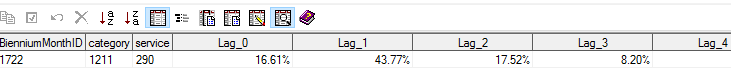
1. A repository of FMAP knowledge and tools from Jeff

* [Q:\ForecastOFM\Docs\FMAP new](file:///\\filedepot\OFMFC\SECURE\HMSVC\MedicaidForecast\ForecastOFM\Docs\FMAP%20new)
* The FMAP Documentation folder is Scott’s: [Q:\ForecastOFM\Docs\FMAP Documentation](file:///\\filedepot\OFMFC\SECURE\HMSVC\MedicaidForecast\ForecastOFM\Docs\FMAP%20Documentation)

2. Production process:

* Run Initialize\_94\_PC.sas
* Run Q:\ForecastOFM\Development\NwCycle1722\_zxg\ForecastPTFmap\SourceInformation\ RunFMAP.sas
* The code RunFMAP.sas calls is saved in Q:\ForecastOFM\Development\NwCycle1722\_zxg\ForecastPTFmap\SourceInformation\FMAP
* Run Meg 1280 separately from other MEG.

3. Note on Code of RunFMAP.sas:

* ***%ExecuteMethod(MainFmap.Fmap)*** calls ***%MainFmap\_482***(test = , NewExcelTable = NO, loadBaseData = YES)
* ***%MainFmap\_482***(test = , NewExcelTable = NO, loadBaseData = YES)
  + Step 1: %***MakeCurrentFmapModelSheet***; this step creates the temporary data ***ForecastPTmodelsCurrent,*** which is used to create the permanent table ***FMAP.ForecastPTmodelsCurrent*** though exporting and importing table ***ForecastPTmodelsCurrent*. But** this step may not run because the if condition is not met.
  + Step 2: create table ***FMAP.Result\_Fedshare*** and table ***FMAP.PredResult\_Fedshare*** if they do not exist.
  + Step 3: %***InputMOPweights***;
    - use tab ExternalMOPW and ManualCellList from ExternalMOPw.xls to create a table FMAP.Spcial12881277
    - How to populate the tab ExternalMOPW of file ExternalMOPW.xls? And tab ManualCellList?
      * Answer, in the QC folder, where Eddy created a views of scrub data (e.g., ScrubSource.xlsx), use those views to create the weights on tab ExternalMOPW.
    - Where is the table FMAP.Spcial12881277?
  + Step 4: %***PrepareBFAMpweights***
    - %***LoadFmap\_MopDB***; create table ***Fmap.Fmap\_mop***, this table contains the policy FMAP value, for example, FMAP10 refers to the policy FMAP value for ACA newly eligible, so on and so forth; This table is populated by table ***MainDM.Fact\_FmapMopHistory***. Table MainDm.Fact\_FmapMopHistory is populated in MainCyclePrograms.sas where the %***ExecuteMethod***(UpdateForImports.Methods) is executed to populate the table ***MainDM.Fact\_FmapMopHistory*** using ForImportTables.xml.
    - %***BaseFmapData:*** create table ***Fmap.BaseFmapData***,and table ***Fmap.Hist\_FedShare***. TABLE ***Fmap.BaseFmapData*** contains THE subobject, subsubobject, fundType, AfrsExpenditure, month of service, forcastmeg, and forecast service,and Afrs\_Sof\_id,etc***. Fmap.Hist\_FedShare*** contain the column of **FedShareValue** set equal to the total expenditure (for a given AfrsCycle, ForecastMeg, ForecastSvc, ServiceMOnth, and fund type being Federal) divided by the total expenditure (for a given AfrsCycle, ForecastMeg, ForecastSvc, and ServiceMOnth, excluding FundType). Table ***Fmap.BaseFmapData*** is used to calculate the table ***FMAP.BaseFmapWeights*** for each source of fund, where Afrs\_Sof\_ID is named as SOF in the table. **The weight** is calculated as the total (for a given ForecastMeg, ForecastSvc,MOP,and SOF)divided by the Grand Total (for a given ForecastMeg, ForecastSvc,MOP). It is here that SOF in table ***FMAP.BaseFmapWeights*** actually is the Afrs\_Sof\_ID from table ***Fmap.BaseFmapData***.
  + Step 5:%***MOP\_FMAP***:
    - create the empty table ***FMAP.ForecastBaseFmapweights***; create table ***FMAP.BaseFmapFact***;
    - call the macro ***%CalcualteFmapWeights***:
      * It is here that the process touches the macro variables including &Cutoff, &ForecastStart, &FirstDateOfAcutalData, &LastDateofProjectedData ,&LastDateofAcutalData. The ,&LastDateofAcutalData is 01Jun2017, but in reality in the cycle of 1724 cycle, the last date of actual data is 01Feb2017, this may be due to chopping off the last 4 data points. The value of **FirstDate (LastDate)** in tab ***FmapModel*** determine the value for the macro variables of **&FirstDateOfAcutalData( &LastDateofAcutalData);** the macro variable **&ForecastStart** is from value of **ForecastStart** in the tab ***FmapModel***.
      * Call macro ***%MakeAutoModel2***: create table ***work.ForecastBFmap***, based on the regression with dependent variable being Weights on ***TrendMon*** and ***dummy*** variables. This table contains the weights by MOP for a type of source of fund under a given Meg and Service; the weights are then transformed in another form in the macro ***%CalcualteFmapWeights.***
      * Call macro ***%ManualWeights(&Category, &Service)*** , this is conducted on the cells listed in the tab ***ManualCellList*** of the excel file ***ExternalMOPW.xls***. If a cell is not on the list, this macro will not make any real difference, i.e., the table FMAP.Spcial12881277 will not be produced. The tab **ExternalMOPW** and tab **ManualCellList** should stay in sync, never remove the cells in the tab **ExternalMOPW**.
      * Some FMAP adjustment is made in this macro, like the one that 1230-221 TO SHIFT FMAP CHANGE FROM JAN TO FEB. The hard coded part is try to update the table ***FMAP.BaseFmapFact***. We have to pay attention to this part when running this, should fix this part in ***%CalcualteFmapWeights*.**
      * Populate the table ***FMAP.BaseFmapFact***! The column ***BaseFmapValue*** is the weighted average of the FMAP1, FMAP2, … , FAMP11, the weight is from table ***work.ForecastBFmap***. This table is populated by the table work.CalculatedBaseFmap.
  + Step 6: ***%EXECUTEMETHOD(MOS\_FMAP.Fmap***), which calls ***MOS\_FMAP\_507(test = , NewExcelTable = NO, loadBaseData = YES)***;
    - ***% MOS\_FMAP\_507*** does the following:
      * Executing the ***%PctExpenditure***(ThisCycle=&pDataCycle): create table ***FMAP.PctExpenditure***, which contains the lag for a given cell, like the following graph (This macro contains the logic to calculate the lag factors for FAMP):
      * 
      * Executing ***%FMAPBaseData***(&category, &service, &LastDate, &ForecastStart): create table FMAP.FmapMos&category.\_&service, which has hard-coded part, like fix problem with declining too much in Dec; fix problem with declining too much in Nov and Dec, etc. Need to modify with new cycle. This also creates table FMAP.FmapRatio&category.\_&service
      * Executing ***%ForecastFmap***(&NewExcelTable, &test, &ForecastStart). This code has a bug, I fixed it. This macro has hard-coded patch for ACA expansion, need to be taken care of. This is to forecast the FMAP values:
        + The input data for the forecast is FMAP.FmapRatio&category.\_&service (e.g. FMAP.FmapRatio1211\_290.
        + This macro use three method to make the FMAP forecasts: proc forecast; %SpecialFmapForecastAverage and %FmapForecastAverage (Jeff uses this). We take the Jeff’s way in order to make the consistent production, this process creates table ***FMAP.FmapRatio&category.\_&service***. This macro has hard-coded part for each cycle, we have to address this when we run the FMAP process.
        + Create the PDF of graphs ~\Fmap\MopGraphs\BaseFmap\_SOF\_&category.\_&service..pdf
        + Create pdf of graphs \MosGraphs\&ModelType.\_Mar2017\_Fmap\_&service.\_&category.\_Afrs1722.pdf. This is final product. The ProjectedFmap is the predicted FMAP. Jeff put this on to the SharePoint.
        + Question: where the table FmapRatio&category.\_&service.Truncate is created? In the macro FMAPBaseData.sas.

Other Note:

1. Table Fmap.Fmap\_mop should be read together with table temporary table, Work.Distinctsof\_1211\_290. Jeff mentioned that for the table Fmap.Fmap\_mop, the column FAMP10 and FAMP11 should be 0, 8, need to check with Jeff.
2. ExternalMoPw is the super set of the Manualcelllist, determine which cell will run.

**Note on the Other Files**

1. ForImportTables.xml

* Tab FmapMopHist: we are going to change the tab FmapMopHist if there is a big policy change. When AfrsSof = 0, it refers to newly eligible (ACA expansion).

2. ExParameters.xls

* Copy B-J columns from tab FmapModelMaster to tab FmapModel, on which the FMAP forecast is based on. Make sure just paste the value only because the copy contains formulas.
* The column FirstDate and LastDate in tab FmapModel, defines the time window for input data to forecast the FMAP. The value of FirsDate can be overwritten by macro variable cutoff (I checked, seems not true for 1221-333).

3. ExternalMOPw.xls

* Tab ExternalMOPW is the super set of the tab ManualCellList, but it is the tab ManualCellList that determine which cell will run. This is used to patch if the FAMP for a cell is not good or at some point is weird.

**Note on Production Process**

1. Need to change the hard-coded part of the ***%CalcualteFmapWeights***.

2. *F* , where

Where FedShareValue is the actual value happened in the expenditure, so it is considered to be actual FMAP value. This FMAPRatio is calculated in %FMAPBaseData where table FMAP.FmapMos&category.\_&service is created.

FedShareValue is the true transaction, is the actual value of the FMAP; BaseFmapValue is the weighted average of the policy level FMAP value originated from **ForImportTables.xml**. The FMAPMos is to describe how the policy FAMP value or theoretic FMAP has developed to be at a given time (here we use month),i.e. ***FMAPMos is a value that the FMAP value will be if policy level is perfectly followed by all the source of funds, FMAPMos is a theoretic value which can be used as a benchmark for our true FMAP value. Ideally, FedShareValue cannot be bigger than FMAPMos, so the FMAPRatio cannot exceed 1, if FMAPRatio is greater than 1, it means that If the FMAPRatio is greater than 1, we have to pay attention to check if the any funds swap or traction is weird.***

FMAPMos is the backward lagged process. It is to recover how the FMAP develops from past to present. This is an interesting contrast with the regular expenditure lagging process.

**Note of the tables**

Fmap.FmapRatio&Category.\_&Service🡨 FMAP.FmapMOS&category.\_&service🡨

Work. BaseFmapFmap🡨 Work.tempAccuFmap&Nlag🡨work.ThisBaseFmap🡨 FMAP.BaseFmapFact🡨 FMAP.BaseFmapWeights and work.CalculatedBaseFmap**.**

Table Fmap.FmapRatio&Category.\_&Service produces the table FmapRatio&category.\_&service.\_Graph that is used to draw the pdf graph for example, Q:~\Fmap\MosGraphs \L\_Oct2017\_Fmap\_333\_1221\_Afrs1724.pdf

**The data process above runs in the macro %CalcualteFmapWeights and %FMAPBaseData .**

**Notice that BaseFmapValue0 column (from table FMAP.FmapMOS&category.\_&service) is the column BaseFmap of the table FMAP.FmapRatio&category.\_&service.**

**The final output table is** FMAP.LoadPredicted\_FedShare, which is created in macro RunFMAP.sas.

The very final table is ***FMAP.LoadPredictedShare***, which is created in RunFMAP.sas by calling the macro StateFundSplit.sas.

**Note on the some columns**

**1. BaseFmapValue1, BaseFmapValue2, …, BaseFmapValue18, BaseFmapValue19:**

These values BaseFmapValue1, etc. , are from table work.tempAccuFmap&Nlag in macro %FMAPBaseData. The original value is from the table ***FMAP.BaseFmapFact***. It is the value of the column ***BaseFmapValue*** in the table FMAP.BaseFmapFact.

These values, BaseFmapValue1, etc are used to calculate the FMAPRatio in the macro %FMAPBaseData.

***BaseFmapValue*** in the table **FMAP.BaseFmapFact** is calculated from macro %CalcualteFmapWeights like the following:

SUM(a.FMAP1\*b.TW1, a.FMAP2\*b.TW2, a.FMAP3\*b.TW3, a.FMAP4\*b.TW4, a.FMAP5\*b.TW5, a.FMAP6\*b.TW6, a.FMAP7\*b.TW7, a.FMAP8\*b.TW8, a.FMAP9\*b.TW9,

a.FMAP10\*b.TW10, a.FMAP11\*b.TW11)

where FMAP2 is the FMAP value by the policy; and the weight TW1, TW2, etc. is from table work. ForecastBfmap. TW1, TW2 are obtained from like the following

Data ForecastBFmap;

Set ForecastBFmap;

Wsum=SUM(W1, W2, W3, W4, W5, W6, W7, W8, W9, W10, W11);

%DO i=**1** %TO **11**;

TW&i=W&i/Wsum;

IF TW&i<**0** THEN TW&i=**0**;

ELSE IF TW&i >**1** THEN TW&i=**1**;

%END;

Run;

The W1, W2 are predicted weights from PROC REG in the %MakeAutoModel2(&category, &service, &ThisSOF, &cutoff, &LastDate);

Table work.ForecastBFmap\_3 is a copy of table work.ForecastBFmap\_3.

**2.**

The dependent variable Weights in the PROC REG is from the FMAP.BaseFmapWeights, it is a weight by month of payment.

**About the graph**

1. The graph BaseFmap\_SOF\_1221\_350.pdf:

This plot is developed from the input table FMAP.BaseFmapWeights. This cell (1221, 350) have two sources of funds, one source of fund is 10 (or 0), the other source of fund is 11 ( or 8), the sum of the weights corresponding to these two source is 1. The plot contains two lines, one is actual weights, from table FMAP.BaseFmapWeights, the other one is obtained using the PROC REG Procedure, is called predicted value of weights.

The graph is based on the data ***BaseFmap\_&category.\_&service.\_SOF\_&sofID*.**

2. The graph L\_Oct2017\_Fmap\_350\_1221\_Afrs1724.pdf.

* Base Fmap: this is the weighted average of the policy level FMAP, this serve as bench mark.
* Fmap MOS: theoretic FMAP value
* Fed share Value: the proportion of the federal expenditure in the total expenditure.
* Projected FMAP, is the projected FMAP that used along the PT forecast.

**Appendix**

**Work.TempAccuFmap19**

**FMAP.BaseFmapFact (for Meg 1221 and Svc 333):**

**Fmap.Fmapratio1221\_333( table used in plot):**

**The Note about the Graph**

1. the plot Forecast Process Specific Files\Cycle 1724\Version A\Fmap\MosGraphs \L\_Oct2017\_Fmap\_333\_1221\_Afrs1724.pdf is the one that put on the SharePoint.

This plot is based on the data work. FmapRatio&category.\_&service.\_Graph,e.g., work.FmapRatio1221\_333\_Graph.

Where is the table work.FmapRatio&category.\_&service.\_Graph produced? What is the meaning of the following terms?

* BaseFmap
* FmapMos
* FedShare
* FmapRatio
* ProjFmapRatio, from variable ProjectedFmapRatio, is
* ProjectedFmap



|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Note: LastDate is used in the macro %CalculateFmapWeights** | |  |  |  |  |  |  |  |  |  |  |  |  |
|  | | | |  |  |  |  |  |  |  |  |  |  |
| **The cutoff is set in the RunFMAP.sas, but the value used in macro %CalculateFmapWeights is set to be the min(&Cutoff,&ForecastStart). This determines the data where the pdf plot starts** | | | | | | | | | | | | | |
| **&FirstDateOfAcutalData, &LastDateofActualData,&LastDateofProjectedData are both from the table Kernel.Parameters** | | | | | | |  |  |  |  |  |  |  |
| **&FirstDateOfAcutalData, &LastDateofActualData determine the range the time window for the input data for regression in macro MakeAutoModel2.sas, it is further timed by cutoff date** | | | | | | | | | | | | |  |
| **&FirstDate and &LastDateOfAcutalData are used in the macro %ForecastFmap in the PROC FORECAST, they defined the time window of the input data used in the forecast.** | | | | | | | | | | | |  |  |
| **change FirstDate affects the FmapMos** |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Note of some parameters**:

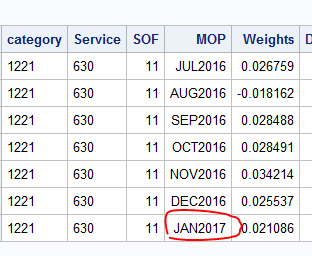
1. ForecastStart in the tab FmapModel in file ExParameters.xls is the date of the first forecasting date; this parameter value determines the month where the output pdf plot starts from.

2. It is in the macro %MOP\_FMAP that reads in the tab FmapModel of file ExParameters.xls, it is the SAS data file FMAP.ForecastPTmodelsCurrent. The macro variable &LastDate, &ForecastStart get their values from their counterparts in the tab. These macro variables are called by the macro % CalcualteFmapWeights. &ForecastStart also determine where to start to predict, which could affect the prediction of the predicted value of weights. This is reflected in the plot of FAMP of (122,630) in the experiment I did for forecasting cycle 1905.

3. The value of the parameter Cutoff = min(&cutoff, &ForecastStart). This parameter is used in the macro %CalcualteFmapWeights. The &FirstDateOfAcutalData, &LastDateofActualData are used in these macros or the macros being called by these macros.

4. I change the value for the parameter LastDateOfAcutalData in the code RunFMAP.sas to see if it make any difference, holding everything else equal:

There is difference. For example, for the cell (1221,630) of the cycle 1905, I change the value to “01Mar2017”, the weight of each fund is different than the production. Also the forecasted FMAP value also changes. The reason is that the value of LastDateOfAcutalData determines the value for the window of month of payment. For example, if the value of the LastDateOfAcutalData is “01Mar2017”, then the table **ForecastBaseFmapWeightsCS’s** column Weights have value up to “01Mar2017”, beyond which the value will be zero. This parameter determine the value of the time window for table fcstBFmapDataReg which is input for proc reg procedure. For example, LastDateOfAcutalData = “01Mar2017”, the fcstBFmapDataReg table looks like the following: the last mop is Jan2017, which is 01Mar2017 minus 2 month! Does parameter ForecastStart determine the first Mop in the table? Answer is no.



Skills in the FMAP:

* Macro % FmapForecastAverage\_zxg is used to do the forecast of the FMAP, adjust the value of the ThisRatioMEAN will change the forecasted value of the FMAP, if this value is greater than 1, the forecasted value will increase, otherwise will decrease. I heavily use this macro to adjust the FMAP predicted in order to make business sense.
* Alternatively, you can change the macro value of LastDateOfAcutalData in RunFMAP.sas to define the input data so that the forecasted FMAP will change. The change of the LastDateOfAcutalData is very similar to determining the jump off point in producing the PT forecast. In PT, when you change the jump point, the level of the PT forecast will change.
* One can use the hard-coded patch in the ***%CalcualteFmapWeights*** to modify the weight of the source of fund to make the business sense. I have saved the %CalcualteFmapWeights in the utility folder for FMAP production.
* The weight plot can be modified in the macro ForecastFmap.sas, I saved this code in my utility folder for production.
* If the weight plot shows the weight is more than 100% and there is negative weight in the plot, I will check and use the reasonable time window to deal with the situation.
* When we do small cells, we use the excel file, for this cycle of 1905, LargeCells1905.xlsx to see importance of the cell. For example, if the FMAP is different than the one in the last cycle, and if the average expenditure per month for that cell is smaller than certain value, I use $100,000 this time, to see if we need to adjust the FMAP or not. If the average expenditure for that cell is small than $100,000, we may need to adjust the FMAP, for it is a very small cell in terms of expenditure.
* Table ***work. Forecastbfmap*** contain the calculated weights and normalized weights.
* In the tab ManualCellList of excel file ExternalMOPw.xls, if one cell, for example, cell (1251,620) is deleted, the weight from the cell on tab ExternalMOPW will not overwrite the calculated weight in the production process. This can be checked by reading the table ***work. Forecastbfmap***.
* It is in the macro **%FMAPBaseData** where problem with declining too much is fixed. For example, you can see the code for the cell (1861,551) to get experiences!!.
* It is in the macro **%FmapForecastAverage** where we manage the problem that the BaseFmap line and other line are not well aligned, i.e., it is in this macro we adjust the forecasted FAMP, etc. The macro variable **FCycle** in this macro is defined in SAS code RunFMAP.sas, this is a very important macro variable that used in the adjusting model.
* It is in the macro %ForecastFmap\_zxg where we manage the weight that is plotted on the pdf.

Adjust the value of the macro variable ***GraphStart*** in RumFMAP.sas can not only determine where the pdf plots begins and also can help to remove the beginning part where the fitted value straying from the actual values. However, the value in column ***ForecastStart*** in the tab ***FmapModel*** in the ***ExParameters.xls*** can overwrite the value from the macro variable ***GraphStart*.**

* In the tab FmapMode in ExParameters.xls, the value for category and service have to be the char type, otherwise it will not produce the FAMP!!!
* I cut the FedShareValue in the final pdf plot by modifying the code **ForecastFmap\_zxg.sas , this**  SAS code draw the production pdf.
* For expansion cells, say (1221,630), just run the runFAMP.sas, do not use any other utility code, because the premium is paid in time. Cells of FFS for meg 1221/1222 should remove Jeff’s hard-coded parts before producing FMAP for all the cells but not the premium service like 630,620,etc, because these cell service are premium and paid without delay

**The working experience from production of October 2018 cycle:**

1. The following note is important for cell MEGs:
   1. MEG 1280 get BCCT enhanced FMAP,FID82
   2. MEG 1861 and 1862 get SCHIP enhanced FMAP, FID42
   3. All other MEGs that have SOF4 get regular enhanced FMAP
   4. As suggested by Carl at HCA, 1261/1262 get SCHIP enhanced FMAP, FID42
2. Cells of FFS for meg 1221/1222 should remove Jeff’s hard-coded parts before producing FMAP for all the cells but not the premium service like 630,620,etc, because these cell service are premium and paid without delay.
3. From cycle 2105 and going forward, only Meg 1280 uses FID82, the other Meg all use fid32, I will check with Eddy for cycle Oct2020 cycle. In the production of cycle 2105, Jason Brown pointed that MEG 1271, 1272, 1470 contains SCHIP, which led to this change.

New note on 6/25/2020:

* The values for macro variable &FirstDate, &LastDate are given by the same column in the tab FmapModel, so is the macro variable &ForecastStart, these macro variable are used in SAS macro codes %ForecastFmap and %FmapForecastAverage, in fact, the macro varaibles &ForecastStart <= MOS <= &LastDate in %FmapForecastAverage determin the data window in which the mean is calculated.

--checking of today, in macro MainFMAP\_158

* PREPAREBFAMPWEIGHTS took 55 seconds.
* %***MOP\_FMAP***(&test)took 4 minutes 34 seconds! It only calls %CalcualteFmapWeights.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1271 | 671 | L | Average | 7/1/2021 | 2/1/2022 | X |  | 1/1/2021 |