Version 05 HHS-HCC Risk Adjustment Modeling "Statistical Analysis System (SAS)" Software Documentation for the 2018 Benefit Year December 4, 2018 Update[1]

Section 1343 of the Patient Protection and Affordable Care Act (PPACA) provides for a permanent risk adjustment program. To protect against potential effects of adverse selection and help stabilize premiums in the individual and small group markets, the risk adjustment program transfers funds from plans with relatively low-risk enrollees to plans with relatively high-risk enrollees. It generally applies to non-grandfathered individual and small group plans inside and outside Exchanges.

The HHS risk adjustment methodology is described in the HHS Notice of Benefit and Payment Parameters for 2014, final rule (78 FR 15410), which was published in the *Federal Register* on March 11, 2013. Modifications to the HHS risk adjustment methodology for the 2018 benefit year are described in the HHS Notice of Benefit and Payment Parameters for 2018 final rule (81 FR 94058) (2018 Payment Notice final rule), which was published in the *Federal Register* on December 22, 2016.[2] Prescription drug utilization factors were incorporated in the final 2018 benefit year adult risk adjustment models, as well as the new hierarchical condition category (HCC) distinction between Chronic Viral Hepatitis C from other types of Chronic Hepatitis, in the adult, child, and infant models. Additionally, a high-cost risk pool calculation was incorporated into the HHS risk adjustment methodology beginning for the 2018 benefit year. This adjustment will be made for all issuers of risk adjustment covered plans[3] in the individual[4] and small group markets, nationally, and will fund 60 percent of an issuer's costs for enrollees with claims above $1 million, while assessing a charge as a percent of premium to all issuers of risk adjustment covered plans in each market. We note that, because this SAS software calculates enrollees' risk scores and not issuers' transfers, the high-cost risk pool transfer portion of the HHS risk adjustment methodology has not been incorporated into the risk score software and is not discussed in these Instructions.

The methodology that HHS will use when operating a risk adjustment program on behalf of a State for the 2018 benefit year[5] will calculate a plan average risk score for each covered plan based upon the relative risk of the plan's enrollees and apply a payment transfer formula to determine risk adjustment payments and charges for plans within a State market risk pool. The HHS-operated risk adjustment methodology addresses three considerations: (1) adverse selection in the individual and small markets; (2) plan metal level differences and permissible rating variation; and (3) the need for risk adjustment transfers that net to zero. The Federally certified risk adjustment methodology developed by HHS for the 2018 benefit year:

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[1] This document provides instructions for the HHS risk adjustment models for the 2018 benefit year, with revisions from the software instructions posted on the CCIIO website on April 6, 2018, available at https://www.cms.gov/CCIIO/Resources/Regulations-and-Guidance/Downloads/2018-RA-Model-SAS.zip

[2] Also see the Adoption of the Methodology for the HHS-Operated Permanent Risk Adjustment Program for the 2018 Benefit Year proposed rule (83 FR 39644), which was published in the *Federal Register* on August 10, 2018.

[3] See 45 C.F.R. § 153.20.

[4] For purposes of the high-cost risk pool calculation, catastrophic plans and merged market plans are included in the individual market risk pool. See the 2018 Payment Notice final rule (81 FR 94058 at 94081).

[5] HHS will operate risk adjustment for the 2018 benefit year in all 50 states and the District of Columbia.

- Is developed on commercial claims data for a population similar to the expected population to be risk adjusted;
- Employs the hierarchical condition category (HCC) grouping logic used in the Medicare risk adjustment program, but with HCCs refined and selected to reflect the expected risk adjustment population;
- Establishes concurrent risk adjustment models, one for each combination of metal level (platinum, gold, silver, bronze, catastrophic) and age group (adult, child, infant);
- Pools catastrophically high-cost enrollees nationally with a portion of the costs funded by a percent of premium charge to issuers of risk adjustment covered plans in each market;
- Results in transfers that net to zero within a State market risk pool;
- Adjusts transfers for plan metal level, geographic rating area, induced demand, premium assistance Medicaid alternative plans, and age rating, so that transfers reflect health risk and not other cost differences; and
- Transfers funds between plans within a State market risk pool based on differences in relative actual risk.

Key Revisions in 2018:

- (April 2018 Revisions [footnote added in November 2018 Revisions]) Revised software to reflect the change in model version from Version 04 (V04) HHS-HCC classification to Version 05 (V05) HHS-HCC classification. This classification change replaces V04 HHS-HCC 37 Chronic Hepatitis with two new V05 HHS-HCCs: HCC 37_1 Chronic Viral Hepatitis C and HCC 37_2 Chronic Hepatitis, Except Chronic Viral Hepatitis C. Updated Table 3 ICD-10 to HHS-Condition Categories (CC) Crosswalk and Table 4 HHS-Hierarchical Condition Categories (HCC) Hierarchies.[6]
- (April 2018 Revisions) Added Prescription Drug Categories (RXCs) and RXC interactions to the adult models for the 2018 benefit year. Created Table 10a RXC to National Drug Code (NDC) Crosswalk, Table 10b RXC to Healthcare Common Procedure Coding System (HCPCS) Crosswalk, and Table 11 Prescription Drug Categories (RXC) Hierarchies. Revised instructions to introduce and define the new RXC variables and the new required NDC-level and HCPCS-level input files. Revised software to create RXC and RXC interaction variables and revised documentation in Section VI to include these variables output by the software. Added error messages to software and Section VIII documentation related to NDC and HCPCS datasets and codes.
- (November 2018 Revisions) Updated software to account for most recent 2018 NDC and HCPCS codes used in RXC crosswalks. Revised Section III instructions to clarify that the only acceptable source for NDCs are pharmacy claims. Inpatient claims are not an acceptable source for NDCs. Clarified that for the Healthcare Common Procedure Coding System (HCPCS) dataset, inpatient and outpatient claims should be restricted to the same facility bill type codes used for the diagnosis-level file. Updated Tables 10a and 10b to contain NDCs and HCPCS codes in the National Library of Medicine's RxNorm dataset

[6] We note that in the EDGE reference data we use "HCC 371" and "HCC 372" (no underscore) to identify HCC 37_1 and HCC 37_2, respectively.

as of August 2018. (Tables 10a and 10b will be updated prior to March 2019 to include the final set of NDC and HCPCS codes for the 2018 Benefit Year.)

- (April 2018 Revisions) Updated Table 2 to add 2018 CPT/HCPCS codes used for diagnosis filtering, as described in Section III. Replaced the 2016 column of code information with 2017 codes (used for historical data purposes).
- (November 2018 Revisions) Updated Table 2 to include review of 2018 quarterly updates of CPT/HCPCS codes with effective dates as of October 1, 2018.
- (April 2018 Revisions) Updated software to account for FY2018 ICD-10 diagnosis code assignments and to remove FY2017 ICD-10 assignments. Updated software to account for deleted FY2017 Medicare Code Editor (MCE) edits. Revised fiscal year validity checks for ICD-10 diagnosis codes and corresponding service dates.
- (November 2018 Revisions) Updated software to account for FY2019 ICD-10 diagnosis code assignments and Medicare Code Editor (MCE) edits. Revised fiscal year validity checks for ICD-10 diagnosis codes and corresponding service dates. Updated mother-infant bundled claim detection in software to include FY2019 ICD-10 diagnosis codes.
- (April 2018 Revisions) Revised Table 3 ICD-10 to HHS-Condition Categories (CC) Crosswalk to include assignments to new V05 HCCs and to remove Fiscal Year (FY) 2017 and Calendar Year (CY) 2017 Medicare Code Editor (MCE) columns. Revised corresponding explanatory text in Section III.
- (November 2018 Revisions) Revised Table 3 ICD-10 to HHS-Condition Categories (CC) Crosswalk to contain FY2018 and FY2019 ICD-10 diagnosis codes and FY2018 and FY2019 Medicare Code Editor (MCE) age and sex conditions. Updated ICD-10 code labels to reflect changes in FY2019. Updated CC assignments to account for new FY2019 ICD-10 codes. Updated the combined set of MCE age and sex conditions to be used for Calendar Year (CY) 2018 that covers both fiscal years (FY2018 and FY2019). Revised explanatory text in Section III to clarify the use of FY2018 and FY2019 ICD-10 diagnosis codes and MCE code edits.
- (April 2018 Revisions) Updated coefficients and denominator for the 2018 benefit year using 2013, 2014, and 2015 MarketScan® data (Sections II and VIII). Added RXC and RXC interactions for the adult models for the 2018 benefit year.

The HHS risk adjustment methodology consists of concurrent risk adjustment models, one for each combination of metal level (platinum, gold, silver, bronze, and catastrophic) and age group (adult, child, infant). This document provides the detailed information needed to simulate the calculation of risk scores given individual diagnoses.

These instructions are based on the methodology described in the 2018 Payment Notice final rule. Please direct questions regarding these instructions to HHS HCC Risk Adjustment Models at hhshccraops@cms.hhs.gov. This mailbox will be used only to answer questions pertaining to operations of the HHS risk adjustment models. We look forward to assisting with inquiries pertaining to your risk adjustment program operations using the HHS-HCC risk adjustment models for the 2018 benefit year.

CMS has created two versions of software (SAS software and HHS-developed risk adjustment model algorithm "Do It Yourself [DIY]" software) and software instructions for issuers to use with their enrollment data to simulate their enrollee populations' 2018 benefit year risk scores

within the HHS-HCC risk adjustment models. **This software is being issued only as supplemental tool for issuers of risk adjustment covered plans to better understand and simulate the calculation of plan liability risk scores for their enrollees.**

This software is not a required prerequisite to submitting claims data to the EDGE server for risk adjustment, nor is it a requirement of the HHS-operated risk adjustment program. Furthermore, issuers should not use this software to filter their own claims prior to submitting claims data to the EDGE server. The EDGE server software may have several additional layers of operational rules. This software merely provides a simulation tool for issuers to calculate enrollees' risk scores. Because risk adjustment transfers are dependent on the data submitted by other issuers within the State market risk pool, an issuer that wishes to use this information to assist with estimating its 2018 benefit year transfer(s) should do so with caution and in combination with other data.

This document describes software for HHS-HCC risk adjustment modeling (version 05). The software requires SAS® version 9.

This software (V0518 128 O2) is designed to be used only with 2018 dates of service and with ICD-10 diagnosis codes. If the user will be using historical data (i.e., 2017 or earlier service dates), the user should refer to earlier versions of the software for HHS-HCC risk adjustment modeling also posted on the CCIIO website.

List of Tables

Terminology: The abbreviations ICD-10 and ICD-10-CM are used interchangeably in this document to refer to the International Classification of Diseases, 10th Revision, Clinical Modification. The abbreviations CC and HCC used in these instructions refer to the HHS-HCC risk adjustment models. These are different HCCs from those used in the CMS-HCC risk adjustment model for Medicare Part C.

I. Software description

The software reads four user-provided input SAS® datasets (Section IV); constructs demographic variables for each enrollee; crosswalks ICD-10 diagnoses to Condition Categories (CCs) using SAS® formats which are stored in a FORMAT library; creates Hierarchical Condition Categories (HCCs) by imposing hierarchies on the CCs; creates Prescription Drug

Categories (RXCs) based on National Drug Codes (NDCs) and Healthcare Common Procedure Coding System (HCPCS) codes, and imposes hierarchies on RXCs.

The software uses the demographic variables, adult enrollment duration variables, HCCs, and RXCs to compute risk scores for three models (adult, child, infant); cost sharing reduction (CSR)-adjusted scores for each model including adjustment for enrollment in premium assistance Medicaid alternative plans; and final scores based on the enrollee's age and plan benefit design. Scores for enrollees without diagnoses, NDCs, or HCPCS codes are computed from demographic variables; i.e., zeros are assigned to all CCs, HCCs, and RXCs.

The software's main program (V0518F3P) calls primary macro V0518F3M and passes a set of user-specified parameters (a macro is a subroutine that performs a specific task). Macro V0518F3M calls five external macros (provided as separate files):

- AGESEXV6 – creates age/sex variables;
- I0V05ED2 – performs edits on ICD-10 codes based on age and/or sex;
- V05128L1 – assigns labels to HCCs and RXCs;
- V05128H1 – sets selected HCCs to zero based on hierarchical rules;
- SCOREV4 – calculates risk score variables.

Identical program files with .SAS and .TXT extensions are provided. The .TXT versions are easier to view with some programs. The user must use the files with extension .SAS when installing the software. File names are case sensitive on some computing platforms, so software modules assume that file names are upper case (e.g., I0V05ED2.SAS).

The software:

Step 1: Includes external macros; these are most likely to vary among releases.

Step 2: Defines internal macro variables, formats, and internal macros; these are least likely to vary among releases.

Step 3: Merges the PERSON, NDC, HCPCS, and DIAGNOSIS SAS® datasets, and outputs one record for each enrollee record in the PERSON dataset. Input records must be fully compliant with validity rules (e.g., SEX must be M/m/F/f/1/2), and all datasets must be sorted by the common person identifier variable. The name of the common person identifier variable is set in the macro variable &IDVAR (e.g., &IDVAR = *ID, or HICNO, or SSN, or EnrolleeID*).

Step 3.1: Declares variable lengths, retained variables, and arrays.

Step 3.2: Appends calibration coefficients for all models.

Step 3.3: Merges the PERSON, NDC, HCPCS and DIAGNOSIS datasets by the person identifier variable named in &IDVAR. Each enrollee must have exactly one PERSON record, and may have zero or more NDC, HCPCS, or DIAGNOSIS records.

Step 3.4: Performs tasks when the enrollee's first record is detected.

Step 3.5: If the enrollee has at least one NDC or HCPCS code, this step: creates RXCs using the crosswalk formats specified in parameter &NDCFMTN and &NDCFMTH (see Section II for details regarding the format library and formats specific to this version of software).

Step 3.6: If the enrollee has at least one diagnosis, this step: creates CCs using the crosswalk formats specified in parameter &CCFMT0Y1 and &CCFMT0Y2 (see Section II for details regarding the format library and formats specific to this version of software); performs ICD-10 edits using macro I0V05ED1; and creates additional CCs for some ICD-10 diagnoses.

Step 3.7: When the enrollee's last record is detected, this step: creates demographic variables using macro AGESEXV6; creates HCCs by applying hierarchy rules to CCs using macro V05128H1; sets HCCs to zero if the enrollee has no diagnoses; applies hierarchy rules to RXCs; sets RXCs to zero if the enrollee has no NDC or HCPCS codes; applies validity filters to various input variables; creates additional model-specific variables (e.g., severe illness indicators, HCC groups, interaction terms, adult enrollment duration indicators, RXC and HCC interactions); creates unadjusted and CSR-adjusted scores for each plan level for each enrollee including enrollment in premium assistance Medicaid alternative plans; and defines output formats and labels for variables.

Step 4: The software uses SAS® CONTENTS and PRINT procedure calls to document the output dataset.

II. Files included with the software

The following programs and files are included:

- **V0518F3P –** main program containing all user-provided parameters (see below for the parameter and variable list). The program calls primary macro V0518F3M.
- **V0518F3M –** primary macro that merges input files, crosswalks NDCs and HCPCS to RXCs, crosswalks ICD-10 codes to CCs, creates HCC and risk score variables by calling various external and internal macros. Table 3, ICD-10 to Condition Categories (CC) Crosswalk, summarizes the ICD-10 to CC assignments. Only ICD-10 codes assigned to HCCs in the risk adjustment models are included in this crosswalk. All other ICD-10 codes will be ignored by the software. Table 10a, NDC to RXC Crosswalk, and Table 10b, HCPCS to RXC Crosswalk, summarize the NDC and HCPCS assignments to RXCs. NDC and HCPCS not listed in the tables will be ignored by the software.
- **AGESEXV6 –** creates age/sex variables.
- **I0V05ED2 –** performs edits on ICD-10 codes based on age and/or sex. The Medicare Code Edits (MCEs) and further specified CC age and sex splits are performed by this macro.[7] If the enrollee has an invalid age and/or sex for a particular ICD-10 code, then

[7] The diagnosis-code edits used are based on the Definitions of Medicare Code Edits (MCEs), which are updated and published each year to correspond ICD-10 code updates. The MCEs detect inconsistencies based on a person's age and diagnosis or sex and diagnosis.

the ICD-10 code will be ignored. Table 3, ICD-10 to Condition Categories (CC) Crosswalk, summarizes the ICD-10 code edits; it describes the ICD-10 Medicare Code Edits (MCEs) for age and sex, and additional edits for CC age and sex splits.

- **V05128L1 –** assigns labels to HCCs and RXCs. Table 4, HHS-Hierarchical Condition Categories (HCC) Hierarchies, lists the HCC labels.
- **V05128H1 –** copies CCs into HCCs and sets selected HCCs to zero based on hierarchical rules. Table 4, HHS-Hierarchical Condition Categories (HCC) Hierarchies, summarizes the hierarchy assignments.
- **SCOREV4 –** calculates risk score variables.
- **H0519F1.FY 2018 ICD10.TXT** – is a text version of the format that crosswalks ICD-10 codes to CC categories (and is provided for reference). The format includes ICD-10 codes valid in FY2018.
- **H0519F1.FY 2019 ICD10.TXT** – is a text version of the format that crosswalks ICD-10 codes to CC categories (and is provided for reference). The format includes ICD-10 codes valid in FY2019.
- **H0519F1_ICD10_MCE_AGE.TXT** – is a text version of the format that crosswalks ICD-10 codes to an acceptable age range if MCE edits on ICD-10 codes are to be performed (provided for reference only).
- **H0519F1_ICD10_MCE_SEX.TXT** – is a text version of the format that crosswalks ICD-10 codes to an acceptable sex value if MCE edits on ICD-10 codes are to be performed (provided for reference only).
- **H0519F1_ICD10_BUNDLED_MOTHER.TXT** – is a text version of the format that contains FY2018 and FY2019 completed pregnancy diagnoses for use in detecting mother-infant bundled claims (provided for reference only).
- **H0519F1_ICD10_BUNDLED_INFANT.TXT** – is a text version of the format that contains FY2018 and FY2019 newborn diagnoses for use in detecting mother-infant bundled claims (provided for reference only).
- **H0519F1_NDC.4_2.1808.TXT** – is a text version of the format that contains Table 10a RXC to National Drug Code (NDC) Crosswalk.
- **H0519F1_HCPCS.4_2.1808.TXT** – is a text version of the format that contains Table 10b RXC to Healthcare Common Procedure Coding System (HCPCS) Crosswalk.
- **H0519F1.TRN –** a SAS® transport file containing one format library with all requisite formats. Format name suffixes must be specified as macro parameters in the main program as follows:
    - HHS_V05Y18OC – crosswalks ICD-10 codes to CC categories that are transformed to HCC categories, and contains ICD-10 codes used in the risk adjustment models that are valid in FY2018. This suffix must be specified in macro parameter **CCFMT0Y1**.
    - HHS_V05Y19OC – crosswalks ICD-10 codes to CC categories that are transformed to HCC categories, and contains ICD-10 codes used in the risk adjustment models that are valid in FY2019. This suffix must be specified in macro parameter **CCFMT0Y2**.
    - NDCV1808_RXCV4_2F – crosswalks NDC codes to RXC categories for codes valid in calendar year 2018. This format must be specified in macro parameter **NDCFMTN**.

    - HCPC1808_RXCV4_2F – crosswalks HCPCS codes to RXC categories for codes valid in calendar year 2018. This format must be specified in macro parameter **NDCFMTH**.
    - I0AGEY19MCE – crosswalks ICD-10 codes to an acceptable age range if MCE edits on ICD-10 codes are to be performed. This suffix must be specified in macro parameter **AGEFMT0**.
    - I0SEXY19MCE – crosswalks ICD-10 codes to an acceptable sex value if MCE edits on ICD-10 codes are to be performed. This suffix must be specified in macro parameter **SEXFMT0**.
- **C0515O1.TRN** – a SAS® transport file containing relative coefficients for regression models created using CY2013, CY2014, and CY2015 data, and a denominator defined as the weighted average plan liability for the full modeling sample.

The two SAS® transport files (with filename extension .TRN) contain the SAS® format library and model coefficients dataset. They may be used on any SAS® version 9 platform after uploading them and converting them using SAS® PROC CIMPORT.

If your computing platform is z/OS, both transport files should be uploaded using the following attributes: RECFM(F or FB) LRECL(80) BLKSIZE(8000).

The two transport files should be converted (imported) as follows:

- Model coefficients:

```
FILENAME INC     "user defined location of transport file C0515O1.TRN";
LIBNAME  INCOEF  "user defined location for creation of coefficient file";

proc cimport infile=INC data=INCOEF.Coefficients; run;
```

- Format library:

```
FILENAME INF     "user defined location of transport file H0519F1.TRN";
LIBNAME LIBRARY  "user defined location for creation of format library";

proc cimport infile=INF library=LIBRARY; run;
```

III. Creation of a diagnosis dataset, NDC dataset, and HCPCS dataset

A. Diagnosis-level dataset. The diagnosis input SAS® dataset (DIAGNOSIS) must include ICD-10-CM diagnosis codes used for risk adjustment, listed in Table 3, ICD-10 to Condition Categories (CC) Crosswalk. The user must evaluate each claim or encounter record to determine whether its diagnoses are included in the DIAGNOSIS dataset. Encounter records normally report dates, provider or bill types, diagnoses and procedures, and other information, though they may not have payment information.

This section explains how each record is evaluated to determine whether the record's diagnoses are to be used in CC/HCC creation. It is the user's responsibility to create the DIAGNOSIS dataset according to the filtering logic below. This document provides filtering instructions and a list of the 2017 (for historical data purposes) and 2018 CPT/HCPCS codes that define service or

procedure types that identify acceptable sources of diagnoses for risk adjustment.[8] However, the user must create the DIAGNOSIS dataset for input to the risk adjustment algorithm; the dataset is not created by the software.

NOTE: CMS stated that supplemental diagnosis codes may be submitted in certain circumstances. These instructions and the software do not address the addition of supplemental diagnosis codes. Therefore, risk score output from this software will not account for inclusion of supplemental diagnoses.

Only ICD-10-CM diagnosis codes from sources allowable for risk adjustment should be included in the DIAGNOSIS dataset. ICD-10 codes that are not listed in Table 3 may be included in the DIAGNOSIS dataset, but are ignored by the software.[9] The steps below provide logic to determine which diagnoses are allowable. Note that Steps 1 and 3 refer to Table 2, CPT/HCPCS Included List for Diagnosis Code Filtering, which provides the 2017 and 2018 CPT/HCPCS codes used to define service or procedure types that are acceptable sources of diagnoses for risk adjustment.

- The CPT/HCPCS codes identifying services with diagnoses allowable for risk adjustment are listed in column A of Table 2.
- Column B contains the short descriptions of the CPT/HCPCS codes.
- Columns C and D, respectively, indicate whether a CPT/HCPCS code is acceptable in 2017 or 2018.
- Column E identifies applicable footnotes on the CPT/HCPCS codes.
- Notes begin on row 6543 of the Excel table with the line "Notes:" and should not be imported by any program.

The DIAGNOSIS dataset should include diagnoses from claims/encounter records with **discharge dates or through dates** within the benefit year. Though the term "claim" is used in the steps below, the steps apply equally to encounter records. For the EDGE server, only claims with discharge diagnoses are used for HHS risk adjustment.

1. Professional source of diagnosis
    a. For professional records, use diagnoses from records that have at least one line item with an acceptable CPT/HCPCS code (Table 2). If there is at least one acceptable line on the record, use all the header diagnoses. There are three possible values for CPT/HCPCS codes in columns C and D:
        i. yes = code is acceptable in that calendar year
        ii. no = code is not acceptable in that calendar year
        iii. N/A = code is not in existence in that calendar year
    b. For professional records, if a line item has an acceptable CPT/HCPCS code, use all diagnoses from the line item.

[8] Definitions taken directly from the Current Procedural Terminology (CPT®) codes and the Healthcare Common Procedure Coding System (HCPCS) code set. Note that although CY2017 codes are provided for historical purposes, this software is designed to be used only with CY2018 data.

[9] If the user conducts fiscal year code validity checks described later in this section before using the software, only codes valid for risk adjustment will be included in the final diagnosis-level file.

c. If there are no acceptable service lines on the record, do not use any of the diagnoses for risk adjustment.

2. Inpatient facility source of diagnosis
    a. Use all header diagnoses from records where facility bill type code equals one of the following:
        i. 111 (inpatient admit through discharge); or
        ii. 117 (inpatient replacement of prior claim).
    b. There is no procedure screen for inpatient facility record types.
3. Outpatient facility source of diagnosis
    a. Restrict records to those with facility bill type code equal to:
        i. 131 (hospital outpatient admit through discharge); or
        ii. 137 (hospital outpatient replacement of prior claim); or
        iii. 711 (rural health clinic admit through discharge); or
        iv. 717 (rural health clinic replacement of prior claim); or
        v. 761 (community mental health center admit through discharge); or
        vi. 767 (community mental health center replacement of prior claim); or
        vii. 771 (federally qualified health center admit through discharge); or
        viii. 777 (federally qualified health center replacement of prior claim).
        ix. 851 (critical access hospital admit through discharge); or
        x. 857 (critical access hospital replacement of prior claim).
    b. For records with at least one acceptable CPT/HCPCS code (Table 2) on a service line, use all header diagnoses. Otherwise, do not use the diagnoses for risk adjustment.

Fiscal year code validity: Section IV further describes the diagnosis-level input data file. After creating that file, the user will have the variables needed to conduct fiscal year validity checks before using the software if desired. Table 3 identifies the fiscal year(s) in which the diagnosis codes used for risk adjustment are valid. The user should check that for a given diagnosis (variable DIAG) and service date (variable DIAGNOSIS_SERVICE_DATE), the diagnosis code has a Y in the corresponding Table 3 Code Valid column. ICD-10 diagnosis codes with service dates of January 1, 2018-September 30, 2018 should have a Y in the Code Valid in FY2018 column; otherwise, the user should exclude them. ICD-10 diagnosis codes with service dates of October 1, 2018-December 31, 2018 should have a Y in the Code Valid in FY2019 column; otherwise, the user should exclude them. As noted, this software can detect that an ICD-10 diagnosis code is not valid for a given fiscal year, and will optionally flag the enrollee record in the "Errors/warnings/notes log" (see Section VIII.5, message 16).

Note on bundled claims for mother and newborn infant: In practice, some hospital claims for childbirth include both the mother's record and the newborn infant's record on the same claim (diagnoses and procedure codes). Because there are separate adult, child, and infant risk adjustment models and some of the diagnosis codes may not be distinguishable between mother and infant on bundled claims, **any bundled claims should be redefined as two separate records whenever possible (mother and infant, <u>each with a separate ID, sex, and age</u>) in order for the diagnoses to be appropriately included in the input dataset and used for appropriately calculating risk scores.**

The user will need to independently create a program to detect any bundled claims and redefine them as two separate claims (i.e., it is not part of these instructions). For example, a bundled claim detection program would need to identify enrollees with a claim containing the following elements:
Mother is the enrollee:

- AGE_LAST >= 2 (an age corresponding to the child or adult models; more specifically age should be appropriate for a maternity diagnosis)[10] and
- ICD-10 diagnoses corresponding to a completed pregnancy HCC (HCC 207 or 208 or 209) and
- ICD-10 diagnoses corresponding to a newborn HCC (HCC 242 or 243 or 244 or 245 or 246 or 247 or 248 or 249).

Infant is the enrollee:

- AGE_LAST = 0 (an age corresponding to the infant model; more specifically age is appropriate for a newborn diagnosis at birth) and
- ICD-10 diagnoses corresponding to a completed pregnancy HCC (HCC 207 or 208 or 209) and
- ICD-10 diagnoses corresponding to a newborn HCC (HCC 242 or 243 or 244 or 245 or 246 or 247 or 248 or 249).

See H0519F1_ICD10_BUNDLED_MOTHER.TXT and H0519F1_ICD10_BUNDLED_INFANT.TXT or Table 3, ICD-10 to Condition Category (CC) Crosswalk, for diagnosis codes corresponding to the completed pregnancy and newborn HCCs.

As noted, this software can detect that an enrollee might have bundled claims and will optionally flag the enrollee record in the "Errors/warnings/notes log," but it cannot redefine them as separate mother/infant claims (see Section VIII.5, message 25).

Infants with a record in the person-level file that cannot be matched with a claim or who do not have claims will have no diagnoses in the diagnosis-level file. Infants without diagnoses will be assigned to the lowest severity category and the Age 1 maturity category for infants. Age 0 infants with diagnoses but who lack a newborn HCC will be assigned to the corresponding severity category and the Age 1 maturity category for infants. Male infants will also have the male demographic factor assigned. Age 0 male infants who lack a newborn HCC will have their demographic factor reassigned to Age 1.

B. NDC-level dataset. The National Drug Code input SAS® dataset (NDC) must include NDCs used for risk adjustment, listed in Table 10a RXC to NDC Crosswalk. Only pharmacy claims (not medical claims) are acceptable sources for NDCs. The user must evaluate each claim to determine whether the claim's NDCs are included in the NDC dataset.

The NDCs are to be used for RXC creation. It is the user's responsibility to create the NDC dataset for input to the risk adjustment software; the dataset is <u>not</u> created by the algorithm. The inclusion of RXCs in the 2018 benefit year HHS operated risk adjustment methodology is

[10] Section IV of this document identifies the two age variables used in the software and specifies when each is used.

limited to the adult risk adjustment models. Users should not include information for child or infant enrollees in the NDC dataset.

The NDC dataset should include NDCs from pharmacy claims with **prescription filled dates** within the benefit year and from inpatient claims with **discharge dates** within the benefit year for adult enrollees. NDC codes should be in the 11-digit, no dashes HIPAA format to match the format required for EDGE submission.[11] (Note: Table 10a in the Excel file contains the NDC codes formatted as text, not numbers, to retain any leading zeroes needed for 11-digit codes.) NDC codes that are not listed in Table 10a may be included in the NDC dataset but are ignored by the software and are not included in RXCs for the adult risk adjustment models' risk score calculations. Section IV further describes the NDC dataset.

C. HCPCS-level dataset. The Healthcare Common Procedure Coding System input SAS® dataset (HCPCS) must include HCPCS codes used for risk adjustment, listed in Table 10b RXC to HCPCS Crosswalk. Inpatient, outpatient, and professional medical claims are acceptable sources for HCPCS codes. Inpatient and outpatient claims should be restricted to the same facility bill type codes used for the diagnosis-level file (see Section III. 2a and 3a). HCPCS should only be used for medications when an NDC is not available from a pharmacy claim. The user must evaluate each claim to determine whether the claim's HCPCS codes are included in the HCPCS dataset.

The HCPCS codes in the HCPCS dataset are to be used for RXC creation. It is the user's responsibility to create the HCPCS dataset for input to the risk adjustment software; the dataset is not created by the software. The inclusion of RXCs in the 2018 benefit year HHS operated risk adjustment methodology is limited to the adult risk adjustment models. Users should not include information for child or infant enrollees in the HCPCS dataset.

The HCPCS dataset should include HCPCS codes from inpatient, outpatient, and professional medical claims with **discharge dates or through dates** within the benefit year for adult enrollees. HCPCS codes that are not listed in Table 10b may be included in the HCPCS dataset but are ignored by the software and are not included in RXCs for the adult risk adjustment models' risk score calculations. Section IV further describes the HCPCS dataset.

IV. SAS® datasets supplied by the user

This section describes the four input SAS® datasets required to create CC and HCC groupings, RXC and RXC interactions, enrollment duration variables, demographic variables, and risk score variables—a person-level dataset (PERSON), a diagnosis dataset (DIAGNOSIS), an NDC dataset (NDC), and a HCPCS dataset (HCPCS). It is the responsibility of the user to create these

[11] The source for the NDC codes is the U.S. Food and Drug Administration's Comprehensive NDC SPL Data Elements File: https://www.fda.gov/ForIndustry/DataStandards/StructuredProductLabeling/ucm240580.htm. The NDCs are validated as current prescriptions through the U.S National Library of Medicine's RxNorm dataset: https://www.nlm.nih.gov/research/umls/rxnorm/. The RxNorm Technical Documentation includes an algorithm the user can access to normalize NDC codes to the 11-digit, no dashes HIPAA format. The source for the NDC start dates is the U.S. Food and Drug Administration's Orange Book: https://www.accessdata.fda.gov/scripts/cder/ob/index.cfm.

input datasets with the variables listed in this section. All input datasets must be ordered in ascending order by the person identifier variable.

Note on CSR_INDICATOR
In operations, cost-sharing reduction (CSR) plan variations and premium assistance Medicaid Alternative plans (i.e., private options) will be identified by the Health Insurance Oversight System (HIOS) variant ID. Listed below are the codes that will be used to identify the plan variation.[12] Please note that unlike the risk adjustment software person-level CSR indicator, the HIOS variant ID is a plan-level indicator.

Cost-Sharing Reduction (CSR) Level	HIOS Variant ID	CSR RA Factor	RA Software Person-level CSR Indicator
CSR: 94% AV Silver Plan Variation	06	1.12	1
CSR: 87% AV Silver Plan Variation	05	1.12	2
CSR: 73% AV Silver Plan Variation	04	1.00	3
CSR: Zero Cost Sharing – Platinum	02	1.00	4
CSR: Zero Cost Sharing – Gold	02	1.07	5
CSR: Zero Cost Sharing – Silver	02	1.12	6
CSR: Zero Cost Sharing – Bronze	02	1.15	7
CSR: Limited Cost Sharing – Platinum	03	1.00	8
CSR: Limited Cost Sharing – Gold	03	1.07	9
CSR: Limited Cost Sharing – Silver	03	1.12	10
CSR: Limited Cost Sharing – Bronze	03	1.15	11
CSR: Premium Assistance Medicaid Alternative Plan w/94% AV Silver Plan	36	1.12	12
CSR: Premium Assistance Medicaid Alternative Plan w/Zero Cost Sharing – Silver	32	1.12	13
Non-CSR/unknown CSR	00	1.00	0

Note on Enrollment Duration
There are two steps involved in creating the enrollment duration indicator variables:

STEP 1: For the PERSON file, the user should create an ENROLDURATION variable for each enrollee with 12 possible values corresponding to 1-12 months based on an enrollee's total number of days enrolled in the plan in the benefit year as described below. Although ENROLDURATION will only be used to create variables needed for the adult models, this software was designed for ENROLDURATION to be constructed for *all* enrollees to maintain consistency in the variables present in the PERSON file. Thus, enrollees missing ENROLDURATION will receive this Error message: *WARNING: [Msg33] Invalid*

[12] We note that Massachusetts CSR variant plans have a state-specific CSR factor table, as discussed in the 2017 Payment Notice final rule (81 FR 12204 at 12228). In addition to the CSR variants listed with factors of 1.12, plan variants of 04 are also 1.12 in Massachusetts only.

ENROLDURATION, enrollee rejected. Once created, the ENROLDURATION variable will be ignored for enrollees in the child or infant models.

STEP 2: The monthly enrollment duration indicator variables (ED_1– ED_11) are created by the software for adult enrollees as specified in Section VI.

The variable names must be spelled as written; SAS® variable names are case-insensitive (i.e., SEX and Sex and sex and SeX designate the same variable), but are illustrated in upper case.

1. PERSON dataset
    a. &IDVAR (Person identification code). As noted, &IDVAR is the name of the common person identifier variable (e.g., ID).
        i. Character or numeric type, any length, not missing.
        ii. Unique to an individual, and unique in the dataset (i.e., no duplicates).
    b. SEX.
        i. Character type, 1 byte, 1/M=male, 2/F=female, not missing.
        ii. Converted to upper case by the software.
    c. DOB.
        i. Numeric type, 8-digit numeric field (YYYYMMDD), valid calendar date, not missing, provides the enrollee's date of birth.
        ii. Used to calculate AGE_AT_DIAGNOSIS for MCE diagnosis code age edits.
    d. AGE_LAST (Age as of last day of enrollment in benefit year).
        i. Numeric type, integer, 0 or greater, not missing.
        ii. Used for all risk adjustment tasks except MCE diagnosis code age edits.
        iii. For infants born in the previous year but not discharged until the benefit year, users should substitute Age 0 for Age 1 in AGE_LAST.
    e. METAL (Enrollee's plan level – platinum, gold, silver, bronze, catastrophic).
        i. Character type, 1 byte, P/G/S/B/C (only 1 of these values), not missing.[13]
        ii. Converted to upper case by the software.
    f. CSR_INDICATOR (Person-level indicator. Enrollees who qualify for cost-sharing reductions or those enrolled in premium assistance Medicaid alternative plans must be assigned CSR_INDICATOR =1-13. Non-CSR recipients must be assigned CSR_INDICATOR = 0).
        i. Numeric type, integer, 0-13, not missing.
        ii. Values are:
            - 1 = Enrollees in 94% AV Silver Plan Variation.
            - 2 = Enrollees in 87% AV Silver Plan Variation.
            - 3 = Enrollees in 73% AV Silver Plan Variation.
            - 4 = Enrollee in Zero Cost Sharing Plan Variation of Platinum Level QHP.
            - 5 = Enrollee in Zero Cost Sharing Plan Variation of Gold Level QHP.

[13] Although the user is required to select a single metal level for the enrollee, the software produces score variables for all levels. The final unadjusted and CSR-adjusted score variables correspond to the single metal level selected, as is noted in Section VI.

- 6 = Enrollee in Zero Cost Sharing Plan Variation of Silver Level QHP.
- 7 = Enrollee in Zero Cost Sharing Plan Variation of Bronze Level QHP.
- 8 = Enrollee in Limited Cost Sharing Plan Variation of Platinum Level QHP.
- 9 = Enrollee in Limited Cost Sharing Plan Variation of Gold Level QHP.
- 10 = Enrollee in Limited Cost Sharing Plan Variation of Silver Level QHP.
- 11 = Enrollee in Limited Cost Sharing Plan Variation of Bronze Level QHP.
- 12 = Enrollee in a Premium Assistance Medicaid Alternative Plan with 94% AV Silver Plan Variation.
- 13 = Enrollee in a Premium Assistance Medicaid Alternative Plan with Zero Cost Sharing Plan Variation of Silver Level QHP.
- 0 = Non-CSR recipient, and enrollees with unknown CSR.

g. ENROLDURATION
   i. Numeric type, integer, 1-12, not missing.
   ii. Person-level enrollment duration variable. Although ENROLDURATION is for use in adult models only, user should create it for all enrollees for consistency in PERSON file preparation. Values will be ignored for enrollees in child or infant models.
   iii. Allowable values are 1-12 based on months enrolled in plan in benefit year as defined by days:
      - 1 = 1–31 days enrolled
      - 2 = 32–62 days enrolled
      - 3 = 63–92 days enrolled
      - 4 = 93–123 days enrolled
      - 5 = 124–153 days enrolled
      - 6 = 154–184 days enrolled
      - 7 = 185–214 days enrolled
      - 8 = 215–245 days enrolled
      - 9 = 246–275 days enrolled
      - 10 = 276–306 days enrolled
      - 11 = 307–335 days enrolled
      - 12 = 336–366 days enrolled

2. DIAGNOSIS dataset
   a. &IDVAR (Person identification code). As noted, &IDVAR is the name of the common person identifier variable (e.g., ID).[14]
      i. Character or numeric type, any length, not missing.
      ii. Unique to an individual.

[14] Please note that in operation, this information can not include personally identifiable information.

b. DIAG (ICD-10-CM diagnosis codes).
    i. Character type, 7-byte field, no periods or embedded blanks, left justified.
    ii. Converted to upper case by the software.
    iii. Codes should be to the greatest level of available specificity.
    iv. Age and sex edits for diagnoses are performed in macro I0V05ED2 to ensure diagnoses are appropriate for the age and sex of the enrollee.
    v. Only diagnoses from allowable sources should be included in the DIAGNOSIS dataset.
    vi. Invalid diagnoses are ignored; warning messages are optional.[15]
    vii. A valid ICD-10 diagnosis must have a valid DIAGNOSIS_SERVICE_DATE.
c. DIAGNOSIS_SERVICE_DATE
    i. Numeric type, 8-digit numeric field (YYYYMMDD), valid calendar date, not missing, provides the diagnosis's service date.[16]
    ii. As described in Section III, this variable can be used with DIAG and Table 3 to precheck that a diagnosis code is valid for a given fiscal year.[17]

3. NDC dataset
    a. &IDVAR (Person identification code). As noted, &IDVAR is the name of the common person identifier variable (e.g., ID).[18]
        i. Character or numeric type, any length, not missing.
        ii. Unique to an individual.
    b. NDC
        i. NDC normalized drug code (11-digit, no dashes HIPAA standard format), 11-character field, left justified. This format matches the format required for submission to the EDGE server. Only NDCs from pharmacy claims filled in the benefit year or inpatient claims with discharges in the benefit year (Section III B) for adult enrollees should be included in the NDC dataset.

4. HCPCS dataset
    a. &IDVAR (Person identification code). As noted, &IDVAR is the name of the common person identifier variable (e.g., ID).[19]
        i. Character or numeric type, any length, not missing.
        ii. Unique to an individual.
    b. HCPCS

[15] In the context of this software's instructions, valid refers to "included" in the HHS-HCC risk adjustment model and invalid refers to "not included."
[16] Valid diagnosis service date in this version of software (V0518 128 O2): year is 2018, month is 01-12, and day is 01-31 and appropriate for the given month (i.e., cannot be February 30). The service date cannot occur before the date of birth.
[17] The software has a fiscal year validity check. If an ICD-10 code is not valid for a given DIAGNOSIS_SERVICE_DATE (e.g., a deleted in FY2018 code with a FY2018 service date), the optional software warning message will be Message 16 *Diagnosis lookup failed, diagnosis ignored.*
[18] Please note that in operation, this information can not include personally identifiable information.
[19] Please note that in operation, this information can not include personally identifiable information.

i. HCPCS drug code, 5-character field, left justified. Only HCPCS drug codes from inpatient, outpatient, or professional medical claims from allowable sources (Section III) with discharge or through dates in the benefit year (Section III C) for adult enrollees should be included in the HCPCS dataset.

AGE_AT_DIAGNOSIS, the age as of the diagnosis service date, is calculated by the software using DOB from the PERSON dataset and DIAGNOSIS_SERVICE_DATE from the DIAGNOSIS dataset. It is used only for MCE diagnosis code age edits.

The four user-provided datasets (PERSON, DIAGNOSIS, NDC, HCPC) are illustrated below. These examples are not based on actual data.

- Person-level dataset example (PERSON) containing seven variables; we use ID as the person identifier variable to illustrate:

ID	SEX	DOB	AGE_LAST	METAL	CSR_INDICATOR	ENROLDURATION
201	M	19551201	63	P	0	12
202	F	20050315	13	C	0	12
301	F	19630414	55	G	5	7
302	M	19690101	49	B	11	12
304	X	19670132		R	16	3
305	M	19780101	40	S	0	12

- Diagnosis dataset example (DIAGNOSIS) containing three variables; we use ID as the person identifier variable and ICD-10 diagnoses to illustrate:

ID	DIAG	DIAGNOSIS_SERVICE_DATE
201	E118	20180113
201	H9319	20180113
201	M532X9	20180629
201	M25461	20180630
201	M25569	20180706
201	M25579	20180706
201	209	20180835
202	J4530	20180219
302	J200	20180317
302	Z430	20180504
303	E890	20180929
304	Z0000	20180617
305	B20	20180302

- NDC dataset example (NDC) containing two variables; we use ID as the person identifier variable and NDC normalized drug code, 11-digits, HIPAA standard format, character field, left justified, to illustrate:

ID	NDC
201	00002751001
202	

```
303   42291018920
304   13411019102
305   0003-1964-1
```

- HCPCS dataset example (HCPCS) containing two variables; we use ID as the person identifier variable and HCPCS code, 5 digits, left justified, to illustrate:

```
ID    HCPCS

302   C9482
303   J87
304   Q3028
305   J1324
```

- ID 301 has no diagnoses; the other IDs in PERSON have one or more diagnoses.
- ID 303 in DIAGNOSIS and NDC will be ignored because there is no ID 303 in PERSON.
- Missing or invalid information in any PERSON variable will cause that enrollee and all his/her diagnoses, NDCs, and HCPCS codes to be ignored (e.g., ID 304).
- Missing or invalid information in DIAGNOSIS will cause that diagnosis to be ignored (e.g., ID 201 DIAG 209).
- Missing or invalid information in NDC will cause that NDC to be ignored (e.g., ID 202, and ID 305).
- Missing or invalid information in HCPCS will cause that HCPCS to be ignored (e.g., ID 303).
- Risk scores for enrollees without diagnoses, NDCs, and HCPCS codes are calculated using only PERSON demographic information (e.g., ID 301).

If an enrollee has N different diagnoses, the enrollee will have N records in DIAGNOSIS and 1 record in PERSON. If an enrollee has no diagnoses, the enrollee will have zero records in DIAGNOSIS and 1 record in PERSON.

V. Parameters supplied by the user

The user must set the following parameters when calling macro V0518F3M:

- **INP** – input PERSON SAS® dataset name (e.g., *IN1.Person*).
- **IND** – input DIAGNOSIS SAS® dataset name (e.g., *IN2.Diagnosis*).
- **INN** – input NDC SAS® dataset name (e.g., *IN3.NDC*).
- **INH** – input HCPCS SAS® dataset name (e.g., *IN4.HCPCS*).
- **OUTDATA** – output SAS® dataset name (e.g., *OUT.OutputScores*).
- **IDVAR** – name of the person identifier variable (e.g., *ID, or HICNO, or SSN, or EnrolleeID*). This variable can be either character or numeric type, and any length.
- **KEEPVAR** – variables written to the output dataset. There is a list of KEEP variables in the program, but the user can alter the list (e.g., *DOB, AGE_LAST, SEX, METAL, CSR_INDICATOR, SCORE_:, CSR_ADJ_SCR_:, or _ALL_*).
- **CCFMT0Y1 –** format name suffix for formats that crosswalk ICD-10 codes to HHS-CCs for fiscal year 2018. For this version of the software it is *HHS_V05Y18OC*.

- **CCFMT0Y2 –** format name suffix for formats that crosswalk ICD-10 codes to HHS-CCs for fiscal year 2019. For this version of the software it is *HHS_V05Y19OC.*
- **NDCFMTN –** format name for format that crosswalks NDC codes to RXC for calendar year 2018. For this version of software, it is *NDCV1808_RXCV4_2F*.
- **NDCFMTH –** format name for format that crosswalks HCPCS codes to RXC for calendar year 2018. For this version of software, it is *HCPC1808_RXCV4_2F*.
- **AGEFMT0 –** format name suffix for formats that crosswalk ICD-10 codes to an acceptable age range when MCE edits on ICD-10 codes are performed. For this version of the software it is *I0AGEY19MCE.*
- **SEXFMT0 –** format name suffix for formats that crosswalk ICD-10 codes to an acceptable sex value when MCE edits on ICD-10 codes are performed. For this version of the software it is *I0SEXY19MCE.*

VI. Variables output by the software

The software generates a person-level output SAS® dataset. As noted, the user can specify variables to KEEP in the **KEEPVAR** parameter of the macro V0518F3M call.

The following variables can be specified:

1. Any person-level variable from the original PERSON dataset.
2. Demographic age/sex variables created by the software:

```
AGE0_MALE       AGE1_MALE

MAGE_LAST_2_4   MAGE_LAST_5_9   MAGE_LAST_10_14 MAGE_LAST_15_20
MAGE_LAST_21_24 MAGE_LAST_25_29 MAGE_LAST_30_34 MAGE_LAST_35_39
MAGE_LAST_40_44 MAGE_LAST_45_49 MAGE_LAST_50_54 MAGE_LAST_55_59
MAGE_LAST_60_GT

FAGE_LAST_2_4   FAGE_LAST_5_9   FAGE_LAST_10_14 FAGE_LAST_15_20
FAGE_LAST_21_24 FAGE_LAST_25_29 FAGE_LAST_30_34 FAGE_LAST_35_39
FAGE_LAST_40_44 FAGE_LAST_45_49 FAGE_LAST_50_54 FAGE_LAST_55_59
FAGE_LAST_60_GT
```

3. CCs created by the software (before hierarchies are applied).
4. HCCs created by the software (after hierarchies are applied).
5. HCC groups and HCC interactions created by the software.
6. RXCs created by the software (after hierarchies are applied).
7. RXC interactions created by the software.
8. Adult models enrollment duration indicators (ED_1–ED_11) created by the software.
9. Infant model maturity categories, severity level categories, and maturity by severity level interactions created by the software.
10. Score variables created by the software:
    a. Adult Models
        i. SCORE_ADULT_PLATINUM
        ii. SCORE_ADULT_GOLD
        iii. SCORE_ADULT_SILVER
        iv. SCORE_ADULT_BRONZE

v. SCORE_ADULT_CATASTROPHIC
b. Child Models
i. SCORE_CHILD_PLATINUM
ii. SCORE_CHILD_GOLD
iii. SCORE_CHILD_SILVER
iv. SCORE_CHILD_BRONZE
v. SCORE_CHILD_CATASTROPHIC
c. Infant Models
i. SCORE_INFANT_PLATINUM
ii. SCORE_INFANT_GOLD
iii. SCORE_INFANT_SILVER
iv. SCORE_INFANT_BRONZE
v. SCORE_INFANT_CATASTROPHIC

11. CSR-adjusted score variables:
    a. Adult model
        i. CSR_ADJ_SCR_ADULT_PLATINUM
        ii. CSR_ADJ_SCR_ADULT_GOLD
        iii. CSR_ADJ_SCR_ADULT_SILVER
        iv. CSR_ADJ_SCR_ADULT_BRONZE
        v. CSR_ADJ_SCR_ADULT_CATASTROPHIC
    b. Child model
        i. CSR_ADJ_SCR_CHILD_PLATINUM
        ii. CSR_ADJ_SCR_CHILD_GOLD
        iii. CSR_ADJ_SCR_CHILD_SILVER
        iv. CSR_ADJ_SCR_CHILD_BRONZE
        v. CSR_ADJ_SCR_CHILD_CATASTROPHIC
    c. Infant model
        i. CSR_ADJ_SCR_INFANT_PLATINUM
        ii. CSR_ADJ_SCR_INFANT_GOLD
        iii. CSR_ADJ_SCR_INFANT_SILVER
        iv. CSR_ADJ_SCR_INFANT_BRONZE
        v. CSR_ADJ_SCR_INFANT_CATASTROPHIC
12. Final unadjusted and CSR-adjusted score variables depending on the enrollee's metal (plan benefit) level and CSR indicator, including enrollment in premium assistance Medicaid alternative plans, created by the software.
    a. Adult scores
        i. SCORE_ADULT
        ii. CSR_ADJ_SCR_ADULT
    b. Child scores
        i. SCORE_CHILD
        ii. CSR_ADJ_SCR_CHILD
    c. Infant scores
        i. SCORE_INFANT
        ii. CSR_ADJ_SCR_INFANT

The user must determine which of the scores is appropriate for the enrollee, depending upon the enrollee's age and plan benefit design of that enrollee.

VII. Computing platforms

The software has been tested using SAS® v9 on two platforms:

- Linux (server)
- z/OS (IBM mainframe).

VIII. Steps

1. Install software:
    - Copy files to the computing platform on which the risk scores will be calculated. If the platform is z/OS, upload the two transport files (.TRN) using RECFM(F or FB) LRECL(80) BLKSIZE(8000).
    - Use files with .SAS extensions. Files with .TXT extensions are identical, but might be more easily viewed by the user. File names are case sensitive on some computing platforms; software modules assume that file names are upper case (e.g., I0V05ED2.SAS).
2. Prepare software-provided SAS® input format library and coefficients dataset:
    - Convert both .TRN files (containing the SAS® format library and model coefficients dataset) using SAS® PROC CIMPORT on the computing platform on which the risk scores will be calculated as described in Section II.
    - The format library and coefficients dataset are provided with the software, but must be imported by the user; they are not imported by the risk adjustment modeling software.
3. Prepare user-provided SAS® input datasets:
    - Create PERSON, DIAGNOSIS, NDC, and HCPCS datasets using the guidelines in Section III and dataset descriptions in Section IV.
    - These datasets are created by the user; they are not created by the risk adjustment modeling software.
4. Generate scores:
    - Set parameters as described in Section V.
    - Execute SAS® program V0518F3P and generate variables described in Section VI.
5. Review errors/warnings, notes: the software prints messages in the "Errors/warnings/notes log" for various situations. The user may print (or suppress printing) any of them. To print messages of type nn, set macro variable MSGnn to blank; e.g., `%let MSG01= ;` To suppress printing messages of type nn, set macro variable MSGnn to *; e.g., `%let MSG01=*; .`

We recommend the following be printed because they indicate possible errors in datasets, variables or variable values:

```
ERROR  : [Msg01] Variable --- is not in --- file
ERROR  : [Msg02] User-provided variable --- in --- file must be --- type
ERROR  : [Msg03] Duplicate IDVARs in PERSON file
```

```
ERROR  : [Msg04] Program halted due to duplicate IDVARs in PERSON file
OK     : [Msg05] PERSON file is free of duplicate IDVARs
ERROR  : [Msg06] Program halted due to non-existent variable(s) in PERSON file
OK     : [Msg07] PERSON file contains all requisite variables
ERROR  : [Msg08] Program halted due to incorrect user-provided variable type(s) in PERSON file
OK     : [Msg09] PERSON file`s variables have the correct type
ERROR  : [Msg10] Program halted due to non-existent variable(s) in DIAG file
OK     : [Msg11] DIAG file contains all requisite variables
ERROR  : [Msg12] Program halted due to incorrect user-provided variable type(s) in DIAG file
OK     : [Msg13] DIAG file`s variables have the correct type
WARNING: [Msg14] Diagnosis matches no enrollee, diagnosis ignored
WARNING: [Msg15] Blank diagnosis code, diagnosis ignored
WARNING: [Msg18] Missing IDVAR, enrollee rejected
WARNING: [Msg19] Invalid SEX, enrollee rejected
WARNING: [Msg20] Invalid DOB, enrollee rejected
WARNING: [Msg21] Invalid AGE_LAST, enrollee rejected
WARNING: [Msg22] Invalid METAL, enrollee rejected
WARNING: [Msg23] Invalid CSR_INDICATOR, enrollee rejected
WARNING: [Msg24] Failed HHS HCC filter, enrollee rejected
WARNING: [Msg27] Invalid DIAGNOSIS_SERVICE_DATE, diagnosis ignored
WARNING: [Msg28] Invalid AGE_AT_DIAGNOSIS, diagnosis ignored
WARNING: [Msg29] AGE_AT_DIAGNOSIS > AGE_LAST, diagnosis ignored
ERROR  : [Msg30] Program halted, file --- does not exist
WARNING: [Msg31] AGE_LAST minus AGE_AT_DIAGNOSIS > 1, diagnosis ignored
WARNING: [Msg32] DOB > DIAGNOSIS_SERVICE_DATE, diagnosis ignored
WARNING: [Msg33] Invalid ENROLDURATION, enrollee rejected
ERROR  : [Msg34] Program halted due to non-existent variable(s) in NDC file
OK     : [Msg35] NDC file contains all requisite variables
ERROR  : [Msg36] Program halted due to incorrect user-provided variable type(s) in NDC file
OK     : [Msg37] NDC file`s variables have the correct type
WARNING: [Msg38] NDC matches no enrollee, NDC ignored
WARNING: [Msg39] Blank NDC code, NDC ignored
ERROR  : [Msg41] Program halted due to non-existent variable(s) in HCPCS file
OK     : [Msg42] HCPCS file contains all requisite variables
ERROR  : [Msg43] Program halted due to incorrect user-provided variable type(s) in HCPCS file
OK     : [Msg44] HCPCS file`s variables have the correct type
WARNING: [Msg45] HCPCS matches no enrollee, HCPCS ignored
WARNING: [Msg46] Blank HCPCS code, HCPCS ignored
```

We recommend the following be printed during testing with small datasets. The user may choose to suppress printing the messages during production runs with large datasets as these conditions tend to generate many messages.

```
WARNING: [Msg16] Diagnosis lookup failed, diagnosis ignored
NOTE   : [Msg17] Enrollee has no diagnoses, risk score based on remaining information
WARNING: [Msg25] Possible bundled mother/infant claim(s) -- ---
WARNING: [Msg40] NDC lookup failed, NDC ignored
WARNING: [Msg47] HCPCS lookup failed, HCPCS ignored
```

Suppressing printed output for type `nn` does not affect whether an enrollee record or diagnosis is rejected. I.e., diagnosis code ZZZZZ will be ignored by the software even if `%let MSG16=*;` is set.

End of Document