

SNW_VFI_MAIN_GRID_SEARCH Small Solution Analysis

This is the example vignette for function: [snw_vfi_main_grid_search](#) from the [PrjOptiSNW Package](#). This function solves for policy function using grid search. Small Solution Analysis. Small Solution Analysis, husband 5 shocks, wife 1 shocks.

Test SNW_VFI_MAIN_GRID_SEARCH Defaults Small

Call the function with defaults.

```
mp_param = snw_mp_param('default_small');  
[V_VFI,ap_VFI,cons_VFI,mp_valpol_more] = snw_vfi_main_grid_search(mp_param);
```

```
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:18 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:17 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:16 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:15 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:14 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:13 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:12 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:11 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:10 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:9 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:8 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:7 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:6 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:5 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:4 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:3 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:2 of 18  
SNW_VFI_MAIN_GRID_SEARCH: Finished Age Group:1 of 18  
Elapsed time is 5.839670 seconds.  
Completed SNW_VFI_MAIN_GRID_SEARCH;SNW_MP_PARAM=default_small;SNW_MP_CONTROL=default_base
```

Small 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 = [19, 22:5:97, 100];  
agrid = mp_param('agrid');  
eta_H_grid = mp_param('eta_H_grid');  
eta_S_grid = mp_param('eta_S_grid');  
ar_st_eta_HS_grid = string(cellstr([num2str(eta_H_grid', 'hz=%3.2f;'), num2str(eta_S_grid', 'wz=%3.2f;')], 'wz=%3.2f;'), 'hz=%3.2f;');  
edu_grid = [0,1];  
marry_grid = [0,1];  
kids_grid = (1:1:mp_param('n_kidsgrid'))';  
% NaN(n_jgrid,n_agrid,n_etagrid,n_eduagrid,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'}, {'Hshock', 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});
```

```
c1_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('c1_st_xtitle') = {'Savings States, a'};
mp_support_graph('st_legend_loc') = 'best';
mp_support_graph('bl_graph_logy') = true; % do not log
```

MEAN(VAL(A,Z)), MEAN(AP(A,Z)), MEAN(C(A,Z))

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(VAL(A,Z))", V_VFI, true, ["mean"], 4, 1, c1_mp_datasetdesc, ar_permute);
```

xxx	MEAN(VAL(A,Z))	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx					
group	savings	mean_Hshock__0_91976	mean_Hshock__0_45988	mean_Hshock__0	mean_Hshock__0_45988	me	
1	0	-7.2621	-5.3086	-3.7492	-2.4926		
2	0.0097656	-7.1445	-5.2223	-3.6785	-2.4286		
3	0.078125	-6.489	-4.7412	-3.2884	-2.0835		
4	0.26367	-5.3573	-3.8789	-2.6221	-1.5232		
5	0.625	-4.0454	-2.8494	-1.8168	-0.89616		
6	1.2207	-2.7343	-1.8181	-0.98298	-0.25711		
7	2.1094	-1.5234	-0.86783	-0.22453	0.35789		
8	3.3496	-0.46769	-0.030108	0.4355	0.88833		
9	5	0.39914	0.68023	0.99893	1.3355		
10	7.1191	1.0817	1.2609	1.4733	1.7121		
11	9.7656	1.6112	1.7245	1.8649	2.03		
12	12.998	2.0172	2.0904	2.183	2.2964		
13	16.875	2.3301	2.3771	2.439	2.5167		
14	21.455	2.5712	2.6024	2.6436	2.6973		
15	26.797	2.758	2.779	2.8073	2.8446		
16	32.959	2.9047	2.9189	2.9383	2.9646		
17	40	3.0205	3.0304	3.044	3.0625		
18	47.979	3.1125	3.1195	3.1293	3.1426		
19	56.953	3.1866	3.1917	3.1987	3.2085		
20	66.982	3.2468	3.2505	3.2556	3.2628		
21	78.125	3.296	3.2988	3.3026	3.3079		
22	90.439	3.3366	3.3386	3.3415	3.3456		
23	103.98	3.3704	3.3719	3.3741	3.3772		
24	118.82	3.3987	3.3999	3.4015	3.4039		
25	135	3.4225	3.4234	3.4247	3.4266		

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(AP(A,Z))", ap_VFI, true, ["mean"], 4, 1, c1_mp_datasetdesc, ar_permute);
```

xxx	MEAN(AP(A,Z))	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx					
group	savings	mean_Hshock__0_91976	mean_Hshock__0_45988	mean_Hshock__0	mean_Hshock__0_45988	me	
1	0	1.1204	1.3194	1.7407	2.4259		

2	0.0097656	1.1389	1.3611	1.787	2.4676
3	0.078125	1.8241	1.9861	2.3009	2.7731
4	0.26367	2.912	3.0509	3.2315	3.5833
5	0.625	3.9861	4.1435	4.2269	4.4815
6	1.2207	5.0231	5.1806	5.2407	5.3009
7	2.1094	6.0741	6.1806	6.2037	6.2176
8	3.3496	7.0463	7.1157	7.1528	7.1574
9	5	7.9537	7.9954	8.0509	8.0741
10	7.1191	8.8657	8.9028	8.9398	8.9861
11	9.7656	9.787	9.787	9.8426	9.875
12	12.998	10.606	10.63	10.639	10.685
13	16.875	11.481	11.495	11.532	11.556
14	21.455	12.407	12.407	12.421	12.458
15	26.797	13.259	13.287	13.296	13.315
16	32.959	14.093	14.102	14.125	14.144
17	40	14.972	14.977	14.986	15.005
18	47.979	15.843	15.866	15.87	15.88
19	56.953	16.75	16.75	16.773	16.782
20	66.982	17.653	17.657	17.667	17.699
21	78.125	18.477	18.486	18.495	18.505
22	90.439	19.315	19.319	19.329	19.347
23	103.98	20.218	20.222	20.227	20.245
24	118.82	21.083	21.083	21.083	21.097
25	135	21.944	21.949	21.954	21.958

% Consumption Choices

```
tb_az_c = ff_summ_nd_array("MEAN(C(A,Z))", cons_VFI, true, ["mean"], 4, 1, cl_mp_datasetdesc, a
```

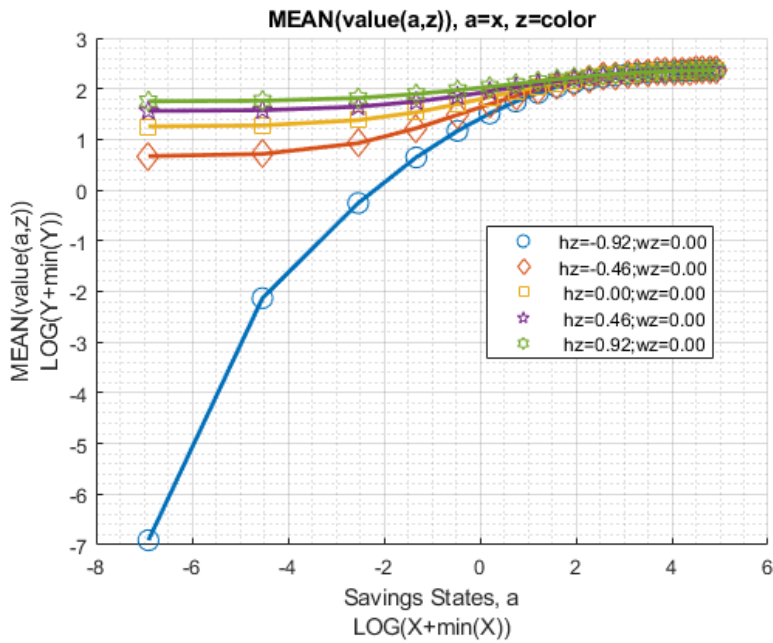
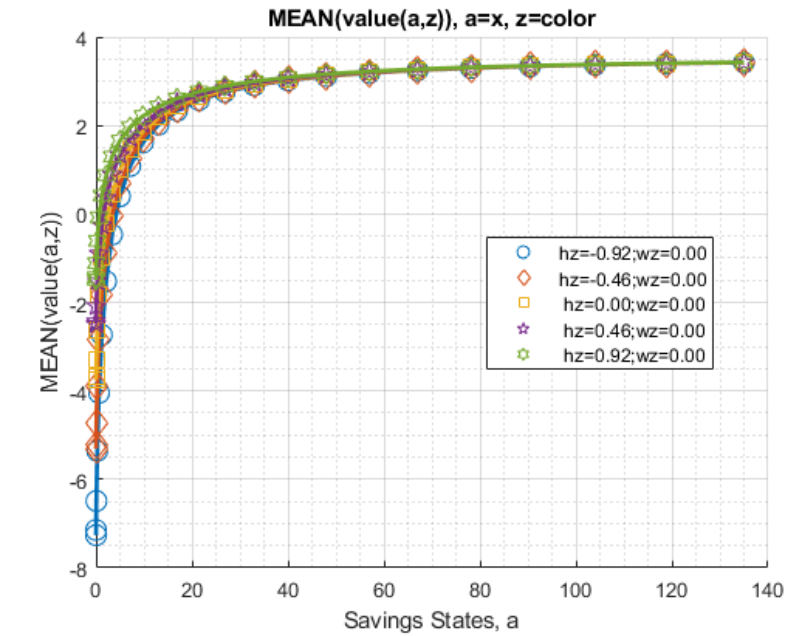
xxx	MEAN(C(A,Z))	xxxxxxxxxxxxxxxxxxxxxxxxxxxx				
group	savings	mean_Hshock__0_91976	mean_Hshock__0_45988	mean_Hshock__0	mean_Hshock__0_45988	me
1	0	0.47561	0.60477	0.78755	1.0221	
2	0.0097656	0.48688	0.61444	0.79661	1.0285	
3	0.078125	0.55276	0.67316	0.84544	1.0812	
4	0.26367	0.68068	0.79387	0.9582	1.1664	
5	0.625	0.87413	0.95556	1.1377	1.3323	
6	1.2207	1.1386	1.1823	1.359	1.6442	
7	2.1094	1.4348	1.4767	1.6678	1.9853	
8	3.3496	1.8593	1.9088	2.0737	2.3969	
9	5	2.4822	2.5483	2.6665	2.9566	
10	7.1191	3.276	3.3318	3.4625	3.6919	
11	9.7656	4.2223	4.356	4.4176	4.6587	
12	12.998	5.5639	5.6224	5.8007	5.9774	
13	16.875	7.1191	7.1983	7.2626	7.4988	
14	21.455	8.7496	8.8825	9.0265	9.1825	
15	26.797	10.88	10.865	11.023	11.249	
16	32.959	13.483	13.559	13.624	13.835	
17	40	16.255	16.355	16.497	16.692	
18	47.979	19.414	19.362	19.532	19.783	
19	56.953	22.728	22.861	22.86	23.102	
20	66.982	26.496	26.587	26.701	26.705	
21	78.125	31.189	31.223	31.332	31.559	
22	90.439	36.369	36.444	36.537	36.645	
23	103.98	41.558	41.627	41.772	41.846	
24	118.82	47.433	47.565	47.772	47.903	
25	135	53.934	53.998	54.13	54.386	

Graph Mean Values:

```

mp_support_graph('cl_st_graph_title') = {'MEAN(value(a,z)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'MEAN(value(a,z))'};
ff_graph_grid((tb_az_v{1:end, 3:end})', ar_st_eta_HS_grid, agrid, mp_support_graph);

```

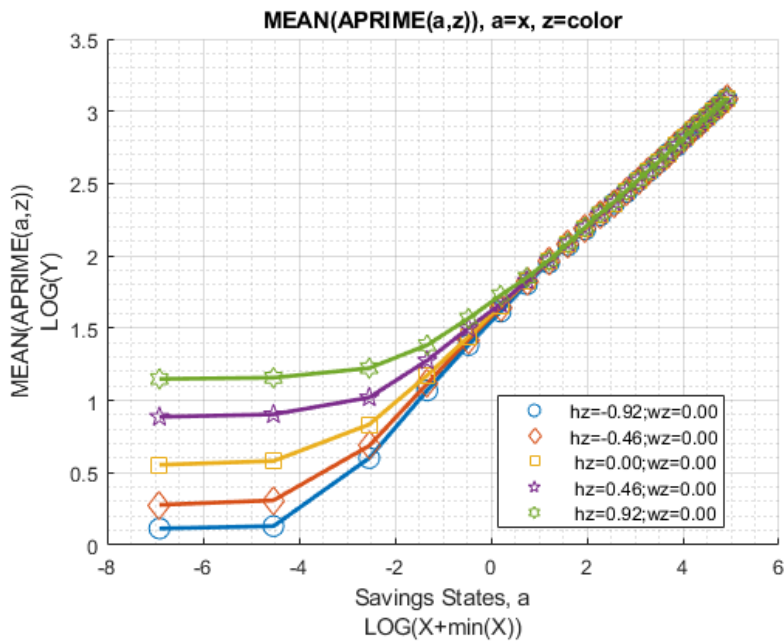
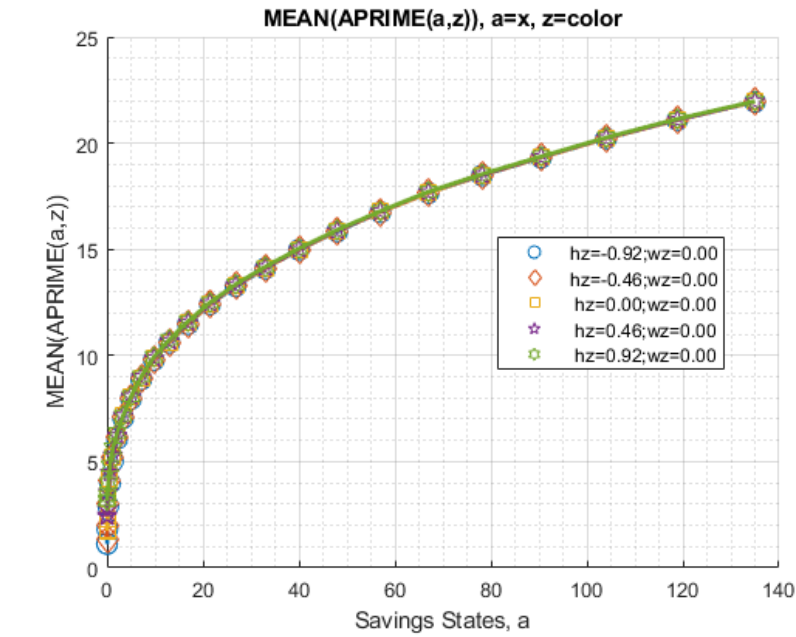


Graph Mean Savings Choices:

```

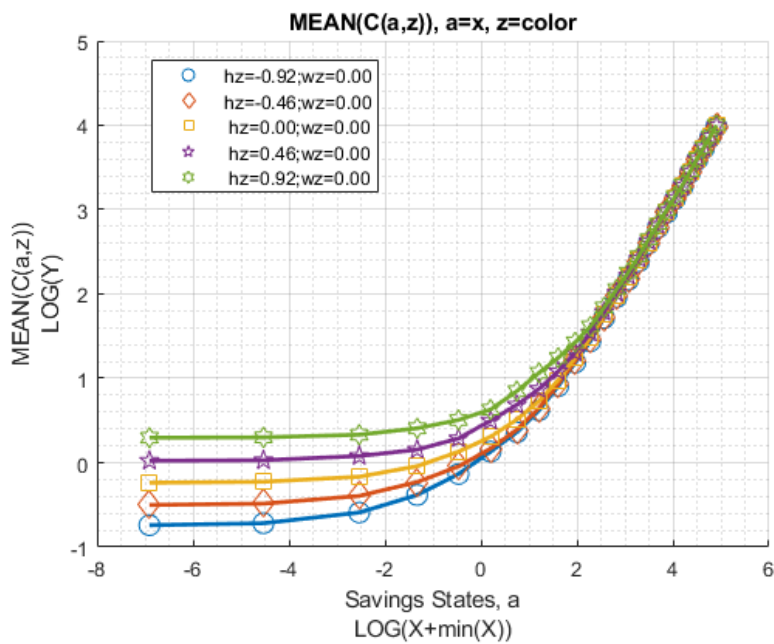
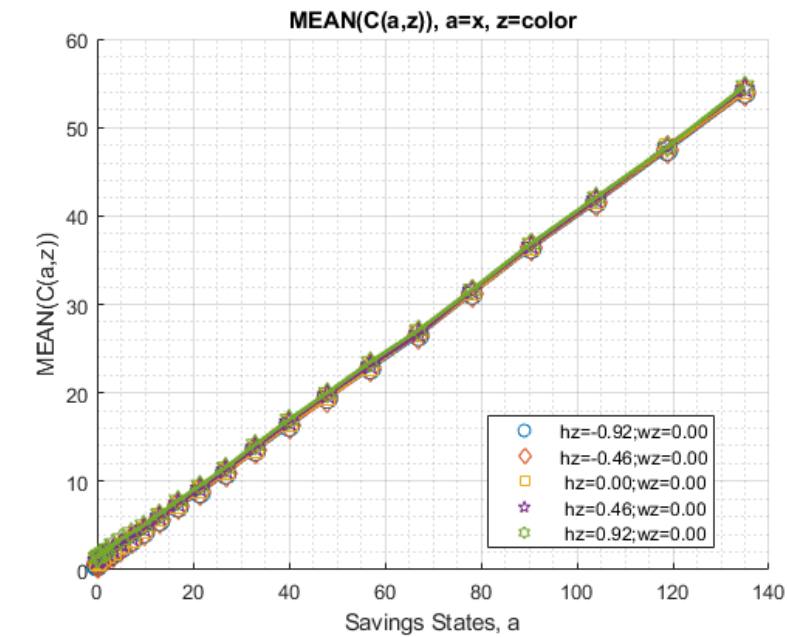
mp_support_graph('cl_st_graph_title') = {'MEAN(APRIME(a,z)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'MEAN(APRIME(a,z))'};
ff_graph_grid((tb_az_ap{1:end, 3:end})', ar_st_eta_HS_grid, agrid, mp_support_graph);

```



Graph Mean Consumption:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(C(a,z)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'MEAN(C(a,z))'};
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", "k0M1", "K1M1", "K2M1"];
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', 'o', 'd', 's' };
mp_support_graph('cl_colors') = { 'red', 'red', 'red', '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
tb_az_v = ff_summ_nd_array("MEAN(VAL(KM,J))", V_VFI, true, ["mean"], 3, 1, cl_mp_datasetdesc, a
```

xxx	MEAN(VAL(KM,J))	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx							
	group	kids	marry	mean_age_19	mean_age_22	mean_age_27	mean_age_32	mean_age_37	mean_age_42
	1	1	0	2.5769	2.726	2.8073	2.7855	2.6939	2.5501
	2	2	0	1.5197	1.8098	2.0206	2.1004	2.0952	2.0212
	3	3	0	0.9869	1.2649	1.4811	1.5698	1.5738	1.5134
	4	1	1	2.3544	2.5201	2.6205	2.6297	2.5748	2.4711
	5	2	1	1.564	1.8114	1.9978	2.0809	2.0936	2.0476
	6	3	1	1.2123	1.4401	1.6171	1.6965	1.7071	1.666

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(AP(KM,J))", ap_VFI, true, ["mean"], 3, 1, cl_mp_datasetdesc,
```

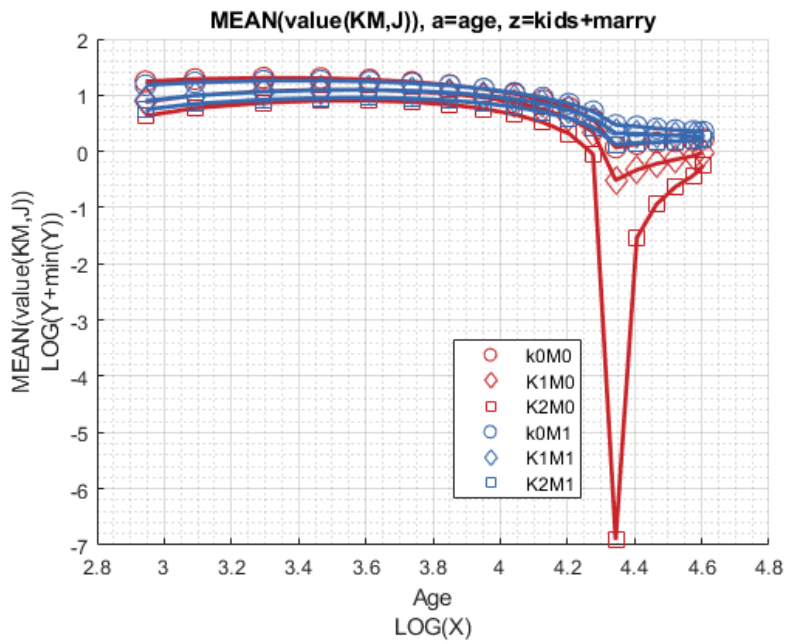
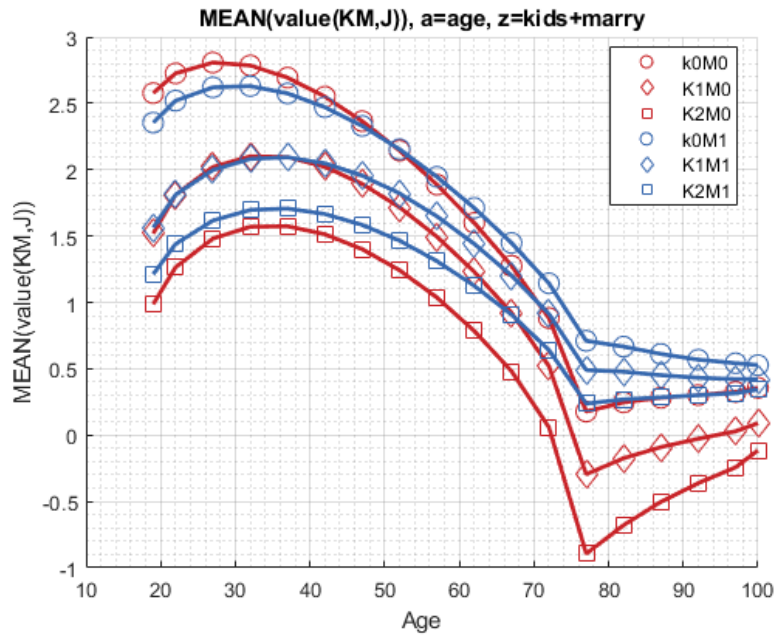
xxx	MEAN(AP(KM,J))	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx							
	group	kids	marry	mean_age_19	mean_age_22	mean_age_27	mean_age_32	mean_age_37	mean_age_42
	1	1	0	12.876	12.86	12.976	13.068	13.14	13.176
	2	2	0	12.86	12.84	12.916	13.016	13.06	12.952
	3	3	0	12.824	12.792	12.884	12.988	12.94	12.884
	4	1	1	12.832	12.796	12.892	12.98	13.052	13.1
	5	2	1	12.824	12.788	12.856	12.94	13.004	12.98
	6	3	1	12.768	12.724	12.828	12.904	12.972	12.888

```
% Consumption Choices
tb_az_c = ff_summ_nd_array("MEAN(C(KM,J))", cons_VFI, true, ["mean"], 3, 1, cl_mp_datasetdesc,
```

xxx	MEAN(C(KM,J))	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx							
	group	kids	marry	mean_age_19	mean_age_22	mean_age_27	mean_age_32	mean_age_37	mean_age_42
	1	1	0	6.3895	6.4629	6.6288	6.7554	6.8327	6.866
	2	2	0	6.4025	6.4709	6.6411	6.7667	7.2326	9.0966
	3	3	0	6.4139	6.4906	6.6473	6.7745	8.3105	9.6757
	4	1	1	6.6365	6.7334	6.9186	7.0691	7.1681	7.2225
	5	2	1	6.6219	6.7043	6.8923	7.0386	7.1354	8.2428
	6	3	1	6.6135	6.7111	6.8733	7.0145	7.1123	9.0255

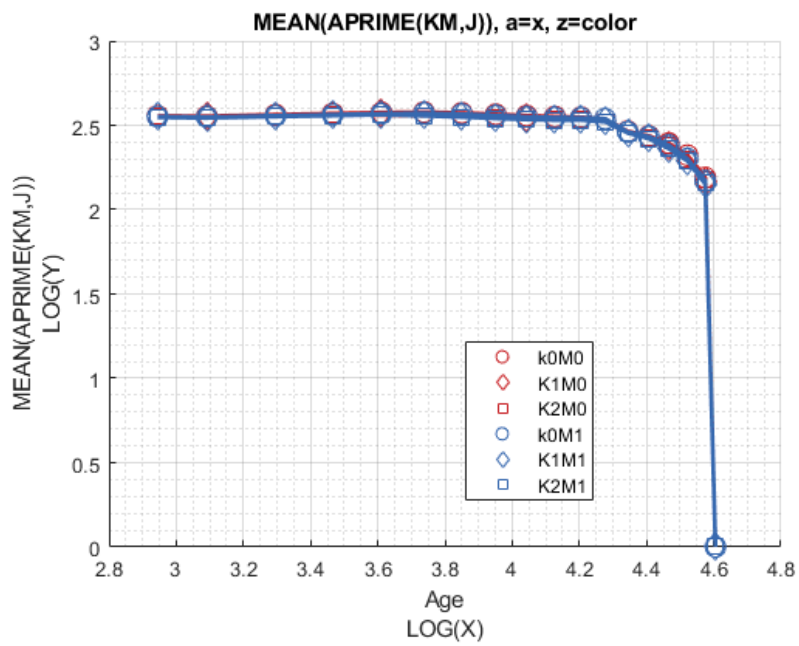
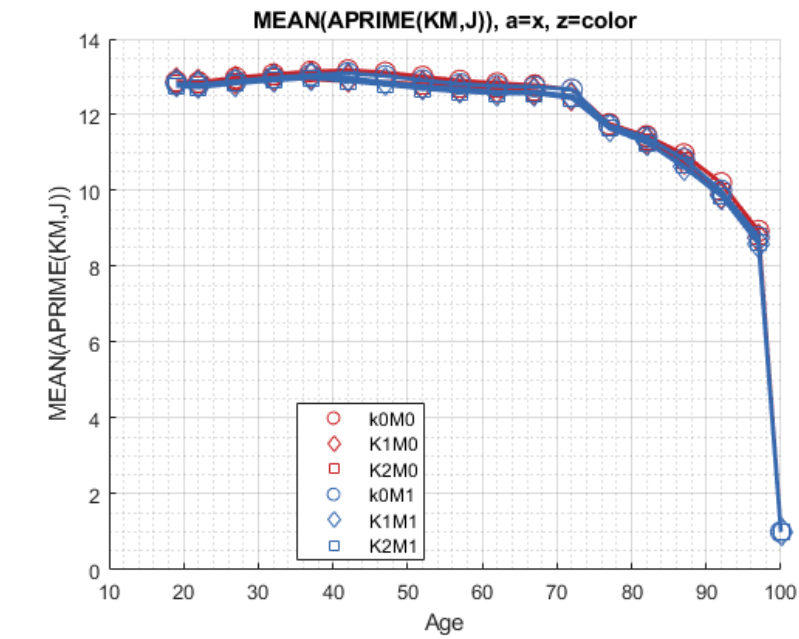
Graph Mean Values:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(value(KM,J)), a=age, z=kids+marry'};
mp_support_graph('cl_st_ytitle') = {'MEAN(value(KM,J))'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```



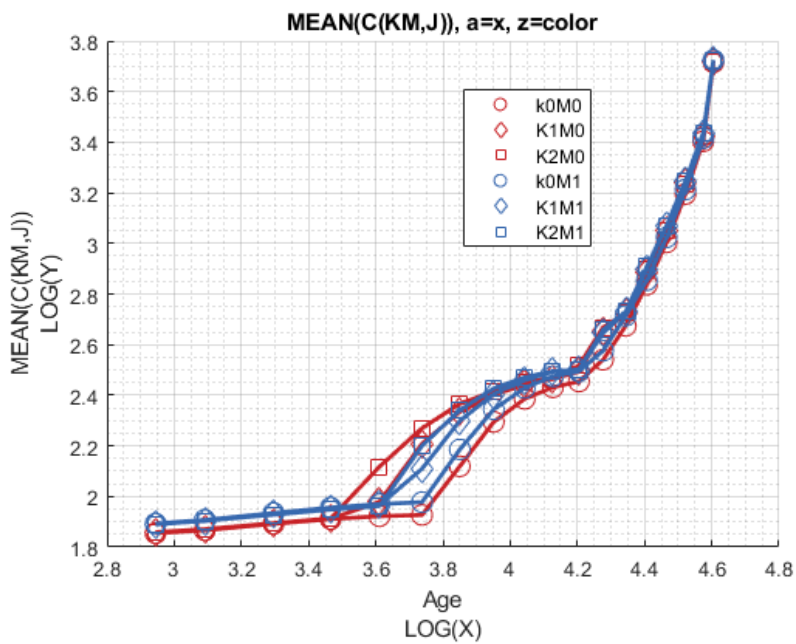
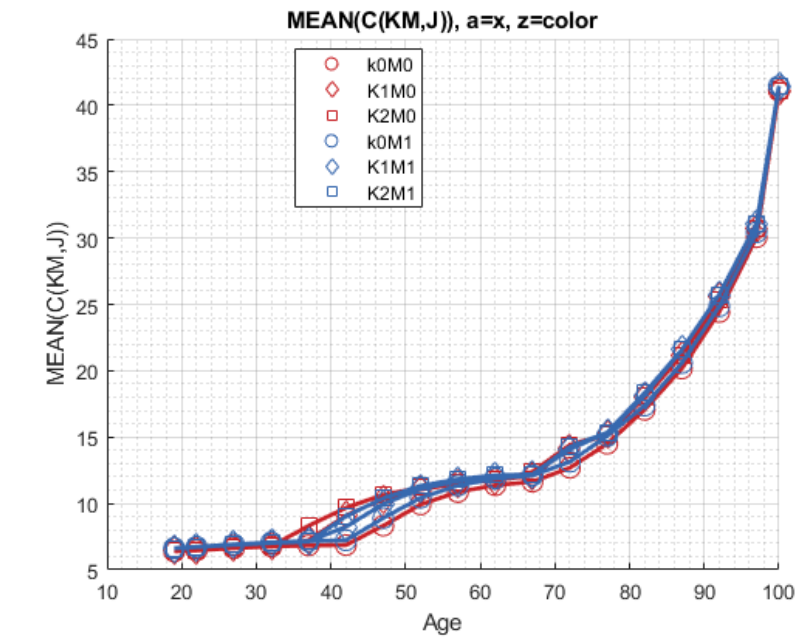
Graph Mean Savings Choices:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(APRIME(KM,J)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'MEAN(APRIME(KM,J))'};
ff_graph_grid((tb_az_ap{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

Graph Mean Consumption:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(C(KM,J)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'MEAN(C(KM,J))'};
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(VAL(EKM,J)), MEAN(AP(EKM,J)), MEAN(C(EKM,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
tb_az_v = ff_summ_nd_array("MEAN(VAL(EKM,J))", V_VFI, true, ["mean"], 3, 1, cl_mp_datasetdesc,
```

```
xxx  MEAN(VAL(EKM,J))  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  group    edu    marry    mean_age_19    mean_age_22    mean_age_27    mean_age_32    mean_age_37    mean_age_42
  -----
    1      0      0      1.397      1.5992      1.7503      1.807      1.7952      1.7249
    2      1      0      1.9919      2.268      2.4556      2.4968      2.4467      2.3315
    3      0      1      1.3943      1.589      1.7371      1.8066      1.8173      1.7774
    4      1      1      2.0262      2.2588      2.4199      2.4648      2.4331      2.3457
```

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(AP(EKM,J))", ap_VFI, true, ["mean"], 3, 1, cl_mp_datasetdesc,
```

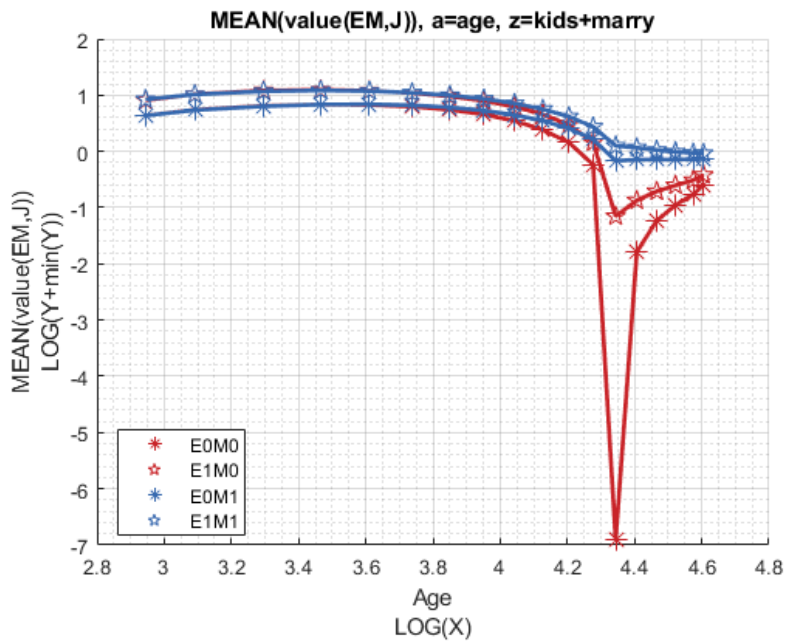
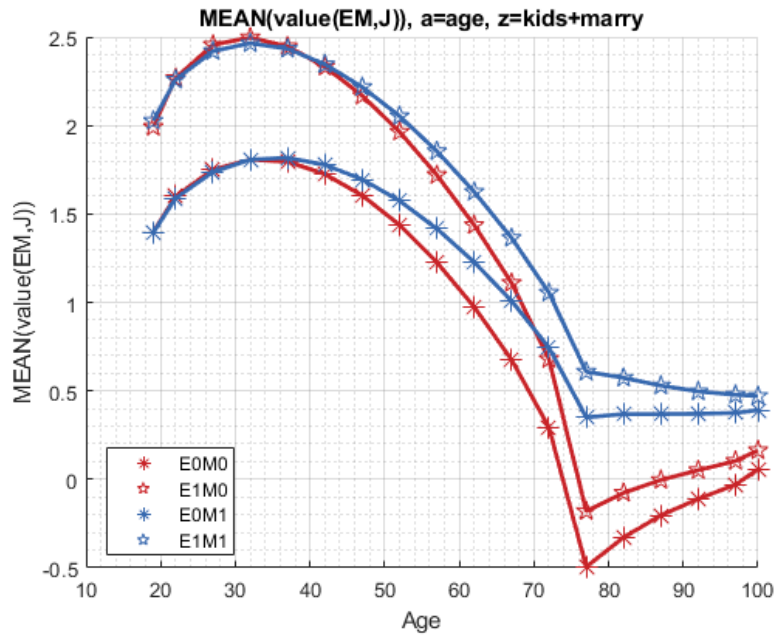
```
xxx  MEAN(AP(EKM,J))  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  group    edu    marry    mean_age_19    mean_age_22    mean_age_27    mean_age_32    mean_age_37    mean_age_42
  -----
    1      0      0      12.923      12.909      12.957      13.011      13.016      12.968
    2      1      0      12.784      12.752      12.893      13.037      13.077      13.04
    3      0      1      12.883      12.837      12.899      12.949      12.987      12.952
    4      1      1      12.733      12.701      12.819      12.933      13.032      13.027
```

```
% Consumption Choices
tb_az_c = ff_summ_nd_array("MEAN(C(EKM,J))", cons_VFI, true, ["mean"], 3, 1, cl_mp_datasetdesc,
```

```
xxx  MEAN(C(EKM,J))  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  group    edu    marry    mean_age_19    mean_age_22    mean_age_27    mean_age_32    mean_age_37    mean_age_42
  -----
    1      0      0      6.3781      6.4224      6.5232      6.6018      7.3509      8.4324
    2      1      0      6.4259      6.5271      6.7549      6.9292      7.5663      8.6599
    3      0      1      6.5686      6.6336      6.7481      6.8408      6.9145      8.0279
    4      1      1      6.6793      6.799      7.0414      7.2407      7.3627      8.2993
```

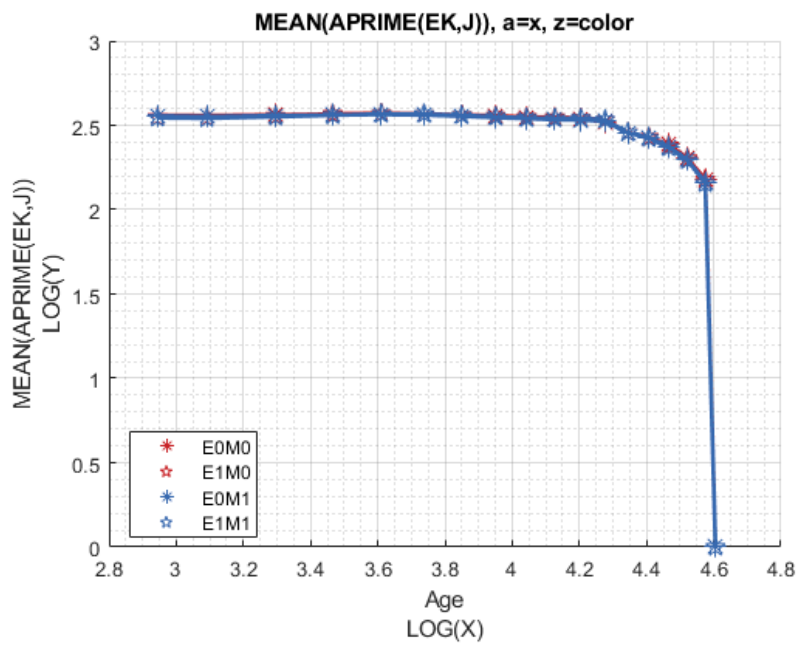
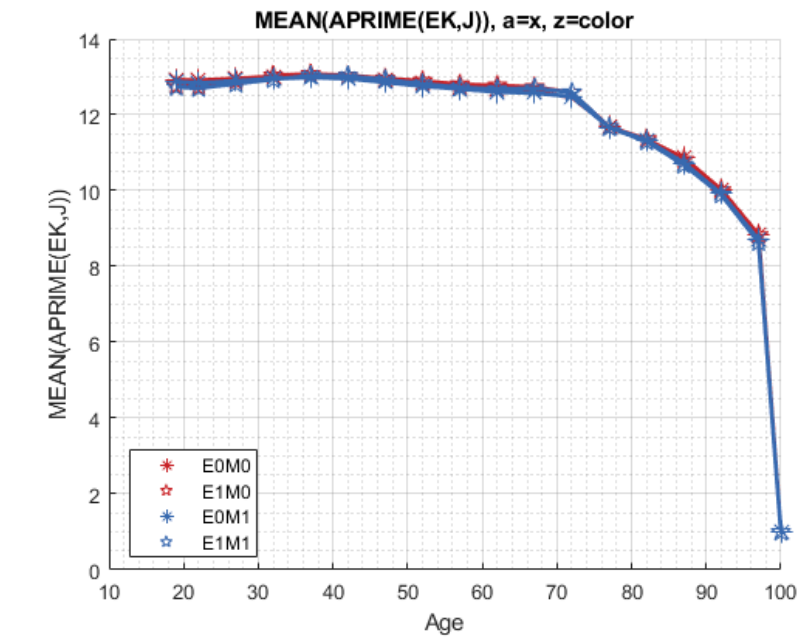
Graph Mean Values:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(value(EM,J)), a=age, z=kids+marry'};
mp_support_graph('cl_st_ytitle') = {'MEAN(value(EM,J))'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```



Graph Mean Savings Choices:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(APRIME(EK,J)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'MEAN(APRIME(EK,J))'};
ff_graph_grid((tb_az_ap{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```



Graph Mean Consumption:

```
mp_support_graph('cl_st_graph_title') = {'MEAN(C(EK,J)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'MEAN(C(EK,J))'};
ff_graph_grid((tb_az_c{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

