2020 Full States EV and EC of One Check

This is the example vignette for function: **snw_evuvw20_jaeemk** from the **PrjOptiSNW Package.** 2020 integrated over VU and VW. Average C or V given unemployment probabilities.

Test SNW_EVUVW20_JAEEMK Defaults

Call the function with defaults.

```
clear all;
st_solu_type = 'bisec_vec';

% Solve the VFI Problem and get Value Function
mp_params = snw_mp_param('default_docdense');
mp_controls = snw_mp_control('default_test');

% set Unemployment Related Variables
xi=0.5; % Proportional reduction in income due to unemployment (xi=0 refers to 0 labor income;
b=0; % Unemployment insurance replacement rate (b=0 refers to no UI benefits; b=1 refers to 100
TR=100/58056; % Value of a welfare check (can receive multiple checks). TO DO: Update with alte

mp_params('xi') = xi;
mp_params('b') = b;
mp_params('TR') = TR;

% Solve for Unemployment Values
mp_controls('bl_print_vfi') = false;
mp_controls('bl_print_ds') = false;
mp_controls('bl_print_ds_verbose') = false;
mp_controls('bl_print_precompute') = false;
mp_controls('bl_print_precompute_verbose') = false;
mp_controls('bl_print_a4chk') = false;
mp_controls('bl_print_a4chk_verbose') = false;
mp_controls('bl_print_evuvw20_jaeemk') = false;
mp_controls('bl_print_evuvw20_jaeemk_verbose') = false;
```

Solve the model:

```
%% A. Solve VFI
% 2. Solve VFI and Distributon
% Solve the Model to get V working and unemployed
% solved with calibrated regular a2
[V_ss,ap_ss,cons_ss,mp_valpol_more_ss] = snw_vfi_main_bisec_vec(mp_params, mp_controls);
```

```
Completed SNW_VFI_MAIN_BISEC_VEC;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;time=517.3877
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_outcomes ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                 i    idx    ndim     numel      rowN      colN          sum          mean        std       coefvari
                 _    ___    ____    ________    ____    _________    ___________    _______    ______    ________

    V_VFI        1     1      6      4.37e+07     83     5.265e+05    -1.5339e+08    -3.5101    26.119     -7.441
    ap_VFI       2     2      6      4.37e+07     83     5.265e+05     1.4159e+09     32.402    36.798     1.1357
    cons_VFI     3     3      6      4.37e+07     83     5.265e+05     2.1402e+08     4.8975    8.3294     1.7007
```

```
xxx TABLE:V_VFI xxxxxxxxxxxxxxxxxx
             c1         c2         c3         c4         c5      c526496    c526497    c526498    c526499    c52650
           _______    _______    _______    _______    _______    _______    _______    _______    _______    ______

    r1     -346.51    -346.12    -343.63    -337.86    -328.51     21.702     21.852     22.003     22.154     22.30
    r2     -334.38    -333.99    -331.51    -325.83    -316.83     21.724     21.869     22.015     22.163     22.31
    r3     -322.45    -322.06     -319.6    -314.14     -305.6     21.745     21.885     22.027     22.171     22.31
    r4     -310.63    -310.27    -307.99    -302.88    -294.87     21.767     21.903     22.041     22.182     22.32
    r5     -299.94     -299.6    -297.46    -292.67    -285.12     21.775     21.907     22.042      22.18     22.32
    r79    -9.9437    -9.9325    -9.8557    -9.6597    -9.3232     2.5394     2.5501     2.5602     2.5696     2.578
    r80    -8.9023    -8.8911    -8.8143    -8.6183    -8.2818     2.3039     2.3121     2.3198      2.327     2.333
    r81    -7.6363    -7.6251    -7.5484    -7.3524    -7.0159     2.0068     2.0124     2.0176     2.0226     2.027
    r82    -5.9673    -5.9561    -5.8793    -5.6833    -5.3468     1.5958     1.5989     1.6018     1.6046     1.607
    r83    -3.5892     -3.578    -3.5012    -3.3052    -2.9687    0.97904    0.98004    0.98097    0.98185    0.9826
```

```
xxx TABLE:ap_VFI xxxxxxxxxxxxxxxxxx
           c1    c2        c3           c4           c5      c526496    c526497    c526498    c526499    c526500
           __    __    __________    _________    ________    _______    _______    _______    _______    _______

    r1     0     0      0.0005656    0.0075134    0.022901    114.75     120.41     126.27     132.38      138.8
    r2     0     0     0.00051498    0.0065334    0.021549    114.86     120.53     126.41     132.54     138.95
    r3     0     0     0.00051498    0.0049294    0.019875    114.97     120.65     126.56      132.7     139.12
    r4     0     0     0.00051498    0.0047937    0.019672    115.73     121.42     127.34     133.51     139.92
    r5     0     0     0.00048517    0.0046683    0.019484     116.5     122.21     128.15     134.32     140.74
    r79    0     0              0            0           0    81.091      85.68     90.335     94.378     98.419
    r80    0     0              0            0           0    76.669     80.563     84.304      88.04     91.693
    r81    0     0              0            0           0    68.313     71.534     74.475     77.832      81.11
    r82    0     0              0            0           0    50.126     53.467     56.953     58.745     60.587
    r83    0     0              0            0           0         0          0          0          0          0
```

```
xxx TABLE:cons_VFI xxxxxxxxxxxxxxxxxx
              c1          c2          c3          c4          c5       c526496    c526497    c526498    c526499    c
           ________    ________    ________    ________    ________    _______    _______    _______    _______    _

    r1     0.036717    0.037251    0.040426     0.04363    0.048012    9.6491      9.817     9.9649     10.073     1
    r2     0.036717    0.037251    0.040477     0.04461    0.049364    9.8118     9.9685     10.101     10.191     1
    r3     0.036717    0.037251    0.040477    0.046214    0.051039    9.9779      10.12     10.234     10.302     1
    r4     0.038144    0.038678    0.041903    0.047776    0.052666    10.131     10.258     10.354     10.405     1
    r5     0.039534    0.040068    0.043323     0.04929    0.054241    10.272     10.384     10.463       10.5
    r79      0.2179     0.21844     0.22216     0.23228     0.25197    35.858     37.092     38.455     40.627     4
    r80      0.2179     0.21844     0.22216     0.23228     0.25197    40.253     42.183     44.459     46.938
    r81      0.2179     0.21844     0.22216     0.23228     0.25197    48.587      51.19     54.266     57.123     6
    r82      0.2179     0.21844     0.22216     0.23228     0.25197    66.755     69.238      71.77     76.192     8
    r83      0.2179     0.21844     0.22216     0.23228     0.25197    116.87     122.69     128.71     134.92     1
```

```matlab
% COVID year tax
mp_params('a2_covidyr') = mp_params('a2_covidyr_manna_heaven');
% 2020 V and C same as V_SS and cons_ss if tax the same
if (mp_params('a2_covidyr') == mp_params('a2'))
    % mana from heaven
    V_ss_2020 = V_ss;
    cons_ss_2020 = cons_ss;
else
    % change xi and b to for people without unemployment shock
    % solving for employed but 2020 tax results
    % a2_covidyr > a2, we increased tax in 2020 to pay for covid and other
    % costs resolve for both employed and unemployed
    xi = mp_params('xi');
    b = mp_params('b');
    mp_params('xi') = 1;
    mp_params('b') = 0;
    [V_ss_2020,~,cons_ss_2020,~] = snw_vfi_main_bisec_vec(mp_params, mp_controls, V_ss);
    mp_params('xi') = xi;
    mp_params('b') = b;
end

% Solve unemployment, with three input parameters, auto will use a2_covidyr
% as tax, similar for employed call above
[V_unemp_2020,~,cons_unemp_2020] = snw_vfi_main_bisec_vec(mp_params, mp_controls, V_ss);
```

```
Completed SNW_VFI_MAIN_BISEC_VEC 1 Period Unemp Shock;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;time
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_outcomes ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                i    idx    ndim     numel      rowN       colN           sum          mean        std      coefvari
                _    ___    ____    ________    ____    _________    ___________    _______    ______    ________

    V_VFI       1     1      6      4.37e+07     83     5.265e+05    -1.7805e+08    -4.0743    27.116     -6.6554
    ap_VFI      2     2      6      4.37e+07     83     5.265e+05     1.3789e+09     31.553    36.673      1.1622
    cons_VFI    3     3      6      4.37e+07     83     5.265e+05     2.1097e+08     4.8277    8.3289      1.7252

xxx TABLE:V_VFI xxxxxxxxxxxxxxxxxx
             c1         c2         c3         c4         c5       c526496    c526497    c526498    c526499    c52650
           _______    _______    _______    _______    _______    _______    _______    _______    _______    ______

    r1     -372.97    -371.47    -362.94    -349.52    -336.96     21.573     21.728     21.882     22.036     22.19
    r2     -360.84    -359.34    -350.81    -337.39    -324.98     21.595     21.745     21.894     22.044     22.19
    r3     -348.91    -347.41    -338.88    -325.46    -313.34     21.617     21.762     21.906     22.052     22.20
    r4     -336.09     -334.7    -326.73    -314.01    -302.44     21.633     21.772     21.913     22.056     22.20
    r5     -324.48    -323.18    -315.72    -303.62    -292.54     21.634      21.77     21.907     22.046     22.18
    r79    -9.9437    -9.9325    -9.8557    -9.6597    -9.3232     2.5374     2.5482     2.5584      2.568      2.57
    r80    -8.9023    -8.8911    -8.8143    -8.6183    -8.2818     2.3024     2.3107     2.3185     2.3259     2.332
    r81    -7.6363    -7.6251    -7.5484    -7.3524    -7.0159     2.0057     2.0114     2.0168     2.0218     2.026
    r82    -5.9673    -5.9561    -5.8793    -5.6833    -5.3468     1.5952     1.5984     1.6014     1.6042     1.606
    r83    -3.5892     -3.578    -3.5012    -3.3052    -2.9687    0.97886    0.97987    0.98082    0.98171    0.9825

xxx TABLE:ap_VFI xxxxxxxxxxxxxxxxxx
           c1    c2    c3    c4        c5        c526496    c526497    c526498    c526499    c526500
           __    __    __    __    _________    _______    _______    _______    _______    _______

    r1     0     0     0     0     0.0092181     110.06     115.71     121.55     127.62     133.93
    r2     0     0     0     0      0.008238     110.03     115.68     121.54     127.62     133.95
    r3     0     0     0     0     0.0066341     109.99     115.65     121.53     127.63     133.97
    r4     0     0     0     0     0.0058019     110.28     115.95     121.84     127.96     134.33
    r5     0     0     0     0      0.004998     110.58     116.27     122.17     128.31     134.69
    r79    0     0     0     0             0     81.091     85.229     89.297     93.341     97.382
    r80    0     0     0     0             0     75.865     79.539      83.28     87.016     90.669
    r81    0     0     0     0             0     67.781     70.521     73.462     76.819     81.091
    r82    0     0     0     0             0     50.126     53.467     56.108     57.742     60.587
    r83    0     0     0     0             0          0          0          0          0          0

xxx TABLE:cons_VFI xxxxxxxxxxxxxxxxxx
              c1          c2          c3          c4          c5        c526496    c526497    c526498    c526499    c
           ________    ________    ________    ________    ________    _______    _______    _______    _______    _

    r1     0.018623    0.019158    0.022901    0.033062     0.04363     9.4708     9.6491      9.817     9.9649    1
    r2     0.018623    0.019158    0.022901    0.033062     0.04461     9.6414     9.8118     9.9685     10.101    1
    r3     0.018623    0.019158    0.022901    0.033062    0.046214     9.8179     9.9779      10.12     10.234    1
    r4     0.019354    0.019888    0.023632    0.033792    0.047776     9.9825     10.131     10.258     10.354    1
    r5     0.020066    0.020601    0.024344    0.034504     0.04929     10.135     10.272     10.384     10.463
    r79      0.2179     0.21844     0.22216     0.23228     0.25197      34.82     36.506     38.455     40.627    4
    r80      0.2179     0.21844     0.22216     0.23228     0.25197     40.033     42.183     44.459     46.938
    r81      0.2179     0.21844     0.22216     0.23228     0.25197     48.106      51.19     54.266     57.123    5
    r82      0.2179     0.21844     0.22216     0.23228     0.25197     65.751     68.234     71.611     76.192     7
    r83      0.2179     0.21844     0.22216     0.23228     0.25197     115.87     121.69     127.71     133.93     1
```

```
%% B. Solve Dist
[Phi_true] = snw_ds_main_vec(mp_params, mp_controls, ap_ss, cons_ss);
```

```
Completed SNW_DS_MAIN_VEC;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;time=876.6781
```

Previous code

```
% % Solve the Model to get V working and unemployed
% [V_ss,ap_ss,cons_ss,mp_valpol_more_ss] = snw_vfi_main_bisec_vec(mp_params, mp_controls);
% % Solve unemployment
% [V_unemp,~,cons_unemp,~] = snw_vfi_main_bisec_vec(mp_params, mp_controls, V_ss);
% [Phi_true] = snw_ds_main(mp_params, mp_controls, ap_ss, cons_ss, mp_valpol_more_ss);
```

Precompute

```
inc_VFI = mp_valpol_more_ss('inc_VFI');
spouse_inc_VFI = mp_valpol_more_ss('spouse_inc_VFI');
total_inc_VFI = inc_VFI + spouse_inc_VFI;
% Get Matrixes
cl_st_precompute_list = {'a', ...
    'inc', 'inc_unemp', 'spouse_inc', 'spouse_inc_unemp', 'ref_earn_wageind_grid'};
mp_controls('bl_print_precompute_verbose') = false;
[mp_precompute_res] = snw_hh_precompute(mp_params, mp_controls, cl_st_precompute_list, ap_ss, P
```

```
Wage quintile cutoffs=0.4645      0.71528      1.0335      1.5632
Completed SNW_HH_PRECOMPUTE;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;time cost=318.8898
```

Solve for 2020 Evuvw With 0 and 2 Checks

```
% Call Function
welf_checks = 0;
[ev20_jaeemk_check0, ec20_jaeemk_check0] = snw_evuvw20_jaeemk(...
    welf_checks, st_solu_type, mp_params, mp_controls, ...
    V_ss_2020, cons_ss_2020, V_unemp_2020, cons_unemp_2020, mp_precompute_res);
```

```
Completed SNW_A4CHK_WRK_BISEC_VEC;welf_checks=0;TR=0.0017225;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_te
Completed SNW_A4CHK_UNEMP_BISEC_VEC;welf_checks=0;TR=0.0017225;xi=0.5;b=0;SNW_MP_PARAM=default_docdense;SNW_MP_CONTR
Completed SNW_EVUVW20_JAEEMK;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;timeEUEC=8.0778
```

```
% Call Function
welf_checks = 2;
[ev20_jaeemk_check2, ec20_jaeemk_check2] = snw_evuvw20_jaeemk(...
    welf_checks, st_solu_type, mp_params, mp_controls, ...
    V_ss_2020, cons_ss_2020, V_unemp_2020, cons_unemp_2020, mp_precompute_res);
```

```
Completed SNW_A4CHK_WRK_BISEC_VEC;welf_checks=2;TR=0.0017225;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_te
Completed SNW_A4CHK_UNEMP_BISEC_VEC;welf_checks=2;TR=0.0017225;xi=0.5;b=0;SNW_MP_PARAM=default_docdense;SNW_MP_CONTR
Completed SNW_EVUVW20_JAEEMK;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;timeEUEC=7.8452
```

Differences between Checks in Expected Value and Expected Consumption

```
mn_V_U_gain_check = ev20_jaeemk_check2 - ev20_jaeemk_check0;
```

```
mn_MPC_U_gain_share_check = (ec20_jaeemk_check2 - ec20_jaeemk_check0)./(welf_checks*mp_params('
```

Param Results Define Frames

Define the matrix dimensions names and dimension vector values. Policy and Value Functions share the same ND dimensional structure.

```
% Grids:
age_grid = 18:100;
agrid = mp_params('agrid')';
eta_H_grid = mp_params('eta_H_grid')';
eta_S_grid = mp_params('eta_S_grid')';
ar_st_eta_HS_grid = string(cellstr([num2str(eta_H_grid', 'hz=%3.2f;'), num2str(eta_S_grid', 'wz
edu_grid = [0,1];
marry_grid = [0,1];
kids_grid = (1:1:mp_params('n_kidsgrid'))';
% NaN(n_jgrid,n_agrid,n_etagrid,n_educgrid,n_marriedgrid,n_kidsgrid);
cl_mp_datasetdesc = {};
cl_mp_datasetdesc{1} = containers.Map({'name', 'labval'}, {'age', age_grid});
cl_mp_datasetdesc{2} = containers.Map({'name', 'labval'}, {'savings', agrid});
cl_mp_datasetdesc{3} = containers.Map({'name', 'labval'}, {'eta', 1:length(eta_H_grid)});
cl_mp_datasetdesc{4} = containers.Map({'name', 'labval'}, {'edu', edu_grid});
cl_mp_datasetdesc{5} = containers.Map({'name', 'labval'}, {'marry', marry_grid});
cl_mp_datasetdesc{6} = containers.Map({'name', 'labval'}, {'kids', kids_grid});
```

Analyze Difference in V and C with Check

The difference between V and V with Check, marginal utility gain given the check.

```
% Generate some Data
mp_support_graph = containers.Map('KeyType', 'char', 'ValueType', 'any');
mp_support_graph('cl_st_xtitle') = {'Savings States, a'};
mp_support_graph('st_legend_loc') = 'eastoutside';
mp_support_graph('bl_graph_logy') = true; % do not log
mp_support_graph('it_legend_select') = 21; % how many shock legends to show
mp_support_graph('cl_colors') = 'jet';
```

MEAN(MN_V_GAIN_CHECK(A,Z))

Tabulate value and policies along savings and shocks:

```
% Set
ar_permute = [1,4,5,6,3,2];
% Value Function
st_title = ['MEAN(MN_V_U_GAIN_CHECK(A,Z)), welf_checks=' num2str(welf_checks) ', TR=' num2str(m
tb_az_v = ff_summ_nd_array(st_title, mn_V_U_gain_check, true, ["mean"], 4, 1, cl_mp_datasetdesc
```

```
xxx  MEAN(MN_V_U_GAIN_CHECK(A,Z)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxxx
    group      savings      mean_eta_1    mean_eta_2    mean_eta_3    mean_eta_4    mean_eta_5    mean_eta_6    mean_
    _____    __________    __________    __________    __________    __________    __________    __________    _____

      1               0       1.1134       0.99534       0.88994       0.79581       0.71183       0.63701       0.
      2      0.00051498        1.098       0.98245        0.8792       0.78685       0.70433       0.63073       0.
      3       0.0041199      0.88037       0.80097       0.72635       0.65728       0.59416       0.53692       0.
      4        0.013905      0.63865       0.59083       0.54384       0.49875       0.45643       0.41724       0.
      5       0.032959       0.44836       0.42078        0.3921        0.3635       0.33593       0.30995       0.
      6       0.064373       0.32067         0.304       0.28585       0.26716       0.24873       0.23105       0.
```

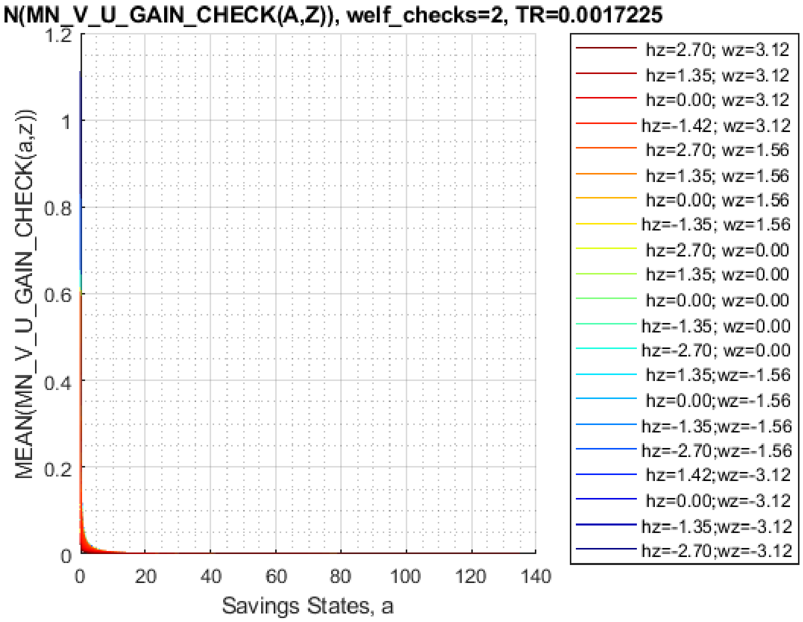
```
% Consumption
st_title = ['MEAN(MN_MPC_U_GAIN_CHECK(A,Z)), welf_checks=' num2str(welf_checks) ', TR=' num2str
tb_az_c = ff_summ_nd_array(st_title, mn_MPC_U_gain_share_check, true, ["mean"], 4, 1, cl_mp_dat
```

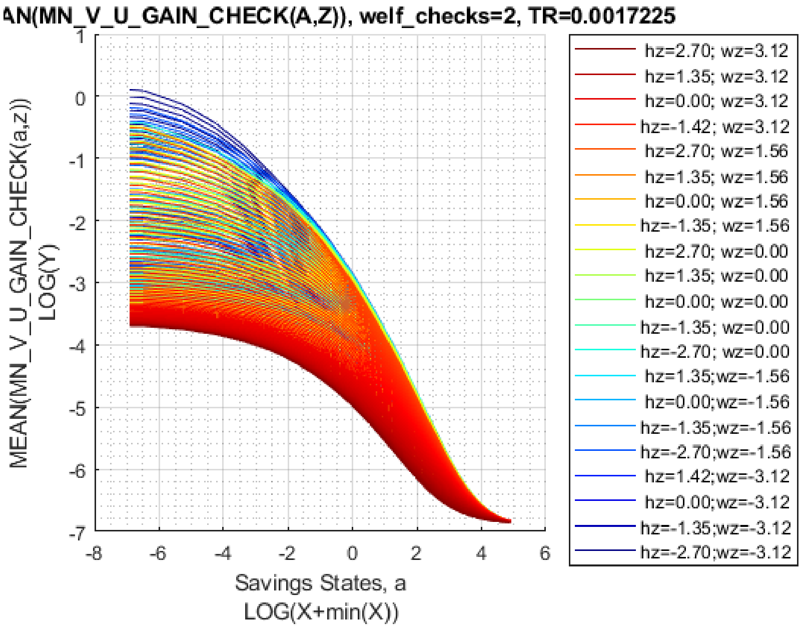
```
xxx  MEAN(MN_MPC_U_GAIN_CHECK(A,Z)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group      savings      mean_eta_1    mean_eta_2    mean_eta_3    mean_eta_4    mean_eta_5    mean_eta_6    mean_
    _____    __________    __________    __________    __________    __________    __________    __________    _____

      1               0       0.99528       0.99037       0.98518       0.98297       0.98267       0.98334       0.98
      2      0.00051498       0.99442        0.9886       0.98246       0.97995       0.97977       0.98071       0.98
      3       0.0041199       0.87952       0.87675       0.87503       0.87358       0.87283       0.87252       0.87
      4        0.013905       0.79582       0.78989        0.7857       0.78365       0.78356       0.78456       0.78
      5        0.032959       0.70405       0.69975       0.69839       0.69882       0.69984        0.7011       0.70
      6        0.064373       0.63337        0.6334       0.63405       0.63503       0.63635       0.63811       0.63
```

Graph Mean Values:

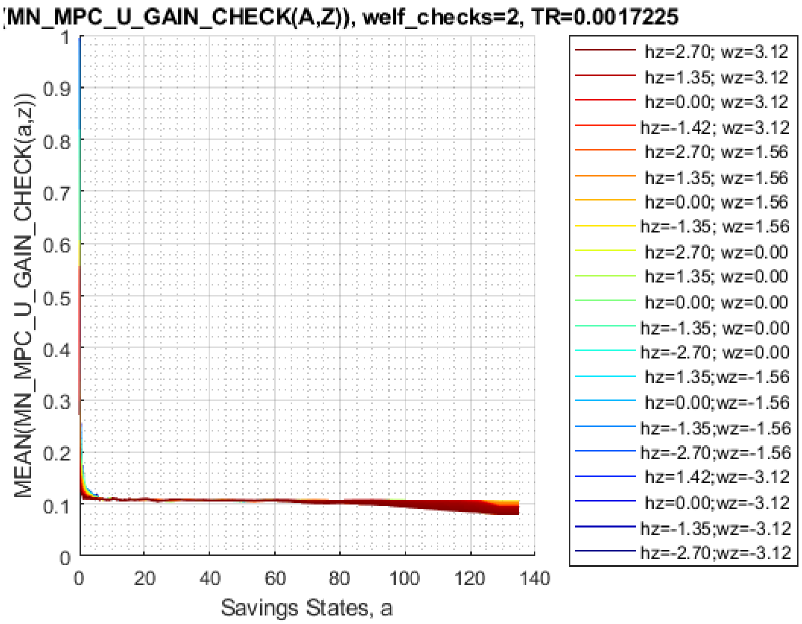
```
st_title = ['MEAN(MN\_V\_U\_GAIN\_CHECK(A,Z)), welf\_checks=' num2str(welf_checks) ', TR=' num2
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_V\_U\_GAIN\_CHECK(a,z))'};
ff_graph_grid((tb_az_v{1:end, 3:end})', ar_st_eta_HS_grid, agrid, mp_support_graph);
```

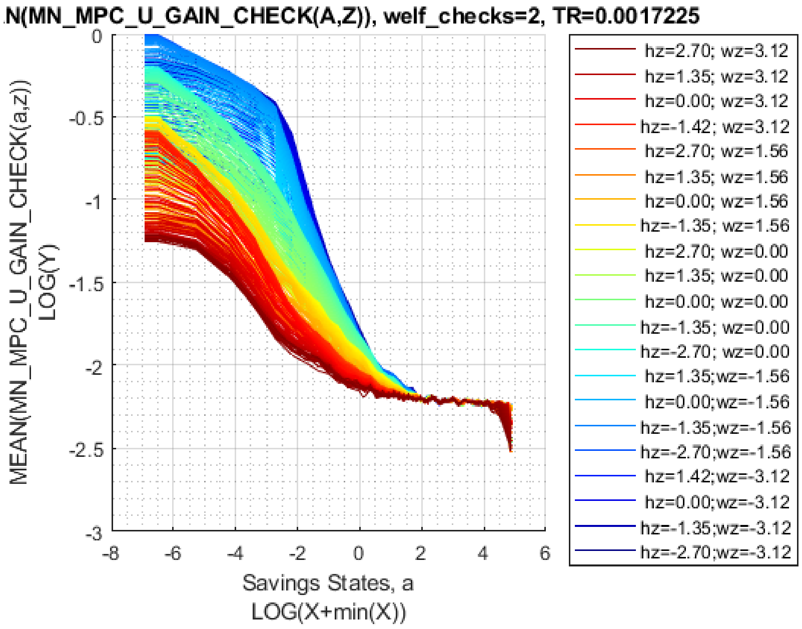




Graph Mean Consumption (MPC: Share of Check Consumed):

```
st_title = ['MEAN(MN\_MPC\_U\_GAIN\_CHECK(A,Z)), welf\_checks=' num2str(welf_checks) ', TR=' nu
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_MPC\_U\_GAIN\_CHECK(a,z))'};
ff_graph_grid((tb_az_c{1:end, 3:end})', ar_st_eta_HS_grid, agrid, mp_support_graph);
```





Analyze Marginal Value and MPC over Y(a,eta), Conditional On Kids, Marry, Age, Education

Income is generated by savings and shocks, what are the income levels generated by all the shock and savings points conditional on kids, marital status, age and educational levels. Plot on the Y axis MPC, and plot on the X axis income levels, use colors to first distinguish between different a levels, then use colors to distinguish between different eta levles.

Set Up date, Select Age 38, unmarried, no kids, lower education:

```
% NaN(n_jgrid,n_agrid,n_etagrid,n_educgrid,n_marriedgrid,n_kidsgrid);
% 38 year old, unmarried, no kids, lower educated
% Only Household Head Shock Matters so select up to 'n_eta_H_grid'
mn_total_inc_jemk = total_inc_VFI(20,:,1:mp_params('n_eta_H_grid'),1,1,1);
mn_V_W_gain_check_use = ev20_jaeemk_check2 - ev20_jaeemk_check0;
mn_C_W_gain_check_use = ec20_jaeemk_check2 - ec20_jaeemk_check0;
```

Select Age, Education, Marital, Kids Count:s

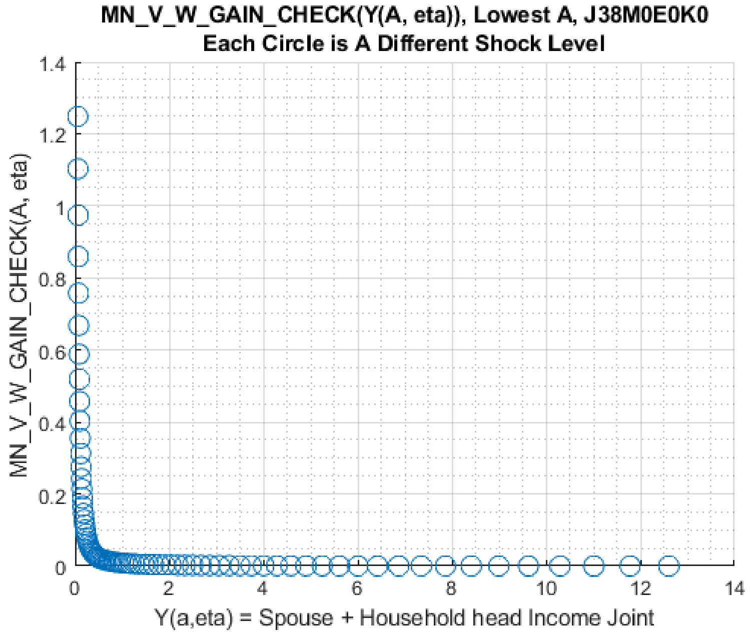
```
% Selections
it_age = 21; % +18
it_marital = 1; % 1 = unmarried
it_kids = 1; % 1 = kids is zero
it_educ = 1; % 1 = lower education
% Select: NaN(n_jgrid,n_agrid,n_etagrid,n_educgrid,n_marriedgrid,n_kidsgrid);
mn_C_W_gain_check_jemk = mn_C_W_gain_check_use(it_age, :, 1:mp_params('n_eta_H_grid'), it_educ,
mn_V_W_gain_check_jemk = mn_V_W_gain_check_use(it_age, :, 1:mp_params('n_eta_H_grid'), it_educ,
% Reshape, so shock is the first dim, a is the second
mt_total_inc_jemk = permute(mn_total_inc_jemk,[3,2,1]);
mt_C_W_gain_check_jemk = permute(mn_C_W_gain_check_jemk,[3,2,1]);
mt_C_W_gain_check_jemk(mt_C_W_gain_check_jemk<=1e-10) = 1e-10;
mt_V_W_gain_check_jemk = permute(mn_V_W_gain_check_jemk,[3,2,1]);
mt_V_W_gain_check_jemk(mt_V_W_gain_check_jemk<=1e-10) = 1e-10;
```

```
% Generate meshed a and shock grid
[mt_eta_H, mt_a] = ndgrid(eta_H_grid(1:mp_params('n_eta_H_grid')), agrid);
```

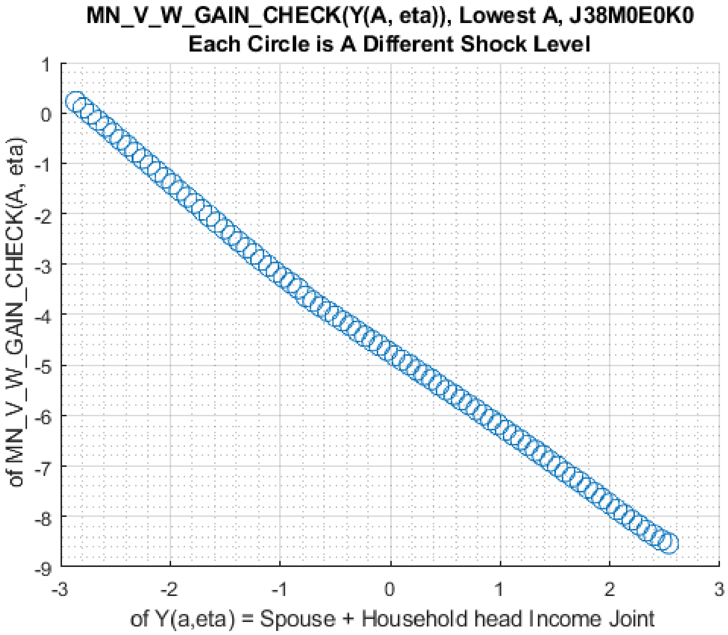
Marginal Value Gains, Color as Shock, Conditional on Age, Marital, Kids, and Education

How do shocks and a impact marginal value. First plot one asset level, variation comes only from increasingly higher shocks:

```
figure();
it_a = 1;
scatter((mt_total_inc_jemk(:,it_a)), (mt_V_W_gain_check_jemk(:,it_a)), 100);
title({'MN\_V\_W\_GAIN\_CHECK(Y(A, eta)), Lowest A, J38M0E0K0', ...
    'Each Circle is A Different Shock Level'});
xlabel('Y(a,eta) = Spouse + Household head Income Joint');
ylabel('MN\_V\_W\_GAIN\_CHECK(A, eta)');
grid on;
grid minor;
```

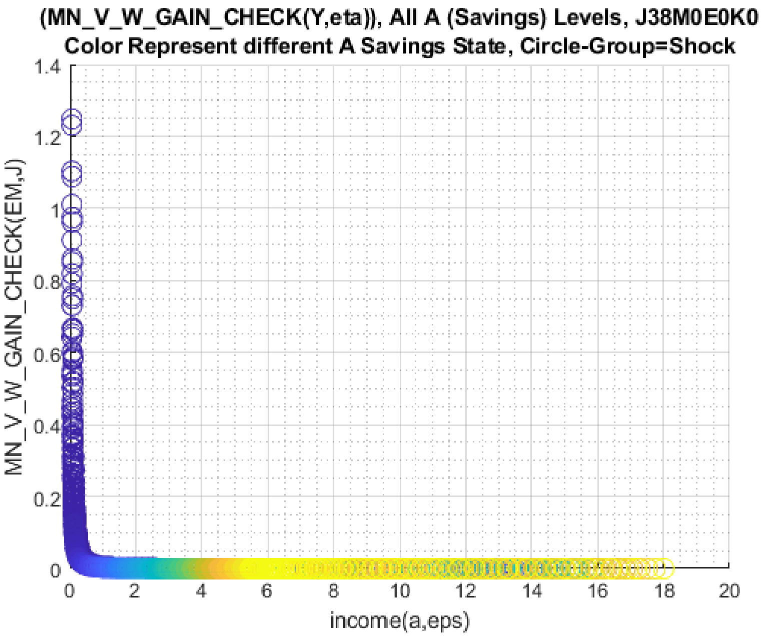


```
figure();
it_shock = 1;
scatter(log(mt_total_inc_jemk(:,it_a)), log(mt_V_W_gain_check_jemk(:,it_a)), 100);
title({'MN\_V\_W\_GAIN\_CHECK(Y(A, eta)), Lowest A, J38M0E0K0', ...
    'Each Circle is A Different Shock Level'});
xlabel(' of Y(a,eta) = Spouse + Household head Income Joint');
ylabel(' of MN\_V\_W\_GAIN\_CHECK(A, eta)');
grid on;
grid minor;
```

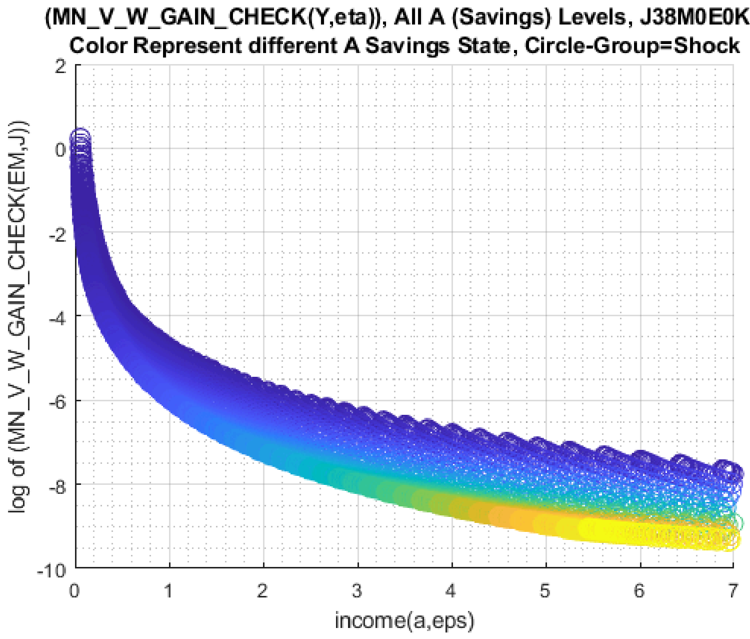


Plot all asset levels:

```
figure();
scatter((mt_total_inc_jemk(:)), (mt_V_W_gain_check_jemk(:)), 100, mt_a(:));
title({'(MN\_V\_W\_GAIN\_CHECK(Y,eta)), All A (Savings) Levels, J38M0E0K0', ...
    'Color Represent different A Savings State, Circle-Group=Shock'});
xlabel('income(a,eps)');
ylabel('MN\_V\_W\_GAIN\_CHECK(EM,J)');
grid on;
grid minor;
```



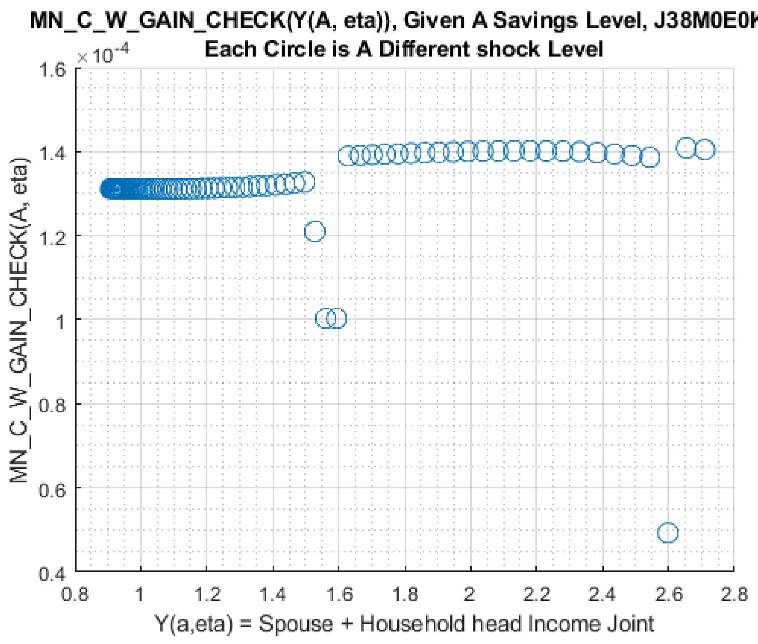
```
figure();
scatter((mt_total_inc_jemk(:)), log(mt_V_W_gain_check_jemk(:)), 100, mt_a(:));
title({'(MN\_V\_W\_GAIN\_CHECK(Y,eta)), All A (Savings) Levels, J38M0E0K0', ...
    'Color Represent different A Savings State, Circle-Group=Shock'});
xlabel('income(a,eps)');
ylabel('log of (MN\_V\_W\_GAIN\_CHECK(EM,J))');
xlim([0,7]);
grid on;
grid minor;
```



Marginal Consumption Gains, Color as Shock, Conditional on Age, Marital, Kids, and Education

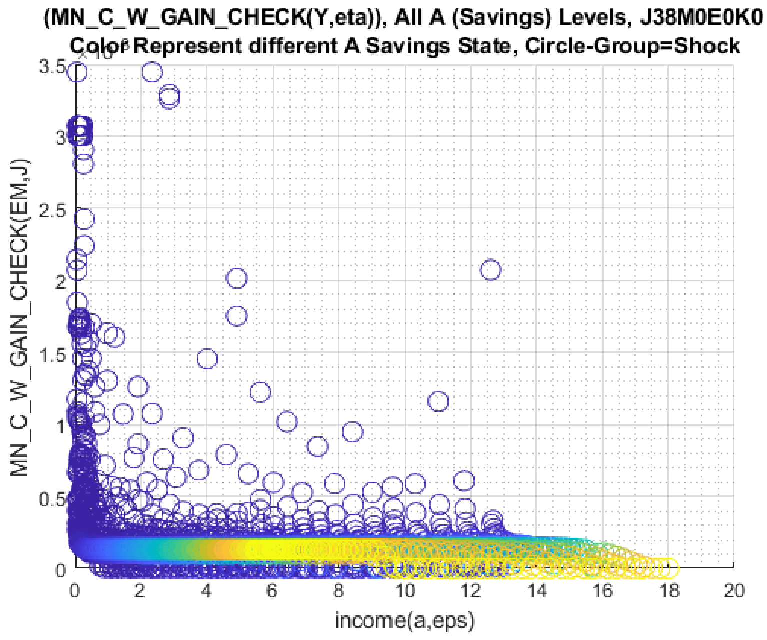
How do shocks and a impact marginal value. First plot one asset level, variation comes only from increasingly higher shocks:

```
figure();
it_a = 50;
scatter(log(mt_total_inc_jemk(:,it_a)), mt_C_W_gain_check_jemk(:,it_a), 100);
title({'MN\_C\_W\_GAIN\_CHECK(Y(A, eta)), Given A Savings Level, J38M0E0K0', ...
    'Each Circle is A Different shock Level'});
xlabel('Y(a,eta) = Spouse + Household head Income Joint');
ylabel('MN\_C\_W\_GAIN\_CHECK(A, eta)');
grid on;
grid minor;
```

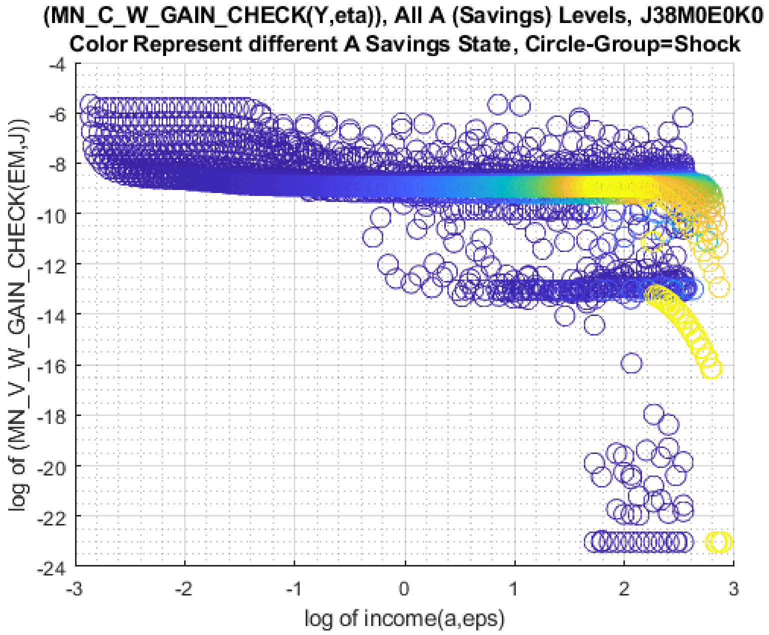


Plot all asset levels:

```
figure();
scatter((mt_total_inc_jemk(:)), (mt_C_W_gain_check_jemk(:)), 100, mt_a(:));
title({'(MN\_C\_W\_GAIN\_CHECK(Y,eta)), All A (Savings) Levels, J38M0E0K0', ...
    'Color Represent different A Savings State, Circle-Group=Shock'});
xlabel('income(a,eps)');
ylabel('MN\_C\_W\_GAIN\_CHECK(EM,J)');
grid on;
grid minor;
```



```
figure();
scatter(log(mt_total_inc_jemk(:)), log(mt_C_W_gain_check_jemk(:)), 100, mt_a(:));
title({'(MN\_C\_W\_GAIN\_CHECK(Y,eta)), All A (Savings) Levels, J38M0E0K0', ...
    'Color Represent different A Savings State, Circle-Group=Shock'});
xlabel('log of income(a,eps)');
ylabel('log of (MN\_V\_W\_GAIN\_CHECK(EM,J))');
grid on;
grid minor;
```



Analyze Kids and Marriage and Age

Aggregating over education, savings, and shocks, what are the differential effects of Marriage and Age.

```
% Generate some Data
mp_support_graph = containers.Map('KeyType', 'char', 'ValueType', 'any');
ar_row_grid = [...
    "k0M0", "K1M0", "K2M0", "K3M0", "K4M0", ...
    "k0M1", "K1M1", "K2M1", "K3M1", "K4M1"];
mp_support_graph('cl_st_xtitle') = {'Age'};
mp_support_graph('st_legend_loc') = 'best';
mp_support_graph('bl_graph_logy') = true; % do not log
mp_support_graph('st_rounding') = '6.2f'; % format shock legend
mp_support_graph('cl_scatter_shapes') = {...
    'o', 'd' ,'s', 'x', '*', ...
    'o', 'd', 's', 'x', '*'};
mp_support_graph('cl_colors') = {...
    'red', 'red', 'red', 'red', 'red'...
    'blue', 'blue', 'blue', 'blue', 'blue'};
```

MEAN(VAL(KM,J)), MEAN(AP(KM,J)), MEAN(C(KM,J))

Tabulate value and policies:

```
% Set
% NaN(n_jgrid,n_agrid,n_etagrid,n_educgrid,n_marriedgrid,n_kidsgrid);
ar_permute = [2,3,4,1,6,5];
% Value Function
```

```
st_title = ['MEAN(MN_V_U_GAIN_CHECK(KM,J)), welf_checks=' num2str(welf_checks) ', TR=' num2str(
tb_az_v = ff_summ_nd_array(st_title, mn_V_U_gain_check, true, ["mean"], 3, 1, cl_mp_datasetdesc
```

```
xxx  MEAN(MN_V_U_GAIN_CHECK(KM,J)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    kids    marry    mean_age_18    mean_age_19    mean_age_20    mean_age_21    mean_age_22    mean_age_23
    _____    ____    _____    ___________    ___________    ___________    ___________    ___________    ___________

      1        1       0        0.033245       0.031982       0.030513       0.027957       0.025823       0.024029
      2        2       0        0.045318       0.043648       0.041624       0.038035       0.035028       0.032489
      3        3       0        0.052753       0.051115       0.049022       0.044815       0.041294       0.038324
      4        4       0        0.059779       0.058053       0.055771          0.051       0.047008        0.04364
      5        5       0        0.065493       0.063784       0.061427       0.056219       0.051865       0.048197
      6        1       1       0.0098334      0.0093632       0.008915       0.008078      0.0073763      0.0067827
      7        2       1        0.013114       0.012489        0.01189       0.010765      0.0098179      0.0090221
      8        3       1        0.015745       0.015027        0.01433       0.012975       0.011838       0.010879
      9        4       1        0.018816       0.017992       0.017173       0.015564       0.014209       0.013064
     10        5       1        0.022802       0.021889       0.020957       0.019021       0.017394       0.016019
```

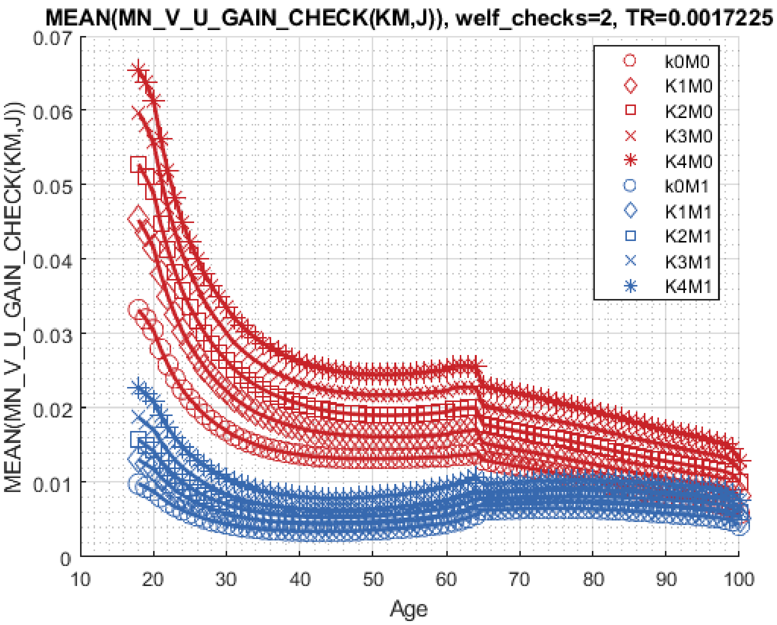
```
% Consumption Function
st_title = ['MEAN(MN_MPC_U_GAIN_CHECK(KM,J)), welf_checks=' num2str(welf_checks) ', TR=' num2st
tb_az_c = ff_summ_nd_array(st_title, mn_MPC_U_gain_share_check, true, ["mean"], 3, 1, cl_mp_dat
```

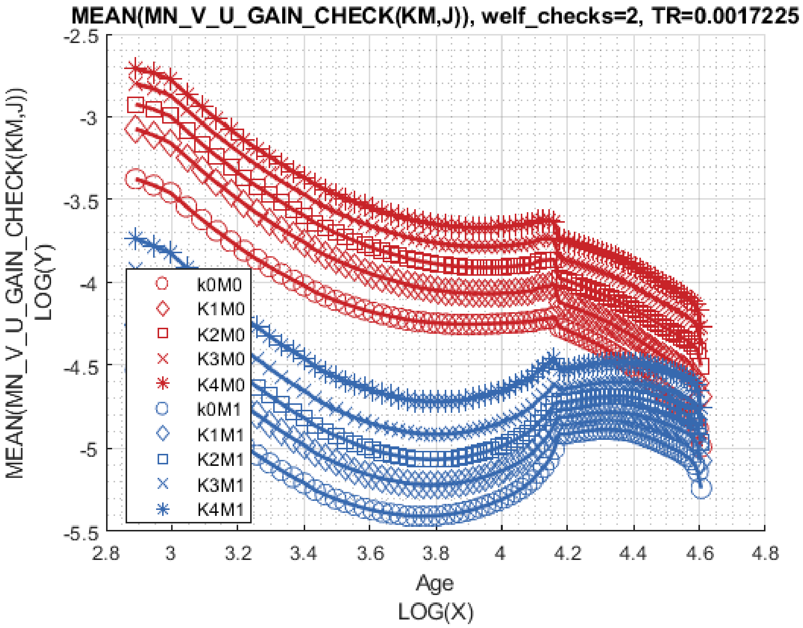
```
xxx  MEAN(MN_MPC_U_GAIN_CHECK(KM,J)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    kids    marry    mean_age_18    mean_age_19    mean_age_20    mean_age_21    mean_age_22    mean_age_23
    _____    ____    _____    ___________    ___________    ___________    ___________    ___________    ___________

      1        1       0       0.054527       0.058931       0.069975       0.068541       0.066643       0.065914
      2        2       0       0.061679       0.066745       0.079243       0.077437       0.076495       0.074679
      3        3       0       0.069419       0.075436       0.090313       0.087902       0.086963       0.084214
      4        4       0       0.073241       0.080862       0.095495       0.092897        0.09086       0.088896
      5        5       0       0.078577       0.086033        0.10041        0.09783       0.095009       0.092812
      6        1       1       0.084627       0.088189       0.090609       0.089711       0.088925       0.088472
      7        2       1       0.086884        0.08995       0.093211       0.092146       0.090954       0.090142
      8        3       1       0.090166        0.09473       0.099076       0.097712       0.096798       0.096232
      9        4       1       0.092841       0.096367        0.10103        0.10024       0.099267       0.097844
     10        5       1       0.097558        0.10223         0.1097        0.10567        0.10418        0.10352
```

Graph Mean Values:

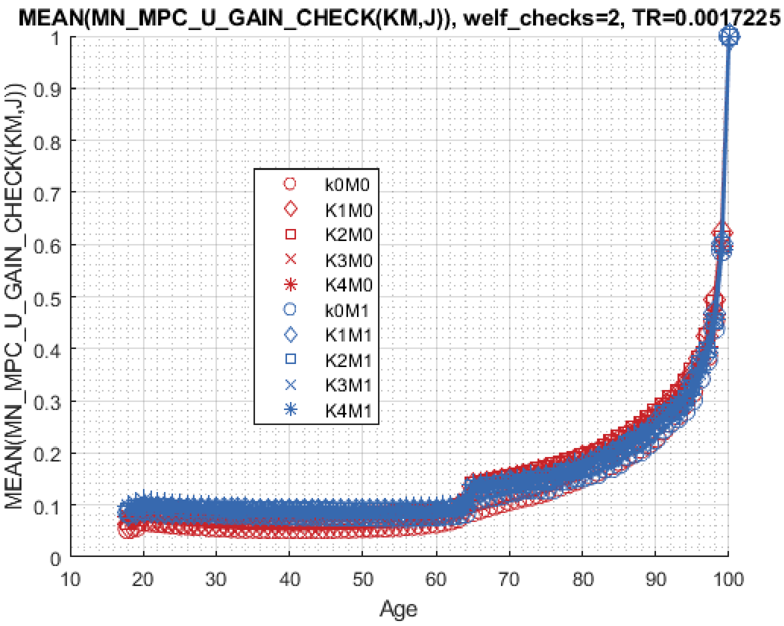
```
st_title = ['MEAN(MN\_V\_U\_GAIN\_CHECK(KM,J)), welf\_checks=' num2str(welf_checks) ', TR=' num
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_V\_U\_GAIN\_CHECK(KM,J))'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

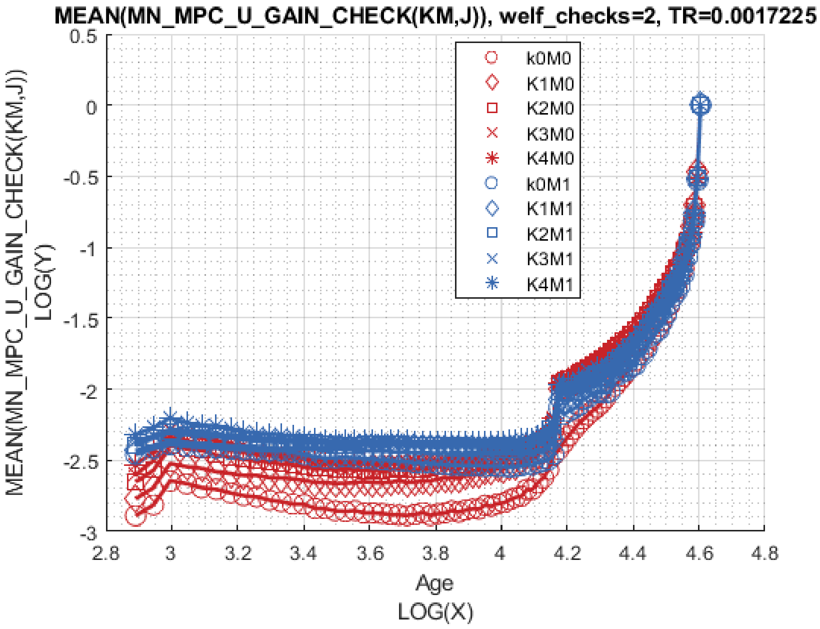




Graph Mean Consumption (***MPC: Share of Check Consumed***):

```
st_title = ['MEAN(MN\_MPC\_U\_GAIN\_CHECK(KM,J)), welf\_checks=' num2str(welf_checks) ', TR=' r
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_MPC\_U\_GAIN\_CHECK(KM,J))'};
ff_graph_grid((tb_az_c{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```





Analyze Education and Marriage

Aggregating over education, savings, and shocks, what are the differential effects of Marriage and Age.

```
% Generate some Data
mp_support_graph = containers.Map('KeyType', 'char', 'ValueType', 'any');
ar_row_grid = ["E0M0", "E1M0", "E0M1", "E1M1"];
mp_support_graph('cl_st_xtitle') = {'Age'};
mp_support_graph('st_legend_loc') = 'best';
mp_support_graph('bl_graph_logy') = true; % do not log
mp_support_graph('st_rounding') = '6.2f'; % format shock legend
mp_support_graph('cl_scatter_shapes') = {'*', 'p', '*','p' };
mp_support_graph('cl_colors') = {'red', 'red', 'blue', 'blue'};
```

MEAN(VAL(EM,J)), MEAN(AP(EM,J)), MEAN(C(EM,J))

Tabulate value and policies:

```
% Set
% NaN(n_jgrid,n_agrid,n_etagrid,n_educgrid,n_marriedgrid,n_kidsgrid);
ar_permute = [2,3,6,1,4,5];
% Value Function
st_title = ['MEAN(MN_V_U_GAIN_CHECK(EM,J)), welf_checks=' num2str(welf_checks) ', TR=' num2str(
tb_az_v = ff_summ_nd_array(st_title, mn_V_U_gain_check, true, ["mean"], 3, 1, cl_mp_datasetdesc
```

```
xxx  MEAN(MN_V_U_GAIN_CHECK(EM,J)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    edu    marry    mean_age_18    mean_age_19    mean_age_20    mean_age_21    mean_age_22    mean_age_23
    _____    ___    _____    ___________    ___________    ___________    ___________    ___________    ___________

      1       0       0       0.053096       0.051807       0.050213       0.047392       0.044883       0.042648
      2       1       0       0.049539       0.047626        0.04513       0.039818       0.035524       0.032023
      3       0       1         0.0171       0.016386        0.01569       0.014562        0.01357       0.012706
      4       1       1       0.015024       0.014318       0.013616       0.011999       0.010684      0.0096012
```

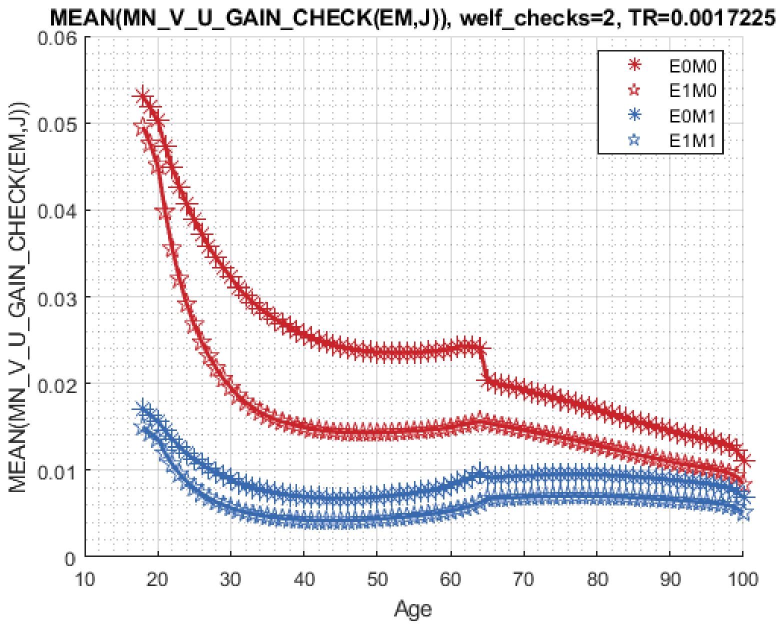
```
% Consumption
st_title = ['MEAN(MN_MPC_U_GAIN_CHECK(EM,J)), welf_checks=' num2str(welf_checks) ', TR=' num2st
tb_az_c = ff_summ_nd_array(st_title, mn_MPC_U_gain_share_check, true, ["mean"], 3, 1, cl_mp_dat
```

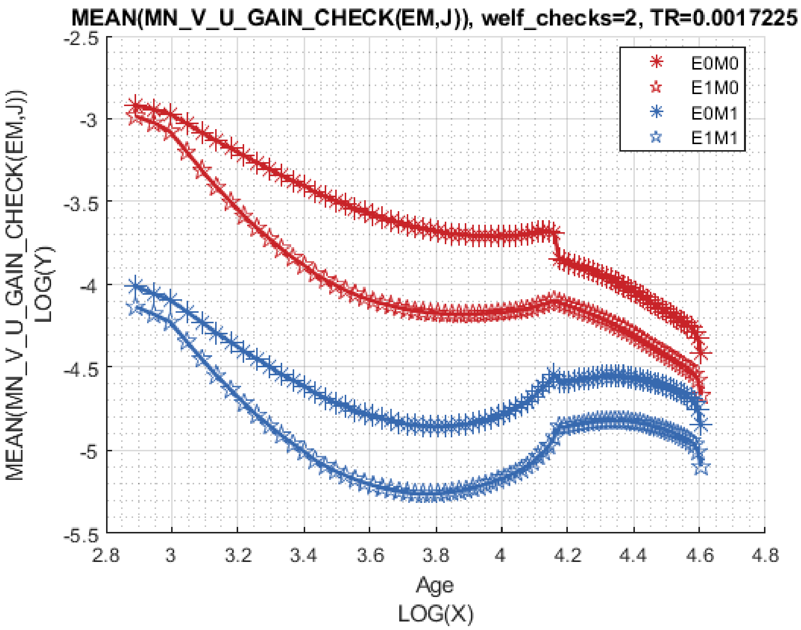
```
xxx  MEAN(MN_MPC_U_GAIN_CHECK(EM,J)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxx
    group    edu    marry    mean_age_18    mean_age_19    mean_age_20    mean_age_21    mean_age_22    mean_age_23
    _____    ___    _____    ___________    ___________    ___________    ___________    ___________    ___________

      1       0       0        0.06081       0.064362       0.073095       0.072607       0.072694       0.071887
      2       1       0       0.074167       0.082841        0.10108       0.097236       0.093694       0.090718
      3       0       1       0.083761       0.086559       0.088972       0.089128       0.088901       0.088933
      4       1       1       0.097069        0.10202        0.10848        0.10507        0.10315        0.10155
```

Graph Mean Values:

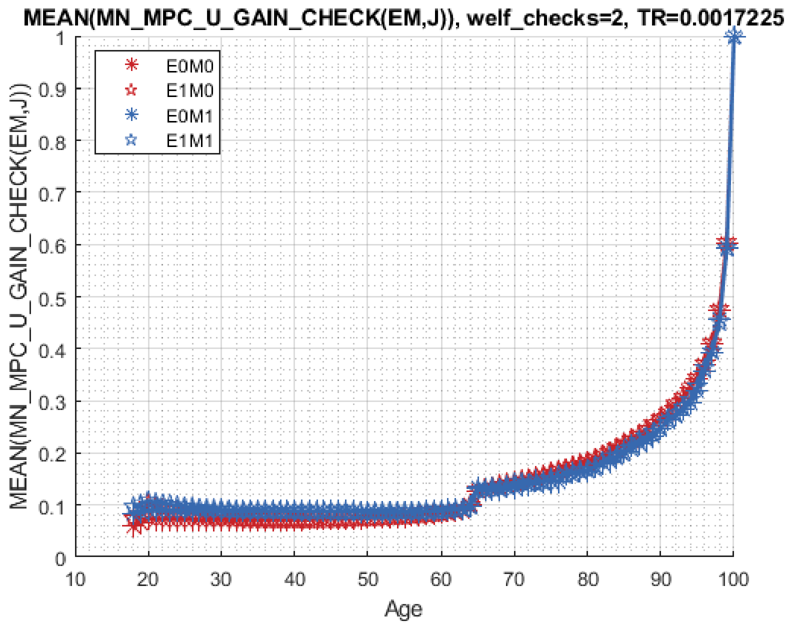
```
st_title = ['MEAN(MN\_V\_U\_GAIN\_CHECK(EM,J)), welf\_checks=' num2str(welf_checks) ', TR=' num
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_V\_U\_GAIN\_CHECK(EM,J))'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

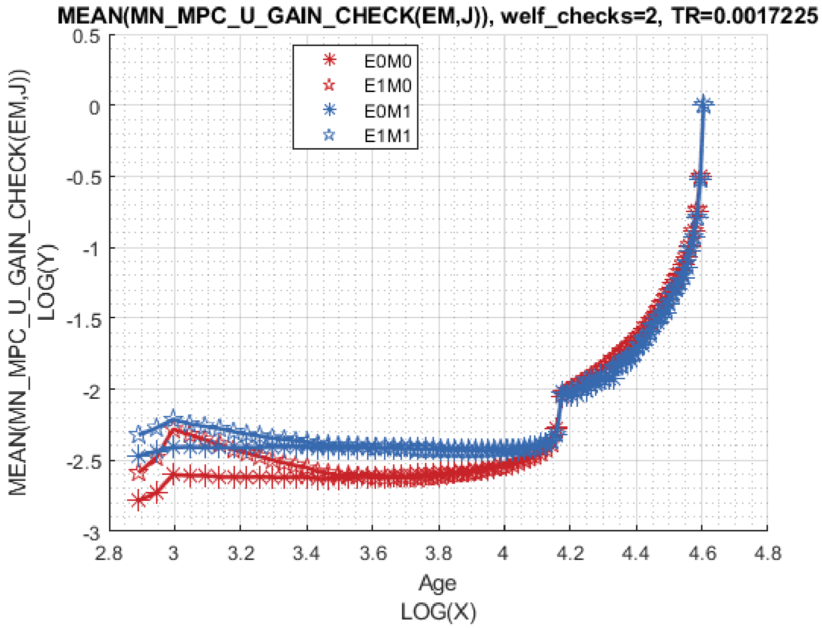




Graph Mean Consumption (***MPC: Share of Check Consumed***):

```
st_title = ['MEAN(MN\_MPC\_U\_GAIN\_CHECK(EM,J)), welf\_checks=' num2str(welf_checks) ', TR=' r
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_MPC\_U\_GAIN\_CHECK(EM,J))'};
ff_graph_grid((tb_az_c{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```


MEAN(MN_MPC_U_GAIN_CHECK(EM,J)), welf_checks=2, TR=0.0017225
MEAN(MN_MPC_U_GAIN_CHECK(EM,J))
Age
E0M0
E1M0
E0M1
E1M1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
10
20
30
40
50
60
70
80
90
100


MEAN(MN_MPC_U_GAIN_CHECK(EM,J)), welf_checks=2, TR=0.0017225
MEAN(MN_MPC_U_GAIN_CHECK(EM,J))
LOG(Y)
Age
LOG(X)
E0M0
E1M0
E0M1
E1M1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8