Life Cycle Dynamic Programming under Great Recession Unemployment Shock

This is the example vignette for function: **snw_v08p08_jaeemk** from the **PrjOptiSNW Package.** Solving the dynamic programming problem conditional on having an one period unemployment shock that is expected with known unemployment probability. Unemployment probability is a function of the realized state-space next year, specifically, it is determined by age and education. Bush 2008 checks were received by households in expectation of forth-coming unemployment shocks, ex-ante the realization of shocks. During COVID, the shocks were received ex-post the realization of shocks. In both cases, stimulus checks were determined based on ex-ante information.

Due to expected shock, households consume less and save more in 2008 than under steady-state, as shown below. Value/welfare overall is lower in 2008 than under steady-state.

Test SNW_V08P08_JAEEMK

First, solve for value without unemployment issue (use the vectorized code that was previously tested). This is the steady state results, but also the results in 2009 without unemployment.

```
mp_more_inputs = containers.Map('KeyType','char', 'ValueType','any');
mp_more_inputs('fl_ss_non_college') = 0.225;
mp_more_inputs('fl_ss_college') = 0.271;
mp_more_inputs('fl_scaleconvertor') = 54831;
% st_param_group = 'default_small';
% st_param_group = 'default_dense';
st_param_group = 'default_docdense';
mp_params = snw_mp_param(st_param_group, false, 'tauchen', false, 8, 8, mp_more_inputs);
mp_controls = snw_mp_control('default_test');
mp_controls('bl_print_vfi') = false;
mp_controls('bl_print_vfi_verbose') = false;
mp_controls('bl_print_ds') = false;
mp_controls('bl_print_ds_verbose') = false;
[V_VFI_ss, ap_VFI_ss, cons_VFI_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=526.0056
```

```
V_emp_2009 = V_VFI_ss;
```

Second, solve for the unemployment value, use the exact-bisec result code, call the snw_vfi_main_bisec_vec.m function with a third input of existing value. xi is the share of income lost during covid year given surprise covid shock, b is the share of income loss that is covered by unemployment insurance. If xi=0.5 and b=0 means will lose 50 percent of income given 2009 great recession shocks, and the loss will not be covered at all by unemployment insurance.

```
mp_params('xi') = 0.532;
mp_params('b') = 0.37992;
mp_params('a2_covidyr') = mp_params('a2_greatrecession_2009');
[V_unemp_2009] = snw_vfi_main_bisec_vec(mp_params, mp_controls, V_VFI_ss);
```

```
Completed SNW_VFI_MAIN_BISEC_VEC 1 Period Unemp Shock;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;time
```

Third, solve for 2008 policy and value funtion given employed and unemployed value function in 2009,

```
[V_2008, ap_2008, cons_2008, ev_empshk_2009] = ...
    snw_v08p08_jaeemk(mp_params, mp_controls, V_emp_2009, V_unemp_2009);
```

```
Completed SNW_VFI_MAIN_BISEC_VEC 1 Period Unemp Shock;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;time
Completed SNW_V08P08_JAEEMK;SNW_MP_PARAM=default_docdense;SNW_MP_CONTROL=default_test;time=534.4681
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_outcomes ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari
V_2008	1	1	6	4.37e+07	83	5.265e+05	-8.6418e+08	-19.775	28.14	-1.423
ap_2008	2	2	6	4.37e+07	83	5.265e+05	1.4164e+09	32.413	36.799	1.1353
cons_2008	3	3	6	4.37e+07	83	5.265e+05	2.1314e+08	4.8774	8.3275	1.7073

```
xxx TABLE:V_2008 xxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c526496	c526497	c526498	c526499
r1	-377.6	-377.2	-374.55	-368.41	-358.7	-6.6852	-6.5348	-6.3841	-6.2323
r2	-365.34	-364.94	-362.31	-356.26	-346.87	-6.4943	-6.3486	-6.2023	-6.0543
r3	-353.22	-352.83	-350.3	-344.47	-335.51	-6.3002	-6.1591	-6.0168	-5.8723
r4	-341.2	-340.84	-338.49	-333.04	-324.62	-6.1007	-5.964	-5.8255	-5.6842
r5	-330.3	-329.97	-327.77	-322.66	-314.72	-5.9113	-5.7784	-5.6432	-5.5046
r79	-13.739	-13.726	-13.636	-13.409	-13.022	-0.22845	-0.21772	-0.20765	-0.19821
r80	-12.3	-12.287	-12.198	-11.97	-11.583	-0.17425	-0.16609	-0.1584	-0.15115
r81	-10.552	-10.538	-10.449	-10.221	-9.8344	-0.11926	-0.11367	-0.10842	-0.10346
r82	-8.2458	-8.2327	-8.1431	-7.9156	-7.5286	-0.065967	-0.062837	-0.059921	-0.057181
r83	-4.9602	-4.9471	-4.8576	-4.6301	-4.2431	-0.020966	-0.019971	-0.019037	-0.01816

```
xxx TABLE:ap_2008 xxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c526496	c526497	c526498	c526
r1	0.00051498	0.00051498	0.0032921	0.0091501	0.023607	114.76	120.42	126.29	132.
r2	0.00051498	0.00051498	0.0030624	0.0084089	0.022296	114.88	120.54	126.43	132.
r3	0	0	0.0016162	0.0069216	0.020659	114.99	120.67	126.57	132.
r4	0	0	0.0016317	0.0069002	0.020494	115.74	121.44	127.36	133.
r5	0	0	0.0016507	0.0068855	0.020347	116.52	122.23	128.16	134.
r79	0	0	0	0	0.00051498	81.091	85.68	90.33	94.3
r80	0	0	0	0	0	76.669	80.556	84.298	88.0
r81	0	0	0	0	0	68.313	71.526	74.467	77.8
r82	0	0	0	0	0	50.126	53.467	56.953	58.
r83	0	0	0	0	0	0	0	0	

```
xxx TABLE:cons_2008 xxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c526496	c526497	c526498	c526499	c
r1	0.036202	0.036736	0.0377	0.041994	0.047306	9.6346	9.8024	9.9503	10.059	1
r2	0.036202	0.036736	0.037929	0.042735	0.048617	9.7969	9.9535	10.086	10.177	1
r3	0.036717	0.037251	0.039375	0.044222	0.050255	9.962	10.105	10.219	10.288	1
r4	0.038144	0.038678	0.040786	0.045669	0.051843	10.114	10.242	10.338	10.39	
r5	0.039534	0.040068	0.042157	0.047073	0.053379	10.254	10.367	10.447	10.485	1
r79	0.2016	0.20214	0.20586	0.21598	0.23516	35.82	37.055	38.423	40.592	4
r80	0.2016	0.20214	0.20586	0.21598	0.23568	40.216	42.153	44.428	46.907	4
r81	0.2016	0.20214	0.20586	0.21598	0.23568	48.55	51.16	54.237	57.094	6

```
r82      0.2016     0.20214     0.20586     0.21598     0.23568     66.719     69.201     71.733     76.161     8
r83      0.2016     0.20214     0.20586     0.21598     0.23568     116.83     122.65     128.67     134.89
```

Difference Between Value and Choices In steady state and in 2008, given expected unemployment (one-period) shock due to the great recession, **snw_v08p08_jaeemk**.

```
V_VFI_unemp_drop = V_VFI_ss - V_2008;
ap_VFI_unemp_drop = ap_VFI_ss - ap_2008;
cons_VFI_unemp_drop = cons_VFI_ss - cons_2008;
```

Define Parameter 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 Savings and Shocks

First, analyze Savings Levels and Shocks, Aggregate Over All Others, and do various other calculations.

```
% 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') = 15; % how many shock legends to show
mp_support_graph('cl_colors') = 'jet';
```

MEAN(VAL(A,Z) - VAL(A,Z, 08wthEV09unemshk)), MEAN(AP(A,Z) - AP(A,Z, 08wthEV09unemshk)), MEAN(C(A,Z) - C(A,Z, 08wthEV09unemshk))

Tabulate value and policies along savings and shocks:

```
% Set
% NaN(n_jgrid,n_agrid,n_etagrid,n_educgrid,n_marriedgrid,n_kidsgrid);
```

```
ar_permute = [1,4,5,6,3,2];
% Value Function
tb_az_v = ff_summ_nd_array("MEAN(v(A,Z) - v(A,Z, 08wthEV09unemshk))", V_VFI_unemp_drop, true, [
```

```
xxx  MEAN(v(A,Z) - v(A,Z, 08wthEV09unemshk))  xxxxxxxxxxxxxxxxxxxxxxxxxx
```

group	savings	mean_eta_1	mean_eta_2	mean_eta_3	mean_eta_4	mean_eta_5	mean_eta_6	mean_
1	0	0.61601	0.59253	0.56551	0.53755	0.5101	0.48381	0.
2	0.00051498	0.61585	0.59199	0.56477	0.53681	0.50943	0.4832	0
3	0.0041199	0.60855	0.58066	0.5514	0.5232	0.49656	0.47141	0.
4	0.013905	0.54472	0.52256	0.49909	0.47633	0.45473	0.43419	0.
5	0.032959	0.44669	0.43305	0.41839	0.4036	0.389	0.37467	0.
6	0.064373	0.37716	0.36829	0.35848	0.34803	0.3372	0.32622	0.

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(AP(A,Z) - AP(A,Z, 08wthEV09unemshk))", ap_VFI_unemp_drop, tru
```

```
xxx  MEAN(AP(A,Z) - AP(A,Z, 08wthEV09unemshk))  xxxxxxxxxxxxxxxxxxxxxxxxxx
```

group	savings	mean_eta_1	mean_eta_2	mean_eta_3	mean_eta_4	mean_eta_5	mean_eta_6
1	0	-7.3284e-06	-3.5629e-05	-7.2995e-05	-9.7831e-05	-0.00012331	-0.00014314
2	0.00051498	-1.4831e-05	-6.5918e-05	-9.7611e-05	-0.00013303	-0.00015672	-0.00017746
3	0.0041199	-0.00023391	-0.00041139	-0.00055964	-0.00064928	-0.0007066	-0.00074956
4	0.013905	-0.00026726	-0.00045571	-0.00062462	-0.00073298	-0.00080614	-0.00086368
5	0.032959	-0.00025565	-0.00039576	-0.00048282	-0.00053831	-0.00059111	-0.00064471
6	0.064373	-0.00026331	-0.00027992	-0.00029286	-0.00030841	-0.0003269	-0.00034936

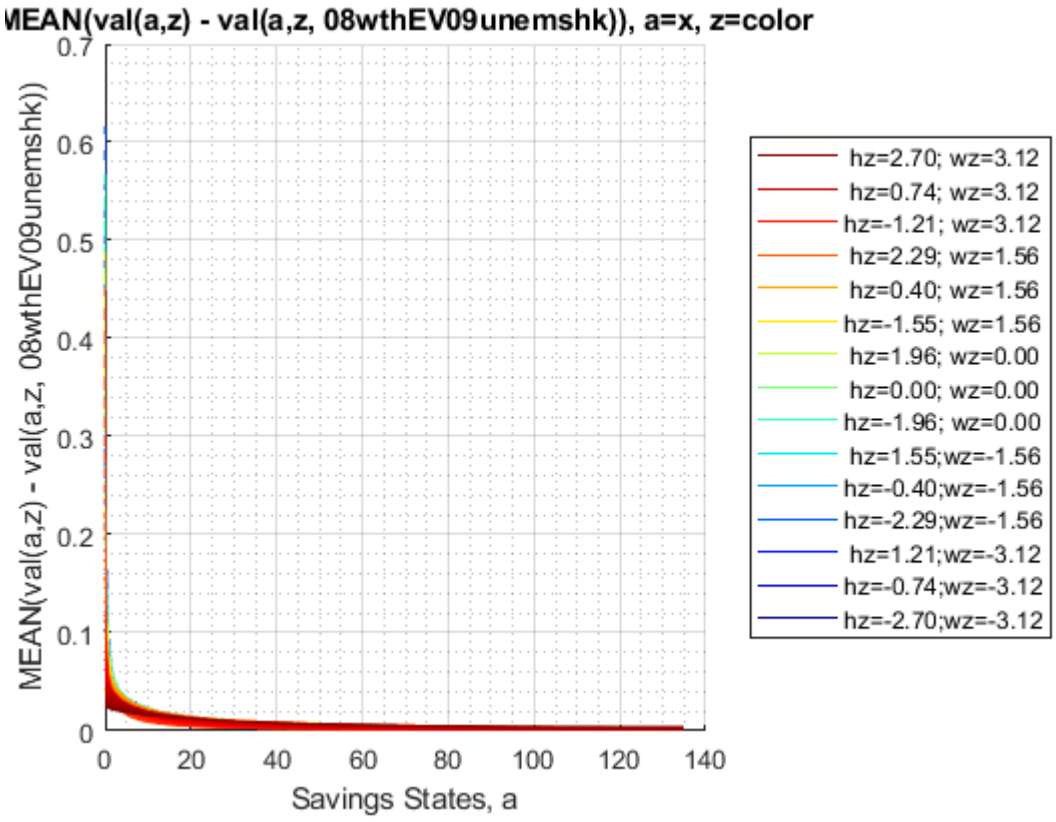
```
% Consumption Choices
tb_az_c = ff_summ_nd_array("MEAN(C(A,Z) - C(A,Z, 08wthEV09unemshk))", cons_VFI_unemp_drop, true
```

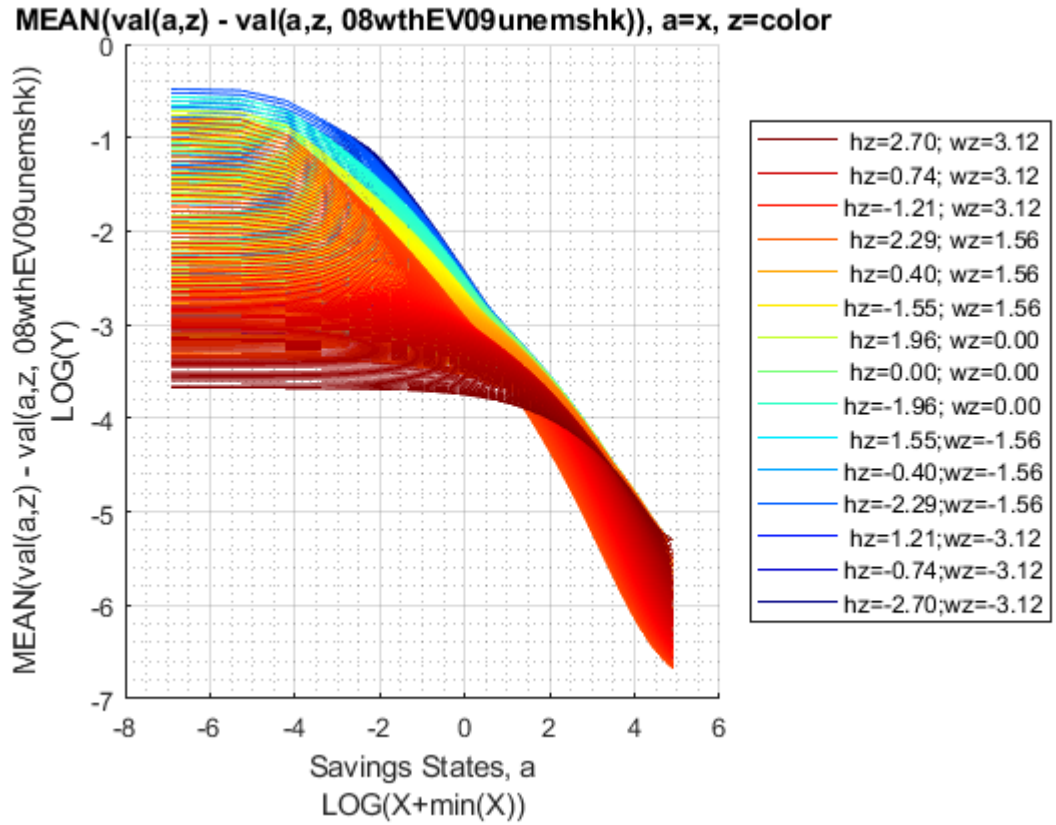
```
xxx  MEAN(C(A,Z) - C(A,Z, 08wthEV09unemshk))  xxxxxxxxxxxxxxxxxxxxxxxxxx
```

group	savings	mean_eta_1	mean_eta_2	mean_eta_3	mean_eta_4	mean_eta_5	mean_eta_6	mean_
1	0	7.3284e-06	3.5629e-05	7.2995e-05	9.7831e-05	0.00012331	0.00014314	0.000
2	0.00051498	1.4831e-05	6.5918e-05	9.7611e-05	0.00013303	0.00015672	0.00017746	0.000
3	0.0041199	0.00023391	0.00041139	0.00055964	0.00064928	0.0007066	0.00074956	0.000
4	0.013905	0.00026726	0.00045571	0.00062462	0.00073298	0.00080614	0.00086368	0.000
5	0.032959	0.00025565	0.00039576	0.00048282	0.00053831	0.00059111	0.00064471	0.000
6	0.064373	0.00026331	0.00027992	0.00029286	0.00030841	0.0003269	0.00034936	0.000

Graph Mean Values Change:

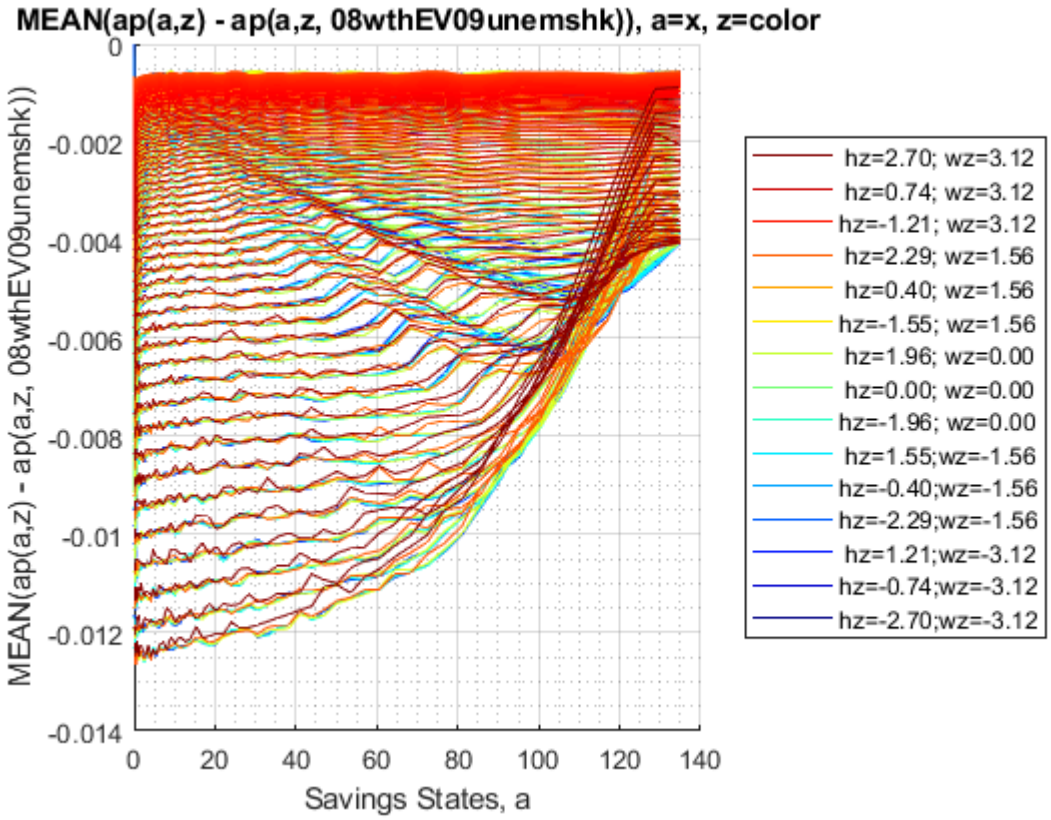
```
mp_support_graph('cl_st_graph_title') = {'MEAN(val(a,z) - val(a,z, 08wthEV09unemshk)), a=x, z=c
mp_support_graph('cl_st_ytitle') = {'MEAN(val(a,z) - val(a,z, 08wthEV09unemshk))'};
ff_graph_grid((tb_az_v{1:end, 3:end})', ar_st_eta_HS_grid, agrid, mp_support_graph);
```

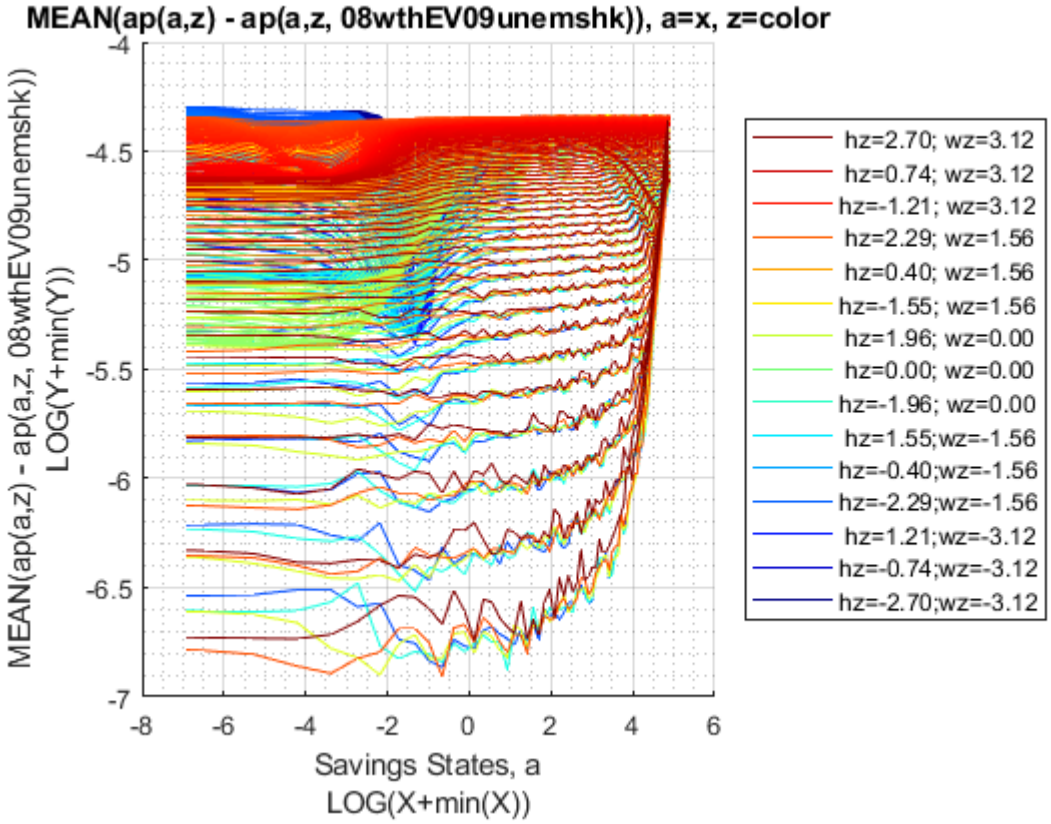




Graph Mean Savings Choices Change:

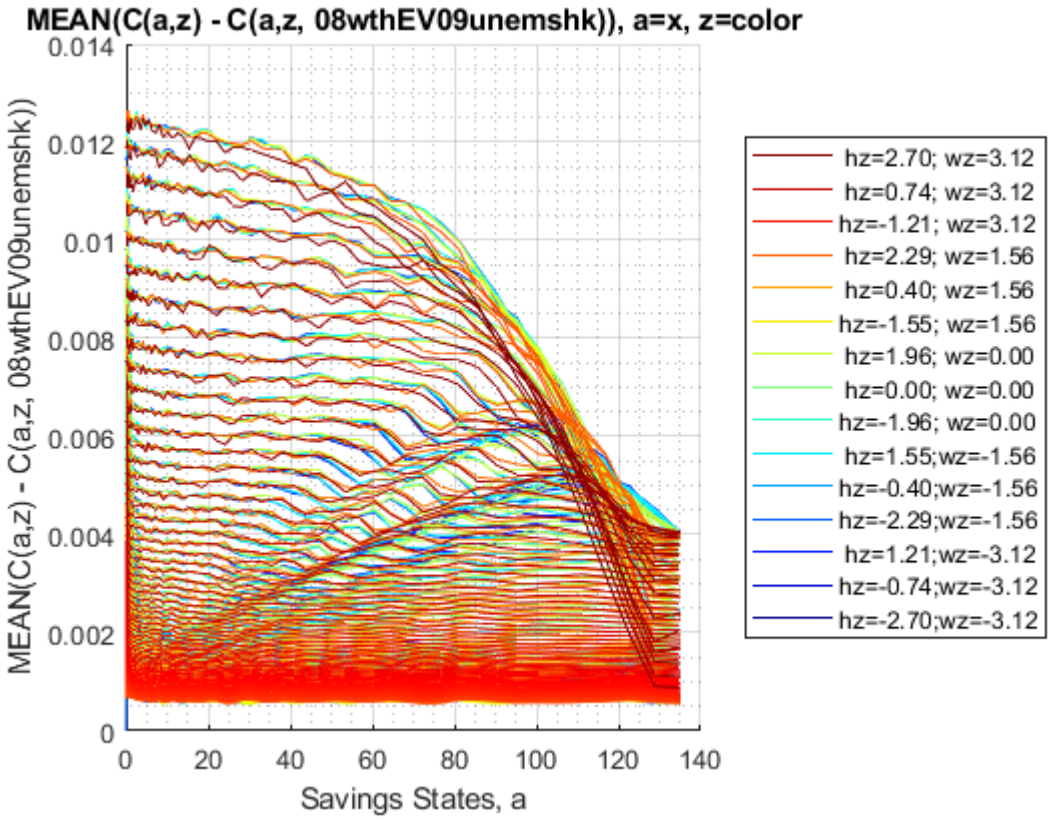
```
mp_support_graph('cl_st_graph_title') = {'MEAN(ap(a,z) - ap(a,z, 08wthEV09unemshk)), a=x, z=col
mp_support_graph('cl_st_ytitle') = {'MEAN(ap(a,z) - ap(a,z, 08wthEV09unemshk))'};
ff_graph_grid((tb_az_ap{1:end, 3:end})', ar_st_eta_HS_grid, agrid, mp_support_graph);
```

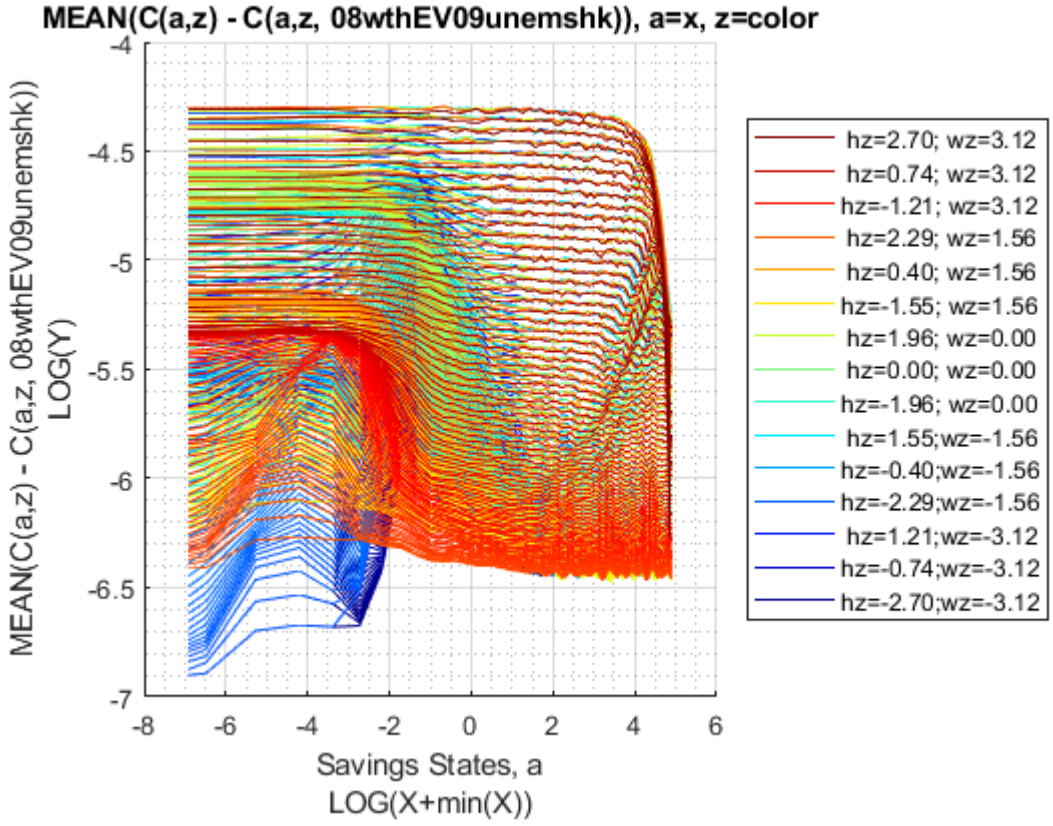




Graph Mean Consumption Change:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(C(a,z) - C(a,z, 08wthEV09unemshk)), a=x, z=color
mp_support_graph('cl_st_ytitle') = {'MEAN(C(a,z) - C(a,z, 08wthEV09unemshk))'};
ff_graph_grid((tb_az_c{1:end, 3:end})', ar_st_eta_HS_grid, agrid, mp_support_graph);
```





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(V(KM,J) - V(KM,J | unemp)), MEAN(ap(KM,J) - ap(KM,J | unemp)), MEAN(c(KM,J) - c(KM,J | unemp))

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
```

```
tb_az_v = ff_summ_nd_array("MEAN(V(KM,J) - V(KM,J | unemp))", V_VFI_unemp_drop, true, ["mean"],
```

xxx MEAN(V(KM,J) - V(KM,J | unemp)) xxxxxxxxxxxxxxxxxxxxxxxxxx

group	kids	marry	mean_age_18	mean_age_19	mean_age_20	mean_age_21	mean_age_22	mean_age_23
1	1	0	0.046286	0.045154	0.045206	0.044045	0.043041	0.042174
2	2	0	0.061509	0.060105	0.060105	0.058309	0.05672	0.05531
3	3	0	0.071135	0.069801	0.06956	0.06751	0.065702	0.064099
4	4	0	0.080137	0.0788	0.078496	0.076191	0.074156	0.072353
5	5	0	0.087487	0.086234	0.085827	0.083393	0.081251	0.079361
6	1	1	0.035539	0.034243	0.033548	0.032741	0.032045	0.031451
7	2	1	0.043811	0.042205	0.041298	0.040208	0.039233	0.038362
8	3	1	0.048496	0.046783	0.045815	0.044615	0.043554	0.042607
9	4	1	0.053774	0.051966	0.05096	0.049624	0.048442	0.047397
10	5	1	0.058404	0.056626	0.055602	0.05418	0.052931	0.051825

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(ap(KM,J) - ap(KM,J | unemp))", ap_VFI_unemp_drop, true, ["mea
```

xxx MEAN(ap(KM,J) - ap(KM,J | unemp)) xxxxxxxxxxxxxxxxxxxxxxxxxx

group	kids	marry	mean_age_18	mean_age_19	mean_age_20	mean_age_21	mean_age_22	mean_age_23
1	1	0	-0.0020954	-0.0022922	-0.0023124	-0.0023781	-0.002452	-0.002541
2	2	0	-0.0025384	-0.0028561	-0.0028769	-0.002923	-0.0029984	-0.0030695
3	3	0	-0.0029997	-0.0034133	-0.003403	-0.0033945	-0.0033908	-0.0034369
4	4	0	-0.0033272	-0.0037849	-0.0037592	-0.0037304	-0.003723	-0.0037402
5	5	0	-0.0036714	-0.0040673	-0.0040589	-0.0040155	-0.0039849	-0.0039914
6	1	1	-0.0033041	-0.003509	-0.0035692	-0.0036765	-0.0037787	-0.0038947
7	2	1	-0.0035178	-0.0037456	-0.003797	-0.0038875	-0.0039924	-0.0040965
8	3	1	-0.0038496	-0.0040777	-0.00411	-0.0041767	-0.0042559	-0.0043528
9	4	1	-0.004079	-0.0043493	-0.0043317	-0.0043657	-0.0044326	-0.0045066
10	5	1	-0.0043828	-0.0047223	-0.0045492	-0.0045848	-0.0046013	-0.0046315

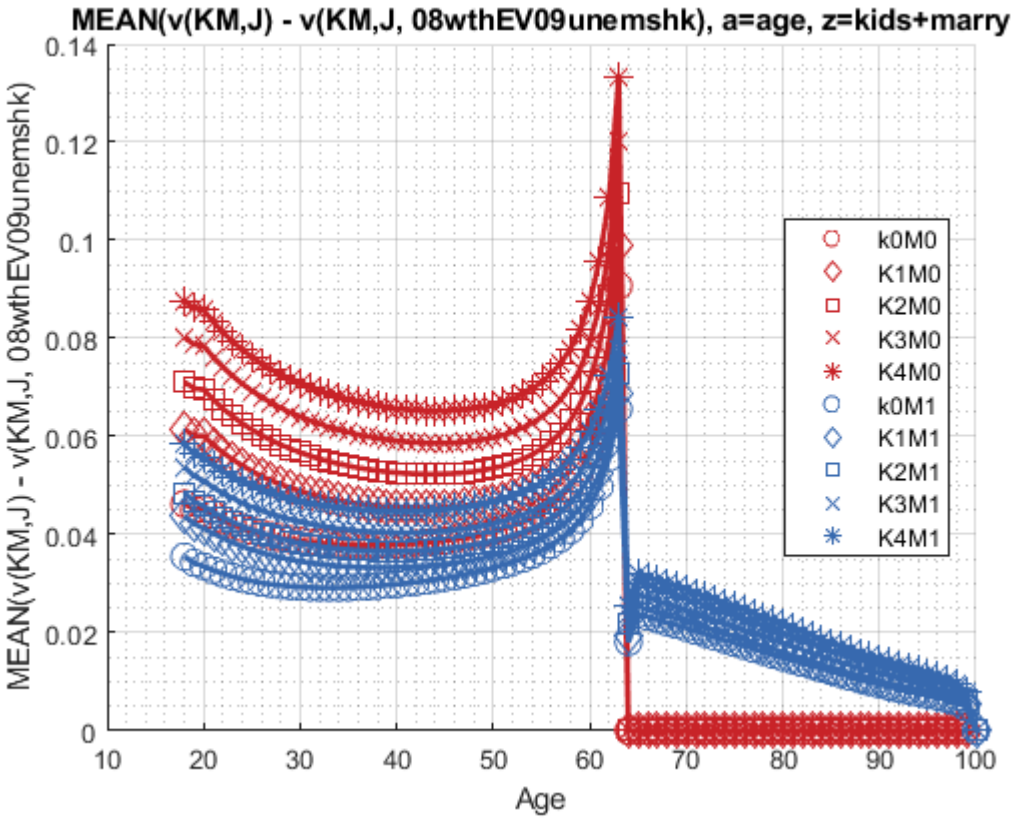
```
% Consumption Choices
tb_az_c = ff_summ_nd_array("MEAN(c(KM,J) - c(KM,J | unemp))", cons_VFI_unemp_drop, true, ["mean
```

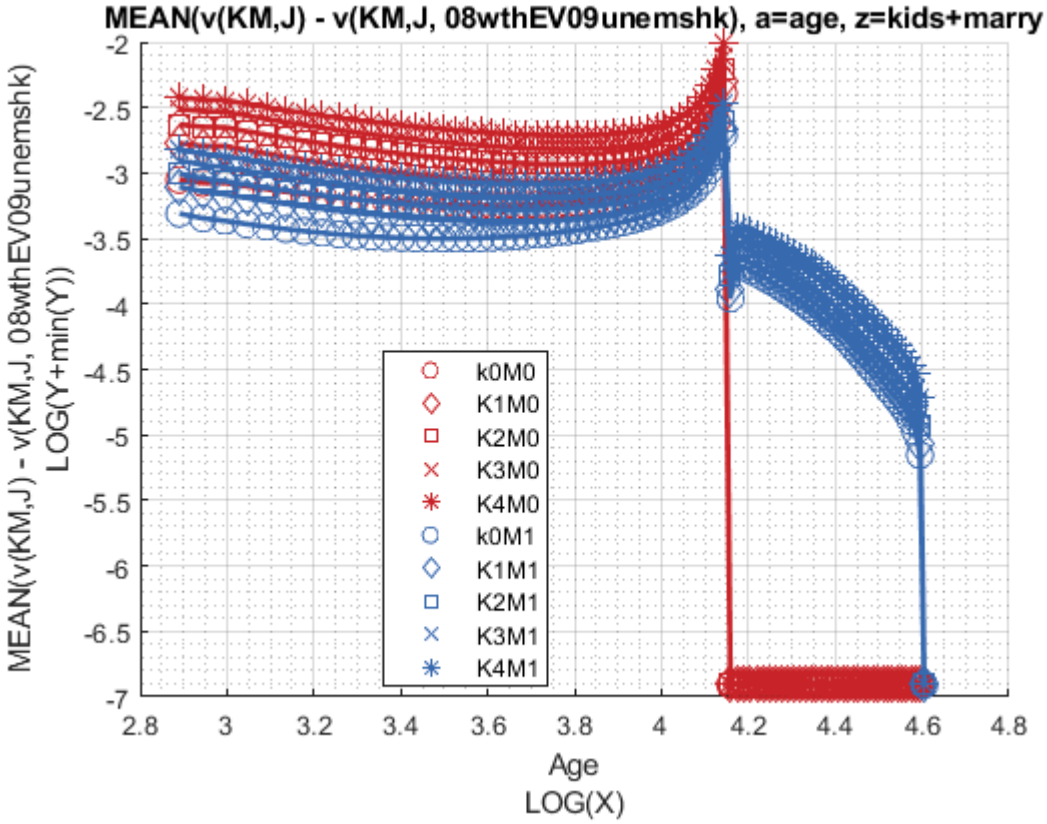
xxx MEAN(c(KM,J) - c(KM,J | unemp)) xxxxxxxxxxxxxxxxxxxxxxxxxx

group	kids	marry	mean_age_18	mean_age_19	mean_age_20	mean_age_21	mean_age_22	mean_age_23
1	1	0	0.0020954	0.0022922	0.0023124	0.0023781	0.002452	0.002541
2	2	0	0.0025384	0.0028561	0.0028769	0.002923	0.0029984	0.0030695
3	3	0	0.0029997	0.0034133	0.003403	0.0033945	0.0033908	0.0034369
4	4	0	0.0033272	0.0037849	0.0037592	0.0037304	0.003723	0.0037402
5	5	0	0.0036714	0.0040673	0.0040589	0.0040155	0.0039849	0.0039914
6	1	1	0.0033041	0.003509	0.0035692	0.0036765	0.0037787	0.0038947
7	2	1	0.0035178	0.0037456	0.003797	0.0038875	0.0039924	0.0040965
8	3	1	0.0038496	0.0040777	0.00411	0.0041767	0.0042559	0.0043528
9	4	1	0.004079	0.0043493	0.0043317	0.0043657	0.0044326	0.0045066
10	5	1	0.0043828	0.0047223	0.0045492	0.0045848	0.0046013	0.0046315

Graph Mean Values Change:

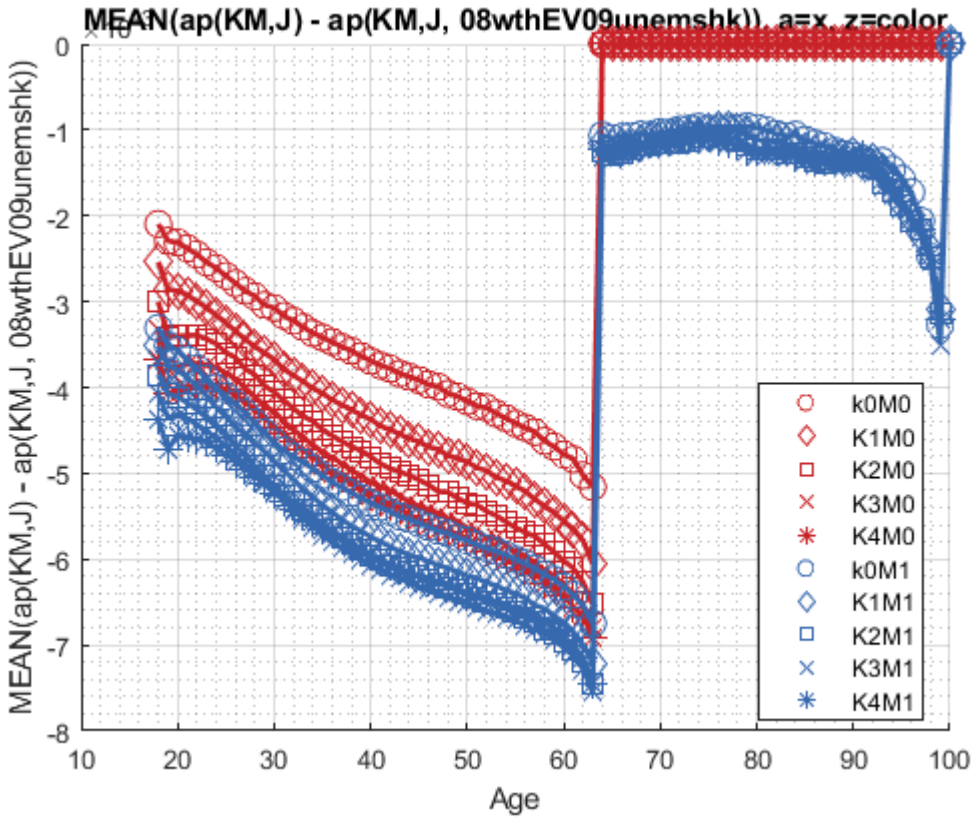
```
mp_support_graph('cl_st_graph_title') = {'MEAN(v(KM,J) - v(KM,J, 08wthEV09unemshk), a=age, z=ki
mp_support_graph('cl_st_ytitle') = {'MEAN(v(KM,J) - v(KM,J, 08wthEV09unemshk)'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

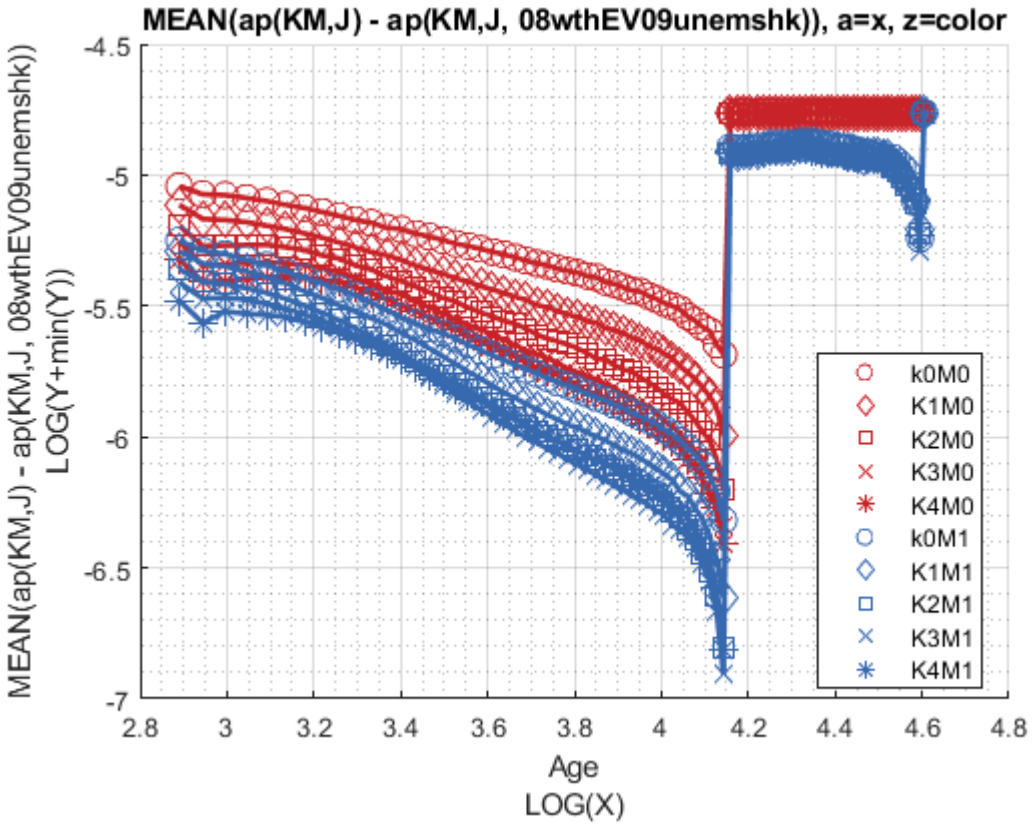




Graph Mean Savings Choices Change:

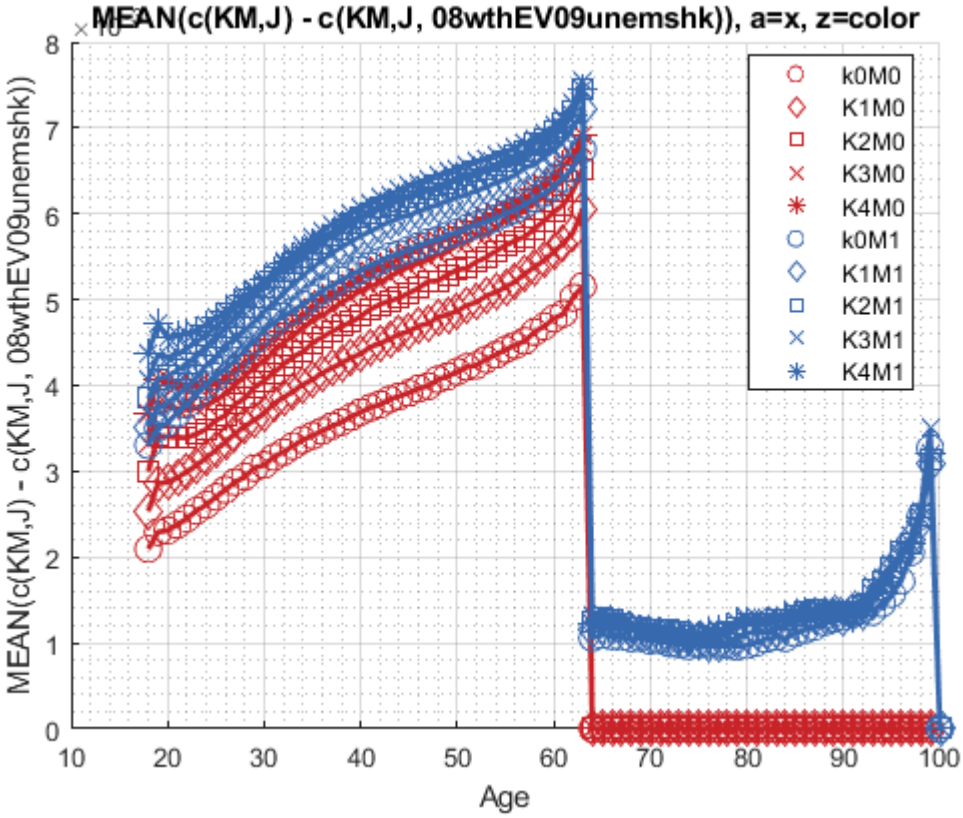
```
mp_support_graph('cl_st_graph_title') = {'MEAN(ap(KM,J) - ap(KM,J, 08wthEV09unemshk)), a=x, z=c
mp_support_graph('cl_st_ytitle') = {'MEAN(ap(KM,J) - ap(KM,J, 08wthEV09unemshk))'};
ff_graph_grid((tb_az_ap{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

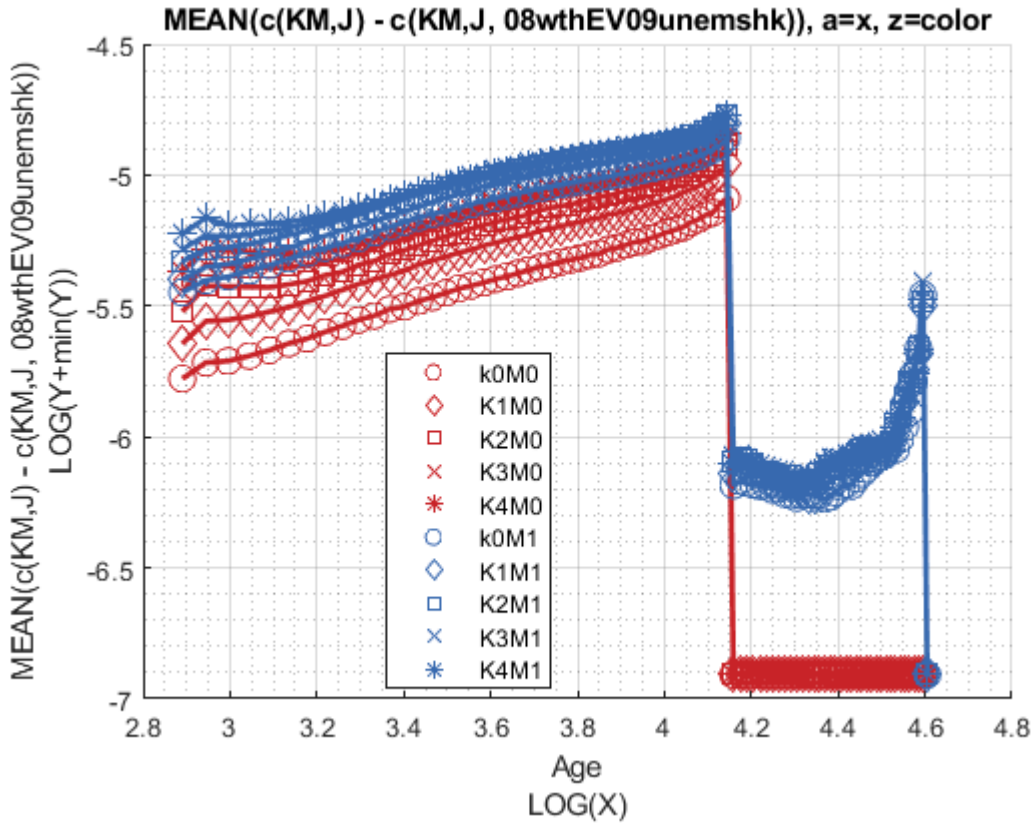




Graph Mean Consumption Change:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(c(KM,J) - c(KM,J, 08wthEV09unemshk)), a=x, z=col
mp_support_graph('cl_st_ytitle') = {'MEAN(c(KM,J) - c(KM,J, 08wthEV09unemshk))'};
ff_graph_grid((tb_az_c{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```





Analyze Education 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 = ["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(v(EKM,J) - v(EKM,J, 08wthEV09unemshk)), MEAN(ap(EM,J, steady) - ap(EM,J, 08wthEV09unemshk)), MEAN(c(EM,J, steady) - c(EM,J, 08wthEV09unemshk))

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
tb_az_v = ff_summ_nd_array("MEAN(v(EM,J, steady) - v(EM,J, 08wthEV09unemshk))", V_VFI_unemp_dro
```

```
xxx  MEAN(v(EM,J, steady) - v(EM,J, 08wthEV09unemshk))  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	0.084881	0.083361	0.083388	0.08165	0.080055	0.078588
2	1	0	0.05374	0.052677	0.052289	0.050129	0.048293	0.046731
3	0	1	0.059454	0.057684	0.056623	0.055357	0.05421	0.053173
4	1	1	0.036556	0.035045	0.034267	0.03319	0.032272	0.031484

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(ap(EM,J, steady) - ap(EM,J, 08wthEV09unemshk))", ap_VFI_unemp
```

xxx MEAN(ap(EM,J, steady) - ap(EM,J, 08wthEV09unemshk)) 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	-0.0028826	-0.003052	-0.0031902	-0.0032817	-0.0033667	-0.0034573
2	1	0	-0.0029702	-0.0035135	-0.003374	-0.0032948	-0.003253	-0.0032542
3	0	1	-0.003801	-0.0039575	-0.0040645	-0.0041885	-0.0043137	-0.0044335
4	1	1	-0.0038523	-0.004204	-0.0040784	-0.004088	-0.0041106	-0.0041594

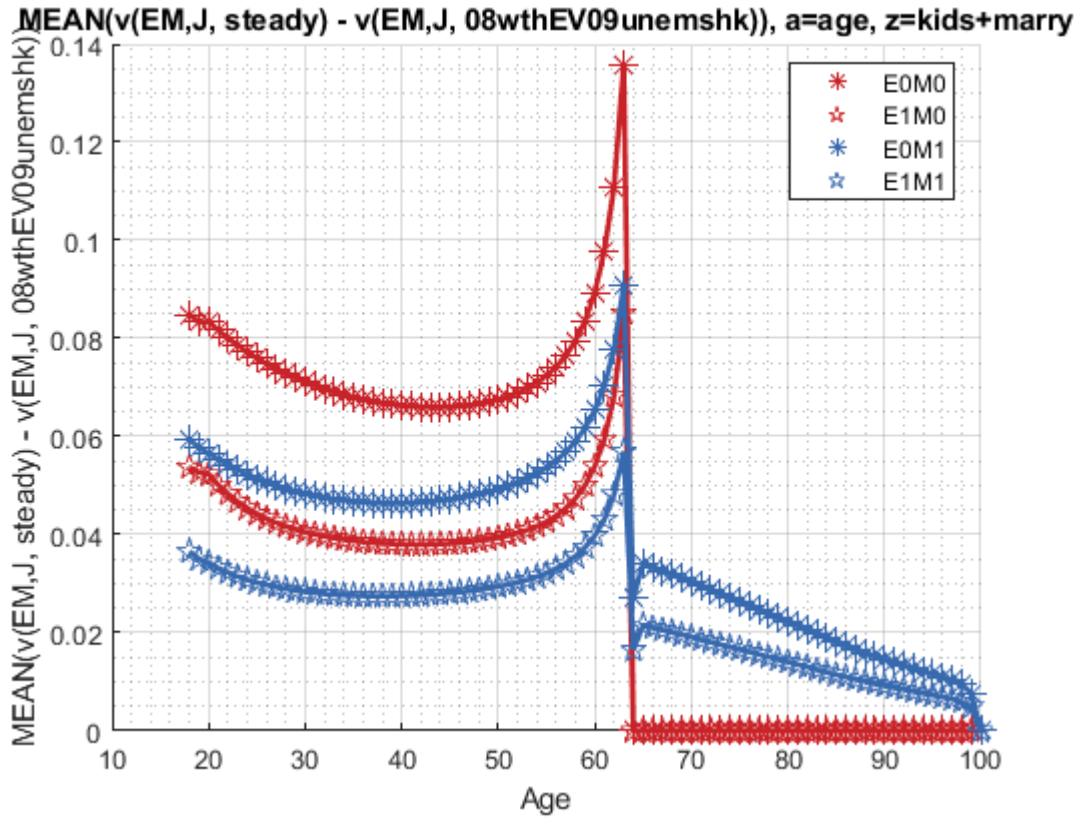
```
% Consumption Choices
tb_az_c = ff_summ_nd_array("MEAN(c(EM,J, steady) - c(EM,J, 08wthEV09unemshk))", cons_VFI_unemp_
```

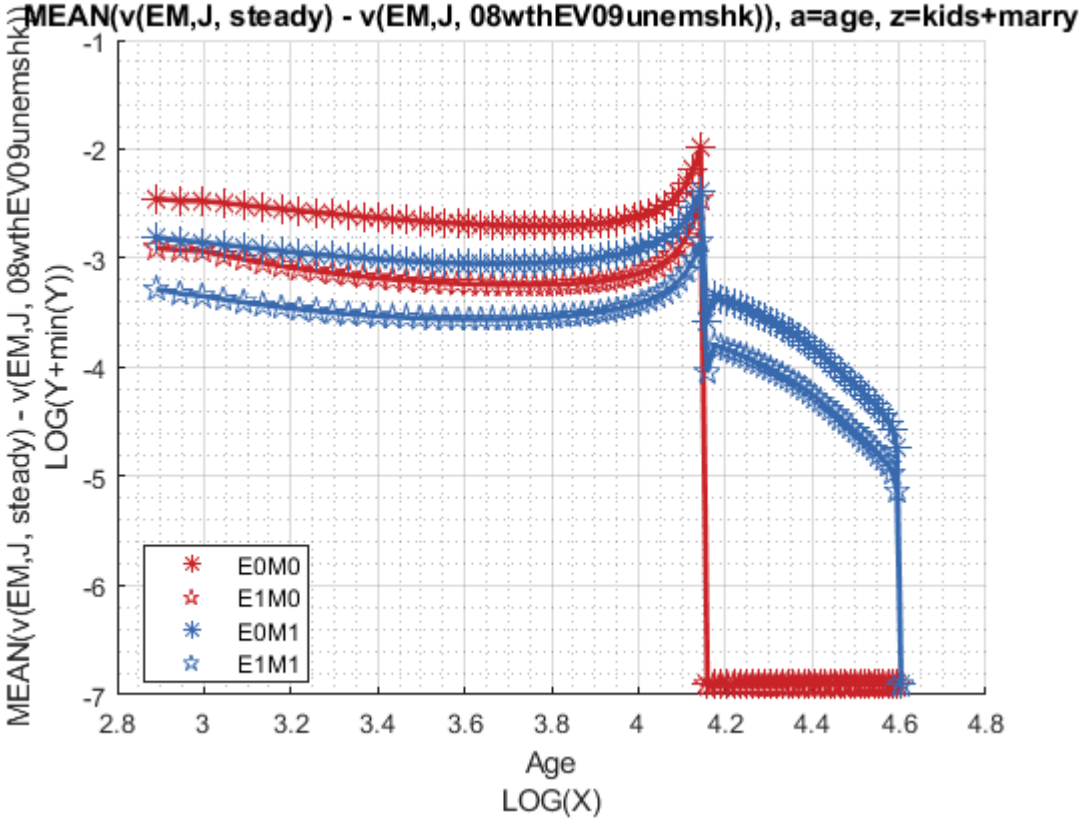
xxx MEAN(c(EM,J, steady) - c(EM,J, 08wthEV09unemshk)) xxxxxxxxxxxxxxxxxxxxxxxxxxx

group	edu	marry	mean_age_18	mean_age_19	mean_age_20	mean_age_21	mean_age_22	mean_age_23
1	0	0	0.0028826	0.003052	0.0031902	0.0032817	0.0033667	0.0034573
2	1	0	0.0029702	0.0035135	0.003374	0.0032948	0.003253	0.0032542
3	0	1	0.003801	0.0039575	0.0040645	0.0041885	0.0043137	0.0044335
4	1	1	0.0038523	0.004204	0.0040784	0.004088	0.0041106	0.0041594

Graph Mean Values Change:

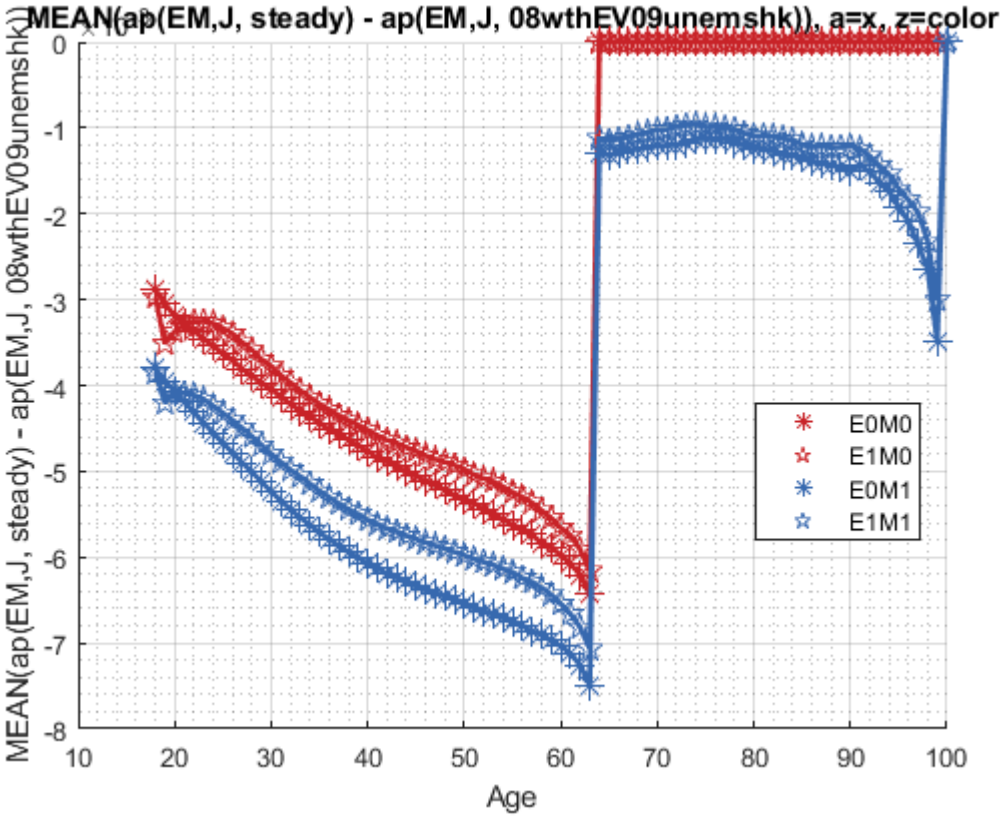
```
mp_support_graph('cl_st_graph_title') = {'MEAN(v(EM,J, steady) - v(EM,J, 08wthEV09unemshk)), a=
mp_support_graph('cl_st_ytitle') = {'MEAN(v(EM,J, steady) - v(EM,J, 08wthEV09unemshk))'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

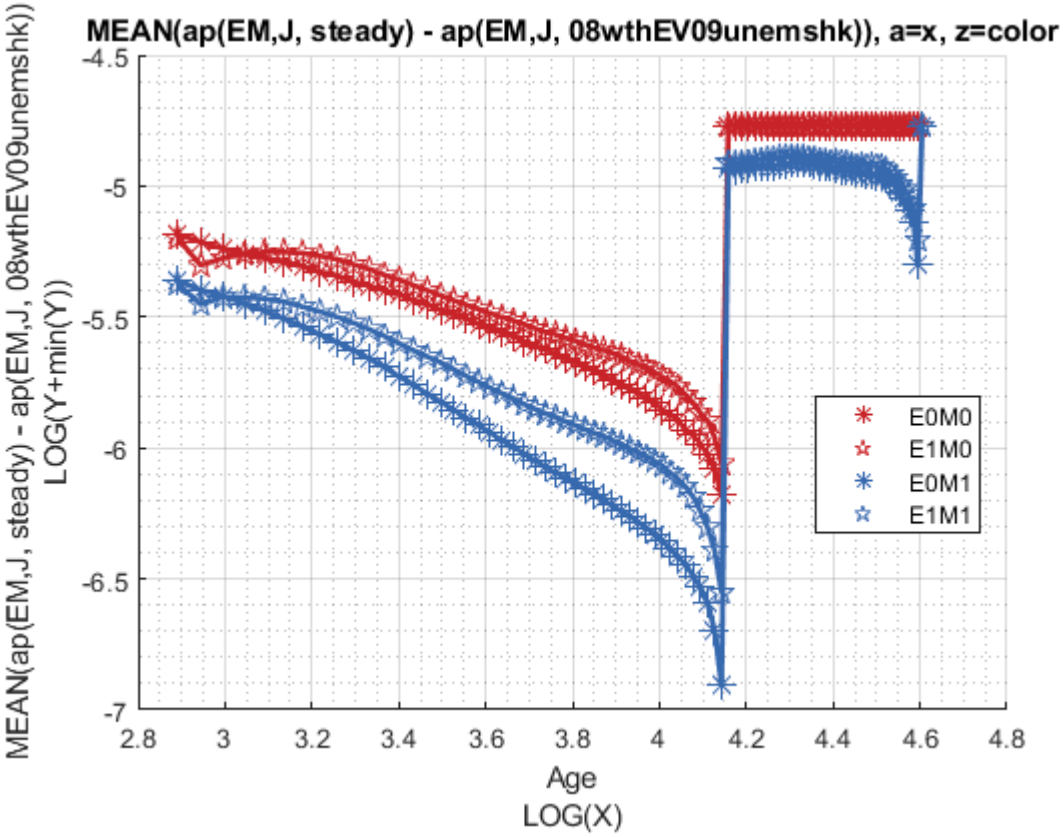




Graph Mean Savings Choices Change:

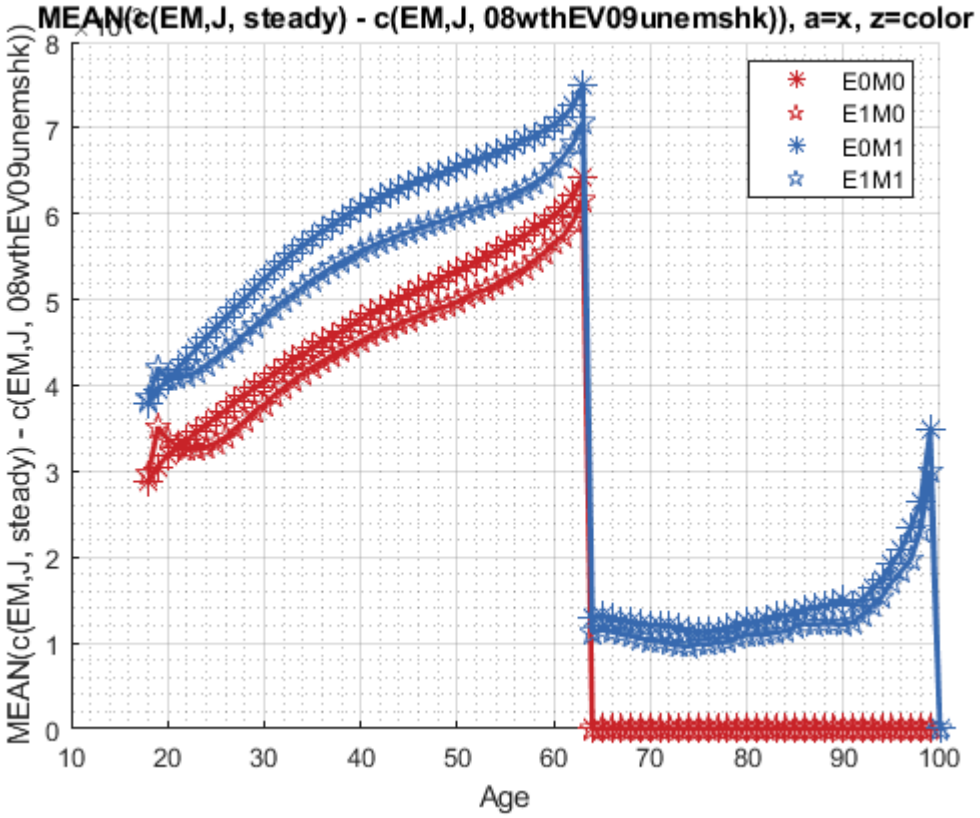
```
mp_support_graph('cl_st_graph_title') = {'MEAN(ap(EM,J, steady) - ap(EM,J, 08wthEV09unemshk)),
mp_support_graph('cl_st_ytitle') = {'MEAN(ap(EM,J, steady) - ap(EM,J, 08wthEV09unemshk))'};
ff_graph_grid((tb_az_ap{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

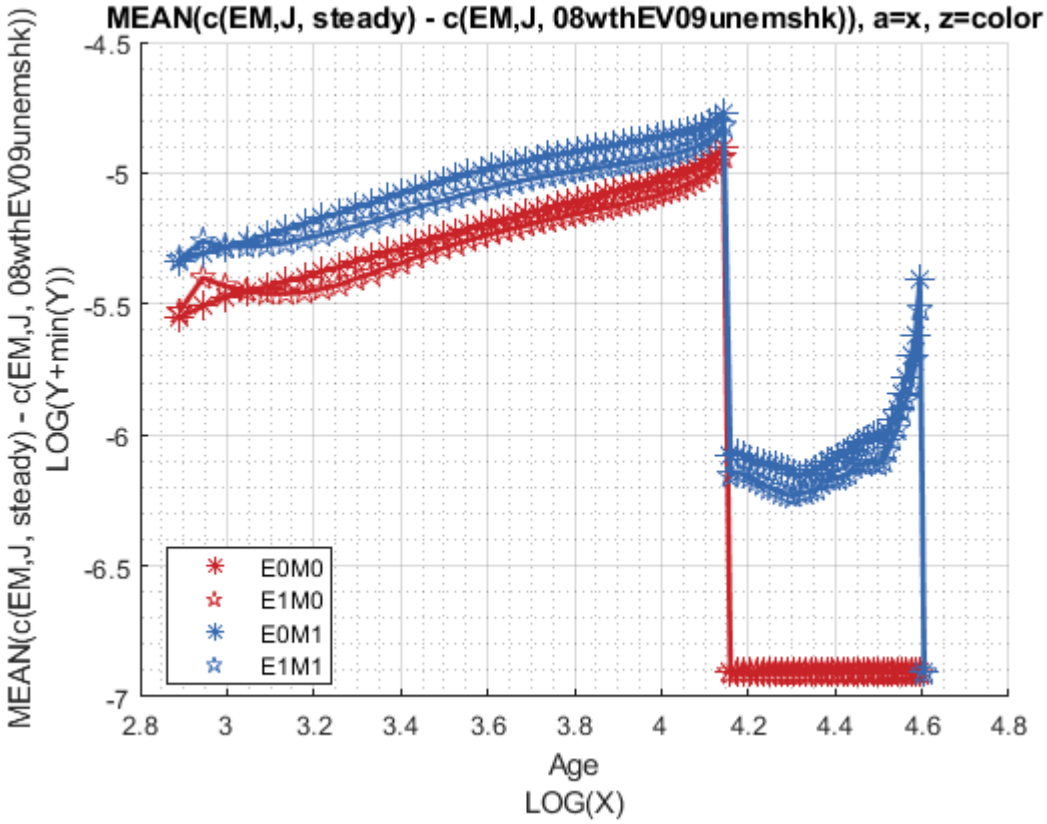




Graph Mean Consumption Change:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(c(EM,J, steady) - c(EM,J, 08wthEV09unemshk)), a=
mp_support_graph('cl_st_ytitle') = {'MEAN(c(EM,J, steady) - c(EM,J, 08wthEV09unemshk))'};
ff_graph_grid((tb_az_c{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```




MEAN(c(EM,J, steady) - c(EM,J, 08wthEV09unemshk)), a=x, z=color
MEAN(c(EM,J, steady) - c(EM,J, 08wthEV09unemshk))
LOG(Y+min(Y))
-4.5
-5
-5.5
-6
-6.5
-7
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
Age
LOG(X)
E0M0
E1M0
E0M1
E1M1