
# Compensating for Missing ERISA Information in Calculating Private Market Per Capita Costs

NAHDO'S HEALTH CARE DATA SUMMIT

OCTOBER 10 - 12, 2018

# Overview

- Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data
- Using the Medical Expenditure Panel (MEPS) Insurance / Employer Component to estimate Privately Insured Self-Insured ERISA Medical Enrollment
- Calculation of Privately Insured Self-Insured Medical Per Annual Per Capita Cost
- Benchmarking Medical Annual Per Capita Costs: MCDB v. National Health Expenditures (NHE) for Private Health Insurance from CMS

# Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data

- **Purpose**:
  - Create regression model to predict self-insured ERISA medical claims for 2015 and beyond using Maryland's APCD
  - Estimation necessary because self-insured ERISA claims not available due to the SCOTUS's *Gobeille v. Liberty Mutual Ins. Co.* court case ruling on March 1, 2016
  - Loss of self-insured ERISA health plan data was about a third (34%) of the APCD's privately insured data
- **Population Selection**:
  - Examined the PMPM correlation (R) and coefficient of determination ($R^2$) results by age and county for Maryland residents
    - fully-insured large group vs. self-insured ERISA
    - self-insured large group public employer vs. self-insured ERISA
    - 2013 and 2014 years for the above populations were studied separately
    - under 65 and above 65 years old for the populations were studied separately
  - Selected fully-insured large group under age 65 Maryland residents population to approximate the ERISA data
    - Fully-insured large group wide variety of business types similar to self-insured ERISA
    - PMPM linear relationship results more consistent from 2013 to 2014
- **Overall Plan**:
  - Exclude the over 65 Maryland residents population
  - Under 65 population: Combined years 2013 and 2014 for the fully-insured large group vs. self-insured ERISA results
  - Create a scatter plot of PMPMs: fully-insured large group vs. self-insured ERISA for the combined years (2013 & 2014)
  - Studied the 2-year predicted average vs. 2-year actual average by observing the residuals

# Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data

## Regression Model Assumptions

- Residuals are independent and identically distributed normally with zero means
- Residuals have the same variance (constant standard deviation) for all values of the fully-insured large group PMPMs
- Residuals are additive (e.g. $y_i = b_0 + b_1 x_i + e_i$)
- Fully-insured large group and self-insured ERISA PMPMs are linearly related
- Fully-insured large group PMPM is non-stochastic (deterministic or non-random) and is calculated without error

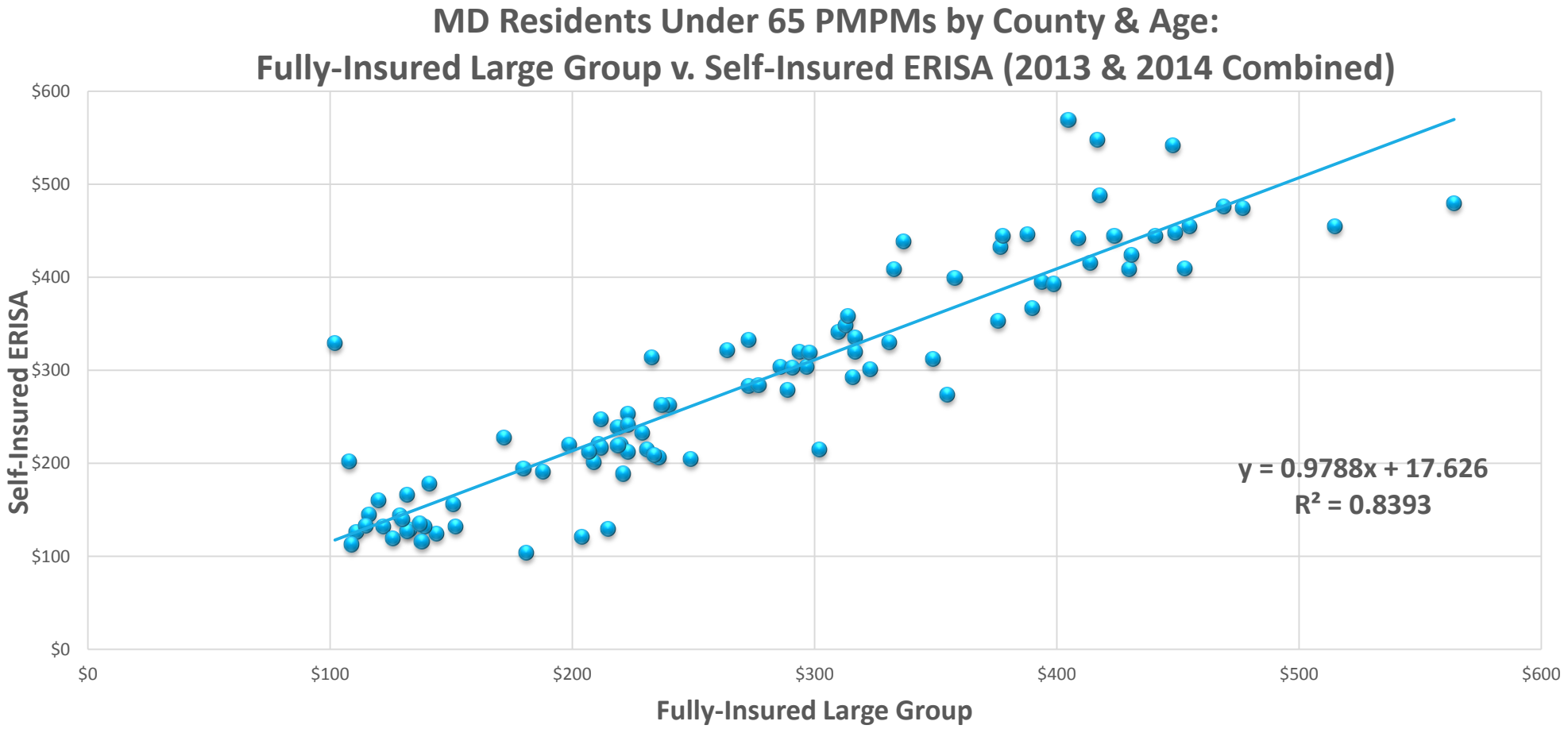
# Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data

## Visual tests to verify regression model assumptions

- Scatter plot of self-funded large group ERISA vs. fully-insured large group should be linear (Exhibit 1)
- Run regression to find out whether the scatter plot relationship is significant (Exhibit 2)
- Scatter plot of residuals vs. predicted PMPMs should not have any trends (Exhibit 3)
- The normal probability plot (quantile-quantile plot) of residuals should be linear (Exhibit 4)

# Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data

Exhibit 1



# Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data

Exhibit 2

| ***Regression Statistics*** | |
|---|---|
| Multiple R | 0.916 |
| R Square | 0.839 |
| Adjusted R Square | 0.838 |
| Standard Error | 48.975 |
| Observations | 96 |

**ANOVA**

| | *df* | *SS* | *MS* | *F* | *Sign. F* |
|---|---|---|---|---|---|
| Regression | 1 | 1,177,650.058 | 1,177,650.058 | 490.975 | 4.295E-39 |
| Residual | 94 | 225,467.776 | 2,398.593 | | |
| Total | 95 | 1,403,117.833 | | | |

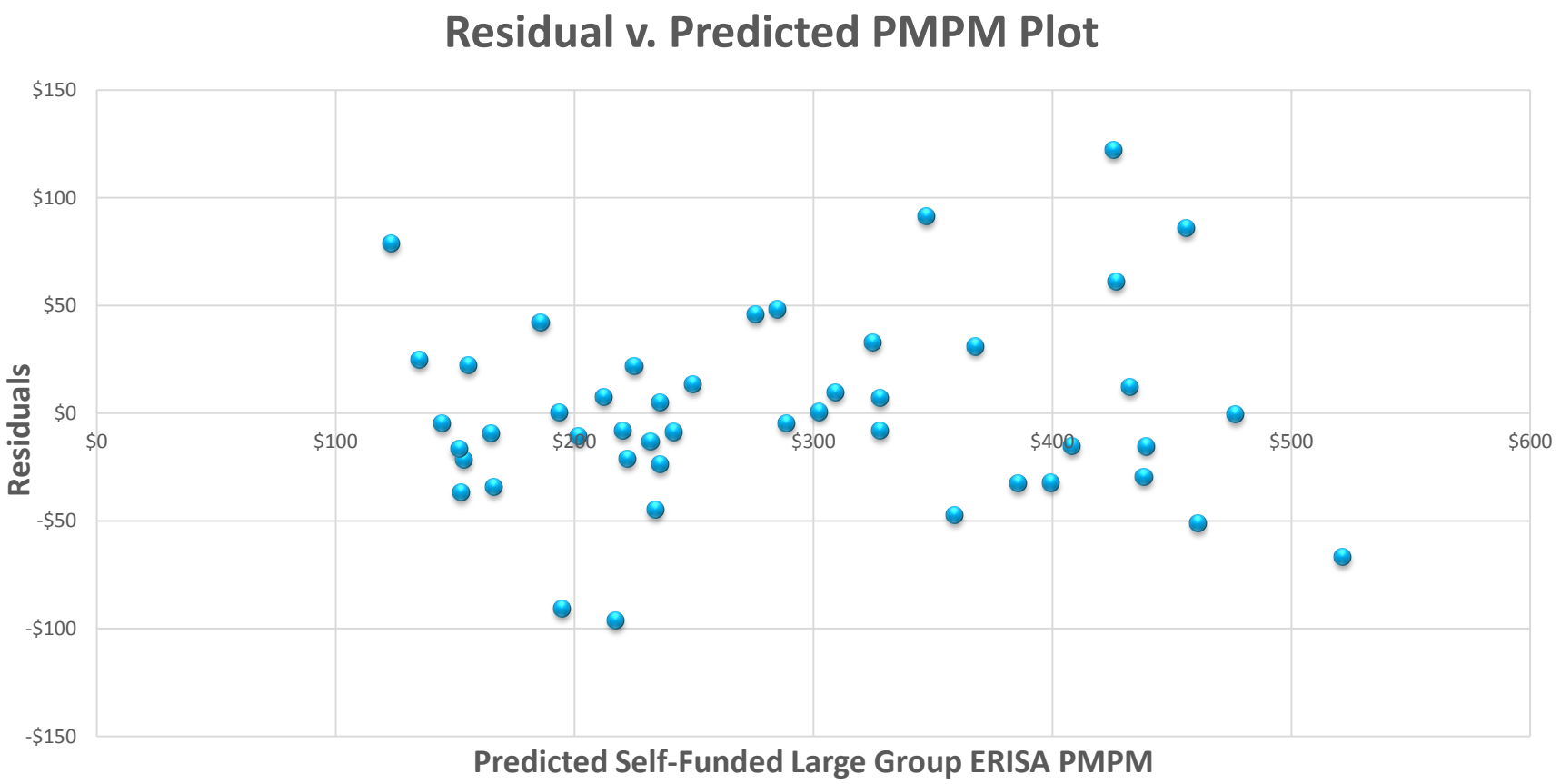
| | *Coeffs.* | *Std Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* |
|---|---|---|---|---|---|---|
| Intercept | 17.626 | 13.073 | 1.348 | 0.181 | -8.331 | 43.583 |
| Fully-Insured Large Group | 0.979 | 0.044 | 22.158 | 0.000 | 0.891 | 1.067 |

**Regression Model: Predicted Self-Funded ERISA PMPM = 0.9788 * Fully-Insured Large Group PMPM + 17.626**

The *p-value* of 0.000 for the slope coefficient is significant (*p-value* < 0.05) which implies real relationship between the fully-insured large group and self-insured ERISA PMPMs

# Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data

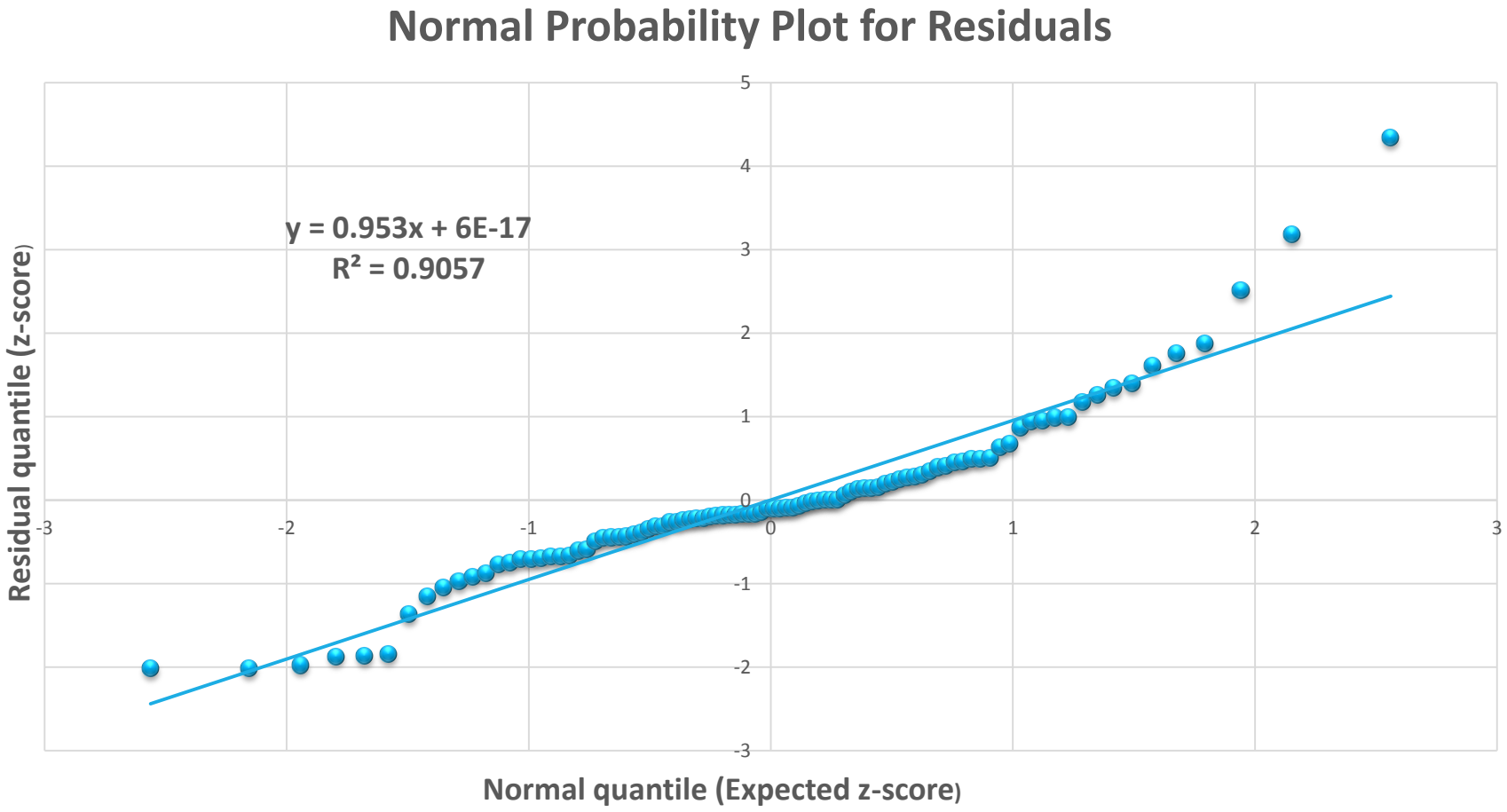
Exhibit 3




Scatter plot shows no visible trend in magnitude or spread of residuals. This verifies independence of residuals and they have an identical distribution which implies the same variance for all PMPM values for self-insured ERISA variable

# Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data

Exhibit 4




The normal probability plot is reasonabe to being a straight line (approx. linear), leading us to believe that the normality assumption is approximately normal

# Self-Insured ERISA Regression Model for Estimating Privately Insured Medical Claims Data

**Conclusions:**

- Using the fully-insured data to approximate the self-funded large group ERISA data seems to be reasonable as shown by the validity of the linear regression model
- *Predicted Self-Funded ERISA PMPM = 0.9788 * Fully-Insured Large Group PMPM + 17.626*

  where, for each dollar of fully-insured large group PMPM, we expect self-funded large ERISA PMPMs to be about 2 cents lower plus $17.63
- About 83.9% of the variability in self-funded large group ERISA PMPMs can be explained by fully-insured large group PMPMs

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

- **Data Source**:
  - "MEPS-IC Table II State of Maryland, private-sector data by firm size, 2016" is the underlying data
  - The data is categorized into two components, "Less than 50 employees" and "50 or more employees"
  - The data is for all employer groups (fully-insured and self-insured) including ERISA and Non-ERISA health plans
- **Method:** The following steps are applied using "Less than 50 employees" and "50 or more employees" data in the table separately:
- **First, calculate the number of self-insured employees enrolled by selecting the following fields from Table II**:
  - Number of employees
  - Percent of employees in establishments that offer health insurance
  - Percent of employees that are enrolled in health insurance at establishments that offer health insurance
  - Percent of enrollees that are enrolled in self-insured plans at establishments that offer health insurance
  - **The number of self-insured employees enrolled** = the product of the above four fields (See Exhibit 5)

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

Exhibit 5

| | Less than 50 Employees | 50 or more Employees | Total |
|---|---|---|---|
| **Calculation the Number of Self-Insured Employees Enrolled** | | | |
| Number of employees | 648,214 | 1,703,508 | 2,351,722 |
| Percent of employees in establishments that offer health insurance | 49.0% | 97.4% | |
| Percent of employees that are enrolled in health insurance at establishments that offer health insurance | 48.7% | 54.6% | |
| Percent of enrollees that are enrolled in self-insured plans at establishments that offer health insurance | 8.5% | 65.0% | |
| **Number of Self-Insured Employees Enrolled** | **13,148** | **588,856** | **602,004** |

Source: Table II. State of Maryland, private-sector data by firm size, 2016

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

- **Second, estimate the number of self-insured members per employee** for "*Less than 50 employees*" and "*50 or more employees*" separately using "*StatePurchasedSelfFunded"* provided by AHRQ

  - Find the percentage of employees by contract type for the following:
    - Employees enrolled in a health insurance plan that have single coverage (*Total Active Single Enrollees*)
    - Employees enrolled in a health insurance plan that have employee-plus-one coverage (*Total Active Employee-Plus-One Enrollees*)
    - Employees enrolled in a health insurance plan that have family coverage (*Total Active Family Enrollees*)

  - Find the average number of members by contract type by calculating the slope of the average premium for the following contract types:
    - Employees enrolled in a health insurance plan that have single coverage = Average Single Premium ÷ Average Single Premium = 1.0
    - Employees enrolled in a health insurance plan that have employee-plus-one coverage = Average Employee-Plus-One Premium ÷ Average Single Premium. This value is usually approximately two times the average single premium.
    - Employees enrolled in a health insurance plan that have family coverage = Average Family Premium ÷ Average Single Premium. This value is usually approximately three times the average single premium.

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

- Find the composite average number of members for the three contract types above by:
  - calculating the sum product of the percentage of employees by contract type and the slope of the average premiums.
  - This result is **the number of self-insured members per employee**. See Exhibit 6 below.

Exhibit 6:

| **Estimate the Number of Self-Insured Members Per Employee** | Avg # of Membs LT 50 By Contract Type [1] | Avg # of Membs GE 50 By Contract Type [1] | Percent of EEs By Contract Type LT 50 EEs | GE 50 EEs |
|---|---|---|---|---|
| Employees enrolled in a health insurance plan that have single coverage | 1.00 | 1.00 | 57.9% | 51.4% |
| Employees enrolled in a health insurance plan that have employee-plus-one cover | 1.78 | 2.03 | 24.6% | 18.6% |
| Employees enrolled in a health insurance plan that have family coverage | 1.50 | 3.07 | 17.5% | 30.0% |
| **Number of Self-Insured Members Per Employee** | | | **1.28** | **1.81** |

(1) 3-Tier members per type of contract assumption developed from the State_Purchased_Self-Insured_2016 information from Davis, Karen (AHRQ) <Karen.Davis@ahrq.hhs.gov>

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

- **Third, estimate the number of self-insured members enrolled** by:
  - calculating the product of the number of self-insured members per employee and the number of self-insured employees enrolled. See Exhibit 7 below.

Exhibit 7

| | Less than 50 Employees | 50 or more Employees | Total |
|---|---|---|---|
| **Calculation the Number of Self-Insured Employees Enrolled:** | | | |
| **Number of Self-Insured Employees Enrolled** | **13,148** | **588,856** | **602,004** |
| **Estimate the Number of Self-Insured Members Per Employee:** | | | |
| **Number of Self-Insured Members Per Employee** | **1.28** | **1.81** | |
| | **Less than 50 Members** | **50 or more Members** | **Total** |
| **Number of Self-Insured Members Enrolled** | **16,816** | **1,067,007** | **1,083,823** |

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

- **Fourth, estimate the number of self-insured members enrolled under age 65**
  - Estimate the percent of self-insured members enrolled under 65 using the SHADAC analysis (http://statehealthcompare.shadac.org/) of the American Community Survey (ACS) for health insurance coverage type by State (Maryland) and age. We use the employer coverage type.
  - Apply this percentage to the number of self-insured members enrolled to find **the number of self-insured members enrolled under age 65.** (See Exhibit 8 below).

Exhibit 8

| | Less than 50 Members | 50 or more Members | Total |
|---|---|---|---|
| **Number of Self-Insured Members Enrolled** | **16,816** | **1,067,007** | **1,083,823** |
| **Number of Self-Insured Members Enrolled under Age 65** | | | |
| Percent of self-insured members enrolled under age 65 (1) | 98.9% | 98.9% | |
| **Number of Self-Insured Members Enrolled under Age 65** | **16,630** | **1,055,217** | **1,071,847** |

(1) Source: Shadac Report

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

- **Fifth, estimate the number of self-insured ERISA members enrolled under age 65**
  - We use the APCD (eligibility files) and SAS to retrieve five years (2010 – 2014) of self-insured (SI) member months by:
    - year
    - market segment (Large Group and Public Employee – Other) for Maryland residents who are under age 65.
    - Please note that the self-insured Large Group is SI-ERISA and the Public Employee – Other is SI-Non-ERISA.
  - We then calculate SI-ERISA member months as a percent of total self-insured member months (SI-ERISA plus SI-Non-ERISA) by:
    - summing all five years of member months for SI-ERISA and dividing this amount by the total of all self-insured member months for all five years.
    - This calculation yields SI-ERISA as 56% of total SI member months. This percentage (56%) for self-insured ERISA is assumed for 2015 and beyond (i.e., data without self-insured ERISA).
  - Apply this percentage assumption for self-insured ERISA to the number of self-insured members enrolled under age 65 to get **the number of self-insured ERISA members under age 65.**

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

- **Finally, estimate the number of exposed months (eligible months) for members enrolled in self-insured ERISA plans who are under age 65**

  - Estimate the average number of months exposed per member per year over five years (2010 - 2014) for self-insured ERISA plans from the MCDB.
    - This result is approximately 10.1 months per member per year

  - Apply this assumption by multiplying 10.1 months per member per year and the number of self-insured ERISA members who are under age 65.
    - This result yields **self-insured ERISA months exposed for members who are under 65.**

# Using the Medical Expenditure Panel Insurance / Employer Component (MEPS-IC) to estimate Privately Insured Self-Insured ERISA Medical Enrollment

- **Limitations**
  - The MEPS-IC data is survey data which is subject to standard errors in gathering the data
  - Approximately 56% of total self-insured members are assumed to be enrolled in ERISA plans for the years 2015 and beyond. There is wearing off of this assumption with new survey data.
  - Approximately 10.1 months exposed per member per year for members enrolled in self-insured ERISA plans is assumed for the years 2015 and beyond. There is wearing off of this assumption with new survey data.
  - Self-Insured ERISA enrollment estimation is only for the under age 65 Maryland residents population
  - Self-Insured ERISA estimations developed are not at the member level as the MEPS-IC data is in aggregate

# Calculation of Privately Self-Insured ERISA Medical Annual Per Capita Cost

- **Self-Insured Medical Annual Per Capita Cost Calculation**
  - Estimate self-insured ERISA members was developed for use in the estimate of medical expenditures for self-insured ERISA as part of the Health Services Cost Review Commission (HSCRC) Total Cost of Care per Capita Cost calculation for privately insured Maryland residents
  - The member months developed are multiplied by self-insured ERISA PMPMs estimated using a regression model and fully-insured large group PMPMs
  - The resulting expenditures are then annualized to estimate the per capital costs
    - ERISA Annual Medical Per Capita Cost ≈ (estimated self-Insured medical PMPM cost) x (12 months)

# Benchmarking Medical Annual Per Capita Costs: MCDB v. National Health Expenditures (NHE) for Private Health Insurance from CMS

**Benchmarking Annual Per Capita Costs: MCDB v. National Health Expenditures (NHE) for Private Health Insurance from CMS**
**Privately Insured Medical (2013 to 2016)**

| | MCDB | | | | NHE (CMS) | | | | % Diff (MCDB over NHE) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2013 | 2014 | 2015 | 2016 | 2013 | 2014 | 2015 | 2016 |
| Medical | $3,132 | $3,240 | $3,444 | $3,504 | $3,489 | $3,638 | $3,920 | $4,163 | -10.2% | -10.9% | -12.1% | -15.8% |

Notes: (1) MCDB population is Maryland residents who are under age 65. There is no age restriction on the NHE (all 50 states) results.

(2) MCDB means Medical Care Data Base which is part of Maryland's All-Payer Claims Database. The MCDB includes claims and membership data submitted by health insurance carriers, and Third Party Administrators.

(3) CMS Source:

https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/nationalhealthexpenddata/nhe-fact-sheet.html

(4) CMS national annual per capita cost excludes net cost of private health insurance and dental services for this comparison.

# Thank You!