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_params('beta') = 0.95;
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=524.9862
----------------------------------------
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	-6.6619e+08	-15.245	21.865	-1.4343

```
    ap_VFI      2     2      6      4.37e+07     83     5.265e+05     1.3967e+09     31.962     36.426     1.1397
    cons_VFI    3     3      6      4.37e+07     83     5.265e+05     2.3276e+08     5.3263     8.4413     1.5848

xxx TABLE:V_VFI xxxxxxxxxxxxxxxxx
              c1          c2          c3          c4          c5          c526496      c526497      c526498      c526499
          ________    ________    ________    ________    ________    _________    _________    _________    _________

    r1    -293.96     -293.57     -291.09     -285.44     -276.41      -4.3584      -4.2643      -4.1713      -4.0795
    r2    -284.42     -284.03     -281.55     -275.97     -267.24      -4.2519      -4.1612      -4.0717      -3.9832
    r3    -274.87     -274.48     -272.03     -266.62     -258.33      -4.1429      -4.0559      -3.9698      -3.8847
    r4    -265.22     -264.86     -262.58     -257.53     -249.74      -4.0309      -3.9475      -3.8649      -3.7833
    r5    -256.51     -256.17     -254.04      -249.3     -241.96      -3.9252      -3.8452      -3.7659      -3.6873
    r79   -13.642     -13.628     -13.535     -13.298     -12.896     -0.22092     -0.21058     -0.20086     -0.19173
    r80   -12.283     -12.269     -12.176     -11.939     -11.537     -0.16979     -0.16182      -0.1543     -0.14722
    r81   -10.605     -10.591     -10.498     -10.261     -9.8589     -0.11712     -0.11163     -0.10646     -0.10157
    r82   -8.3494     -8.3358     -8.2424     -8.0055     -7.6035     -0.065333    -0.062242    -0.05936     -0.056635
    r83   -5.0665     -5.0529     -4.9595     -4.7226     -4.3206     -0.020968    -0.019972    -0.019038    -0.018161

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

    r1    0       0     0.00051498     0.0066578     0.021589    112.13     117.67      123.4     129.31     135.72
    r2    0       0     0.00051498     0.0057684     0.020245    112.17     117.71     123.43     129.34     135.76
    r3    0       0     0.00020768     0.0041456     0.018539     112.2     117.73     123.45     129.37     135.78
    r4    0       0     0.00010346     0.0041199     0.018307    112.86     118.39     124.11     130.03     136.44
    r5    0       0     5.2907e-06     0.0041199     0.018091    113.53     119.07     124.79     130.71     137.12
    r79   0       0              0             0            0    81.091     85.364     89.335     93.258     97.348
    r80   0       0              0             0            0    76.124     79.747     83.431     86.986     90.578
    r81   0       0              0             0            0    67.945     70.639     73.673     76.991     81.091
    r82   0       0              0             0            0    50.126     53.467     56.302     57.884     60.587
    r83   0       0              0             0            0         0          0          0          0          0

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

    r1    0.036717    0.037251    0.040477    0.044486    0.049324    12.265      12.55      12.844     13.145     1
    r2    0.036717    0.037251    0.040477    0.045375    0.050668    12.501     12.787     13.082     13.383     1
    r3    0.036717    0.037251    0.040784    0.046998    0.052374    12.755     13.042     13.337     13.638     1
    r4    0.038144    0.038678    0.042314    0.048449    0.054031        13     13.289     13.584     13.883     1
    r5    0.039534    0.040068    0.043802    0.049839    0.055635    13.236     13.525     13.821     14.116     1
    r79    0.19737     0.19791     0.20163     0.21175     0.23145    35.811     37.362     39.409       41.7     4
    r80    0.19737     0.19791     0.20163     0.21175     0.23145    40.752     42.953     45.286     47.946     5
    r81    0.19737     0.19791     0.20163     0.21175     0.23145    48.909     52.039     55.022     57.919     6
    r82    0.19737     0.19791     0.20163     0.21175     0.23145     66.71     69.193     72.375     77.007
    r83    0.19737     0.19791     0.20163     0.21175     0.23145    116.82     122.65     128.66     134.88     1
```

```
% 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	-6.8822e+08	-15.749	22.879	-1.4527
ap_VFI	2	2	6	4.37e+07	83	5.265e+05	1.3605e+09	31.134	36.294	1.1657
cons_VFI	3	3	6	4.37e+07	83	5.265e+05	2.2887e+08	5.2375	8.4438	1.6122

xxx TABLE:V_VFI xxxxxxxxxxxxxxxxx

	c1	c2	c3	c4	c5	c526496	c526497	c526498	c526499
r1	-320.42	-318.92	-310.39	-296.97	-284.58	-4.4406	-4.3429	-4.2464	-4.1513
r2	-310.88	-309.38	-300.85	-287.43	-275.14	-4.3331	-4.239	-4.1461	-4.0543
r3	-301.33	-299.83	-291.3	-277.88	-265.85	-4.2231	-4.1327	-4.0433	-3.955
r4	-290.68	-289.29	-281.32	-268.6	-257.1	-4.1145	-4.0276	-3.9417	-3.8567
r5	-281.05	-279.76	-272.29	-260.2	-249.16	-4.0121	-3.9284	-3.8457	-3.7638
r79	-13.642	-13.628	-13.535	-13.298	-12.896	-0.22291	-0.21238	-0.20247	-0.19317
r80	-12.283	-12.269	-12.176	-11.939	-11.537	-0.17128	-0.16316	-0.15551	-0.1483
r81	-10.605	-10.591	-10.498	-10.261	-9.8589	-0.11815	-0.11254	-0.10726	-0.10231
r82	-8.3494	-8.3358	-8.2424	-8.0055	-7.6035	-0.065887	-0.062757	-0.059823	-0.057044
r83	-5.0665	-5.0529	-4.9595	-4.7226	-4.3206	-0.021146	-0.020134	-0.019185	-0.018294

xxx TABLE:ap_VFI xxxxxxxxxxxxxxxxx

	c1	c2	c3	c4	c5	c526496	c526497	c526498	c526499	c526500
r1	0	0	0	0	0.0083625	107.54	113.09	118.82	124.74	130.86
r2	0	0	0	0	0.0074731	107.45	112.99	118.72	124.64	130.75
r3	0	0	0	0	0.0058503	107.33	112.88	118.61	124.52	130.64
r4	0	0	0	0	0.0049981	107.54	113.08	118.81	124.73	130.85
r5	0	0	0	0	0.004174	107.76	113.3	119.03	124.95	131.07
r79	0	0	0	0	0	80.462	84.34	88.311	92.234	96.324
r80	0	0	0	0	0	75.113	78.736	82.42	85.975	90.439
r81	0	0	0	0	0	66.945	69.639	72.673	76.669	81.091
r82	0	0	0	0	0	50.126	53.467	55.311	56.953	60.587
r83	0	0	0	0	0	0	0	0	0	0

xxx TABLE:cons_VFI xxxxxxxxxxxxxxxxx

	c1	c2	c3	c4	c5	c526496	c526497	c526498	c526499	c
r1	0.018623	0.019158	0.022901	0.033062	0.044486	11.989	12.265	12.55	12.844	1
r2	0.018623	0.019158	0.022901	0.033062	0.045375	12.223	12.501	12.787	13.082	1
r3	0.018623	0.019158	0.022901	0.033062	0.046998	12.476	12.755	13.042	13.337	1
r4	0.019354	0.019888	0.023632	0.033792	0.048579	12.72	13	13.289	13.584	1
r5	0.020066	0.020601	0.024344	0.034504	0.050114	12.955	13.236	13.525	13.821	1
r79	0.19737	0.19791	0.20163	0.21175	0.23145	35.417	37.362	39.409	41.7	4

r80	0.19737	0.19791	0.20163	0.21175	0.23145	40.752	42.953	45.286	47.946	4
r81	0.19737	0.19791	0.20163	0.21175	0.23145	48.909	52.039	55.022	57.241	5
r82	0.19737	0.19791	0.20163	0.21175	0.23145	65.719	68.202	72.375	76.948	7
r83	0.19737	0.19791	0.20163	0.21175	0.23145	115.84	121.66	127.68	133.89	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=929.8427
```

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=274.186
```

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;SNW_MP_PARAM=st_biden_or_trump_undefined;welf_checks=0;TR=0.0017225;SNW_MP_PARAM=d
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=8.0161
```

```
% 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;SNW_MP_PARAM=st_biden_or_trump_undefined;welf_checks=2;TR=0.0017225;SNW_MP_PARAM=d
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=7.9748
```

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	1.7895	1.5987	1.4282	1.2759	1.1399	1.0186	0.
2	0.00051498	1.7558	1.5706	1.4046	1.2561	1.1234	1.0048	
3	0.0041199	1.2893	1.1743	1.0674	0.96875	0.87844	0.79612	0
4	0.013905	0.81154	0.75393	0.69804	0.64472	0.59456	0.54778	0.
5	0.032959	0.50535	0.47604	0.44576	0.41574	0.38688	0.35965	0.
6	0.064373	0.33813	0.3215	0.3034	0.28476	0.26638	0.24877	0.

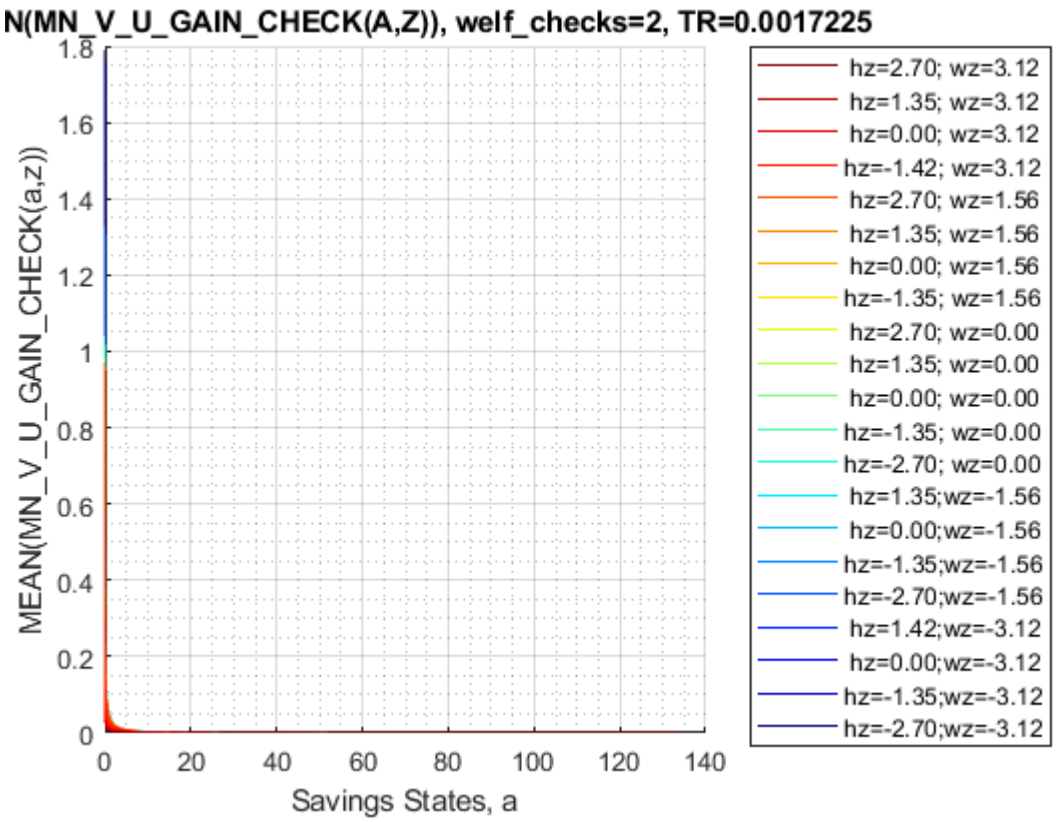
```
% Consumption
st_title = ['MEAN(MN_MPC_U_GAIN_CHECK(A,Z)), welf_checks=' num2str(welf_checks) ', TR=' num2str
tb_az_c = ff_summ_nd_array(st_title, mn_MPC_U_gain_share_check, true, ["mean"], 4, 1, cl_mp_dat
```

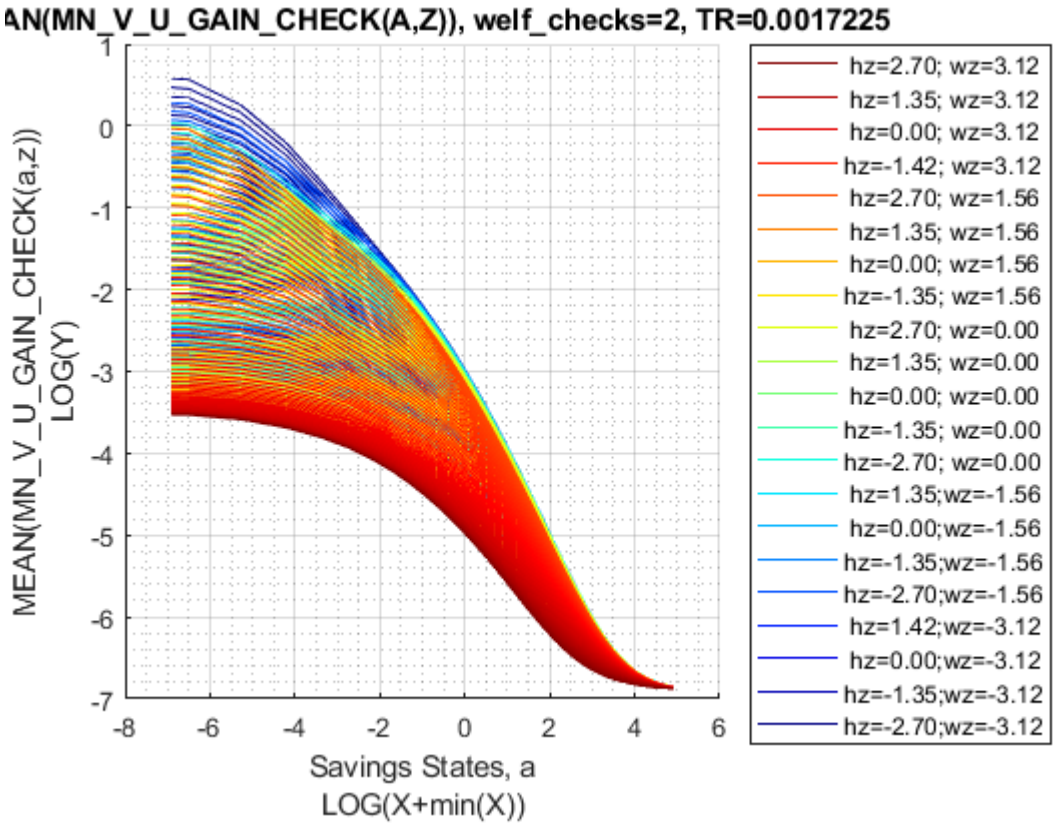
```
xxx  MEAN(MN_MPC_U_GAIN_CHECK(A,Z)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxx
```

group	savings	mean_eta_1	mean_eta_2	mean_eta_3	mean_eta_4	mean_eta_5	mean_eta_6	mean_
1	0	0.99849	0.99673	0.99517	0.99431	0.99427	0.99447	0.99
2	0.00051498	0.99821	0.99612	0.99428	0.99327	0.99321	0.99345	0.99
3	0.0041199	0.92102	0.91723	0.91636	0.91603	0.91597	0.91618	0.91
4	0.013905	0.84509	0.84419	0.84307	0.84318	0.844	0.8451	0.84
5	0.032959	0.731	0.72966	0.7316	0.73563	0.73964	0.74369	0.75
6	0.064373	0.64956	0.64918	0.6496	0.65084	0.6536	0.65665	0.65

Graph Mean Values:

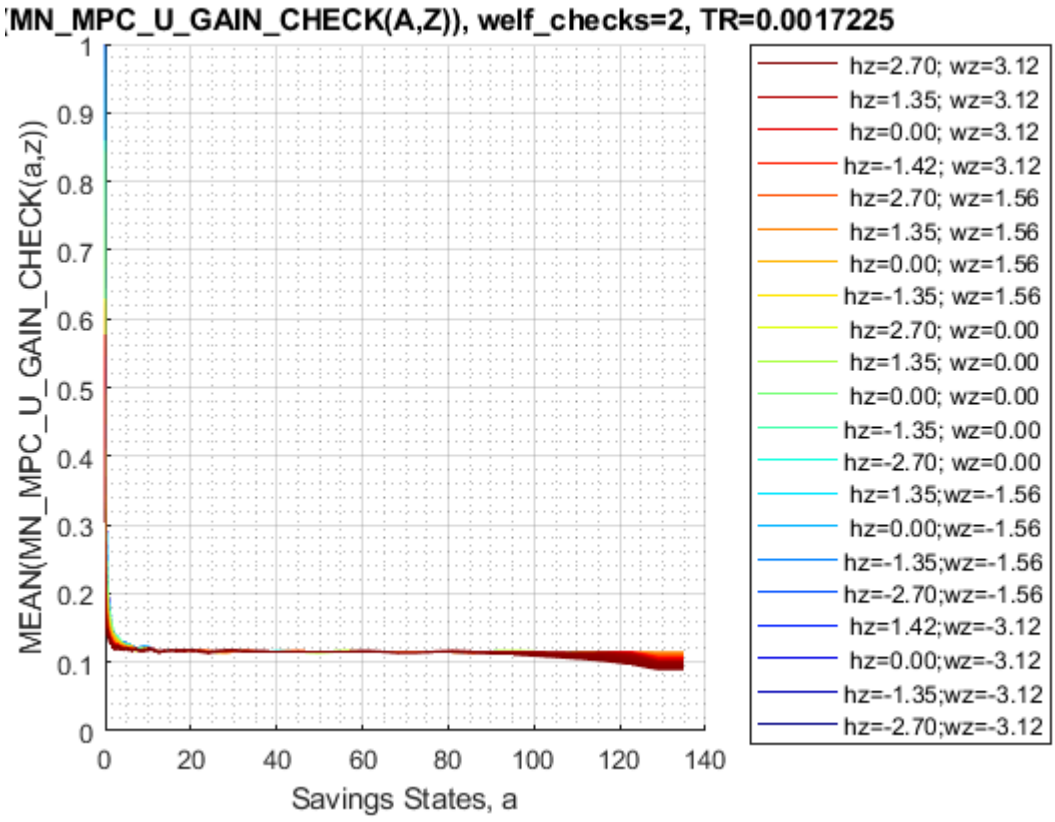
```
st_title = ['MEAN(MN\_V\_U\_GAIN\_CHECK(A,Z)), welf\_checks=' num2str(welf_checks) ', TR=' num2
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_V\_U\_GAIN\_CHECK(a,z))'};
ff_graph_grid((tb_az_v{1:end, 3:end})', ar_st_eta_HS_grid, agrid, mp_support_graph);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

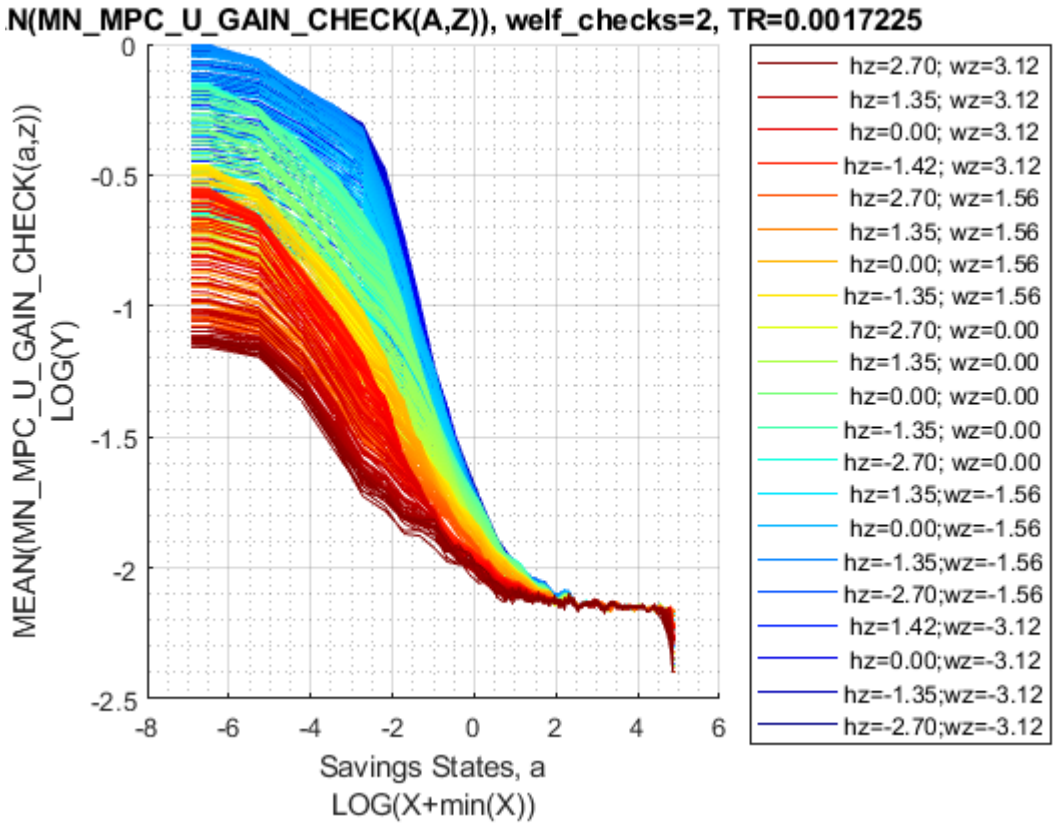




Graph Mean Consumption (MPC: Share of Check Consumed):

```
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;
```

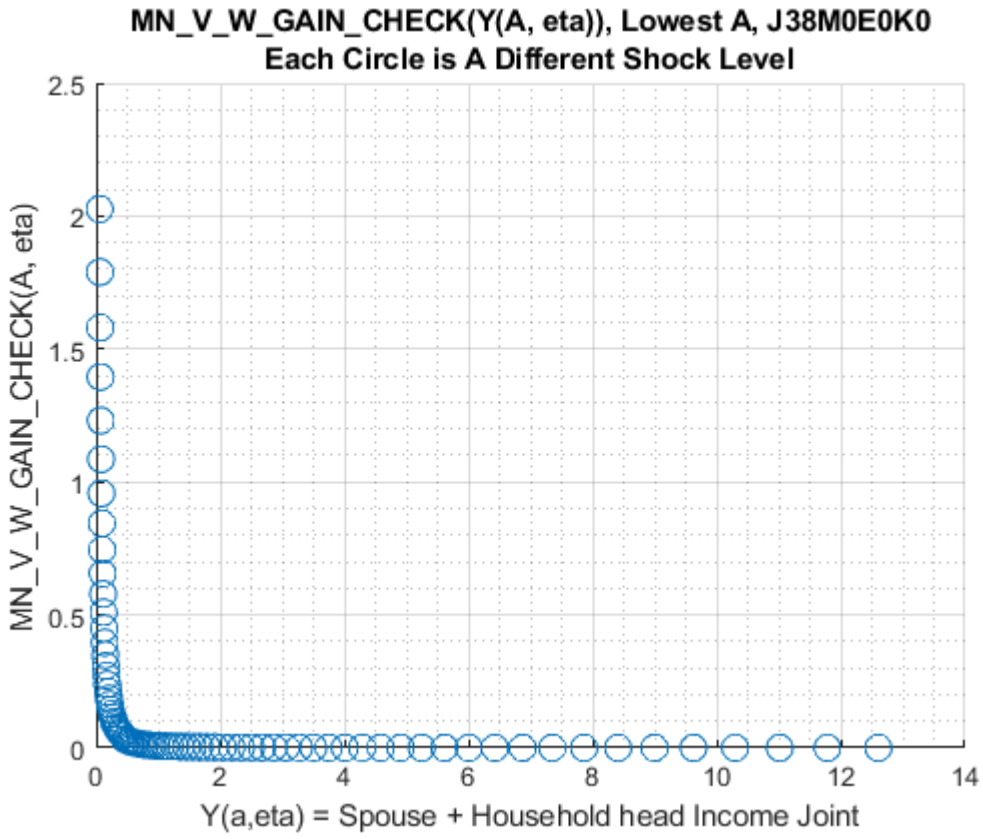
Select Age, Education, Marital, Kids Count:s

```
% 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);
```

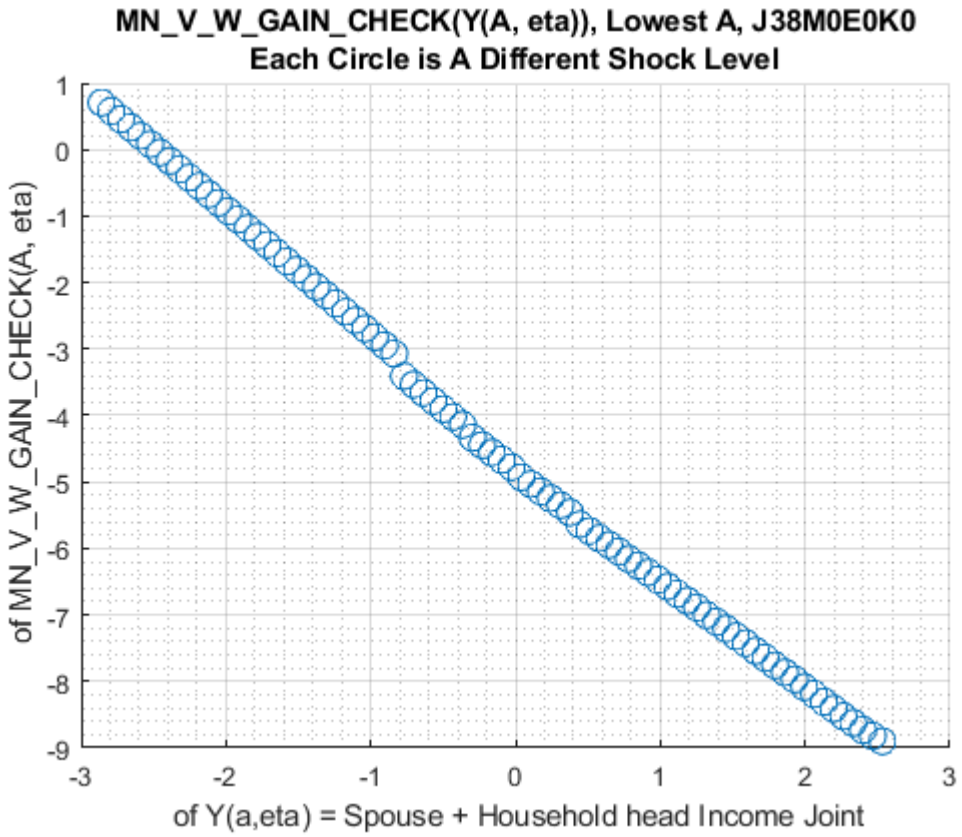
Marginal Value Gains, Color as Shock, Conditional on Age, Marital, Kids, and Education

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;
```

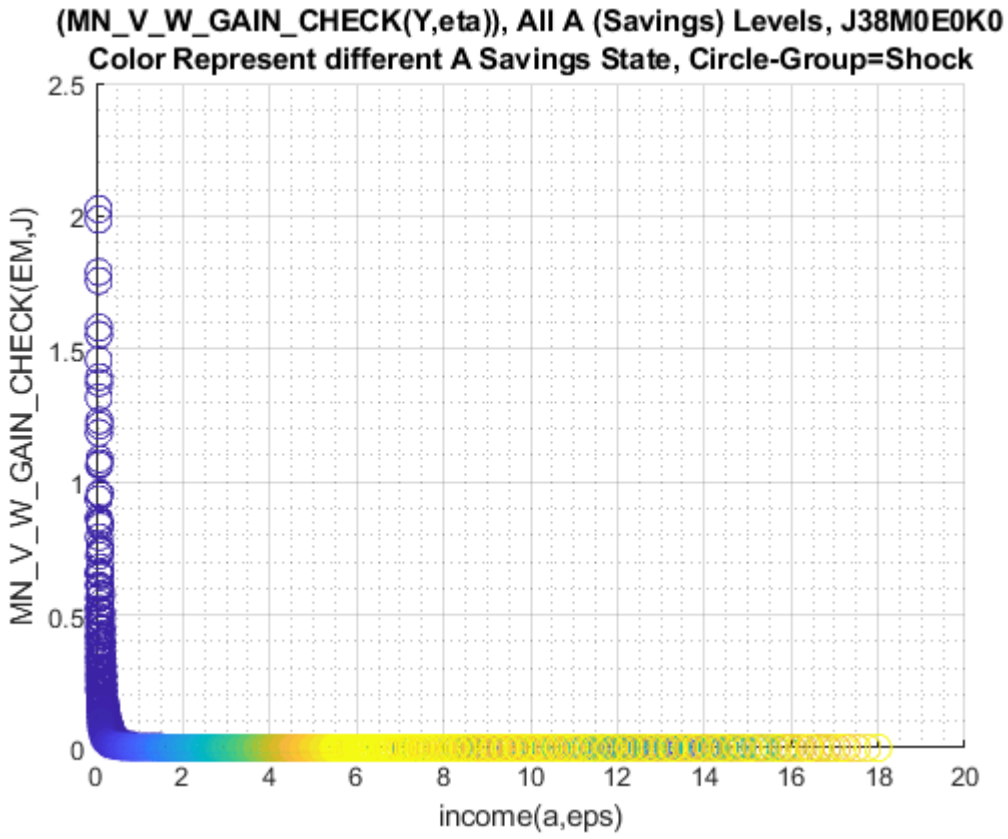



```
figure();
it_shock = 1;
scatter(log(mt_total_inc_jemk(:,it_a)), log(mt_V_W_gain_check_jemk(:,it_a)), 100);
title({'MN\_V\_W\_GAIN\_CHECK(Y(A, eta)), Lowest A, J38M0E0K0', ...
    'Each Circle is A Different Shock Level'});
xlabel(' of Y(a,eta) = Spouse + Household head Income Joint');
ylabel(' of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

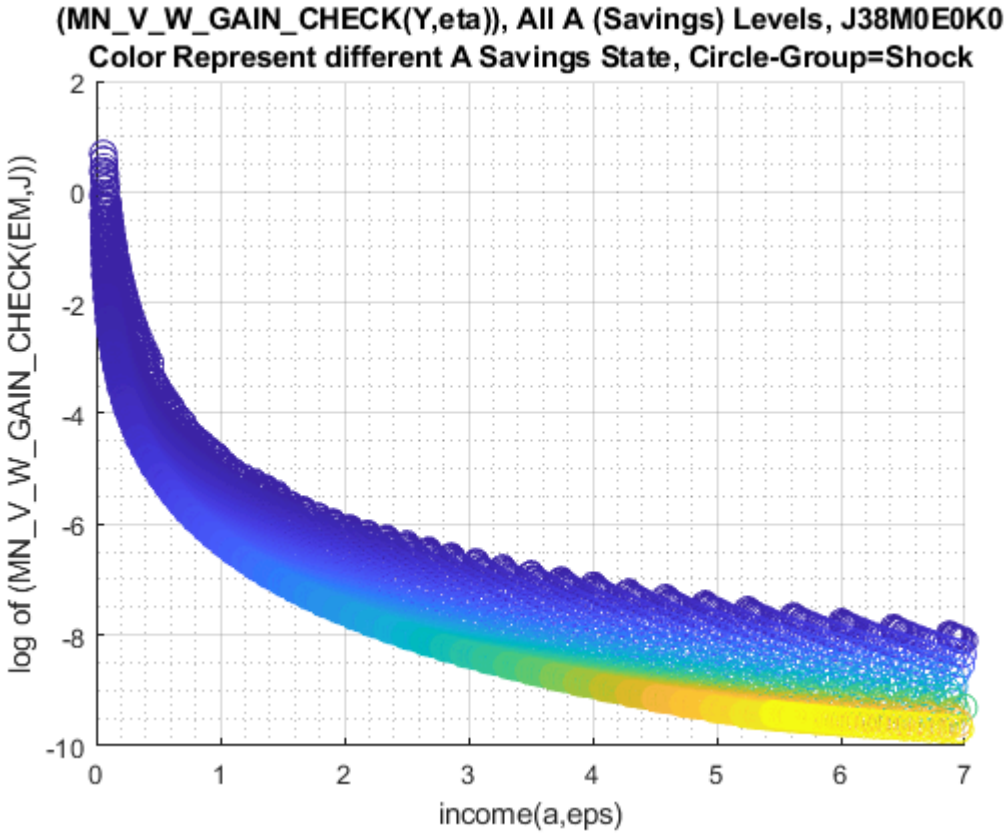


Plot all asset levels:

```
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;
```



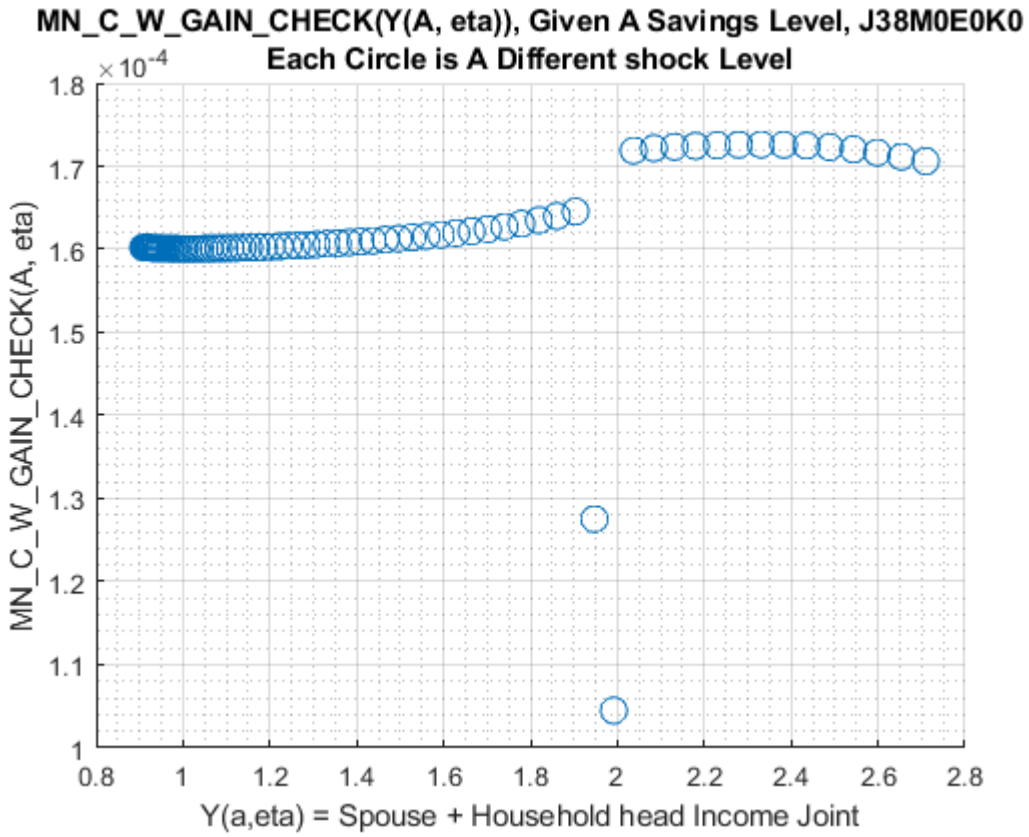

```
figure();
scatter((mt_total_inc_jemk(:)), log(mt_V_W_gain_check_jemk(:)), 100, mt_a(:));
title({'(MN\_V\_W\_GAIN\_CHECK(Y,eta)), All A (Savings) Levels, J38M0E0K0', ...
    'Color Represent different A Savings State, Circle-Group=Shock'});
xlabel('income(a,eps)');
ylabel('log of (MN\_V\_W\_GAIN\_CHECK(EM,J))');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



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

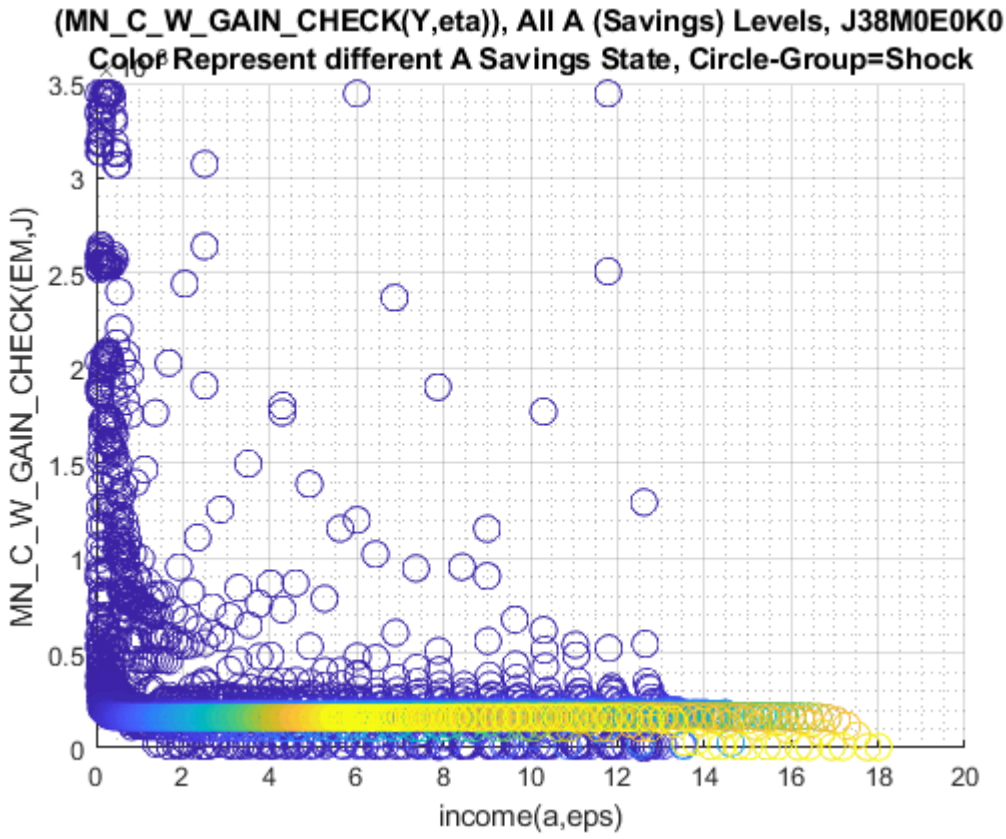
How do shocks and a impact marginal value. First plot one asset level, variation comes only from increasingly higher shocks:

```
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;
```

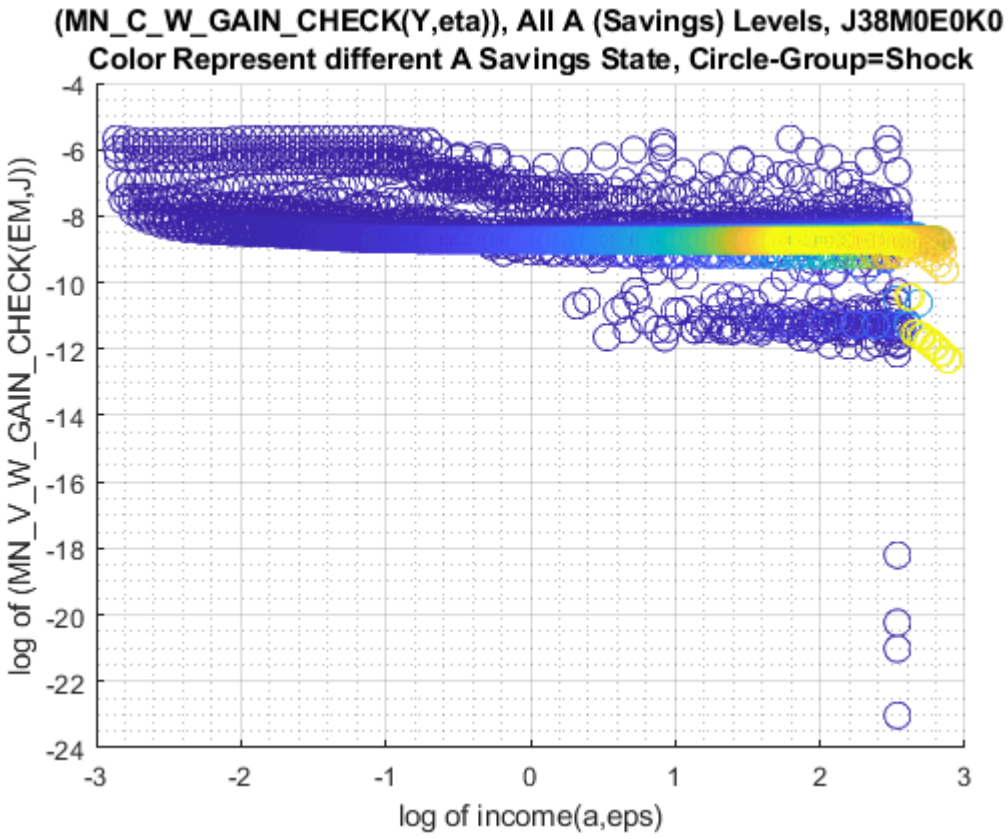


Plot all asset levels:

```
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	0.038527	0.037553	0.036379	0.033145	0.030452	0.028194
2	2	0	0.053415	0.052114	0.050493	0.045939	0.042139	0.038944
3	3	0	0.063389	0.062083	0.060366	0.054947	0.050428	0.046631
4	4	0	0.072383	0.070992	0.069108	0.062921	0.057762	0.053429
5	5	0	0.079913	0.078518	0.076562	0.069748	0.06407	0.059304
6	1	1	0.012602	0.012065	0.01155	0.010426	0.0094863	0.0086955
7	2	1	0.01678	0.016072	0.015393	0.013895	0.012637	0.01158
8	3	1	0.020271	0.019456	0.018665	0.016854	0.015337	0.014062
9	4	1	0.024225	0.023287	0.022361	0.020206	0.018399	0.016877
10	5	1	0.029524	0.028487	0.02744	0.02482	0.022631	0.02079

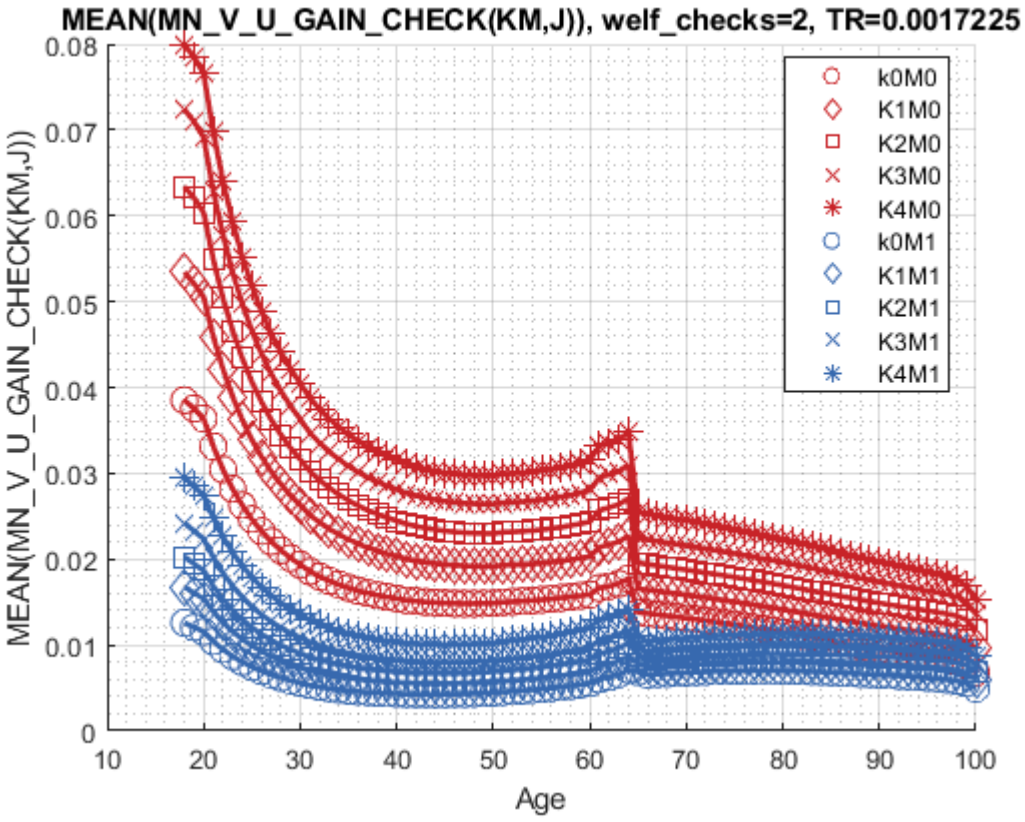
```
% Consumption Function
st_title = ['MEAN(MN_MPC_U_GAIN_CHECK(KM,J)), welf_checks=' num2str(welf_checks) ', TR=' num2st
tb_az_c = ff_summ_nd_array(st_title, mn_MPC_U_gain_share_check, true, ["mean"], 3, 1, cl_mp_dat
```

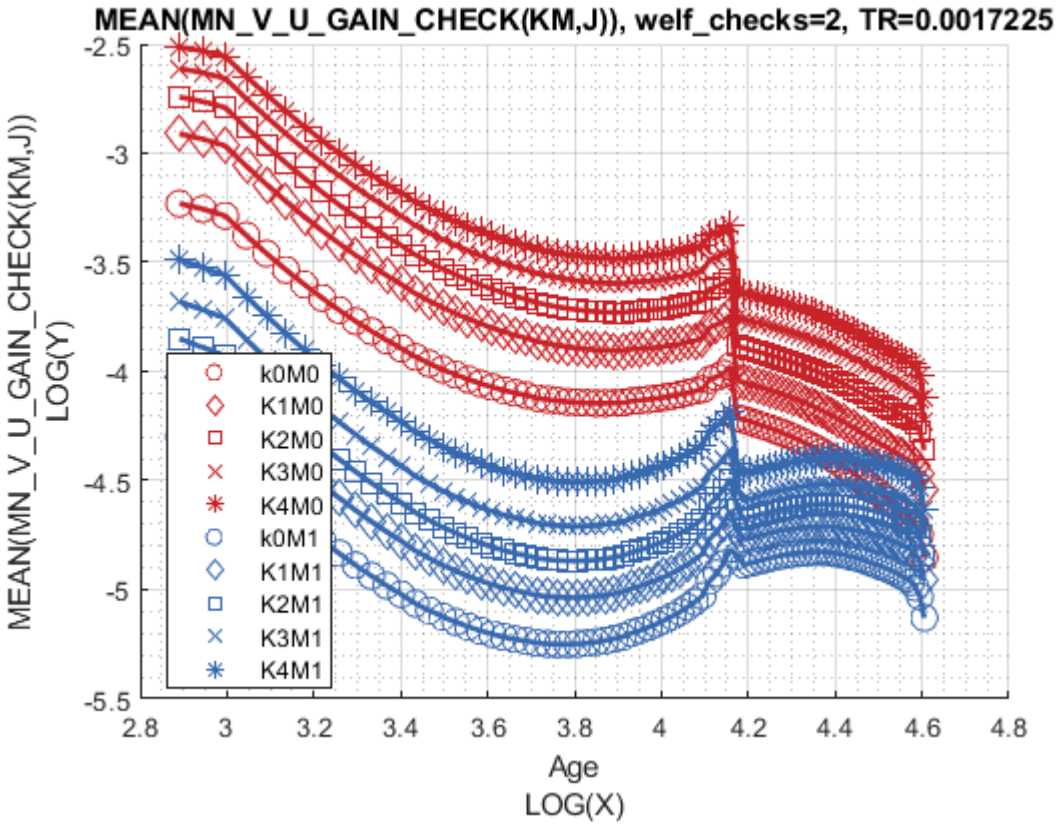
```
xxx  MEAN(MN_MPC_U_GAIN_CHECK(KM,J)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxx
```

group	kids	marry	mean_age_18	mean_age_19	mean_age_20	mean_age_21	mean_age_22	mean_age_23
1	1	0	0.084608	0.090543	0.10335	0.10135	0.099555	0.098243
2	2	0	0.09227	0.09874	0.1136	0.11143	0.10989	0.10821
3	3	0	0.10204	0.1099	0.12674	0.12369	0.12091	0.11993
4	4	0	0.10652	0.1144	0.13184	0.12908	0.1263	0.12421
5	5	0	0.1125	0.11953	0.13744	0.13456	0.13155	0.12878
6	1	1	0.11122	0.11518	0.12131	0.11968	0.11893	0.11799
7	2	1	0.11206	0.11641	0.12306	0.12166	0.12056	0.11955
8	3	1	0.1176	0.12247	0.1311	0.12797	0.12718	0.12652
9	4	1	0.11929	0.12501	0.13176	0.1305	0.13114	0.12824
10	5	1	0.1264	0.13179	0.1402	0.13884	0.13503	0.13339

Graph Mean Values:

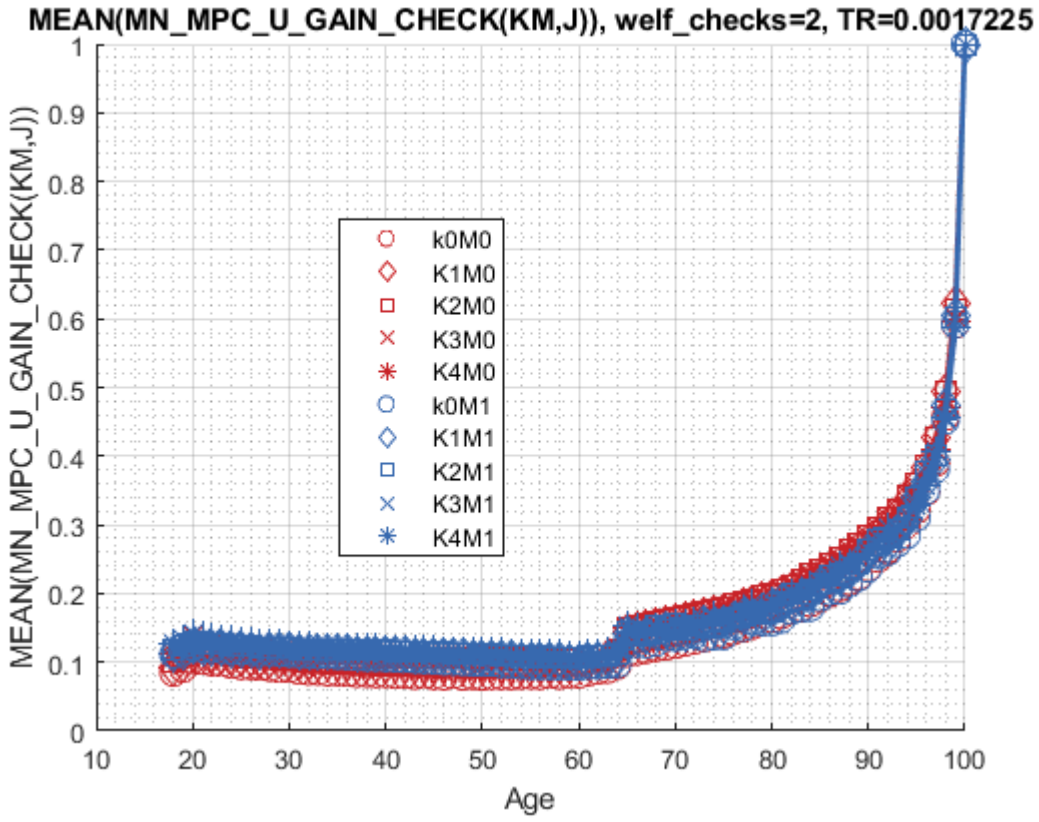
```
st_title = ['MEAN(MN\_V\_U\_GAIN\_CHECK(KM,J)), welf\_checks=' num2str(welf_checks) ', TR=' num
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_V\_U\_GAIN\_CHECK(KM,J))'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);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

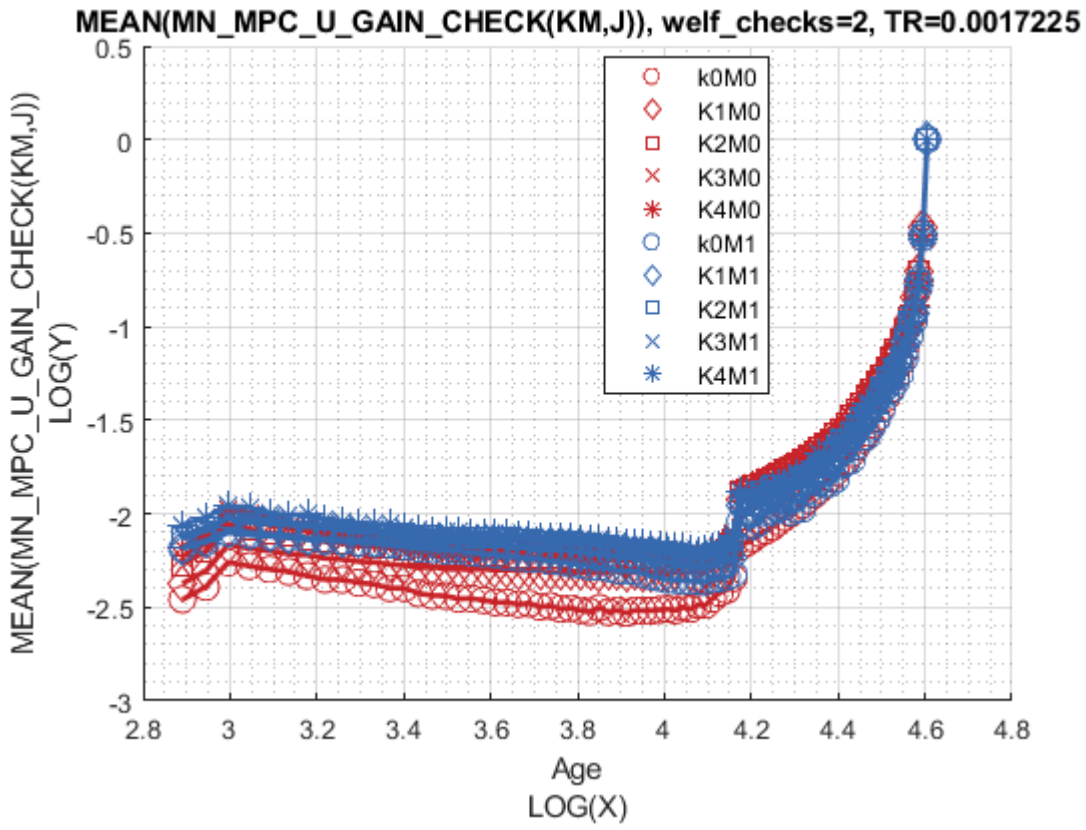




Graph Mean Consumption (***MPC: Share of Check Consumed***):

```
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	0.062745	0.06175	0.060482	0.056976	0.053863	0.051102
2	1	0	0.060305	0.058754	0.056681	0.049704	0.044078	0.039499
3	0	1	0.021795	0.020987	0.020201	0.018731	0.017442	0.016318
4	1	1	0.019567	0.01876	0.017963	0.015749	0.013955	0.012483

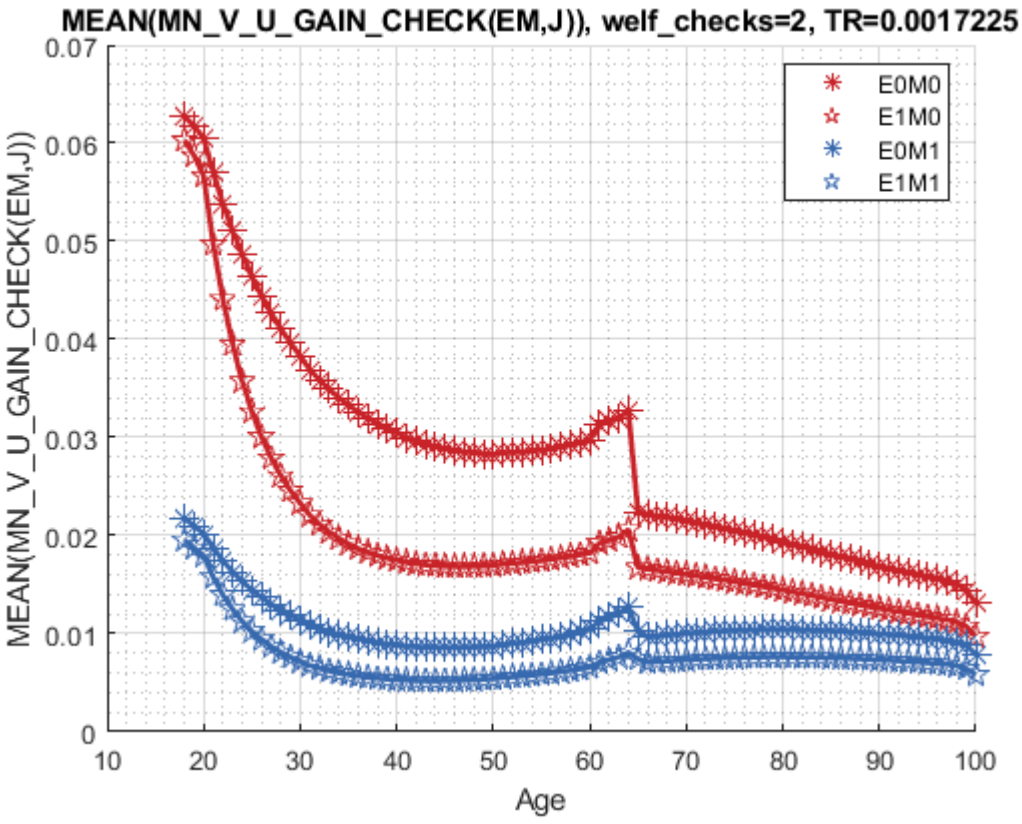
```
% Consumption
st_title = ['MEAN(MN_MPC_U_GAIN_CHECK(EM,J)), welf_checks=' num2str(welf_checks) ', TR=' num2st
tb_az_c = ff_summ_nd_array(st_title, mn_MPC_U_gain_share_check, true, ["mean"], 3, 1, cl_mp_dat
```

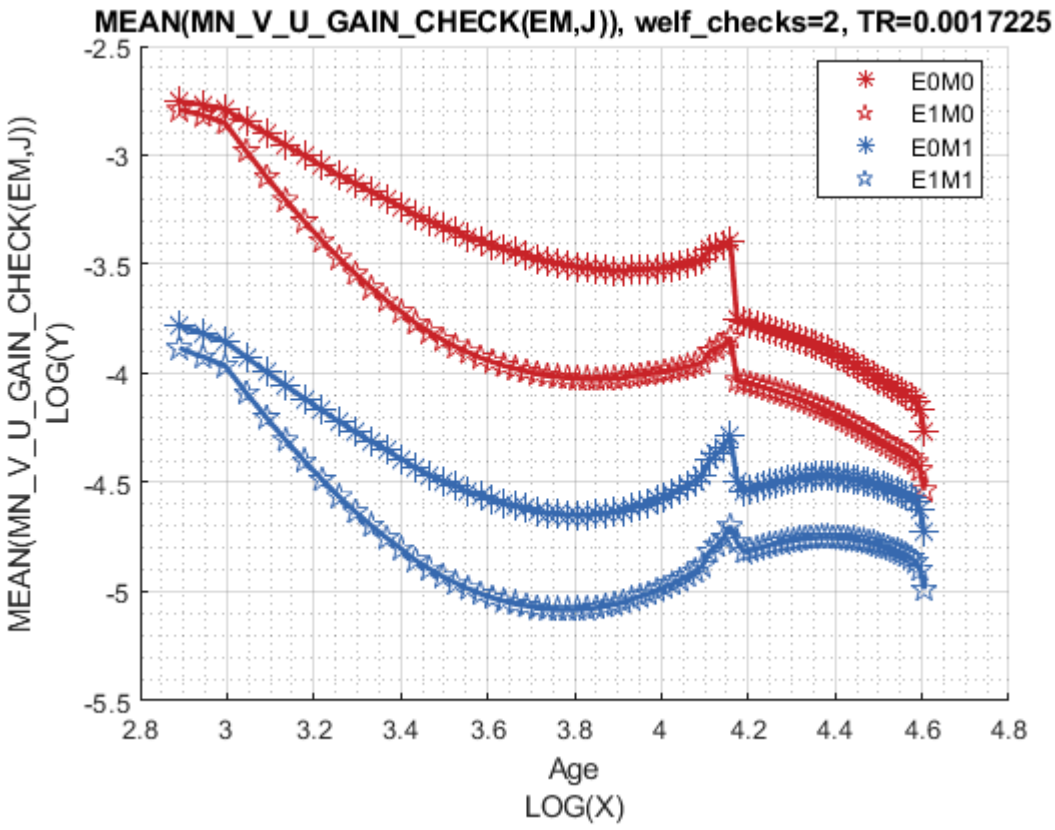
```
xxx  MEAN(MN_MPC_U_GAIN_CHECK(EM,J)), welf_checks=2, TR=0.0017225  xxxxxxxxxxxxxxxxxxxxxxxxxxx
```

group	edu	marry	mean_age_18	mean_age_19	mean_age_20	mean_age_21	mean_age_22	mean_age_23
1	0	0	0.091431	0.09559	0.10516	0.10437	0.10421	0.10418
2	1	0	0.10775	0.11765	0.14003	0.13567	0.13107	0.12756
3	0	1	0.1091	0.11287	0.1172	0.11714	0.11697	0.11645
4	1	1	0.12553	0.13148	0.14177	0.13832	0.13616	0.13382

Graph Mean Values:

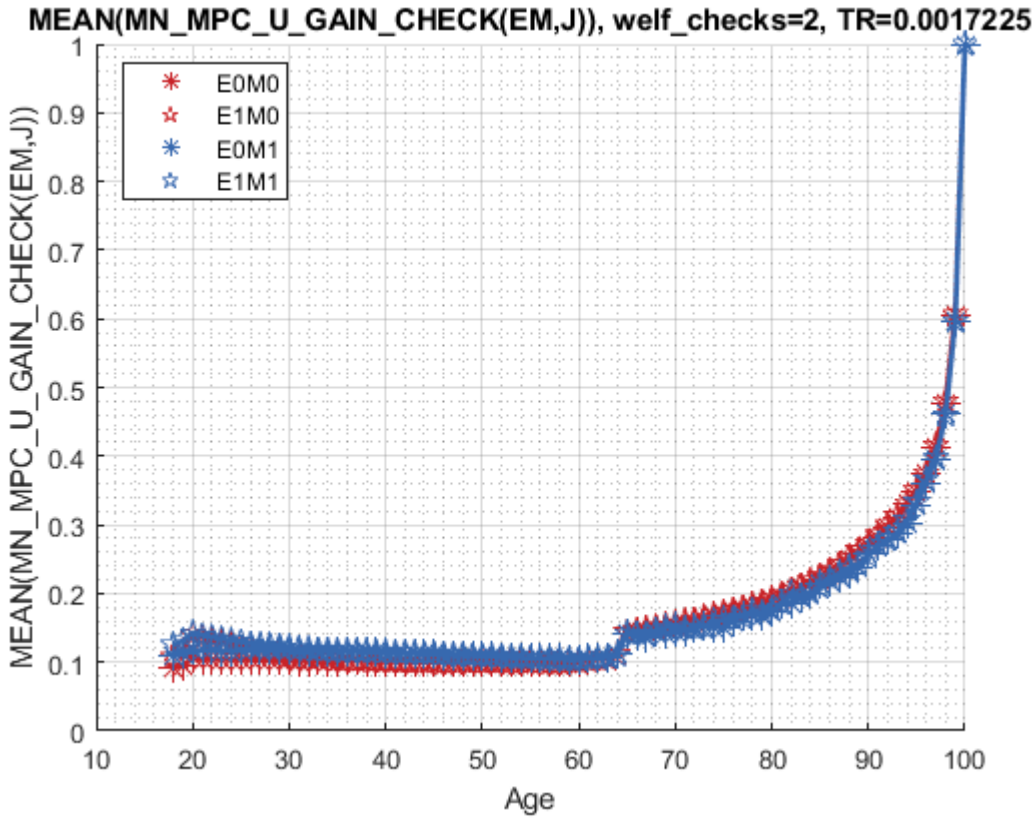
```
st_title = ['MEAN(MN\_V\_U\_GAIN\_CHECK(EM,J)), welf\_checks=' num2str(welf_checks) ', TR=' num
mp_support_graph('cl_st_graph_title') = {st_title};
mp_support_graph('cl_st_ytitle') = {'MEAN(MN\_V\_U\_GAIN\_CHECK(EM,J))'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);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

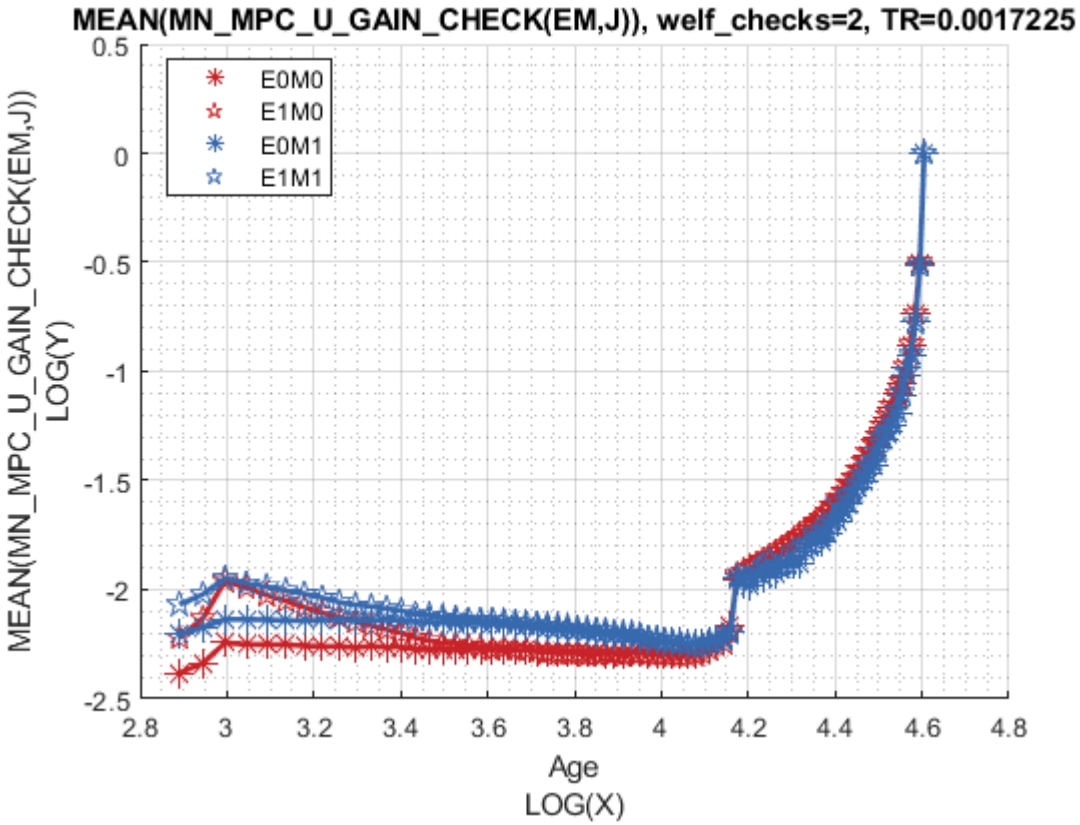




Graph Mean Consumption (***MPC: Share of Check Consumed***):

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