FF_SUMM_ND_ARRAY Examples

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This is the example vignette for function: **ff_summ_nd_array** from the **MEconTools Package.** This function summarizes policy and value functions over states.

Test FF_SUMM_ND_ARRAY Defaults

Call the function with defaults.

```
ff_summ_nd_array();
```

```
xxx  Summ over (a,z), condi age as cols, kids/marriage as rows  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    marry    kids    mean_age_18    mean_age_19    mean_age_20    mean_age_21
    _____    _____    ____    ___________    ___________    ___________    ___________

      1        0        1        0.52456        0.51689        0.48412        0.54526
      2        1        1        0.49355        0.52906         0.5583        0.47342
      3        0        2        0.49085        0.51315        0.45158        0.43201
      4        1        2        0.58096        0.50596        0.47985        0.58791
      5        0        3        0.57811         0.6068        0.55221        0.50677
      6        1        3        0.53023        0.49258        0.48728        0.43352
      7        0        4        0.50339        0.48449        0.53618        0.45993
      8        1        4        0.44418         0.5223        0.55657        0.48583
```

Test FF_SUMM_ND_ARRAY with Random 2 Dimensional Matrix

Summarize over 6 dimensional array, iteratively change how many dimensions to group over.

First, generate matrix:

```
st_title = "Random 2D dimensional Array Testing Summarizing";
rng(123)
mn_polval = rand(5,4);
bl_print_table = true;
ar_st_stats = ["mean"];
cl_mp_datasetdesc = {};
cl_mp_datasetdesc{1} = containers.Map({'name', 'labval'}, ...
    {'a', linspace(0,1,size(mn_polval,1))});
cl_mp_datasetdesc{2} = containers.Map({'name', 'labval'}, ...
    {'z', linspace(-1,1,size(mn_polval,2))});
disp(mn_polval);
```

```
    0.6965    0.4231    0.3432    0.7380
    0.2861    0.9808    0.7290    0.1825
    0.2269    0.6848    0.4386    0.1755
    0.5513    0.4809    0.0597    0.5316
    0.7195    0.3921    0.3980    0.5318
```

Second, show the entire matrix (no labels):

```
it_aggd = 0;
bl_row = 1;
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ar_st_stats, it_aggd, bl_row);
```

```
xxx  Random 2D dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxx
    group    vardim2    mean_vardim1_1    mean_vardim1_2    mean_vardim1_3    mean_vardim1_4    mean_vardim1_5
    _____    _______    ______________    ______________    ______________    ______________    ______________

      1          1          0.69647           0.28614           0.22685           0.55131           0.71947
      2          2          0.42311           0.98076           0.68483           0.48093           0.39212
      3          3          0.34318           0.72905           0.43857          0.059678           0.39804
      4          4            0.738           0.18249           0.17545           0.53155           0.53183
```

Third, rotate row and column, and now with labels:

```
it_aggd = 0;
bl_row = 1;
ar_permute = [2,1];
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ar_st_stats, it_aggd, bl_row, ...
    cl_mp_datasetdesc, ar_permute);
```

```
xxx  Random 2D dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxx
    group      a       mean_z__1    mean_z__0_33333    mean_z_0_33333    mean_z_1
    _____    ____    _________    _______________    ______________    ________

      1         0      0.69647          0.42311            0.34318         0.738
      2      0.25      0.28614          0.98076            0.72905       0.18249
      3       0.5      0.22685          0.68483            0.43857       0.17545
      4      0.75      0.55131          0.48093           0.059678       0.53155
      5         1      0.71947          0.39212            0.39804       0.53183
```

Fourth, dimension one as columns, average over dim 2:

```
it_aggd = 1;
bl_row = 1;
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ar_st_stats, it_aggd, bl_row, ...
    cl_mp_datasetdesc);
```

```
xxx  Random 2D dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxx
    group    x    mean_z__1    mean_z__0_33333    mean_z_0_33333    mean_z_1
    _____    _    _________    _______________    ______________    ________

      1      1     0.49605          0.59235             0.3937         0.43186
```

Fifth, dimension one as rows, average over dim 2:

```
it_aggd = 1;
bl_row = 0;
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ar_st_stats, it_aggd, bl_row, ...
    cl_mp_datasetdesc);
```

```
xxx  Random 2D dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxx
    group       z          sum        mean         std       coefvari       min          max
    _____    ________    ______    _______    _______    ________    ________    _______

      1           -1      2.4802    0.49605    0.22895      2.1666      0.22685    0.71947
      2      -0.33333      2.9617    0.59235    0.24524      2.4154      0.39212    0.98076
      3       0.33333      1.9685     0.3937    0.23907      1.6468     0.059678    0.72905
      4             1      2.1593    0.43186    0.24575      1.7573      0.17545      0.738
```

Sixth, dimension two as rows, average over dim 1:

```
ar_permute = [2,1];
```

```
it_aggd = 1;
bl_row = 0;
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ar_st_stats, it_aggd, bl_row, ...
    cl_mp_datasetdesc, ar_permute);
```

```
xxx  Random 2D dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group     a       sum       mean        std      coefvari      min         max
    _____    ____    ______    _______    _______    ________    ________    _______

      1         0    2.2007    0.55019    0.19636     2.8019      0.34318      0.738
      2      0.25    2.1784    0.54461    0.37514     1.4518      0.18249    0.98076
      3       0.5    1.5257    0.38143    0.23212     1.6432      0.17545    0.68483
      4      0.75    1.6235    0.40587    0.23269     1.7443     0.059678    0.55131
      5         1    2.0415    0.51036    0.15361     3.3226      0.39212    0.71947
```

Test FF_SUMM_ND_ARRAY with Random 6 Dimensional Matrix

Summarize over 6 dimensional array, iteratively change how many dimensions to group over.

First, generate matrix:

```
st_title = "Random ND dimensional Array Testing Summarizing";
rng(123)
mn_polval = rand(8,7,6,5,4,3);
bl_print_table = true;
ar_st_stats = ["mean"];
```

Second, summarize over the first four dimensions, row group others:

```
it_aggd = 4;
bl_row = 0;
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ar_st_stats, it_aggd, bl_row);
```

```
xxx  Random ND dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    vardim5    vardim6     sum       mean        std       coefvari       min          max
    _____    _______    _______    ______    _______    _______    ________    __________    _______

      1          1          1       836.78    0.49808    0.29255     1.7026     8.1888e-05    0.99964
      2          2          1       842.15    0.50128    0.28968     1.7305     6.7838e-05    0.99936
      3          3          1       831.45    0.49491    0.28851     1.7154     0.00091373    0.99989
      4          4          1        843.9    0.50232    0.28154     1.7842     0.00012471    0.99731
      5          1          2       838.99     0.4994     0.2911     1.7156     0.00029749    0.99938
      6          2          2       830.81    0.49453    0.28634     1.7271     0.00027113     0.9992
      7          3          2       832.59    0.49559    0.28682     1.7279     0.00035994    0.99936
      8          4          2       820.42    0.48835    0.29032     1.6821     0.00096259    0.99896
      9          1          3       870.56    0.51819    0.29111     1.7801      0.0010616    0.99951
     10          2          3       854.68    0.50874    0.28458     1.7877       0.001884    0.99965
     11          3          3       838.29    0.49898     0.2891      1.726      0.0019192    0.99945
     12          4          3       842.83    0.50169     0.2877     1.7438     0.00016871    0.99963
```

Third, summarize over the first four dimensions, column group 5th, and row group others:

```
it_aggd = 4;
bl_row = 1;
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ["sum"], it_aggd, bl_row);
```

```
xxx  Random ND dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    vardim6    sum_vardim5_1    sum_vardim5_2    sum_vardim5_3    sum_vardim5_4
    _____    _______    _____________    _____________    _____________    _____________
```

```
1         1         836.78          842.15          831.45           843.9
2         2         838.99          830.81          832.59          820.42
3         3         870.56          854.68          838.29          842.83
```

Fourth, summarize over the first five dimensions, column group 6th, no row groups:

```
it_aggd = 5;
bl_row = 1;
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ["mean", "std"], it_aggd, bl_row);
```

```
xxx  Random ND dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    x    mean_vardim6_1    mean_vardim6_2    mean_vardim6_3    std_vardim6_1    std_vardim6_2    std_vardim
    _____    _    ______________    ______________    ______________    _____________    _____________    __________

      1      1       0.49915           0.49447           0.5069           0.28805          0.28862          0.28816
```

Fifth, summarize over all six dimensions, summary statistics over the entire dataframe:

```
it_aggd = 6;
bl_row = 0;
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ar_st_stats, it_aggd, bl_row);
```

```
xxx  Random ND dimensional Array Testing Summarizing  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    x     sum      mean        std       coefvari       min           max
    _____    _    _____    _______    _______    ________    _________    _______

      1      1    10083    0.50017    0.28831     1.7349     6.7838e-05    0.99989
```

Test FF_SUMM_ND_ARRAY with Random 7 Dimensional Matrix with All Parameters

Given a random seven dimensional matrix, average over the 2nd, 4th and 5th dimensionals. Show as row groups the 3, 6 and 7th dimensions, and row groups the 1st dimension. Show Coefficient of Variation only.

```
st_title = "avg VALUE 2+4+5th dims. groups 3+6+7th dims, and row groups the 1st dim.";
rng(123)
mn_polval = rand(3,10,2,10,10,2,3);
ar_permute = [2,4,5,1,3,6,7];
bl_print_table = true;
ar_st_stats = ["coefvari"];
it_aggd = 3; % mean over 3 dims
bl_row = 1; % one var for row group
cl_mp_datasetdesc = {};
cl_mp_datasetdesc{1} = containers.Map({'name', 'labval'}, ...
    {'age', [18, 19, 20]});
cl_mp_datasetdesc{2} = containers.Map({'name', 'labval'}, ...
    {'savings', linspace(0,1,10)});
cl_mp_datasetdesc{3} = containers.Map({'name', 'labval'}, ...
    {'borrsave', [-1,+1]});
cl_mp_datasetdesc{4} = containers.Map({'name', 'labval'}, ...
    {'shocka', linspace(-5,5,10)});
cl_mp_datasetdesc{5} = containers.Map({'name', 'labval'}, ...
    {'shockb', linspace(-5,5,10)});
cl_mp_datasetdesc{6} = containers.Map({'name', 'labval'}, ...
    {'marry', [0,1]});
```

```
cl_mp_datasetdesc{7} = containers.Map({'name', 'labval'}, ...
    {'region', [1,2,3]});
% call function
ff_summ_nd_array(st_title, mn_polval, bl_print_table, ar_st_stats, it_aggd, bl_row, cl_mp_datas
```

```
xxx  avg VALUE 2+4+5th dims. groups 3+6+7th dims, and row groups the 1st dim.  xxxxxxxxxxxxxxxxxxxxxxxxxx
```

group	borrsave	marry	region	cv_age_18	cv_age_19	cv_age_20
1	-1	0	1	1.7607	1.7534	1.7065
2	1	0	1	1.6566	1.7501	1.7042
3	-1	1	1	1.6608	1.7658	1.7291
4	1	1	1	1.756	1.7479	1.7606
5	-1	0	2	1.7314	1.7506	1.786
6	1	0	2	1.7347	1.728	1.738
7	-1	1	2	1.7811	1.755	1.7568
8	1	1	2	1.7445	1.7398	1.7746
9	-1	0	3	1.7025	1.7286	1.69
10	1	0	3	1.74	1.7549	1.7356
11	-1	1	3	1.7147	1.7287	1.7341
12	1	1	3	1.7919	1.7313	1.7452