FF_VFI_AZ_BISEC_VEC Savings Vectorized Exact (FOC) Examples

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

This is the example vignette for function: **ff_vfi_az_bisec_vec** from the **MEconTools Package.** This function solves the dynamic programming problem for a (a,z) model. Households can save a, and face AR(1) shock z. The problem is solved over the infinite horizon.

This is the vectorized code, its speed is much faster than the looped code. The function is designed to have small memory footprint and requires low computing resources, yet is fast.

The code uses **continuous choices**, solved with bi(multi)section. The state-space is on a grid, but choice grids are in terms of percentage of resources available, which is individual specific, to save and solved exactly up to ((1/(2)^16)*100=0.001525878) percentage of cash on hand. The **ff_vfi_az_vec** from the **MEconTools Package** solves the same problem using vectorized common grid code where the choice set and state space share the same grid. The common grid function is faster, but less precise for the same number of asset grid points.

Links to Other Code:

Core Savings/Borrowing Dynamic Programming Solution Functions that are functions in the **MEconTools Package.** :

- Common Choice and States Grid ***Loop***: **ff_vfi_az_loop**
- Common Choice and States Grid ***Vectorized***: **ff_vfi_az_vec**
- States Grid + Continuous Exact Savings as Share of Cash-on-Hand, rely on FOC, ***Loop***: **ff_vfi_az_bisec_loop**
- States Grid + Continuous Exact Savings as Share of Cash-on-Hand, rely on FOC ***Vectorized***: **ff_vfi_az_bisec_vec**
- States Grid + Continuous Exact Savings as Share of Cash-on-Hand, VALUE comparison, ***Loop***: **ff_vfi_az_mzoom_loop**
- States Grid + Continuous Exact Savings as Share of Cash-on-Hand, VALUE comparison, ***Vectorized***: **ff_vfi_az_mzoom_vec**

Test FF_VFI_AZ_BISEC_VEC Defaults

Call the function with defaults. By default, shows the asset policy function summary. Model parameters can be changed by the mp_params.

```
%mp_params
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('fl_crra') = 1.5;
mp_params('fl_beta') = 0.94;
% call function
ff_vfi_az_bisec_vec(mp_params);
```

```
Elapsed time is 1.762201 seconds.
----------------------------------------
```

```
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
          i    idx    ndim    numel    rowN    colN     sum       mean      std      coefvari    min     max  
          _    ___    ____    _____    ____    ____    ______    ______    ______    ________    ___    ______

    ap    1     1      2       700     100      7      9863.4    14.091    14.388     1.0211      0     50.117

xxx TABLE:ap xxxxxxxxxxxxxxxxxx
              c1        c2        c3         c4         c5         c6         c7  
            ______    ______    ______    ________    _______    _______    ______

    r1           0         0         0    0.053491    0.25574    0.60604    1.1157
    r2           0         0         0    0.053998    0.25571     0.6066    1.1163
    r3           0         0         0    0.056449    0.25576    0.60907    1.1187
    r4           0         0         0    0.061799    0.26016     0.6109    1.1239
    r5           0         0         0    0.066463    0.26897    0.61141    1.1327
    r96     43.388     43.52    43.701      43.925     44.222      44.68    45.228
    r97     44.566    44.695    44.878      45.103     45.398     45.856    46.403
    r98     45.761    45.892    46.072      46.298     46.592      47.05    47.597
    r99     46.973    47.107    47.286      47.514     47.806     48.263    48.815
    r100    48.206    48.338    48.519      48.746     49.037     49.497    50.117
```

Test FF_VFI_AZ_BISEC_VEC Speed Tests

Call the function with defaults. By default, shows the asset policy function summary. Model parameters can be changed by the mp_params.

```
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_timer') = true;
mp_support('ls_ffcmd') = {};
% A grid 50, shock grid 5:
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('it_a_n') = 50;
mp_params('it_z_n') = 5;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 0.792541 seconds.
```

```
% A grid 750, shock grid 15:
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('it_a_n') = 750;
mp_params('it_z_n') = 15;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 43.095190 seconds.
```

```
% A grid 600, shock grid 45:
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('it_a_n') = 600;
mp_params('it_z_n') = 45;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 80.139775 seconds.
```

Test FF_VFI_AZ_BISEC_VEC Control Outputs

Run the function first without any outputs;

```
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('it_a_n') = 50;
mp_params('it_z_n') = 5;
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_timer') = true;
mp_support('bl_print_params') = false;
mp_support('bl_print_iterinfo') = false;
mp_support('ls_ffcmd') = {};
ff_vfi_az_vec(mp_params, mp_support);
```

```
Elapsed time is 0.029901 seconds.
```

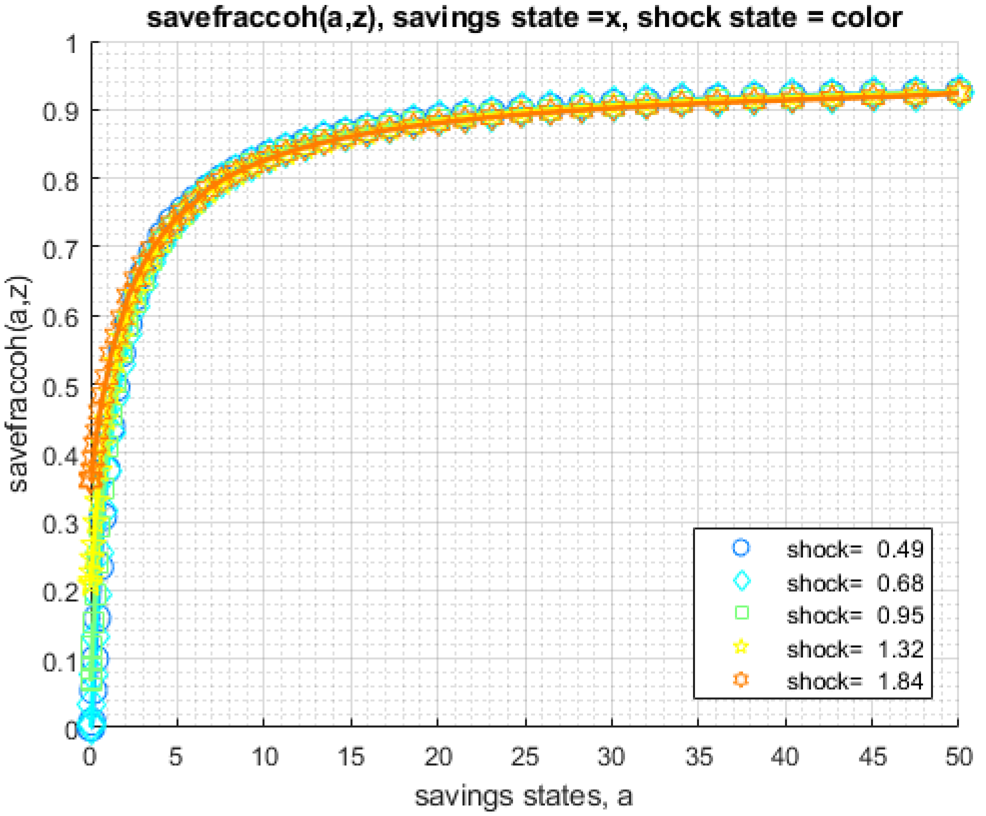
Run the function and show policy function for savings choice. For ls_ffcmd, ls_ffsna, ls_ffgrh, can include these: 'v', 'ap', 'c', 'y', 'coh', 'savefraccoh'. These are value, aprime savings choice, consumption, income, cash on hand, and savings fraction as cash-on-hand.

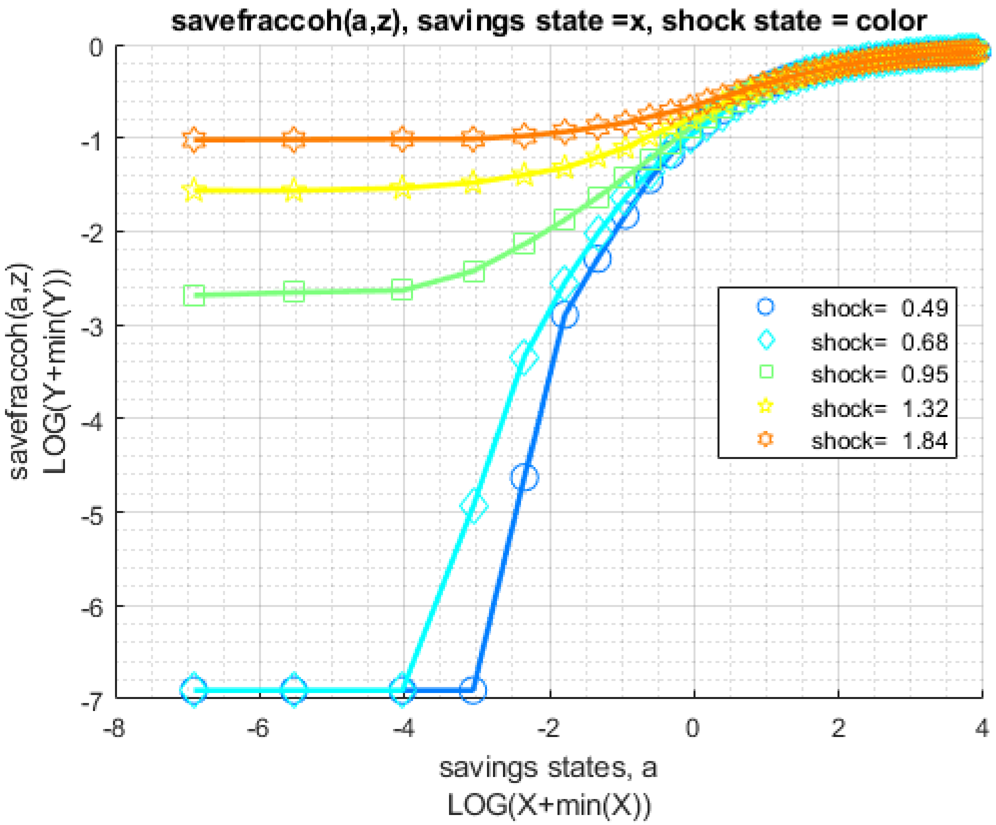
```
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_print_params') = false;
mp_support('bl_print_iterinfo') = false;
% ls_ffcmd: summary print which outcomes
mp_support('ls_ffcmd') = {};
% ls_ffsna: detail print which outcomes
mp_support('ls_ffsna') = {'savefraccoh'};
% ls_ffgrh: graphical print which outcomes
mp_support('ls_ffgrh') = {'savefraccoh'};
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 0.494900 seconds.
xxx  ff_vfi_az_vec, outcome=savefraccoh  xxxxxxxxxxxxxxxxxxxxxxxxxx
    group       a        mean_z_0_4858    mean_z_0_67798    mean_z_0_9462    mean_z_1_3205    mean_z_1_8429
    _____    ________    _____________    ______________    _____________    _____________    _____________

      1             0              0                 0         0.067239          0.20859          0.35953
      2      0.002975              0                 0         0.069375          0.20829          0.36032
      3      0.016829              0                 0         0.070901           0.2139          0.36215
      4      0.046375              0         0.0061439         0.087319           0.2266          0.36264
      5      0.095198      0.0087684          0.034403           0.1168           0.2468          0.37473
      6        0.1663       0.054361          0.077248           0.1522          0.26639          0.39151
      7       0.26234       0.099892           0.13132          0.19388          0.29929          0.41281
      8       0.38568        0.15958           0.19309          0.24112          0.33017          0.43088
      9       0.53852        0.23417           0.25553          0.29215          0.37436          0.45969
     10       0.72291         0.3071           0.31656          0.34812          0.41153          0.48386
     11       0.94076        0.37595           0.37503          0.40842          0.44925          0.50992
     12        1.1939        0.43881           0.42941          0.45755          0.48697          0.54367
     13         1.484        0.49509           0.48129          0.50381          0.53262          0.56979
     14        1.8128        0.54489           0.53018          0.54642          0.56778          0.59634
     15        2.1817        0.58871           0.57382          0.58548          0.60055           0.6282
     16        2.5924        0.62716           0.61258          0.62076          0.63101          0.65249
     17        3.0463        0.66079           0.64682          0.65243          0.65884           0.6752
     18        3.5449        0.69027           0.67709          0.68069          0.68423          0.69638
     19        4.0894        0.71621           0.70376          0.70596          0.70724          0.71591
     20        4.6813        0.73703           0.72732          0.72848          0.72799          0.73385
     21        5.3218        0.75326           0.74813           0.7485          0.74673          0.75021
     22        6.0121        0.76913           0.76657          0.76632          0.76364          0.76535
     23        6.7536        0.78536           0.78286          0.78231          0.77889           0.7842
     24        7.5474        0.79983           0.79745          0.79653          0.79269          0.79678
     25        8.3948        0.81271           0.81039          0.80929          0.80514          0.80831
```

```
   26       9.2967     0.82418     0.82198     0.82076     0.81637     0.81875
   27       10.254      0.8345     0.83242     0.83114     0.82656     0.82833
   28       11.269     0.84377     0.84176     0.84042     0.83584     0.83706
   29       12.342     0.85214     0.85024     0.84884      0.8442     0.84499
   30       13.473     0.85964     0.85781     0.85647     0.85183     0.85232
   31       14.665     0.86648     0.86471     0.86337     0.85879     0.85897
   32       15.918     0.87264     0.87099     0.86965     0.86507     0.86507
   33       17.233     0.87826     0.87667     0.87533     0.87161     0.87063
   34       18.611     0.88338     0.88186     0.88052     0.87771     0.87582
   35       20.053     0.88802     0.88656     0.88528     0.88326     0.88052
   36        21.56      0.8923     0.89089     0.88967     0.88833     0.88485
   37       23.133     0.89614     0.89486     0.89364      0.8926     0.88888
   38       24.773     0.89974     0.89852      0.8973     0.89626      0.8926
   39       26.481     0.90304     0.90182     0.90072     0.89968     0.89608
   40       28.258     0.90603     0.90493     0.90383     0.90279     0.89925
   41       30.104     0.90884     0.90774      0.9067     0.90572     0.90218
   42       32.021      0.9114     0.91036     0.90932     0.90841     0.90493
   43        34.01     0.91378      0.9128     0.91183     0.91091     0.90749
   44        36.07     0.91598     0.91506     0.91408     0.91317     0.90987
   45       38.204     0.91805     0.91714     0.91622     0.91537     0.91207
   46       40.412     0.91994     0.91909     0.91817     0.91732     0.91415
   47       42.695     0.92171     0.92086     0.92001     0.91921      0.9161
   48       45.053     0.92336     0.92257     0.92171     0.92092     0.91799
   49       47.488     0.92489     0.92409     0.92336     0.92257     0.92025
   50           50     0.92629     0.92562     0.92489     0.92428     0.92403
```





Run the function and show summaries for savings and fraction of coh saved:

```
mp_params('it_a_n') = 100;
mp_params('it_z_n') = 9;
mp_support('ls_ffcmd') = {'ap', 'savefraccoh'};
mp_support('ls_ffsna') = {};
mp_support('ls_ffgrh') = {};
mp_support('bl_vfi_store_all') = true; % store c(a,z), y(a,z)
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 1.164186 seconds.
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                   i    idx    ndim    numel    rowN    colN     sum       mean        std       coefvari    min
                   _    ___    ____    _____    ____    ____    ______    _______    _______    ________    ___    _

    ap             1     1      2       900     100      9       12926     14.362     14.544     1.0127      0
    savefraccoh    2     2      2       900     100      9      621.24    0.69027    0.26896    0.38965      0     0

xxx TABLE:ap xxxxxxxxxxxxxxxxxx
             c1        c2        c3          c4           c5          c6          c7          c8        c9
           ______    ______    ______    __________    ________    _________    _________    ______    ______

    r1          0         0         0             0    0.087442    0.27778    0.58243    1.0038    1.5724
    r2          0         0         0             0    0.087962    0.27828    0.58297    1.0044    1.5731
    r3          0         0         0             0    0.090477    0.28074    0.58547    1.0069    1.5755
    r4          0         0         0    0.00055771     0.09279    0.28605     0.5907    1.0122    1.5808
    r5          0         0         0     0.0059496     0.09602    0.29477    0.59952    1.0209    1.5895
    r96    43.845    43.923    44.022        44.198      44.428     44.722     45.103    45.546    46.186
    r97    45.031    45.101    45.208        45.384      45.613      45.91     46.293    46.735    47.382
    r98     46.237    46.297    46.411        46.59      46.818     47.115     47.501    47.948    48.605
    r99      47.46    47.512    47.635       47.812      48.041      48.34     48.726    49.191    49.869
    r100    48.703    48.746    48.878       49.055      49.283     49.586     49.978    50.495    51.171

xxx TABLE:savefraccoh xxxxxxxxxxxxxxxxxx
              c1         c2         c3           c4            c5          c6         c7         c8         c9
            _______    _______    _______    __________    _________    _______    _______    _______    _______

    r1            0          0          0             0     0.066018    0.16569    0.27445    0.37369    0.46243
    r2            0          0          0             0     0.066384    0.16593    0.27463    0.37381    0.46256
    r3            0          0          0             0     0.068154    0.16715    0.27549    0.37442    0.46292
    r4            0          0          0    0.00052879     0.069619    0.16978    0.27726    0.37564    0.46378
    r5            0          0          0     0.0055946     0.071572    0.17405    0.28025    0.37766    0.46512
    r96     0.92458    0.92354    0.92226       0.92171      0.92116    0.92055    0.91994    0.91842    0.91811
    r97     0.92531    0.92416    0.92306       0.92251      0.92196    0.92141    0.92086    0.91933    0.91915
    r98     0.92605     0.9247    0.92379        0.9233      0.92275     0.9222    0.92171    0.92031    0.92031
    r99     0.92672    0.92525    0.92452       0.92403      0.92348      0.923    0.92251    0.92147    0.92184
    r100    0.92739     0.9258    0.92525       0.92477      0.92422    0.92379    0.92342    0.92336    0.92367
```

Test FF_VFI_AZ_BISEC_VEC Change Interest Rate and Discount

Show only save fraction of cash on hand:

```
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_print_params') = false;
mp_support('bl_print_iterinfo') = false;
mp_support('ls_ffcmd') = {'savefraccoh'};
mp_support('ls_ffsna') = {};
mp_support('ls_ffgrh') = {};
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('it_a_n') = 100;
mp_params('it_z_n') = 7;
mp_params('fl_a_max') = 50;
mp_params('st_grid_type') = 'grid_powerspace';
```

Solve the model with several different interest rates and discount factor:

```
% Lower Savings Incentives
mp_params('fl_beta') = 0.80;
mp_params('fl_r') = 0.01;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 0.271658 seconds.
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                   i    idx    ndim    numel    rowN    colN     sum       mean        std       coefvari    min
                   _    ___    ____    _____    ____    ____    ______    _______    _______    ________    ___

    savefraccoh    1     1      2       700     100      7      357.85    0.51122    0.27528    0.53848      0

xxx TABLE:savefraccoh xxxxxxxxxxxxxxxxxx
              c1         c2         c3         c4         c5          c6            c7
            _______    _______    _______    _______    _______    __________    ________

    r1            0          0          0          0          0    0.00022362    0.041544
    r2            0          0          0          0          0    0.00022362    0.041544
    r3            0          0          0          0          0     0.0011391    0.041544
    r4            0          0          0          0          0     0.0016884    0.041483
    r5            0            0            0            0            0      0.0034584      0.04136
    r96     0.79586      0.79275      0.78945      0.78591      0.78225        0.77853      0.77059
    r97     0.79684      0.79379      0.79055      0.78713      0.78359        0.77993      0.77212
    r98     0.79782      0.79482      0.79171      0.78835      0.78488        0.78127      0.77365
    r99     0.79873      0.79586      0.79275      0.78951       0.7861        0.78262      0.77548
    r100    0.79965      0.79684      0.79385      0.79061      0.78732         0.7839       0.7781
```

```
% Higher Savings Incentives
mp_params('fl_beta') = 0.95;
mp_params('fl_r') = 0.04;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 0.971218 seconds.
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                   i    idx    ndim    numel    rowN    colN     sum       mean        std       coefvari    min
                   _    ___    ____    _____    ____    ____    ______    _______    _______    ________    ___

    savefraccoh    1     1      2       700     100      7      481.37    0.68768    0.27118    0.39435      0

xxx TABLE:savefraccoh xxxxxxxxxxxxxxxxxx
              c1          c2          c3          c4           c5          c6          c7
            _______     _______     _______     ________     _______     _______     _______

    r1            0           0           0     0.065774     0.18076     0.30655     0.41654
    r2            0           0           0     0.066201     0.18101     0.30674      0.4166
    r3            0           0           0      0.06791     0.18223     0.30747     0.41709
    r4            0           0           0     0.069619     0.18467     0.30759     0.41812
    r5            0           0           0     0.071694     0.18876     0.30838     0.41983
    r96     0.92428     0.92245     0.92178      0.92116     0.92049     0.91872     0.91824
    r97     0.92501     0.92324     0.92257      0.92196     0.92129     0.91958     0.91921
    r98     0.92574     0.92397     0.92336      0.92275     0.92208     0.92049     0.92025
    r99     0.92647      0.9247     0.92409      0.92348     0.92287     0.92147     0.92159
    r100    0.92702     0.92544     0.92483      0.92422     0.92373     0.92336     0.92348
```

Test FF_VFI_AZ_BISEC_VEC Changing Risk Aversion

Here, again, show fraction of coh saved in summary tabular form, but also show it graphically.

```
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_print_params') = false;
mp_support('bl_print_iterinfo') = false;
mp_support('ls_ffcmd') = {'savefraccoh'};
mp_support('ls_ffsna') = {};
mp_support('ls_ffgrh') = {'savefraccoh'};
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('it_a_n') = 100;
mp_params('it_z_n') = 7;
mp_params('fl_a_max') = 50;
mp_params('st_grid_type') = 'grid_powerspace';
```

Solve the model with different risk aversion levels, higher preferences for risk:

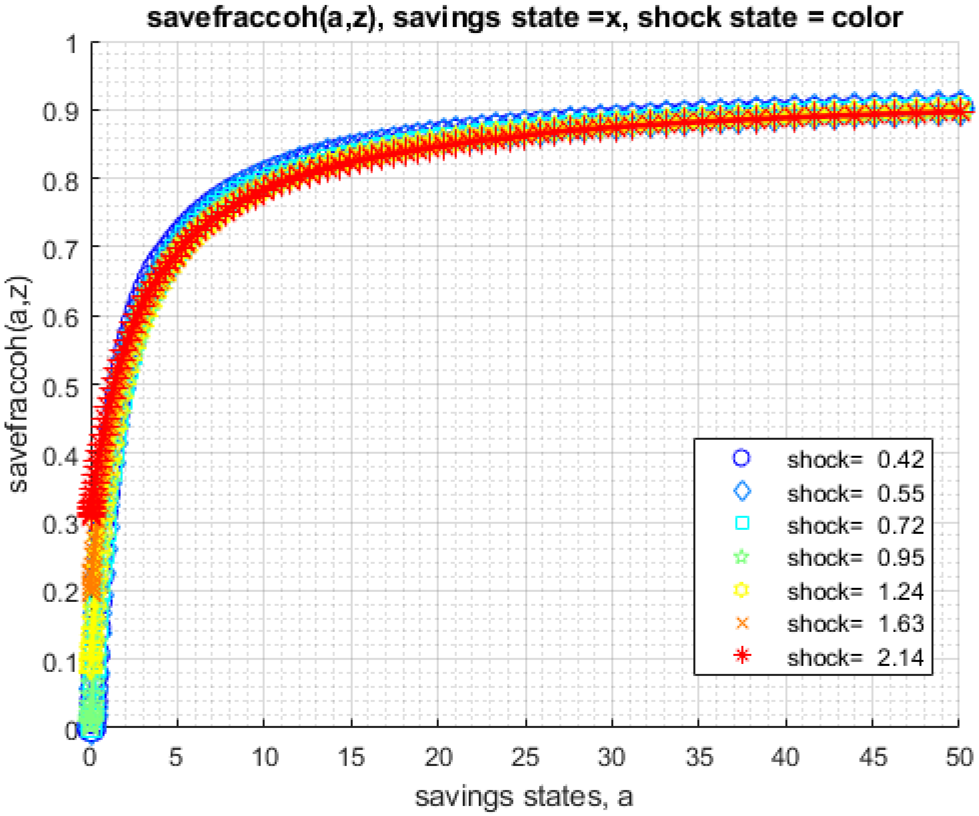
```
% Lower Risk Aversion
mp_params('fl_crra') = 0.5;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

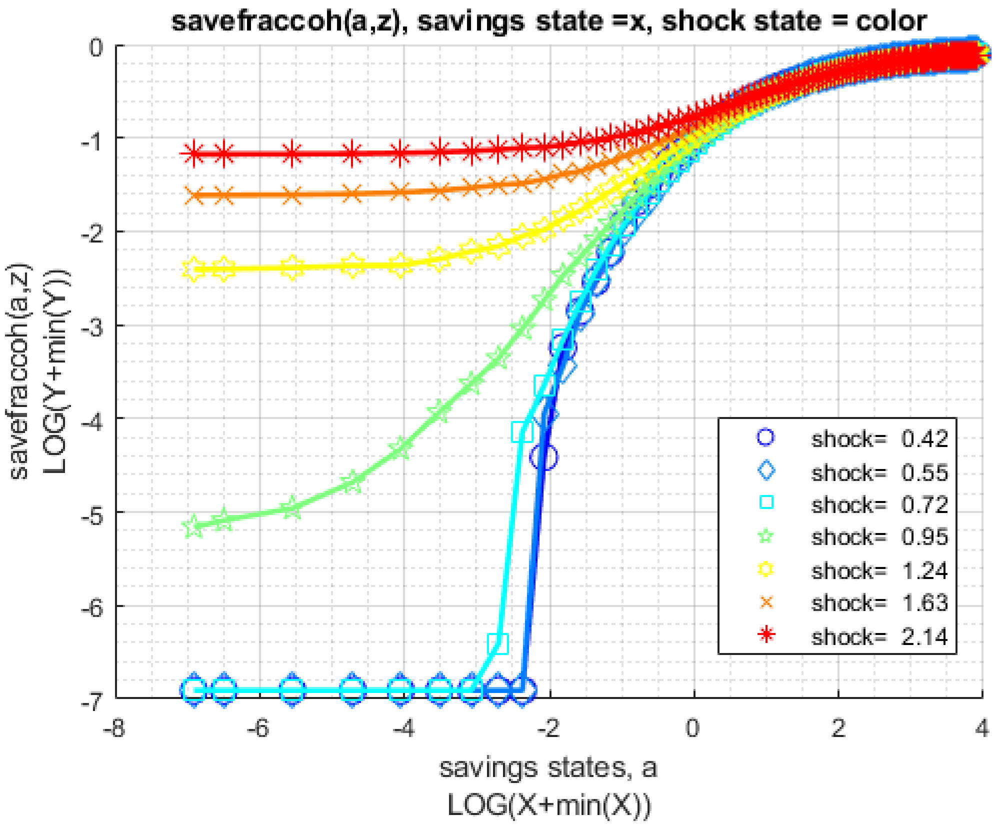
```
Elapsed time is 0.873752 seconds.
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                   i    idx    ndim    numel    rowN    colN     sum       mean       std       coefvari    min
                   _    ___    ____    _____    ____    ____    ______    ______    _______    ________    ___    _

    savefraccoh    1     1      2       700     100      7      452.13    0.6459    0.28031    0.43398      0     0.

xxx TABLE:savefraccoh xxxxxxxxxxxxxxxxxx
               c1         c2         c3           c4            c5          c6          c7
            _______    _______    _______    _________    ________    _______    _______

    r1            0          0          0    0.0047401    0.089089    0.19822    0.30783
    r2            0          0          0    0.0051674    0.089394     0.1984    0.30796
    r3            0          0          0    0.0060218    0.090676    0.19926    0.30851
    r4            0          0          0    0.0082801    0.092812    0.20115    0.30973
    r5            0          0          0     0.012247    0.092995     0.2042    0.31174
    r96     0.90047    0.89925    0.89828       0.8973     0.89632    0.89376    0.89297
    r97     0.90127    0.90017    0.89919      0.89828      0.8973     0.8948    0.89394
    r98     0.90206    0.90102    0.90011      0.89919     0.89828    0.89577    0.89498
    r99     0.90279    0.90188    0.90102      0.90011     0.89919    0.89681     0.8959
    r100    0.90359    0.90273    0.90188      0.90096     0.90011    0.89803    0.89687
```





When risk aversion increases, at every state-space point, the household wants to save more.

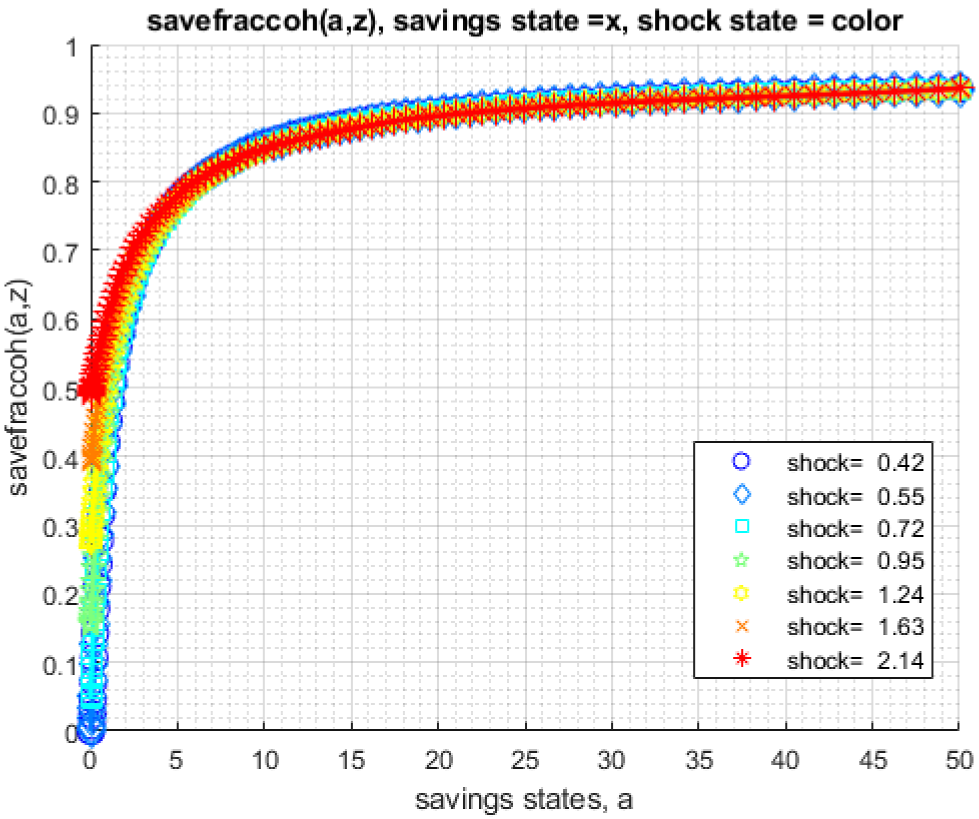
```
% Higher Risk Aversion
mp_params('fl_crra') = 5;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

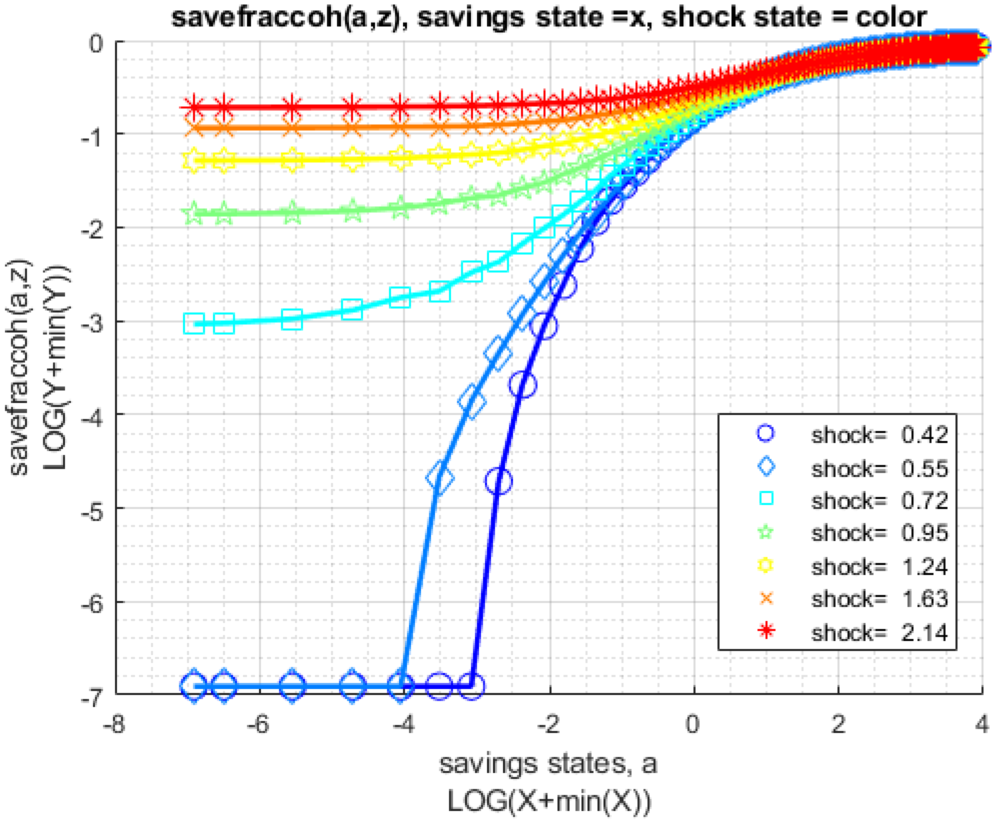
```
Elapsed time is 0.970314 seconds.
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                   i    idx    ndim    numel    rowN    colN     sum      mean       std      coefvari    min
                   _    ___    ____    _____    ____    ____    ______    _______    _______    ________    ___

    savefraccoh    1     1       2      700     100      7      502.71    0.71816    0.25437     0.3542      0

xxx TABLE:savefraccoh xxxxxxxxxxxxxxxxxx
              c1         c2          c3          c4         c5         c6         c7   
            _______    _______    ________    _______    _______    _______    _______

    r1            0          0    0.047037    0.15537    0.27573     0.3909    0.48782
    r2            0          0    0.047525    0.15531    0.27591    0.39102    0.48795
    r3            0          0    0.049844     0.1569    0.27695     0.3917    0.48837
    r4            0          0    0.054788    0.16025    0.27915     0.3931    0.48929
    r5            0          0    0.062905    0.16569    0.28275    0.39542    0.49075
    r96     0.93307    0.93258     0.93203    0.93154     0.9302    0.92995    0.92971
    r97     0.93374    0.93325     0.93276    0.93227    0.93111    0.93105    0.93117
    r98     0.93441    0.93398     0.93349    0.93307    0.93209    0.93227     0.9327
    r99     0.93508    0.93465     0.93423    0.93392    0.93331    0.93368    0.93435
    r100    0.93575    0.93539     0.93508     0.9349    0.93496    0.93526    0.93587
```





Test FF_VFI_AZ_BISEC_VEC with Higher Uncertainty

Increase the standard deviation of the Shock.

```
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_print_params') = false;
mp_support('bl_print_iterinfo') = false;
mp_support('ls_ffcmd') = {'savefraccoh'};
mp_support('ls_ffsna') = {};
mp_support('ls_ffgrh') = {};
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('it_a_n') = 150;
mp_params('it_z_n') = 15;
mp_params('fl_a_max') = 50;
mp_params('st_grid_type') = 'grid_powerspace';
% graph color spectrum
mp_params('cl_colors') = 'copper';
```

Lower standard deviation of shock:

```
% Lower Risk Aversion
mp_params('fl_shk_std') = 0.10;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 2.595920 seconds.
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                   i    idx    ndim    numel    rowN    colN     sum       mean        std       coefvari    min
                   _    ___    ____    _____    ____    ____    ______    _______    _______    ________    ___    _

    savefraccoh    1     1      2      2250     150      15     1507.5    0.67001    0.28668    0.42788      0     0

xxx TABLE:savefraccoh xxxxxxxxxxxxxxxxxx
                 c1         c2         c3         c4         c5         c11        c12        c13        c14        c15
              _______    _______    _______    _______    _______    _______    _______    _______    _______    _____

    r1              0          0          0          0          0    0.13847    0.18485    0.23026    0.27378    0.317
    r2              0          0          0          0          0    0.13853    0.18491    0.23032    0.27384    0.317
    r3              0          0          0          0          0    0.13895    0.18528    0.23063    0.27408     0.31
    r4              0          0          0          0          0    0.13987    0.18607     0.2313    0.27469    0.318
    r5              0          0          0          0          0    0.14011    0.18735     0.2324    0.27567    0.318
    r146      0.92373    0.92354     0.9233    0.92312    0.92287    0.92086    0.92068    0.92049    0.91952    0.919
    r147      0.92422    0.92403    0.92385    0.92361    0.92342    0.92141    0.92123    0.92098    0.92007    0.919
    r148       0.9247    0.92452    0.92434    0.92409    0.92391     0.9219    0.92171    0.92153    0.92062    0.920
    r149      0.92519    0.92501    0.92483    0.92458     0.9244    0.92245    0.92226    0.92208    0.92116     0.92
    r150      0.92568     0.9255    0.92531    0.92507    0.92489    0.92293    0.92275    0.92257    0.92245    0.922
```

Higher shock standard deviation: low shock high asset save more, high shock more asset save less, high shock low asset save more:

```
% Higher Risk Aversion
mp_params('fl_shk_std') = 0.40;
ff_vfi_az_bisec_vec(mp_params, mp_support);
```

```
Elapsed time is 2.805227 seconds.
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

```
                   i    idx    ndim    numel    rowN    colN     sum       mean        std       coefvari    min
                   _    ___    ____    _____    ____    ____    ______    _______    _______    ________    ___    _

    savefraccoh    1     1      2      2250     150      15     1685.6    0.74914    0.22909     0.3058      0     0

xxx TABLE:savefraccoh xxxxxxxxxxxxxxxxxx
              c1         c2         c3         c4         c5         c11        c12        c13        c14        c15
            _______    _______    _______    _______    _______    _______    _______    _______    _______    ____

    r1            0          0          0          0          0     0.5264    0.61264    0.68271    0.73922    0.784
    r2            0          0          0          0          0    0.52646    0.61264    0.68271    0.73922    0.784
    r3            0          0          0          0          0    0.52658     0.6127    0.68271    0.73922    0.784
    r4            0          0          0          0          0    0.52682    0.61288    0.68283    0.73928    0.784
    r5            0          0          0          0          0    0.52731    0.61313    0.68295    0.73934    0.784
    r146    0.92983    0.92928    0.92873    0.92806    0.92739    0.92269    0.92354     0.9258    0.92904    0.933
    r147     0.9302    0.92971     0.9291    0.92849    0.92788    0.92361    0.92477     0.9269    0.93001    0.934
    r148    0.93056    0.93008    0.92953    0.92892    0.92831    0.92458    0.92593      0.928    0.93105    0.935
    r149    0.93093    0.93044    0.92995    0.92934    0.92873     0.9258    0.92702     0.9291    0.93203      0.9
    r150     0.9313    0.93087    0.93032    0.92977    0.92916    0.92696    0.92818    0.93014    0.93294    0.936
```