SNW_VFI_PARAM Tiny Solution Analysis Consumption Rule Changes

back to Fan's Intro Math for Econon, Matlab Examples, or Dynamic Asset Repositories

This is the example vignette for function: **snw_vfi_main** from the **PrjOptiSNW Package.** This function analyzes the effects of the consumption allocation rule on model choices. The consumption allocation rule could be such that been married and having children does not change contemperaneous utility, only changes income.

1. Household consumption is within household public good. Having children and been married only impacts income
2. Marginal utility of household consumption is higher when there are more kids and given marriage with uniform division of consumption for each household member, and the household planner cares about household consumption divided by the number of individuals in the household
3. Consumption divide by square root of household member count.

Public Good: Test SNW_VFI_MAIN Tiny with cons_allocation_rule = 0

Call the function with defaults.

```
mp_param = snw_mp_param('default_tiny');
mp_param('cons_allocation_rule') = 0
```

```
mp_param = 
  Map with properties:

        Count: 28
      KeyType: char
    ValueType: any
```

```
[V_VFI_car0,ap_VFI_car0,cons_VFI_car0,exitflag_VFI_car0] = snw_vfi_main(mp_param);
```

```
SNW_VFI_MAIN: Finished Age Group:7 of 7
SNW_VFI_MAIN: Finished Age Group:6 of 7
SNW_VFI_MAIN: Finished Age Group:5 of 7
SNW_VFI_MAIN: Finished Age Group:4 of 7
SNW_VFI_MAIN: Finished Age Group:3 of 7
SNW_VFI_MAIN: Finished Age Group:2 of 7
SNW_VFI_MAIN: Finished Age Group:1 of 7
Elapsed time is 77.866965 seconds.
Completed SNW_VFI_MAIN;SNW_MP_PARAM=;default_tiny;SNW_MP_CONTROL=;default_base
```

Tiny 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, 28:16:92, 100];
agrid = mp_param('agrid')';
eta_grid = mp_param('eta_grid')';
edu_grid = [0,1];
marry_grid = [0,1];
```

```
kids_grid = (1:1:mp_param('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'}, {'shock', eta_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') = 'best';
mp_support_graph('bl_graph_logy') = true; % do not log
mp_support_graph('st_rowvar_name') = 'z=';
mp_support_graph('it_legend_select') = 3; % how many shock legends to show
mp_support_graph('st_rounding') = '6.2f'; % format shock legend
```

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_car0, true, ["mean"], 4, 1, cl_mp_datasetdes
```

xxx MEAN(VAL(A,Z)) xxxxxxxxxxxxxxxxxxxxxxxxxxxx

group	savings	mean_shock__1_4213	mean_shock__0_71067	mean_shock_0	mean_shock_0_71067	mean_sho
1	0	-9.1873	-6.009	-3.7436	-2.0125	-0.9
2	0.068587	-6.6163	-4.6098	-2.7634	-1.2296	-0.2
3	0.5487	-1.2832	-0.84937	-0.33053	0.30289	0.9
4	1.8519	1.0089	1.0907	1.2155	1.3856	1.
5	4.3896	1.8253	1.8443	1.8772	1.9294	2.
6	8.5734	2.1544	2.16	2.1702	2.188	2.
7	14.815	2.3047	2.3067	2.3104	2.3172	2.
8	23.525	2.3821	2.3829	2.3844	2.3873	2.
9	35.117	2.4262	2.4266	2.4273	2.4286	2.
10	50	2.4525	2.4527	2.453	2.4536	2.

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(AP(A,Z))", ap_VFI_car0, true, ["mean"], 4, 1, cl_mp_datasetde
```

xxx MEAN(AP(A,Z)) xxxxxxxxxxxxxxxxxxxxxxxxxxxx

group	savings	mean_shock__1_4213	mean_shock__0_71067	mean_shock_0	mean_shock_0_71067	mean_sho
1	0	0.012427	0.036775	0.095255	0.21431	0.4
2	0.068587	0.046044	0.073485	0.15988	0.2646	0.5
3	0.5487	0.38016	0.3815	0.43301	0.64172	0.9

4	1.8519	1.3152	1.321	1.3374	1.4607	1.
5	4.3896	3.0086	3.0148	3.0299	3.0959	3.
6	8.5734	5.8935	5.9024	5.9266	5.982	6.
7	14.815	10.347	10.356	10.378	10.429	10
8	23.525	16.607	16.64	16.706	16.799	1
9	35.117	25.304	25.336	25.401	25.535	25
10	50	34.255	34.276	34.321	34.409	34

```
% Consumption Choices
tb_az_c = ff_summ_nd_array("MEAN(C(A,Z))", cons_VFI_car0, true, ["mean"], 4, 1, cl_mp_datasetde
```

xxx MEAN(C(A,Z)) xxxxxxxxxxxxxxxxxxxxxxxxxxx

group	savings	mean_shock__1_4213	mean_shock__0_71067	mean_shock_0	mean_shock_0_71067	mean_sho
1	0	0.21269	0.2688	0.3677	0.56194	0.9
2	0.068587	0.29421	0.34667	0.41729	0.62565	0.9
3	0.5487	0.75896	0.83603	0.94019	1.0437	1.
4	1.8519	1.9776	2.0495	2.188	2.376	2.
5	4.3896	4.4693	4.5406	4.68	4.9249	5.
6	8.5734	8.4802	8.5488	8.679	8.9343	9.
7	14.815	14.312	14.38	14.512	14.773	15
8	23.525	22.405	22.45	22.539	22.756	23
9	35.117	32.808	32.854	32.943	33.12	33
10	50	48.382	48.438	48.547	48.77	49

Graph Mean Values:

```
mp_support_graph('cl_st_graph_title') = {'CAR=0, MEAN(value(a,z)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, MEAN(value(a,z))'};
ff_graph_grid((tb_az_v{1:end, 3:end})', eta_grid, agrid, mp_support_graph);
```

Graph Mean Savings Choices:

```
mp_support_graph('cl_st_graph_title') = {'CAR=0, MEAN(APRIME(a,z)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, MEAN(APRIME(a,z))'};
ff_graph_grid((tb_az_ap{1:end, 3:end})', eta_grid, agrid, mp_support_graph);
```

Graph Mean Consumption:

```
mp_support_graph('cl_st_graph_title') = {'CAR=0, MEAN(C(a,z)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, MEAN(C(a,z))'};
ff_graph_grid((tb_az_c{1:end, 3:end})', eta_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 along savings and shocks:

```
% 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_car0, true, ["mean"], 3, 1, cl_mp_datasetde
```

xxx MEAN(VAL(KM,J)) xxxxxxxxxxxxxxxxxxxxxxxxxxx

group	kids	marry	mean_age_19	mean_age_28	mean_age_44	mean_age_60	mean_age_76	mean_age_92
1	1	0	1.2183	1.0484	0.89246	0.54373	-0.081039	0.071957
2	2	0	1.2183	1.0484	0.89246	0.54373	-0.081039	0.071957
3	3	0	1.2183	1.0484	0.89246	0.54373	-0.081039	0.071957
4	1	1	2.1861	1.8452	1.4485	0.90179	-0.081039	0.071957
5	2	1	2.1718	1.7639	1.3942	0.86313	-0.081039	0.071957
6	3	1	2.094	1.7104	1.3459	0.82727	-0.081039	0.071957

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(AP(KM,J))", ap_VFI_car0, true, ["mean"], 3, 1, cl_mp_datasetd
```

xxx MEAN(AP(KM,J)) xxxxxxxxxxxxxxxxxxxxxxxxxxxx

group	kids	marry	mean_age_19	mean_age_28	mean_age_44	mean_age_60	mean_age_76	mean_age_92
1	1	0	15.06	14.347	14.036	13.561	9.0925	2.7263
2	2	0	15.06	14.347	14.036	13.561	9.0925	2.7263
3	3	0	15.06	14.347	14.036	13.561	9.0925	2.7263
4	1	1	15.096	14.393	14.075	13.677	9.0925	2.7263
5	2	1	15.073	14.385	14.067	13.658	9.0925	2.7263
6	3	1	15.067	14.374	14.061	13.642	9.0925	2.7263

```
% Consumption Choices
tb_az_c = ff_summ_nd_array("MEAN(C(KM,J))", cons_VFI_car0, true, ["mean"], 3, 1, cl_mp_datasetd
```

xxx MEAN(C(KM,J)) xxxxxxxxxxxxxxxxxxxxxxxxxxx

group	kids	marry	mean_age_19	mean_age_28	mean_age_44	mean_age_60	mean_age_76	mean_age_92

1	1	0	8.5784	9.2918	9.8348	10.279	14.031	20.397
2	2	0	8.5784	9.2918	9.8348	10.279	14.031	20.397
3	3	0	8.5784	9.2918	9.8348	10.279	14.031	20.397
4	1	1	8.6997	9.4406	10.036	10.443	14.031	20.397
5	2	1	8.699	9.4178	10.006	10.419	14.031	20.397
6	3	1	8.6844	9.4038	9.9809	10.398	14.031	20.397

Graph Mean Values:

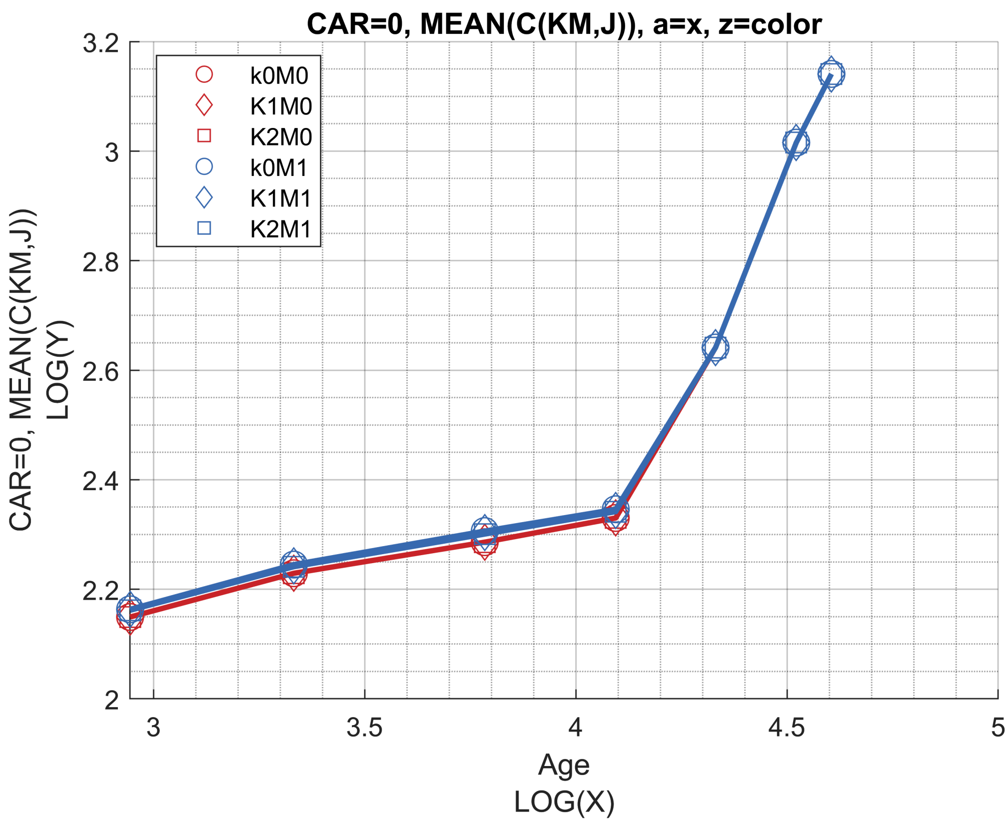
```
mp_support_graph('cl_st_graph_title') = {'CAR=0, MEAN(value(KM,J)), a=age, z=kids+marry'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, MEAN(value(KM,J))'};
ff_graph_grid((tb_az_v{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```

Graph Mean Savings Choices:

```
mp_support_graph('cl_st_graph_title') = {'CAR=0, MEAN(APRIME(KM,J)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, 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') = {'CAR=0, MEAN(C(KM,J)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, 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') = 'eastoutside';
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_car0, true, ["mean"], 3, 1, cl_mp_dataseto
```

xxx MEAN(VAL(EKM,J)) xxxxxxxxxxxxxxxxxxxxxxxxxxxx

group	edu	marry	mean_age_19	mean_age_28	mean_age_44	mean_age_60	mean_age_76	mean_age_92
1	0	0	0.88385	0.76163	0.65943	0.37834	-0.18248	0.01172

2	1	0	1.5527	1.3352	1.1255	0.70912	0.020403	0.13219
3	0	1	1.9094	1.5642	1.2234	0.73088	-0.18248	0.01172
4	1	1	2.3919	1.9822	1.569	0.99725	0.020403	0.13219

```
% Aprime Choice
tb_az_ap = ff_summ_nd_array("MEAN(AP(EKM,J))", ap_VFI_car0, true, ["mean"], 3, 1, cl_mp_dataset
```

xxx MEAN(AP(EKM,J)) xxxxxxxxxxxxxxxxxxxxxxxxxxx

group	edu	marry	mean_age_19	mean_age_28	mean_age_44	mean_age_60	mean_age_76	mean_age_92
1	0	0	15.043	14.34	13.994	13.508	9.0967	2.7361
2	1	0	15.077	14.354	14.077	13.614	9.0883	2.7165
3	0	1	15.059	14.372	14.02	13.589	9.0967	2.7361
4	1	1	15.098	14.396	14.115	13.729	9.0883	2.7165

```
% Consumption Choices
tb_az_c = ff_summ_nd_array("MEAN(C(EKM,J))", cons_VFI_car0, true, ["mean"], 3, 1, cl_mp_dataset
```

xxx MEAN(C(EKM,J)) xxxxxxxxxxxxxxxxxxxxxxxxxxx

group	edu	marry	mean_age_19	mean_age_28	mean_age_44	mean_age_60	mean_age_76	mean_age_92
1	0	0	8.5074	9.2108	9.7136	10.185	14.009	20.369
2	1	0	8.6495	9.3729	9.9561	10.373	14.054	20.425
3	0	1	8.6094	9.3248	9.8669	10.314	14.009	20.369
4	1	1	8.7793	9.5167	10.148	10.527	14.054	20.425

Graph Mean Values:

```
mp_support_graph('cl_st_graph_title') = {'CAR=0, MEAN(value(EM,J)), a=age, z=kids+marry'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, 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') = {'CAR=0, MEAN(APRIME(EK,J)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, 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') = {'CAR=0, MEAN(C(EK,J)), a=x, z=color'};
mp_support_graph('cl_st_ytitle') = {'CAR=0, MEAN(C(EK,J))'};
ff_graph_grid((tb_az_c{1:end, 4:end}), ar_row_grid, age_grid, mp_support_graph);
```