | PPO | | POS | | High Deductible | |
|---|---|---|---|---|---|---|---|---|
| | MarketScan | MEPS | MarketScan | MEPS | MarketScan | MEPS | MarketScan | MEPS |
| 0% | 0.619 | 0.633 | 0.539 | 0.553 | 0.548 | 0.562 | 0.540 | 0.567 |
| 5% | 0.729 | 0.753 | 0.757 | 0.776 | 0.745 | 0.760 | 0.735 | 0.760 |
| 10% | 0.773 | 0.786 | 0.780 | 0.798 | 0.758 | 0.779 | 0.746 | 0.774 |
| 20% | 0.827 | 0.835 | 0.804 | 0.820 | 0.788 | 0.806 | 0.770 | 0.791 |
| 30% | 0.870 | 0.882 | 0.821 | 0.837 | 0.816 | 0.833 | 0.782 | 0.804 |
| 40% | 0.875 | 0.892 | 0.836 | 0.849 | 0.827 | 0.841 | 0.793 | 0.816 |
| 50% | 0.899 | 0.909 | 0.848 | 0.862 | 0.837 | 0.853 | 0.803 | 0.825 |
| 60% | 0.902 | 0.912 | 0.866 | 0.877 | 0.852 | 0.866 | 0.818 | 0.840 |
| 70% | 0.922 | 0.933 | 0.878 | 0.892 | 0.879 | 0.892 | 0.831 | 0.851 |
| 80% | 0.944 | 0.955 | 0.893 | 0.907 | 0.891 | 0.902 | 0.852 | 0.868 |
| 90% | 0.974 | 0.981 | 0.917 | 0.931 | 0.906 | 0.919 | 0.878 | 0.889 |
| 95% | 0.987 | 0.996 | 0.937 | 0.949 | 0.925 | 0.937 | 0.897 | 0.914 |
| 100% | 0.987 | 0.996 | 0.988 | 0.997 | 0.973 | 0.983 | 0.931 | 0.942 |
| Mean | 0.883 | 0.894 | 0.849 | 0.863 | 0.839 | 0.854 | 0.809 | 0.829 |

The figures below (Figures 1-18) show the weighted distribution for each actuarial value variable. The graphics present a visual representation of how the actuarial values are concentrated.

Figure 1 shows the distribution of in-network AV, which shows that most AVs were concentrated around 0.8375. There was more dispersion for in-network hospital AVs and in-network physician AVs (Figures 2 and 3), and for in-network Rx AVs, we saw a larger concentration of AVs at zero (Figure 4).

*Figure 1: Weighted Distribution and Probability Plot for In-Network AV*

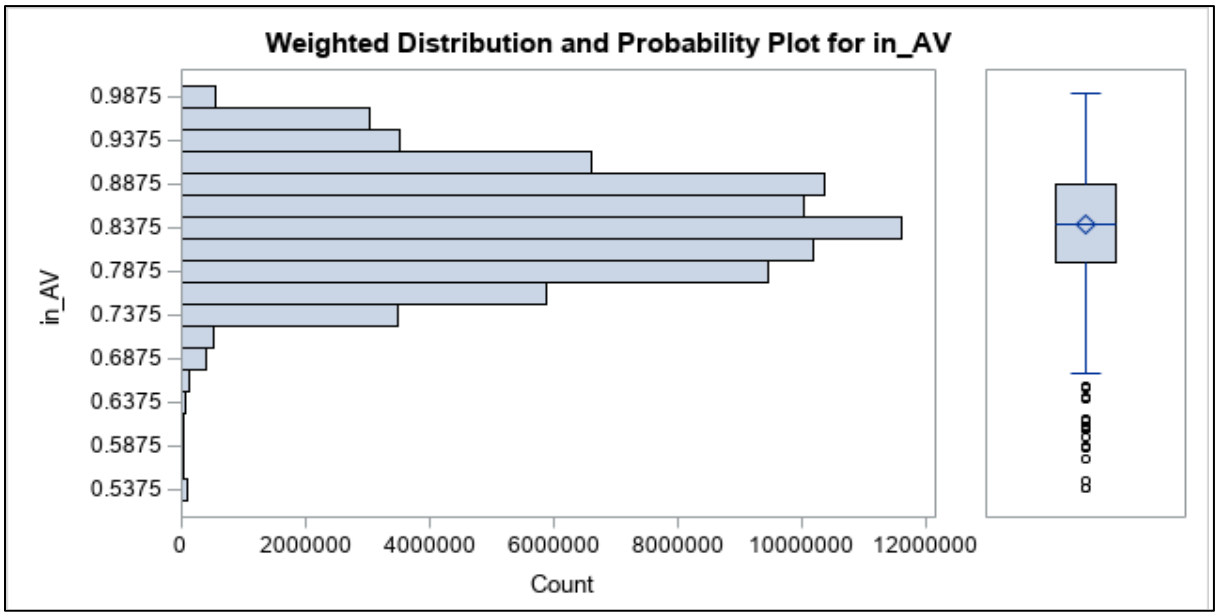



*Figure 2: Weighted Distribution and Probability Plot for In-Network Hospital AV*

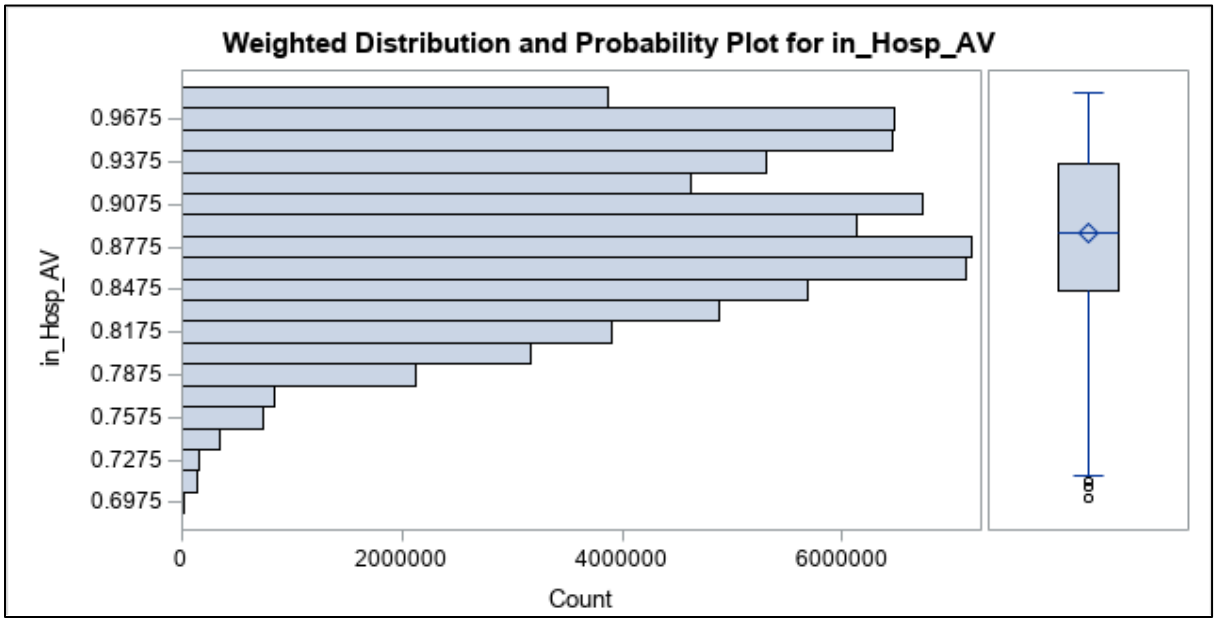


*Figure 3: Weighted Distribution and Probability Plot for In-Network Physician AV*

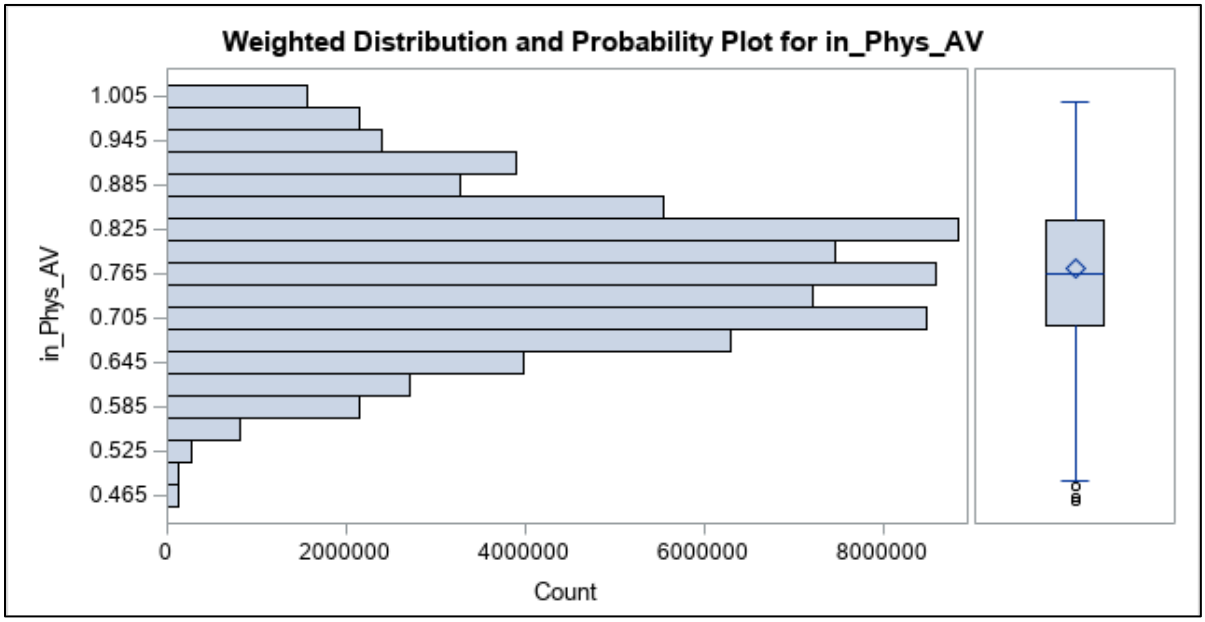
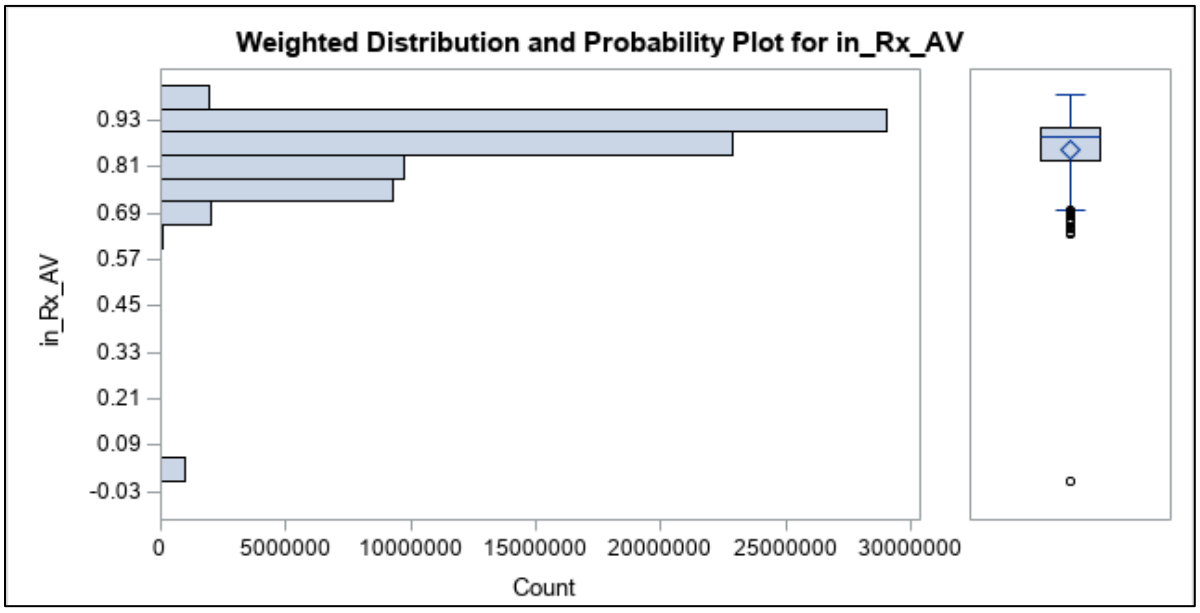



*Figure 4: Weighted Distribution and Probability Plot for In-Network Rx AV*



The out-of-network figures below (Figures 5-8) starkly show the lack of out-of-network coverage for those in HMOs.

***Figure 5: Weighted Distribution and Probability Plot for Out-of-Network AV***

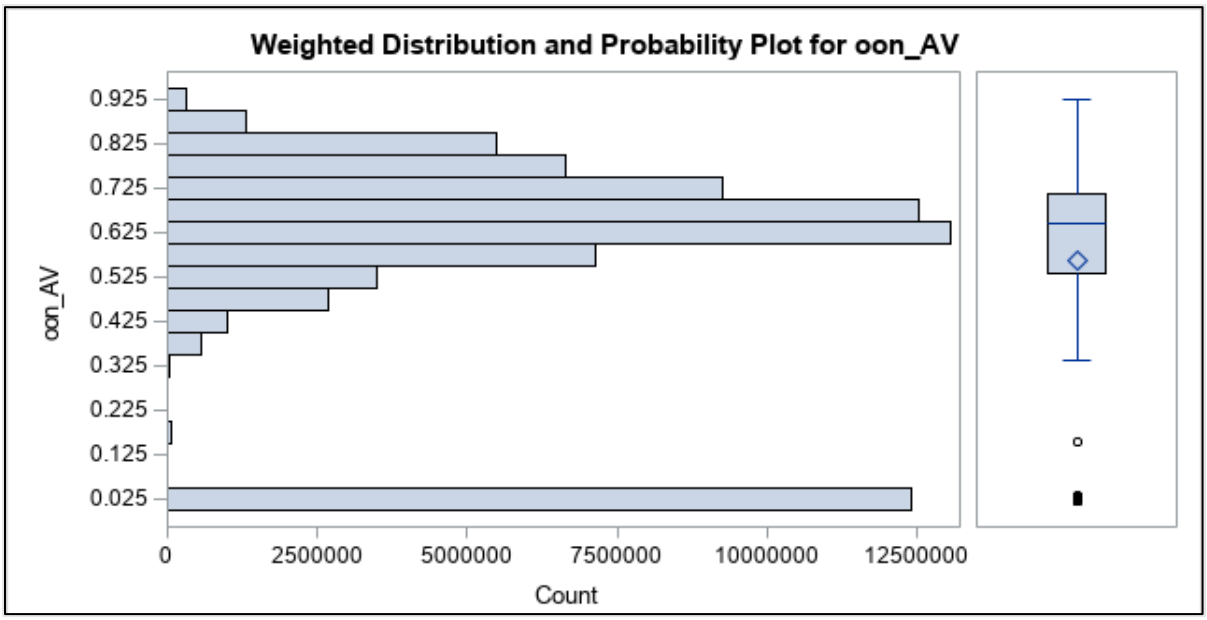



***Figure 6: Weighted Distribution and Probability Plot for Out-of-Network Hospital AV***

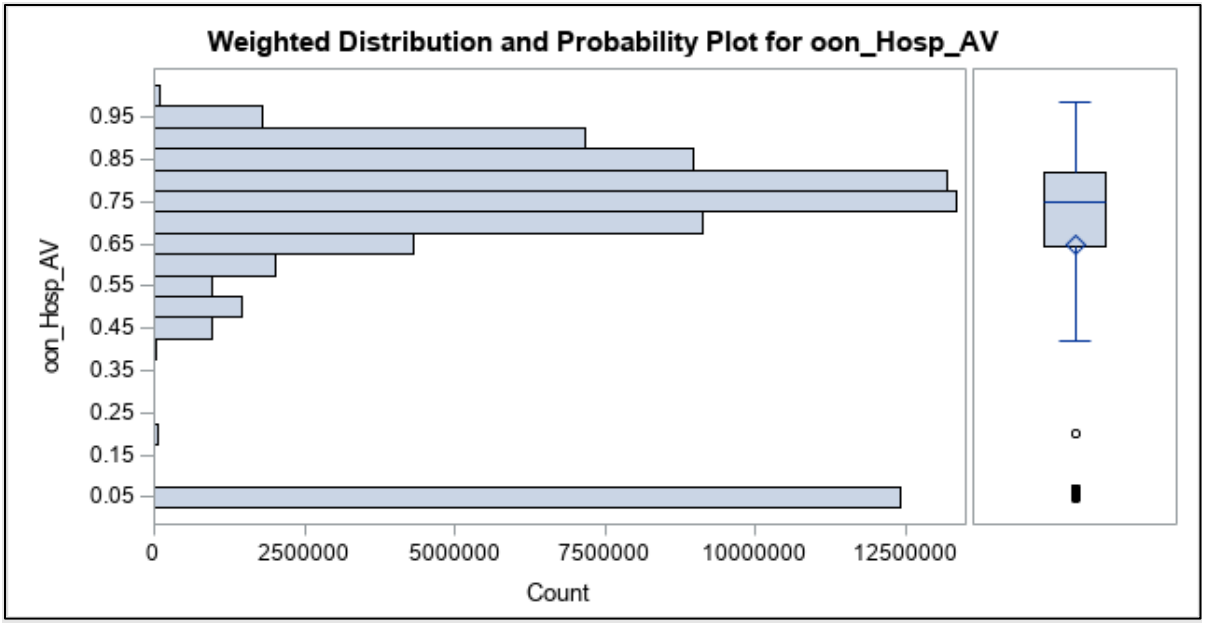


*Figure 7: Weighted Distribution and Probability Plot for Out-of-Network Physician AV*

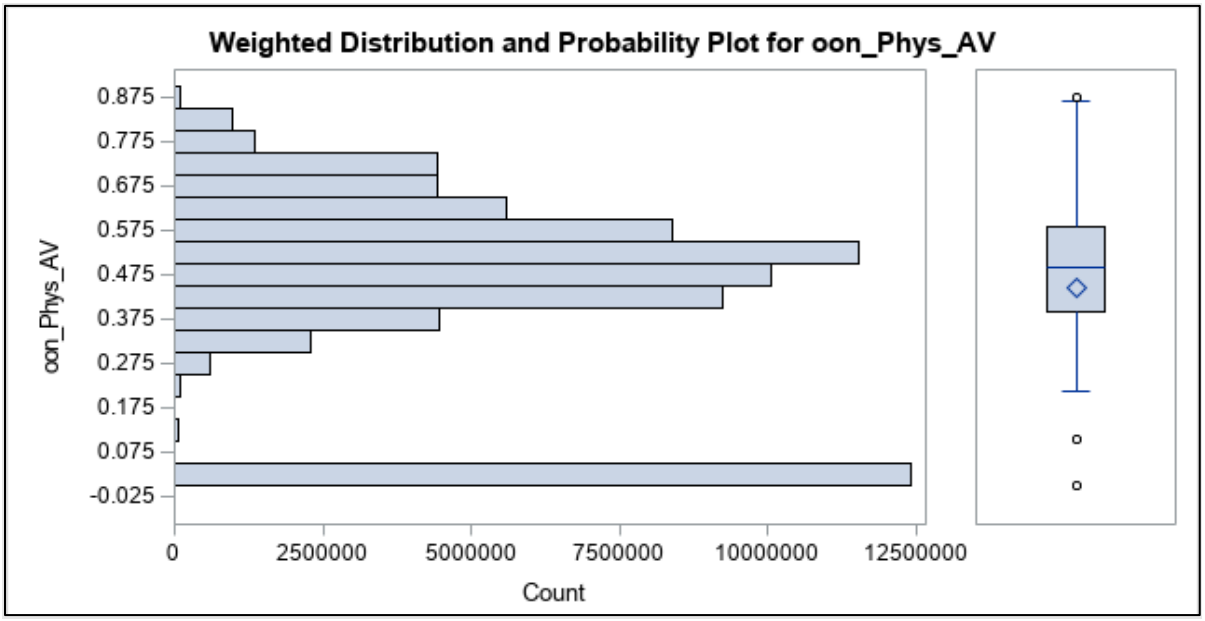
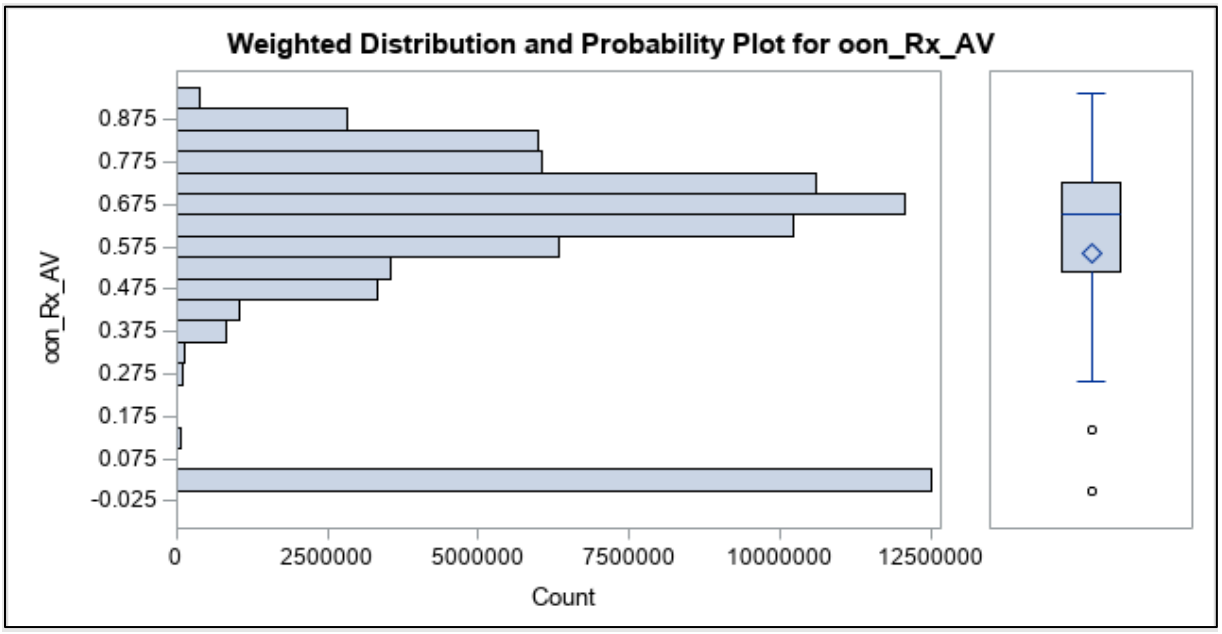
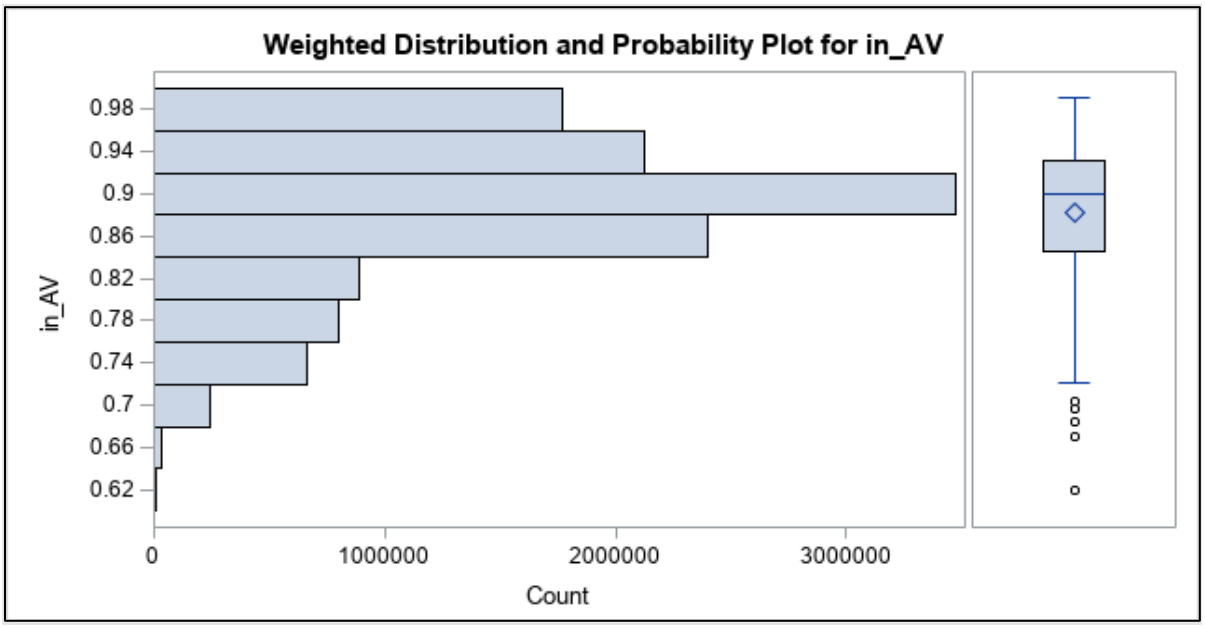



*Figure 8: Weighted Distribution and Probability Plot for Out-of-Network Rx AV*



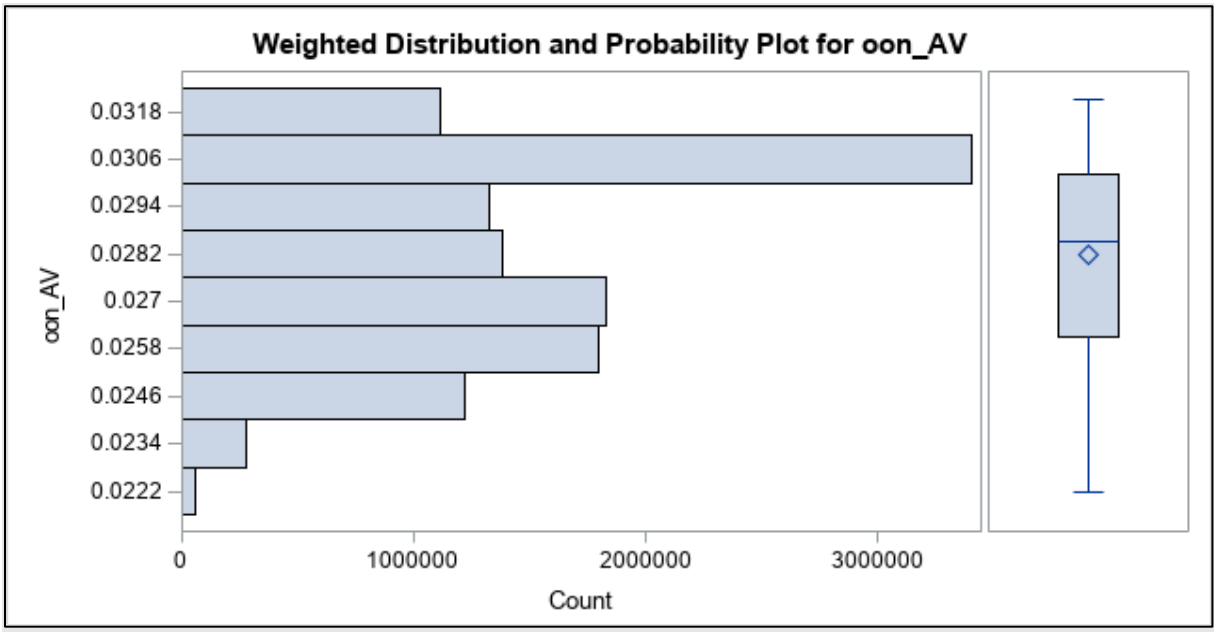
The following figures (Figures 9-18) examine in-network and out-of-network actuarial values by type of plan.

***Figure 9: Weighted Distribution and Probability Plot for In-Network AV, HMO Plans***




While the in-network HMO AVs were concentrated around a value of approximately 0.90, the out-of-network values were much lower, reflecting coverage only for emergency room care (Figures 9 and 10).

***Figure 10: Weighted Distribution and Probability Plot for Out-of-Network AV, HMO Plans***



In general, we saw a similar pattern between in-network and out-of-network actuarial values for the other plan types, although not quite as stark as shown for HMOs (Figures 11-16). Out-of-network actuarial values were consistently lower, compared to the distribution of in-network actuarial values.

***Figure 11: Weighted Distribution and Probability Plot for In-Network AV, PPO Plans***

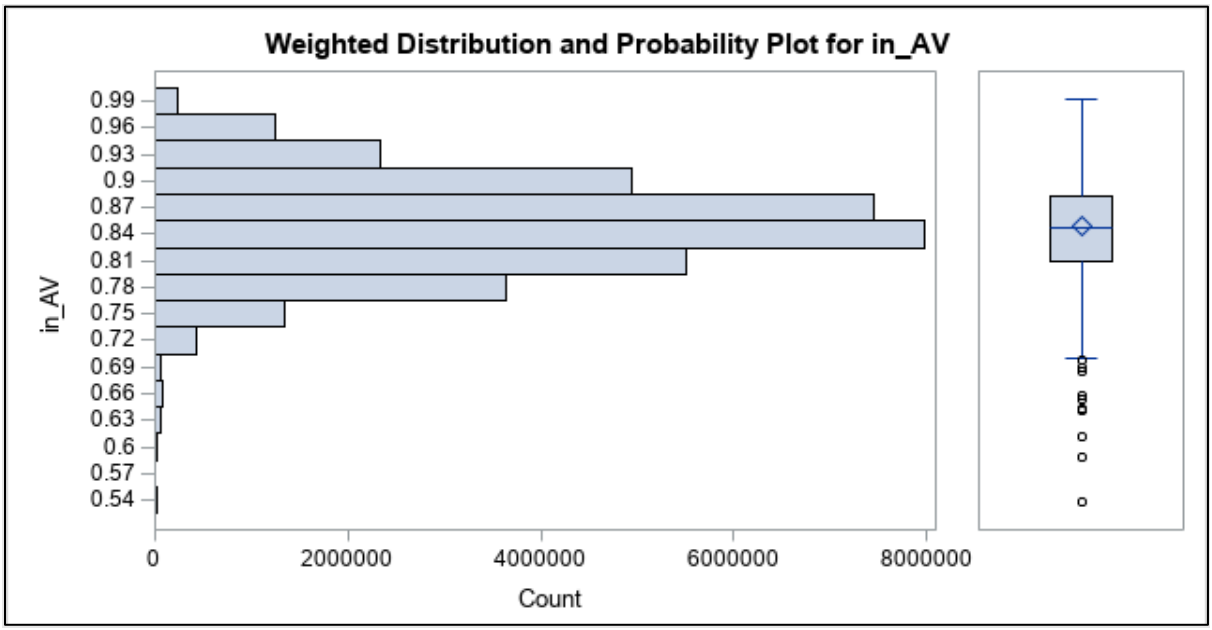



***Figure 12: Weighted Distribution and Probability Plot for Out-of-Network AV, PPO Plans***

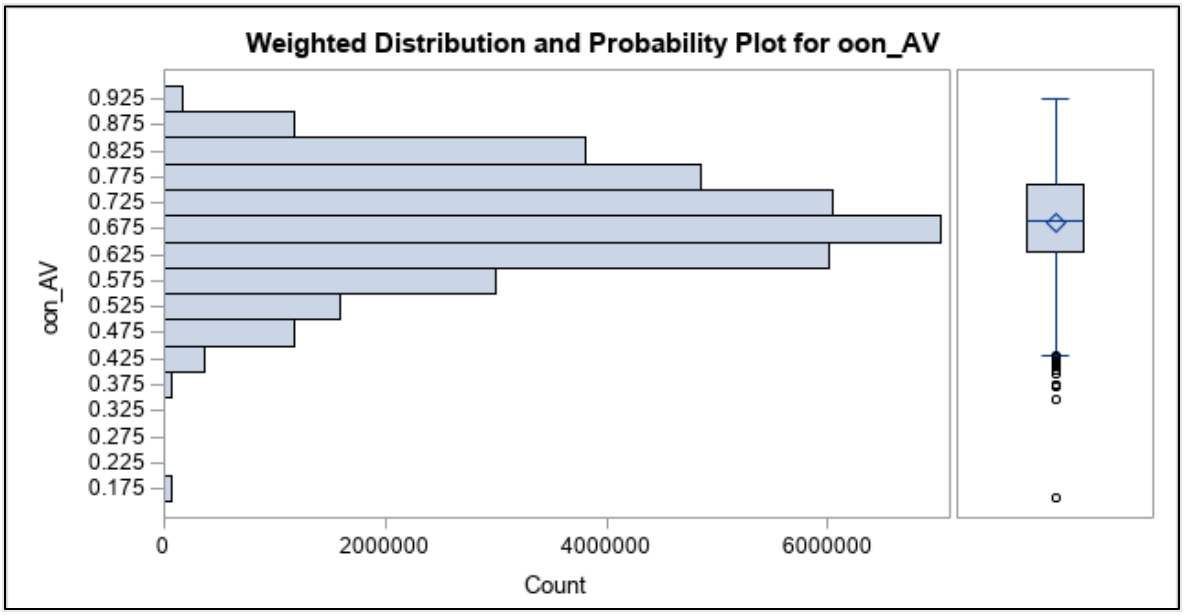


*Figure 13: Weighted Distribution and Probability Plot for In-Network AV, POS Plans*

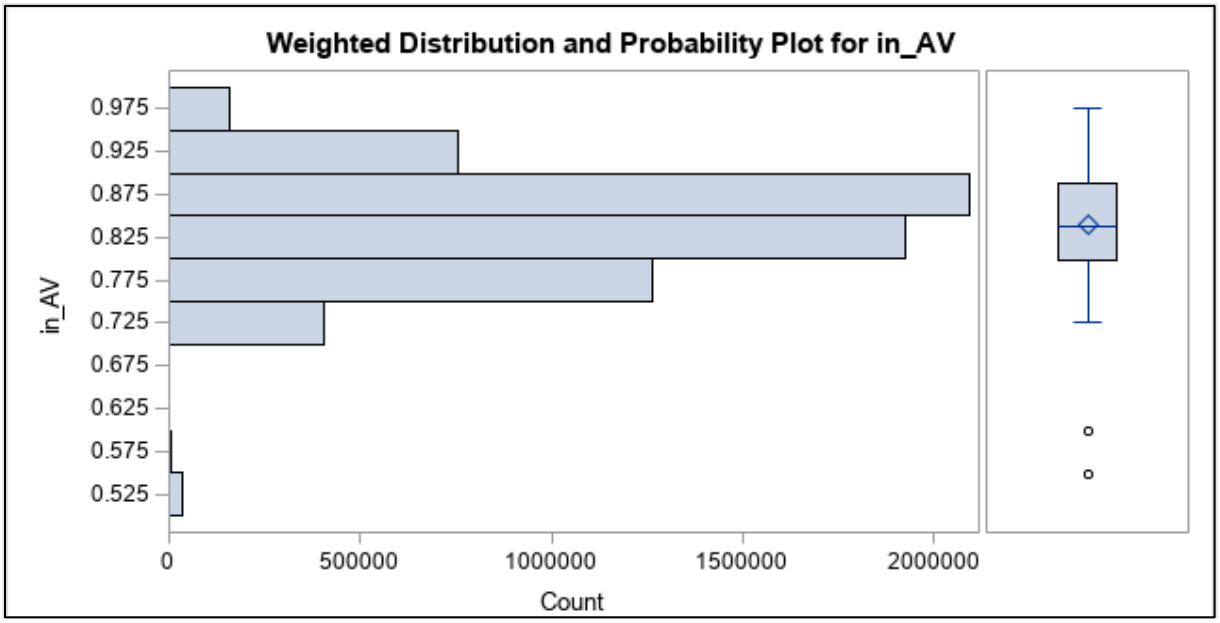



*Figure 14: Weighted Distribution and Probability Plot for Out-of-Network AV, POS Plans*

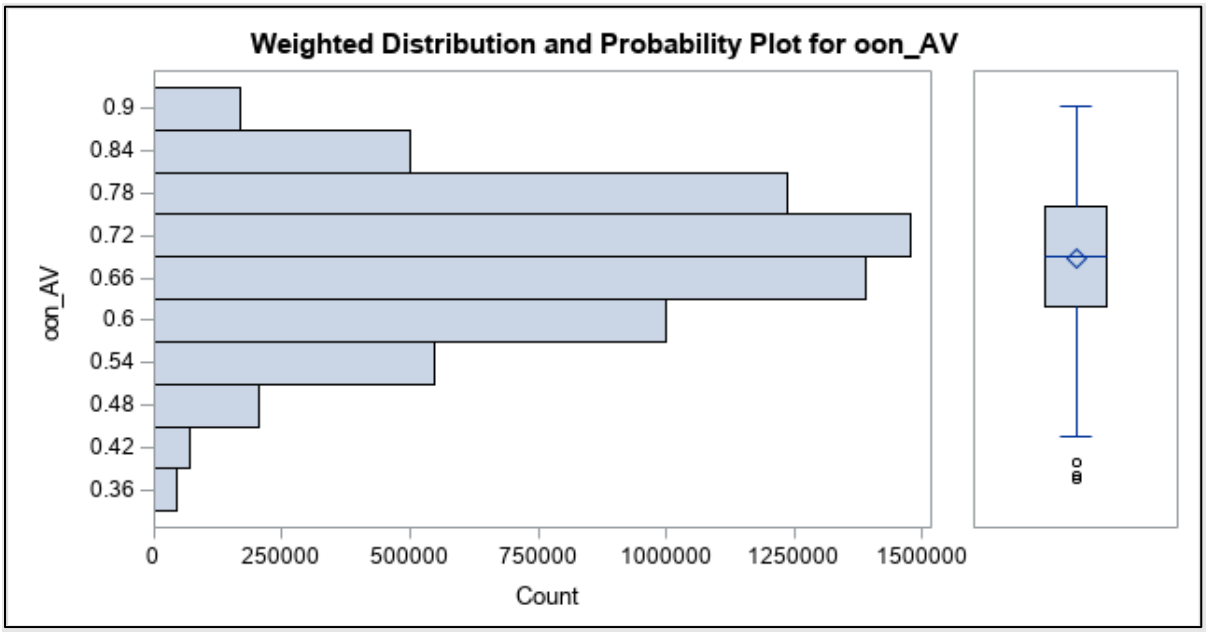


*Figure 15: Weighted Distribution and Probability Plot for In-Network AV, HDED Plans*

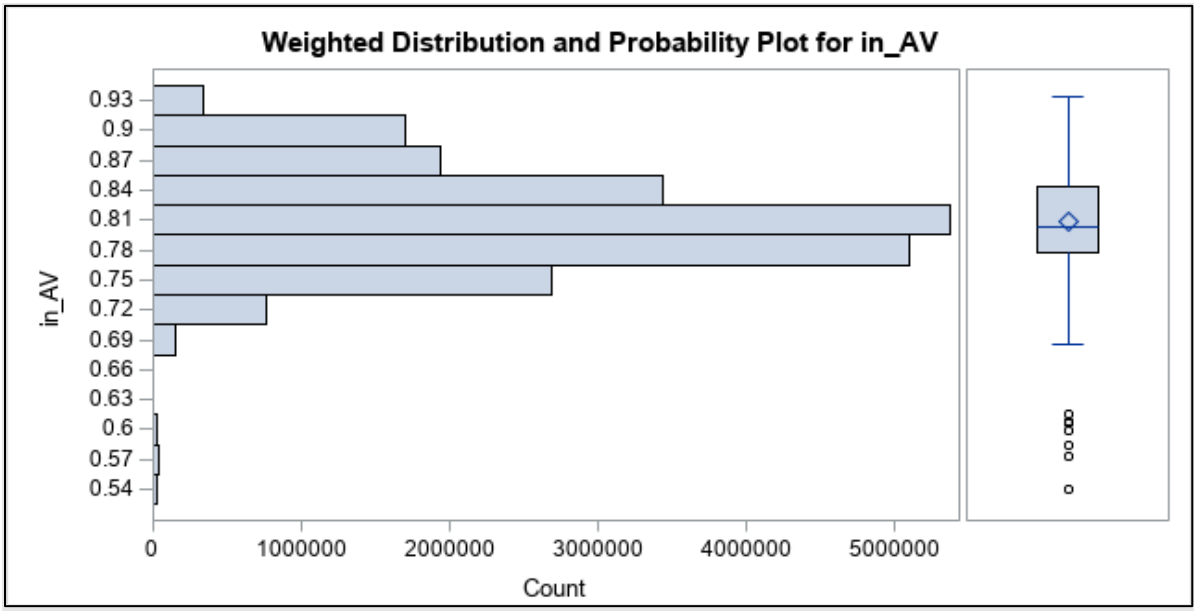
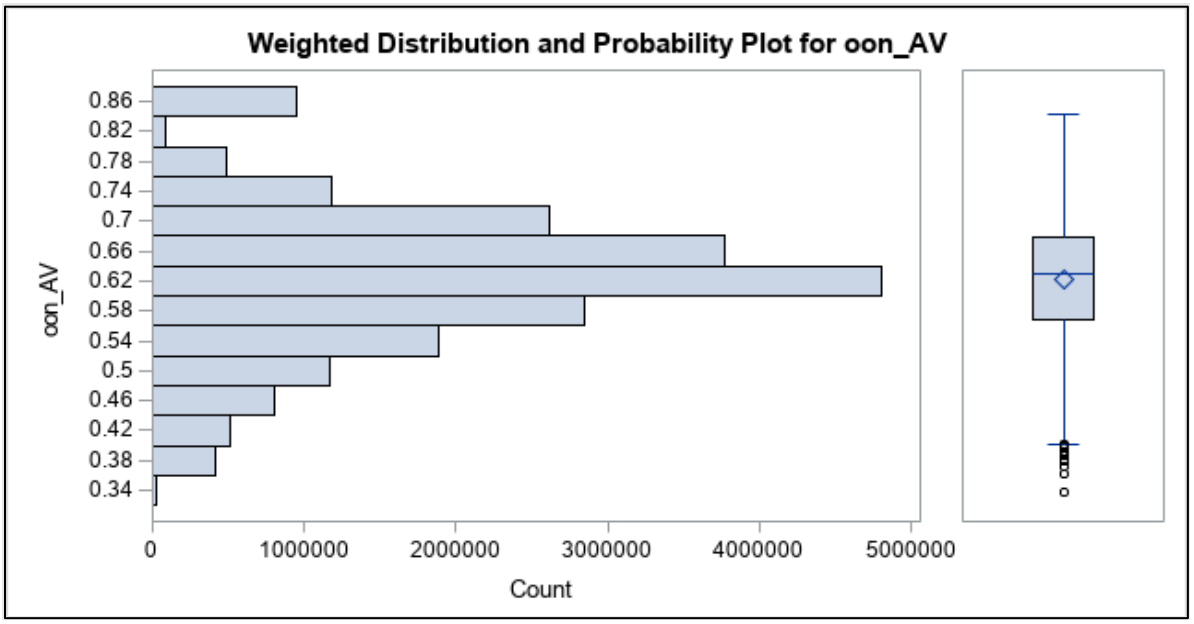



*Figure 16: Weighted Distribution and Probability Plot for Out-of-Network AV, HDED Plans*



As shown in Figures 17 and 18 below, when HMOs were excluded from the in- versus out-of-network comparison, the actuarial value concentrations differed mainly by removing the single bar of participants with very low actuarial value plans in the out-of-network figures.

***Figure 17: Weighted Distribution and Probability Plot for In-Network AV, for PPO, POS and HDED Plans (excl. HMO)***

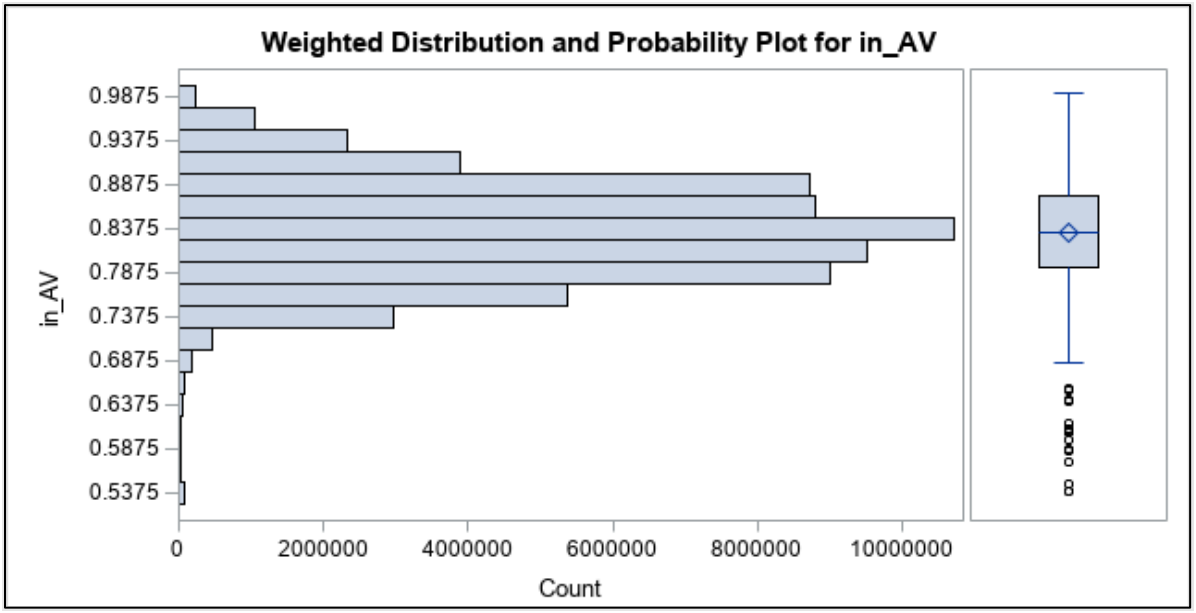
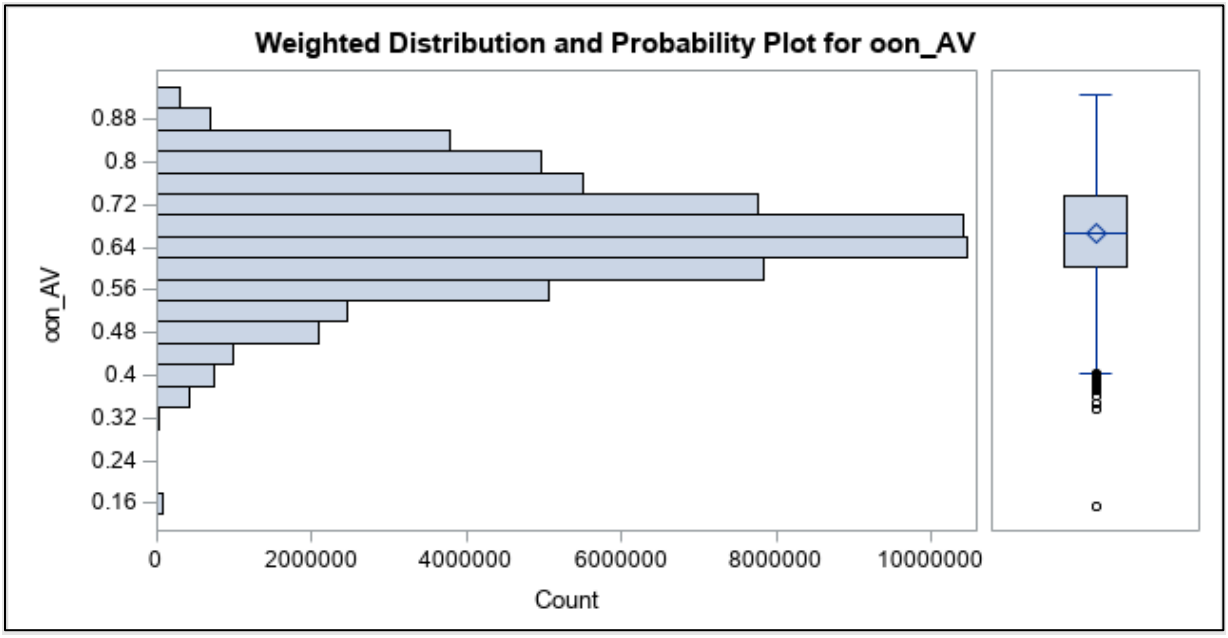



***Figure 18: Weighted Distribution and Probability Plot for Out-of-Network AV, for PPO, POS and HDED Plans (excl. HMO)***



## C. Illustrative Composite Actuarial Values

While comparing in-network and out-of-network actuarial values directly, it should be noted not all users remain in their plan's network for all care, and that most users who go out-of-network do not go do so for all of their care. Therefore, a more realistic actuarial value would be one that takes into account a mix of both in- and out-of-network use. The MarketScan claims data was rather limited in terms of the volume of spending found to be out of network. On the inpatient database, it was approximately 2%, while on the outpatient database it was larger but only 4%.

To the extent that these may undercount actual out of network usage, we looked at various scenarios to blend our actuarial values. These scenarios varied network usage by the broad service categories in the Ratebook: hospital, physician plus other professionals, and prescription drugs. Table 28, below, shows six scenarios for combining the in- and out-of-network actuarial values.[17]

***Table 28: Scenarios for Out-of-Network Usage in Composite AVs***

| Scenario | Description | % OON Hosp | % OON Phys | % OON Rx |
|---|---|---|---|---|
| **1** | 5% OON | 2.50% | 5.00% | 0.00% |
| **2** | 10% OON | 3.75% | 10.00% | 0.00% |
| **3** | 15% OON | 5.00% | 15.00% | 1.00% |
| **4** | 20% OON | 7.50% | 20.00% | 2.00% |
| **5** | 25% OON | 10.00% | 25.00% | 2.50% |
| **6** | 50% OON | 10.00% | 50.00% | 5.00% |

Composite actuarial values were calculated by plan type, by broad service category, where the plan AVs were averaged based on the proportions above. As an example, PPOs had an average in-network actuarial value of 0.849, while the out-of-network AV for PPOs was 0.687. These amounts, however, were not uniform by service, and Table 29, below, shows the calculation for a composite PPO actuarial value for Scenario 1, above.

***Table 29: Example of Calculating Composite PPO AV***

| | Average Hospital AV | Average Physician AV | Average Rx AV | Plan Average AV |
|---|---|---|---|---|
| **In-Network AV** | 0.885 | 0.789 | 0.865 | 0.849 |
| **Out-of-Network AV** | 0.777 | 0.566 | 0.689 | 0.687 |
| **% Out of Network Use** | 2.5% | 5% | 0% | |
| **Weighted Avg AV Calculation** | ((1-2.5%)*0.885) + (2.5%*0.777) | ((1-5%)*0.789) + (5%*0.566) | ((1-0%)*0.865) + (0%*0.689) | |
| **Service Distribution** | 45% | 33% | 22% | |

[17] Scenarios 2, 4, and 6 in Table 28 of the Technical Appendix correspond to scenarios 1, 2, 3 in Table 35 of the main report. They are presented to show the range of effects of this process.

| | Average Hospital AV | Average Physician AV | Average Rx AV | Plan Average AV |
|---|---|---|---|---|
| **Weighted Average AV** | 0.882 | 0.778 | 0.865 | 0.844 |

The resulting composite AV of 0.844 is calculated as (0.45 * 0.882) + (0.33 * 0.778) + (.22 * 0.865). It represents only a slight reduction from the in-network AV of 0.849.

Table 30, below, shows the full range of composite actuarial values, by plan type and scenario. It shows the final blended plan AV as well as the relationship to the in-network actuarial value. While the composite AV in "All Plans" includes HMOs, we have chosen to not show a composite AV for these plans as they do not typically cover anything out-of-network beyond emergency services. For this reason, we show a non-HMO block at the bottom of the table. Three selected scenarios (2, 4, and 6) are presented in the main report to show the range of effects of this process.

***Table 30: Composite Actuarial Values by Plan Type and Option***

| | Scenario | % OON Hosp | % OON Phys | % OON Rx | Composite Plan AV | Change from Base (IN AV) |
|---|---|---|---|---|---|---|
| **All Plans** | **1** | 2.50% | 5.00% | 0.00% | 0.834 | 99.03% |
| | **2** | 3.75% | 10.00% | 0.00% | 0.827 | 98.22% |
| | **3** | 5.00% | 15.00% | 1.00% | 0.820 | 97.34% |
| | **4** | 7.50% | 20.00% | 2.00% | 0.811 | 96.29% |
| | **5** | 10.00% | 25.00% | 2.50% | 0.802 | 95.29% |
| | **6** | 10.00% | 50.00% | 5.00% | 0.773 | 91.84% |
| **PPO** | **1** | 2.50% | 5.00% | 0.00% | 0.844 | 99.42% |
| | **2** | 3.75% | 10.00% | 0.00% | 0.839 | 98.91% |
| | **3** | 5.00% | 15.00% | 1.00% | 0.835 | 98.35% |
| | **4** | 7.50% | 20.00% | 2.00% | 0.829 | 97.72% |
| | **5** | 10.00% | 25.00% | 2.50% | 0.824 | 97.12% |
| | **6** | 10.00% | 50.00% | 5.00% | 0.804 | 94.81% |
| **POS** | **1** | 2.50% | 5.00% | 0.00% | 0.834 | 99.45% |
| | **2** | 3.75% | 10.00% | 0.00% | 0.830 | 98.95% |
| | **3** | 5.00% | 15.00% | 1.00% | 0.826 | 98.41% |
| | **4** | 7.50% | 20.00% | 2.00% | 0.821 | 97.81% |
| | **5** | 10.00% | 25.00% | 2.50% | 0.816 | 97.23% |
| | **6** | 10.00% | 50.00% | 5.00% | 0.796 | 94.91% |
| **HDED** | **1** | 2.50% | 5.00% | 0.00% | 0.803 | 99.33% |
| | **2** | 3.75% | 10.00% | 0.00% | 0.799 | 98.76% |
| | **3** | 5.00% | 15.00% | 1.00% | 0.794 | 98.13% |
| | **4** | 7.50% | 20.00% | 2.00% | 0.788 | 97.41% |
| | **5** | 10.00% | 25.00% | 2.50% | 0.782 | 96.71% |
| | **6** | 10.00% | 50.00% | 5.00% | 0.762 | 94.19% |

| | Scenario | % OON Hosp | % OON Phys | % OON Rx | Composite Plan AV | Change from Base (IN AV) |
|---|---|---|---|---|---|---|
| **Non HMOs** | **1** | 2.50% | 5.00% | 0.00% | 0.829 | 99.39% |
| | **2** | 3.75% | 10.00% | 0.00% | 0.825 | 98.86% |
| | **3** | 5.00% | 15.00% | 1.00% | 0.820 | 98.28% |
| | **4** | 7.50% | 20.00% | 2.00% | 0.814 | 97.63% |
| | **5** | 10.00% | 25.00% | 2.50% | 0.809 | 96.99% |
| | **6** | 10.00% | 50.00% | 5.00% | 0.789 | 94.61% |