

# FF\_DS\_AZ\_CTS\_LOOP Dynamic Savings Loop Continuous Distribution

back to [Fan's Intro Math for Econ](#), [Matlab Examples](#), or [Dynamic Asset Repositories](#)

This is the example vignette for function: [ff\\_ds\\_az\\_cts\\_loop](#) from the [MEconTools Package](#).  $F(a,z)$  discrete probability mass function given policy function solution with continuous savings choices.

- Distribution for Common Choice and States Grid **Loop**: [ff\\_ds\\_az\\_cts\\_loop](#)
- Distribution for States Grid + Continuous Exact Savings as Share of Cash-on-Hand **Loop**: [ff\\_ds\\_az\\_cts\\_loop](#)

## Test FF\_DS\_AZ\_CTS\_LOOP 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_ds_az_cts_loop(mp_params);
```

Elapsed time is 1.029654 seconds.

```
-----
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
CONTAINER NAME: mp_ffcmd ND Array (Matrix etc)
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

	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 XXXXXXXXXXXXXXXXXXXXXXXX
```

	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

FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.25795

```
-----
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
CONTAINER NAME: mp_ddcmd ND Array (Matrix etc)
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari	min
--	---	-----	------	-------	------	------	-----	------	-----	----------	-----

fa	1	1	2	100	100	1	1	0.01	0.0155	1.55	2.6966e-22	0.
faz	2	2	2	700	100	7	1	0.0014286	0.003424	2.3968	1.9078e-27	0.
fz	3	3	2	7	7	1	1	0.14286	0.11742	0.82196	0.015625	0.

xxx TABLE:fa xxxxxxxxxxxxxxxxxxxx

c1

r1	0.11839
r2	0.00028039
r3	2.8585e-05
r4	0.0082178
r5	0.0062146
r96	1.3607e-18
r97	2.0727e-19
r98	2.7005e-20
r99	2.9248e-21
r100	2.6966e-22

xxx TABLE:faz xxxxxxxxxxxxxxxxxxxx

c1

c2

c3

c4

c5

c6

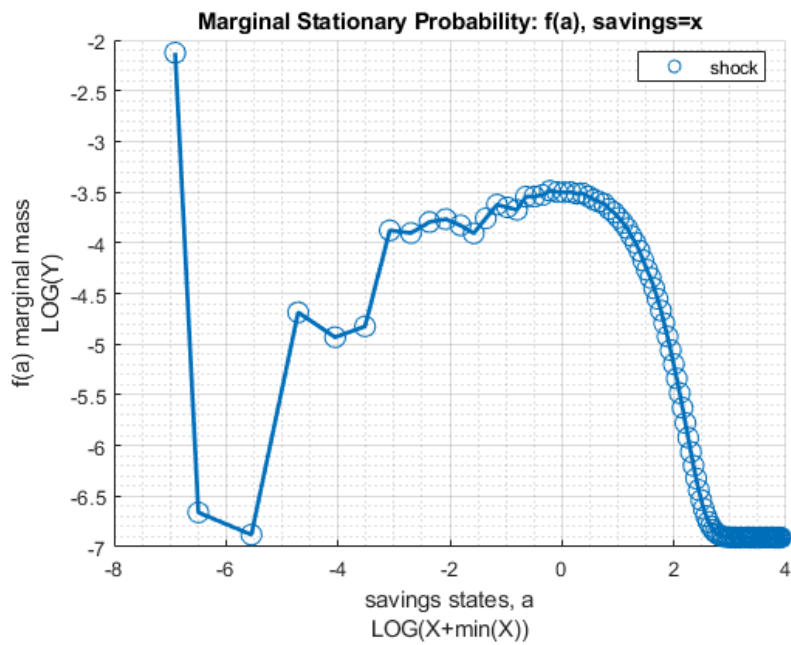
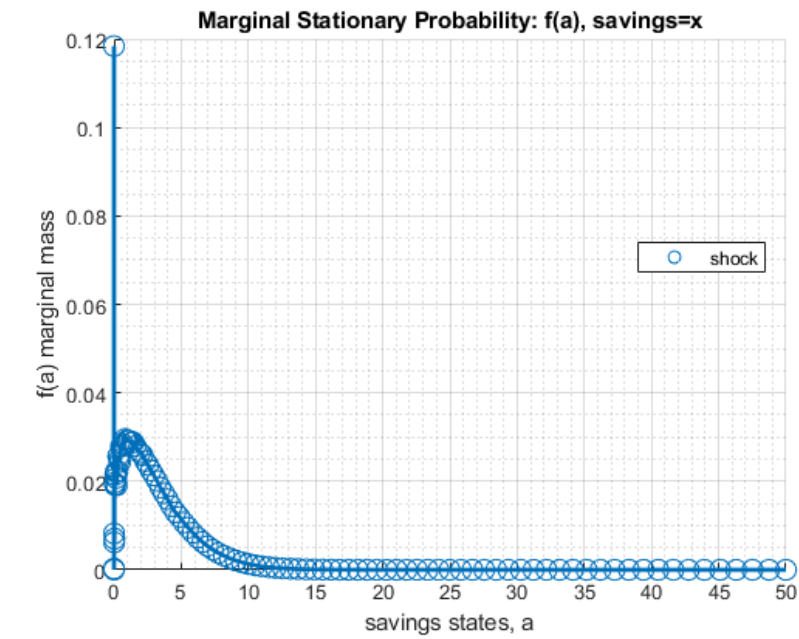
c7

r1	0.0082492	0.036999	0.05152	0.018557	0.0028578	0.00020313	5.5014e-06
r2	0.00014901	9.934e-05	2.7594e-05	4.088e-06	3.4067e-07	1.5141e-08	2.8039e-10
r3	1.0791e-06	3.8554e-06	1.588e-05	6.6114e-06	1.0779e-06	7.8977e-08	2.1795e-09
r4	0.00016483	0.0019292	0.004208	0.0016366	0.00025991	1.8779e-05	5.1379e-07
r5	0.00019509	0.00082304	0.0034877	0.0014538	0.00023711	1.7374e-05	4.795e-07
r96	4.1576e-23	1.0459e-21	1.1798e-20	7.4995e-20	2.7503e-19	5.3901e-19	4.5877e-19
r97	5.3415e-24	1.4108e-22	1.6619e-21	1.0943e-20	4.1203e-20	8.2324e-20	7.0996e-20
r98	5.734e-25	1.6065e-23	1.9875e-22	1.3596e-21	5.2668e-21	1.075e-20	9.414e-21
r99	4.7136e-26	1.4644e-24	1.9531e-23	1.4042e-22	5.6108e-22	1.1675e-21	1.0348e-21
r100	1.9078e-27	7.8348e-26	1.2906e-24	1.0816e-23	4.8188e-23	1.0831e-22	1.0098e-22

xxx TABLE:fz xxxxxxxxxxxxxxxxxxxx

c1

r1	0.015625
r2	0.09375
r3	0.23438
r4	0.3125
r5	0.23438
r6	0.09375
r7	0.015625



xxx tb\_outcomes: all stats xxx

OriginalVariableNames	ap	v	c	y	coh	savefraccoh
{'mean' }	1.6576	5.0855	1.4665	1.4663	3.1241	0.37319
{'sd' }	1.9603	1.7128	0.362	0.51116	2.2726	0.24899
{'coefofvar' }	1.1826	0.33679	0.24684	0.3486	0.72744	0.66717
{'min' }	0	0.87463	0.58543	0.58543	0.58543	0
{'max' }	50.117	16.344	4.8795	4.9969	54.997	0.91671
{'pYis0' }	0.1184	0	0	0	0	0.1184
{'pYls0' }	0	0	0	0	0	0
{'pYgr0' }	0.8816	1	1	1	1	0.8816
{'pYisMINY' }	0.1184	0.0082492	0.0082492	0.0082492	0.0082492	0.1184
{'pYisMAXY' }	1.0098e-22	1.0098e-22	1.0098e-22	1.0098e-22	1.0098e-22	1.9078e-27
{'p0_01' }	0	0.87463	0.58543	0.58543	0.58543	0
{'p0_1' }	0	0.87463	0.58543	0.58543	0.58543	0
{'p1' }	0	1.1243	0.69861	0.59041	0.715	0
{'p5' }	0	2.0791	0.77687	0.76855	0.78562	0
{'p10' }	0	3.1895	1.009	0.85364	1.009	0

{'p20'}	}	0.1057	3.4752	1.14	1.0154	1.3246	0.087685
{'p25'}	}	0.1939	3.8676	1.2593	1.0372	1.4541	0.14292
{'p30'}	}	0.31246	4.2445	1.288	1.0797	1.5906	0.19132
{'p40'}	}	0.60724	4.5309	1.3707	1.3296	1.9628	0.29984
{'p50'}	}	0.95427	5.055	1.4829	1.3613	2.4022	0.39725
{'p60'}	}	1.4469	5.5086	1.5637	1.4343	2.9909	0.48624
{'p70'}	}	2.0596	5.9381	1.6462	1.7599	3.7395	0.55313
{'p75'}	}	2.4165	6.2179	1.7114	1.7855	4.1539	0.58951
{'p80'}	}	2.8138	6.5733	1.7777	1.824	4.6604	0.62436
{'p90'}	}	4.2696	7.3417	1.9216	2.311	6.1793	0.69436
{'p95'}	}	5.8173	8.0019	2.0504	2.4211	7.7898	0.74197
{'p99'}	}	8.6172	9.1635	2.3145	3.1157	10.795	0.79263
{'p99_9'}	}	12.332	10.32	2.5888	3.3595	14.819	0.8312
{'p99_99'}	}	15.614	11.187	2.8357	3.5223	18.494	0.8503
{'fl_cov_ap'}	}	3.8427	2.8209	0.59546	0.62646	4.4381	0.41171
{'fl_cor_ap'}	}	1	0.84018	0.83914	0.6252	0.99624	0.84353
{'fl_cov_v'}	}	2.8209	2.9336	0.61788	0.78698	3.4388	0.36784
{'fl_cor_v'}	}	0.84018	1	0.99656	0.8989	0.88346	0.86257
{'fl_cov_c'}	}	0.59546	0.61788	0.13104	0.16288	0.7265	0.079955
{'fl_cor_c'}	}	0.83914	0.99656	1	0.88023	0.88311	0.88709
{'fl_cov_y'}	}	0.62646	0.78698	0.16288	0.26129	0.78934	0.080066
{'fl_cor_y'}	}	0.6252	0.8989	0.88023	1	0.67949	0.62909
{'fl_cov_coh'}	}	4.4381	3.4388	0.7265	0.78934	5.1646	0.49166
{'fl_cor_coh'}	}	0.99624	0.88346	0.88311	0.67949	1	0.86891
{'fl_cov_savefraccoh'}	}	0.41171	0.36784	0.079955	0.080066	0.49166	0.061994
{'fl_cor_savefraccoh'}	}	0.84353	0.86257	0.88709	0.62909	0.86891	1
{'fracByP0_01'}	}	0	0.0014187	0.003293	0.0032935	0.0015458	0
{'fracByP0_1'}	}	0	0.0014187	0.003293	0.0032935	0.0015458	0
{'fracByP1'}	}	0	0.0018	0.0041476	0.0040773	0.0019486	0
{'fracByP5'}	}	0	0.017798	0.025084	0.025722	0.011837	0
{'fracByP10'}	}	0	0.069566	0.076643	0.051708	0.032927	0
{'fracByP20'}	}	0.0028528	0.1122	0.13024	0.1217	0.065169	0.011916
{'fracByP25'}	}	0.0077609	0.14388	0.17442	0.15825	0.090199	0.025805
{'fracByP30'}	}	0.016336	0.1847	0.21519	0.1908	0.11027	0.047181
{'fracByP40'}	}	0.044743	0.27669	0.31043	0.27733	0.16769	0.11744
{'fracByP50'}	}	0.091661	0.37143	0.40445	0.37462	0.2384	0.21415
{'fracByP60'}	}	0.1676	0.47128	0.50501	0.46524	0.33103	0.33325
{'fracByP70'}	}	0.27323	0.58248	0.6172	0.57522	0.43968	0.47636
{'fracByP75'}	}	0.33601	0.64052	0.67429	0.63346	0.50276	0.54669
{'fracByP80'}	}	0.41177	0.70413	0.73317	0.69614	0.57118	0.62562
{'fracByP90'}	}	0.62757	0.84178	0.85697	0.82738	0.73915	0.80081
{'fracByP95'}	}	0.77414	0.9151	0.92509	0.91117	0.84868	0.89896
{'fracByP99'}	}	0.9381	0.98132	0.98368	0.97823	0.9596	0.97843
{'fracByP99_9'}	}	0.99212	0.99801	0.99826	0.99811	0.99474	0.99783
{'fracByP99_99'}	}	0.99909	0.9998	0.99982	0.99981	0.99944	0.99978

## Test FF\_DS\_AZ\_CTS\_LOOP Speed Tests

Call the function with different a and z grid size, print out speed:

```
mp_support = containers.Map('KeyType','char','ValueType','any');
mp_support('bl_timer') = true;
mp_support('ls_ffcmd') = {};
mp_support('ls_ddcmd') = {};
mp_support('ls_ddgrh') = {};
mp_support('bl_show_stats_table') = false;
% 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_ds_az_cts_loop(mp_params, mp_support);
```

Elapsed time is 0.610510 seconds.  
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.081975

```
% A grid 100, shock grid 7:  
mp_params = containers.Map('KeyType','char', 'ValueType','any');  
mp_params('it_a_n') = 100;  
mp_params('it_z_n') = 7;  
ff_ds_az_cts_loop(mp_params, mp_support);
```

Elapsed time is 1.114978 seconds.  
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.18449

```
% A grid 200, shock grid 9:  
mp_params = containers.Map('KeyType','char', 'ValueType','any');  
mp_params('it_a_n') = 200;  
mp_params('it_z_n') = 9;  
ff_ds_az_cts_loop(mp_params, mp_support);
```

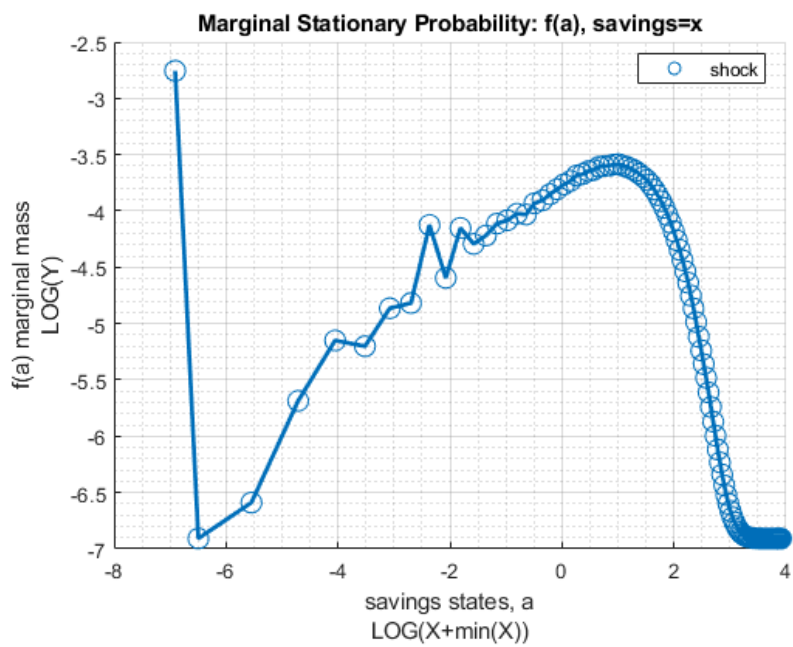
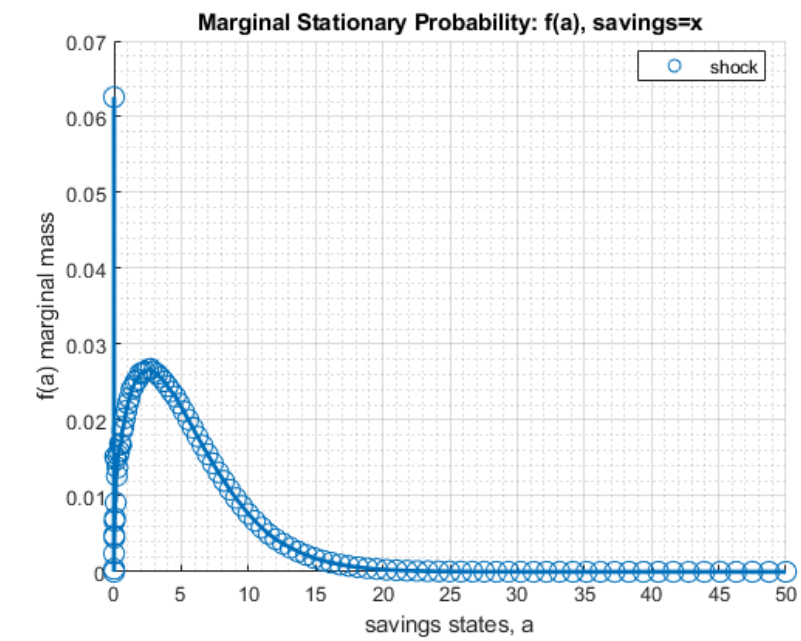
Elapsed time is 2.014970 seconds.  
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.62806

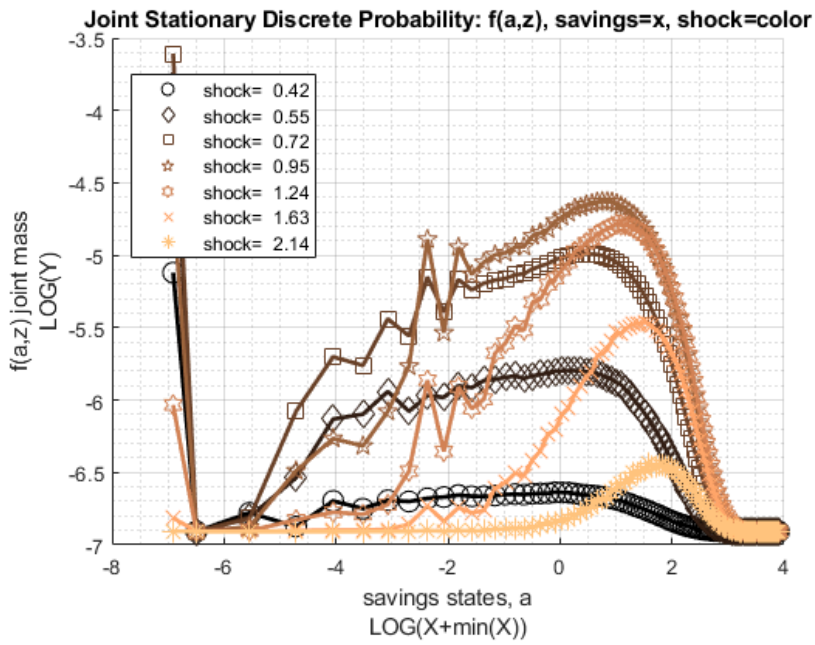
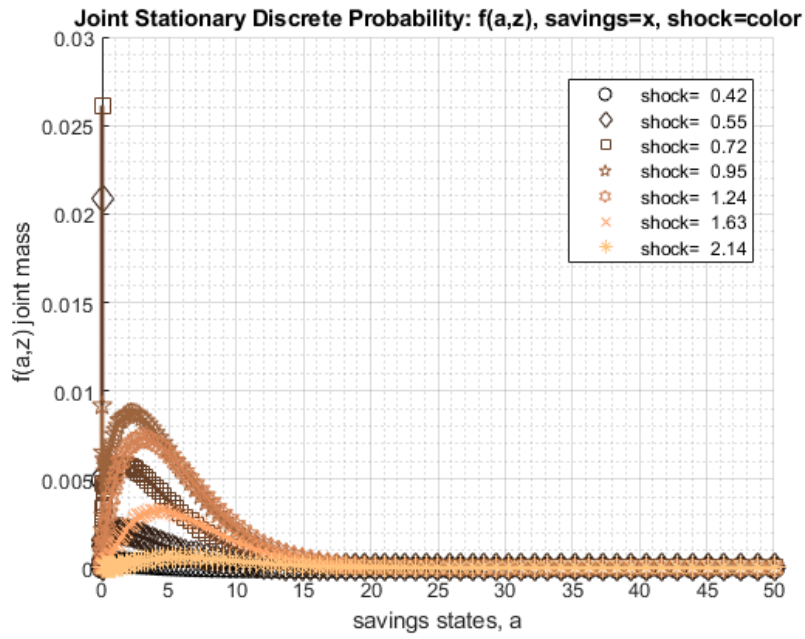
## Test FF\_DS\_AZ\_CTS\_LOOP A grid 100 Shock grid 7

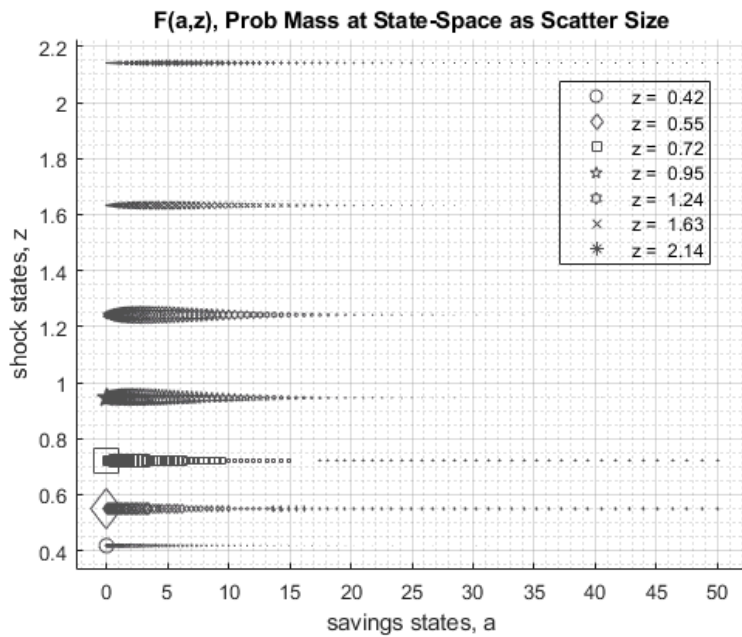
Call the function with different a and z grid size, print out speed:

```
mp_support = containers.Map('KeyType','char', 'ValueType','any');  
mp_support('bl_timer') = true;  
mp_support('ls_ffcmd') = {};  
mp_support('ls_ddcmd') = {};  
mp_support('ls_ddgrh') = {'faz','fa'};  
mp_support('bl_show_stats_table') = true;  
mp_params = containers.Map('KeyType','char', 'ValueType','any');  
mp_params('it_a_n') = 100;  
mp_params('it_z_n') = 7;  
ff_ds_az_cts_loop(mp_params, mp_support);
```

Elapsed time is 0.953345 seconds.  
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.23426







xxx tb\_outcomes: all stats xxx

OriginalVariableNames	ap	v	c	y	coh	savefraccoh
{'mean' }	3.2216	6.9329	1.5295	1.5289	4.7511	0.52357
{'sd' }	3.2562	2.1508	0.34914	0.5307	3.5687	0.25504
{'coefofvar' }	1.0107	0.31024	0.22827	0.34711	0.75113	0.48712
{'min' }	0	1.7008	0.58543	0.58543	0.58543	0
{'max' }	50.789	19.213	4.21	4.9969	54.997	0.92702
{'pYis0' }	0.062608	0	0	0	0	0.062608
{'pYls0' }	0	0	0	0	0	0
{'pYgr0' }	0.93739	1	1	1	1	0.93739
{'pYisMINY' }	0.062608	0.0049772	0.0049772	0.0049772	0.0049772	0.062608
{'pYisMAXY' }	2.9501e-11	2.9501e-11	3.1223e-11	2.9501e-11	2.9501e-11	1.494e-14
{'p0_01' }	0	1.7008	0.58543	0.58543	0.58543	0
{'p0_1' }	0	1.7008	0.58543	0.58543	0.58543	0
{'p1' }	0	2.9492	0.76855	0.62688	0.76855	0
{'p5' }	0	3.4945	0.97884	0.78105	1.009	0
{'p10' }	0.092835	4.1716	1.0603	0.97609	1.223	0.078835
{'p20' }	0.47609	5.1938	1.2588	1.0456	1.7419	0.27652
{'p25' }	0.7311	5.3812	1.3008	1.094	2.0576	0.35312
{'p30' }	0.97803	5.6276	1.351	1.188	2.3618	0.42581
{'p40' }	1.5512	6.3139	1.4528	1.349	3.0158	0.51932
{'p50' }	2.233	6.8328	1.5245	1.4175	3.7588	0.59714
{'p60' }	3.0801	7.416	1.6192	1.5453	4.6604	0.66085
{'p70' }	4.105	8.0461	1.7025	1.7909	5.7649	0.70987
{'p75' }	4.6992	8.4292	1.7544	1.84	6.4292	0.73355
{'p80' }	5.4329	8.7432	1.8159	1.9097	7.3478	0.75277
{'p90' }	7.7004	9.7559	1.9663	2.3407	9.5263	0.79745
{'p95' }	9.7011	10.662	2.1066	2.5036	11.722	0.82522
{'p99' }	14.279	12.148	2.3613	3.1795	16.608	0.85983
{'p99_9' }	19.899	13.734	2.6792	3.5223	22.615	0.8829
{'p99_99' }	25.265	14.885	2.9563	3.7789	28.175	0.8962
{'fl_cov_ap' }	10.603	6.2617	1.0053	1.0453	11.608	0.65544
{'fl_cor_ap' }	1	0.89408	0.8843	0.60489	0.99896	0.78925
{'fl_cov_v' }	6.2617	4.626	0.74802	0.96794	7.0097	0.47179
{'fl_cor_v' }	0.89408	1	0.99613	0.848	0.91325	0.86007
{'fl_cov_c' }	1.0053	0.74802	0.1219	0.15425	1.1272	0.078595
{'fl_cor_c' }	0.8843	0.99613	1	0.83252	0.9047	0.88265
{'fl_cov_y' }	1.0453	0.96794	0.15425	0.28164	1.1995	0.078136
{'fl_cor_y' }	0.60489	0.848	0.83252	1	0.63337	0.57729
{'fl_cov_coh' }	11.608	7.0097	1.1272	1.1995	12.735	0.73404



{'fl_cor_coh' }	0.99896	0.91325	0.9047	0.63337	1	0.8065
{'fl_cov_savefraccoh' }	0.65544	0.47179	0.078595	0.078136	0.73404	0.065046
{'fl_cor_savefraccoh' }	0.78925	0.86007	0.88265	0.57729	0.8065	1
{'fracByP0_01' }	0	0.001221	0.0019051	0.0019058	0.00061329	0
{'fracByP0_1' }	0	0.001221	0.0019051	0.0019058	0.00061329	0
{'fracByP1' }	0	0.011511	0.013437	0.0039104	0.0042425	0
{'fracByP5' }	0	0.021279	0.026546	0.024488	0.012268	0
{'fracByP10' }	0.0006892	0.05109	0.059758	0.051739	0.020676	0.0036864
{'fracByP20' }	0.0099846	0.12278	0.1366	0.12131	0.052438	0.038521
{'fracByP25' }	0.019425	0.15429	0.17945	0.15485	0.072434	0.070039
{'fracByP30' }	0.032212	0.19399	0.22206	0.19029	0.094665	0.10974
{'fracByP40' }	0.0737	0.28144	0.31482	0.27941	0.15063	0.20042
{'fracByP50' }	0.1321	0.3768	0.41124	0.37234	0.22365	0.30981
{'fracByP60' }	0.21336	0.48025	0.51513	0.4642	0.31463	0.42631
{'fracByP70' }	0.3254	0.59015	0.62157	0.57794	0.42288	0.55601
{'fracByP75' }	0.39769	0.65462	0.67967	0.6363	0.48537	0.62983
{'fracByP80' }	0.47503	0.71232	0.73844	0.70062	0.56134	0.69967
{'fracByP90' }	0.67403	0.84445	0.86104	0.82867	0.73331	0.84375
{'fracByP95' }	0.80886	0.92029	0.92647	0.90776	0.84668	0.92112
{'fracByP99' }	0.95057	0.98162	0.98401	0.97831	0.96163	0.98352
{'fracByP99_9' }	0.99336	0.99797	0.99826	0.99778	0.99494	0.99833
{'fracByP99_99' }	0.99924	0.99979	0.99981	0.99977	0.9994	0.99984

## Test FF\_DS\_AZ\_CTS\_LOOP A grid 300 Shock grid 25

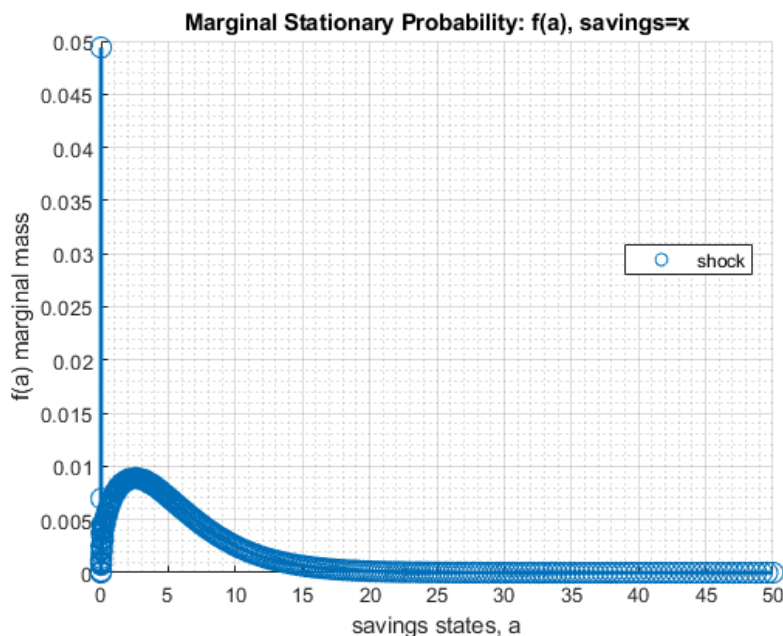
```

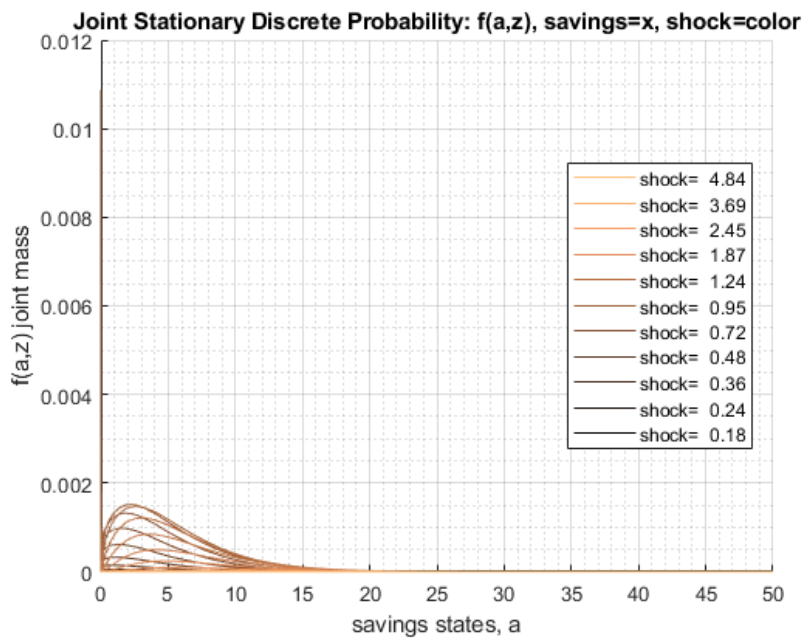
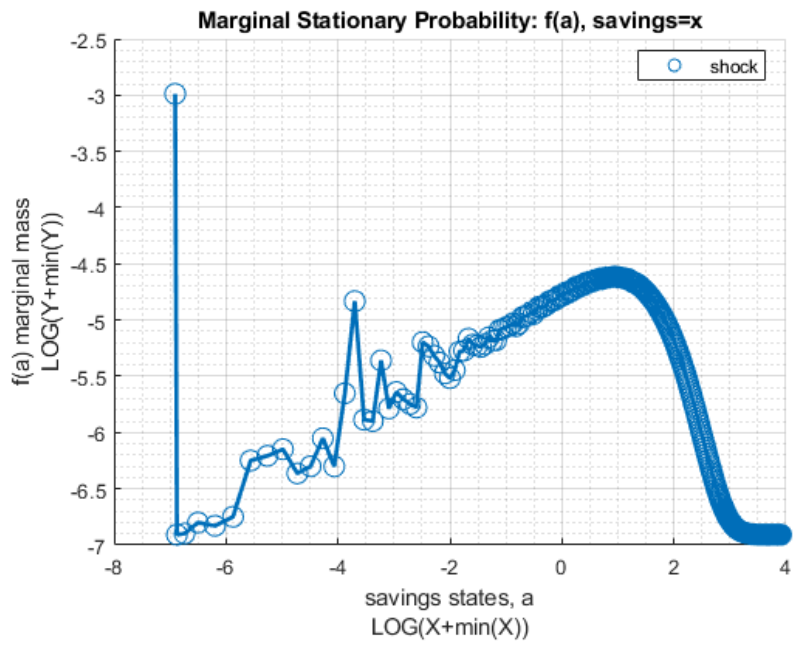
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_timer') = true;
mp_support('ls_ffcmd') = {};
mp_support('ls_ddcmd') = {};
mp_support('ls_ddgrh') = {'faz','fa'};
mp_support('bl_show_stats_table') = true;
mp_params = containers.Map('KeyType','char', 'ValueType','any');
mp_params('it_a_n') = 300;
mp_params('it_z_n') = 25;
ff_ds_az_cts_loop(mp_params, mp_support);

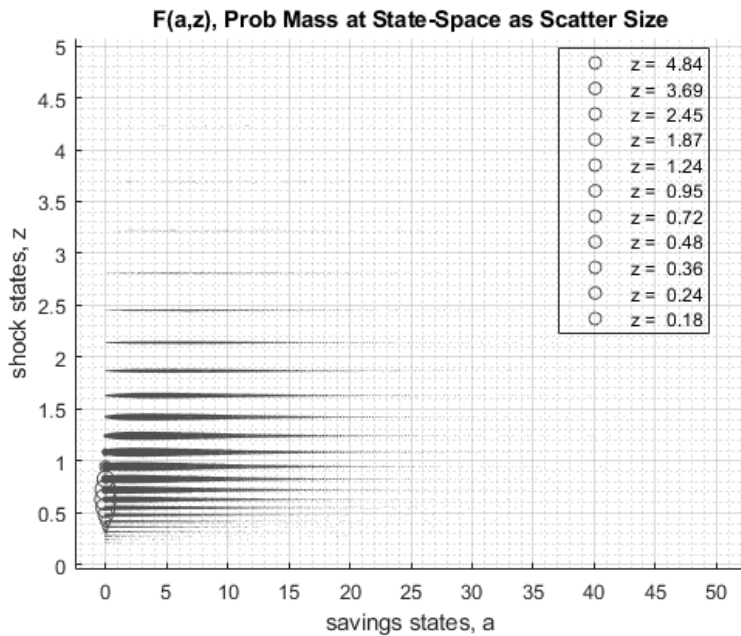
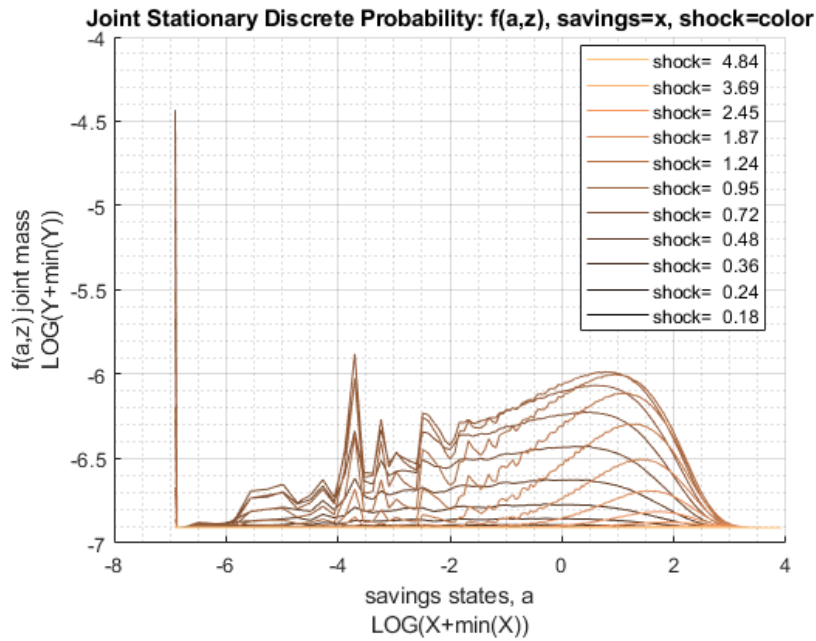
```

Elapsed time is 11.056197 seconds.

FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 2.3435







xxx tb\_outcomes: all stats xxx

OriginalVariableNames	ap	v	c	y	coh	savefraccoh
{'mean' }	3.2612	6.9497	1.5318	1.5305	4.793	0.52715
{'sd' }	3.3352	2.1663	0.35078	0.5359	3.6495	0.25199
{'coefofvar' }	1.0227	0.31171	0.229	0.35014	0.76143	0.47803
{'min' }	0	-2.7616	0.25871	0.25871	0.25871	0
{'max' }	54.451	20.418	4.3301	8.7798	58.78	0.92837
{'pYis0' }	0.04941	0	0	0	0	0.04941
{'pYls0' }	0	7.3281e-05	0	0	0	0
{'pYgr0' }	0.95059	0.99993	1	1	1	0.95059
{'pYisMINY' }	0.04941	3.1163e-08	3.1163e-08	3.1163e-08	3.1163e-08	0.04941
{'pYisMAXY' }	2.8477e-13	2.8477e-13	1.121e-13	2.8477e-13	2.8477e-13	3.6157e-25
{'p0_01' }	0	0.33584	0.44588	0.42374	0.44588	0
{'p0_1' }	0	1.0287	0.51088	0.51088	0.51088	0
{'p1' }	0	2.33	0.67226	0.67069	0.67505	0
{'p5' }	0.0027154	3.5353	0.94151	0.8016	1.0088	0.002787
{'p10' }	0.11496	4.1978	1.0921	0.9095	1.2356	0.093483

{'p20'}	}	0.51133	5.096	1.2504	1.0657	1.779	0.28788
{'p25'}	}	0.75298	5.4004	1.3077	1.1577	2.0685	0.36173
{'p30'}	}	1.004	5.7312	1.3565	1.1951	2.3792	0.42532
{'p40'}	}	1.5834	6.298	1.4458	1.3352	3.0372	0.52408
{'p50'}	}	2.2686	6.8433	1.5287	1.441	3.7996	0.59884
{'p60'}	}	3.0898	7.4098	1.6132	1.5764	4.6904	0.65811
{'p70'}	}	4.0971	8.0297	1.7037	1.7526	5.7899	0.70877
{'p75'}	}	4.7228	8.3787	1.7552	1.8223	6.462	0.73135
{'p80'}	}	5.4827	8.7742	1.8144	1.9267	7.2769	0.75357
{'p90'}	}	7.7718	9.8224	1.9746	2.2406	9.6945	0.79922
{'p95'}	}	9.9683	10.704	2.1148	2.5163	12.048	0.82675
{'p99'}	}	14.759	12.325	2.3956	3.157	17.176	0.86245
{'p99_9'}	}	21.215	14.066	2.7525	3.9803	23.946	0.88686
{'p99_99'}	}	27.205	15.415	3.0759	4.7968	30.277	0.90047
{'fl_cov_ap'}	}	11.123	6.4528	1.0361	1.0808	12.16	0.65691
{'fl_cor_ap'}	}	1	0.89313	0.88563	0.60472	0.999	0.78162
{'fl_cov_v'}	}	6.4528	4.6928	0.75717	0.98035	7.21	0.46786
{'fl_cor_v'}	}	0.89313	1	0.99643	0.84447	0.91198	0.85705
{'fl_cov_c'}	}	1.0361	0.75717	0.12304	0.15594	1.1592	0.07767
{'fl_cor_c'}	}	0.88563	0.99643	1	0.82954	0.90548	0.87868
{'fl_cov_y'}	}	1.0808	0.98035	0.15594	0.28718	1.2368	0.077234
{'fl_cor_y'}	}	0.60472	0.84447	0.82954	1	0.63237	0.57192
{'fl_cov_coh'}	}	12.16	7.21	1.1592	1.2368	13.319	0.73458
{'fl_cor_coh'}	}	0.999	0.91198	0.90548	0.63237	1	0.79876
{'fl_cov_savefraccoh'}	}	0.65691	0.46786	0.07767	0.077234	0.73458	0.063501
{'fl_cor_savefraccoh'}	}	0.78162	0.85705	0.87868	0.57192	0.79876	1
{'fracByP0_01'}	}	0	7.2341e-06	8.9677e-05	2.5415e-05	2.8657e-05	0
{'fracByP0_1'}	}	0	0.00014925	0.00040034	0.00047536	0.00012777	0
{'fracByP1'}	}	0	0.0031002	0.004056	0.0057421	0.0012982	0
{'fracByP5'}	}	4.4271e-07	0.020663	0.026101	0.023318	0.010275	3.7554e-06
{'fracByP10'}	}	0.00081444	0.049128	0.059669	0.051817	0.020124	0.0043579
{'fracByP20'}	}	0.010142	0.11647	0.13733	0.1174	0.051401	0.041452
{'fracByP25'}	}	0.0197	0.15487	0.17845	0.15395	0.07176	0.07241
{'fracByP30'}	}	0.033115	0.19474	0.22243	0.19298	0.095014	0.11033
{'fracByP40'}	}	0.07268	0.28138	0.31442	0.27544	0.15079	0.20152
{'fracByP50'}	}	0.13241	0.3756	0.41097	0.36527	0.22198	0.30736
{'fracByP60'}	}	0.21444	0.47892	0.51282	0.46572	0.31091	0.42746
{'fracByP70'}	}	0.323	0.58868	0.62139	0.57261	0.41949	0.55675
{'fracByP75'}	}	0.39061	0.6478	0.67743	0.63129	0.48319	0.62572
{'fracByP80'}	}	0.46952	0.70943	0.73587	0.6919	0.55532	0.69697
{'fracByP90'}	}	0.66831	0.84297	0.85906	0.82754	0.72955	0.84259
{'fracByP95'}	}	0.80219	0.91616	0.92541	0.90507	0.84194	0.91979
{'fracByP99'}	}	0.94613	0.98125	0.98339	0.97711	0.95822	0.98365
{'fracByP99_9'}	}	0.9927	0.9979	0.99812	0.99719	0.99443	0.99831
{'fracByP99_99'}	}	0.99909	0.99977	0.99979	0.99967	0.99932	0.99983

## Test FF\_DS\_AZ\_CTS\_LOOP A grid 300 Shock grid 50

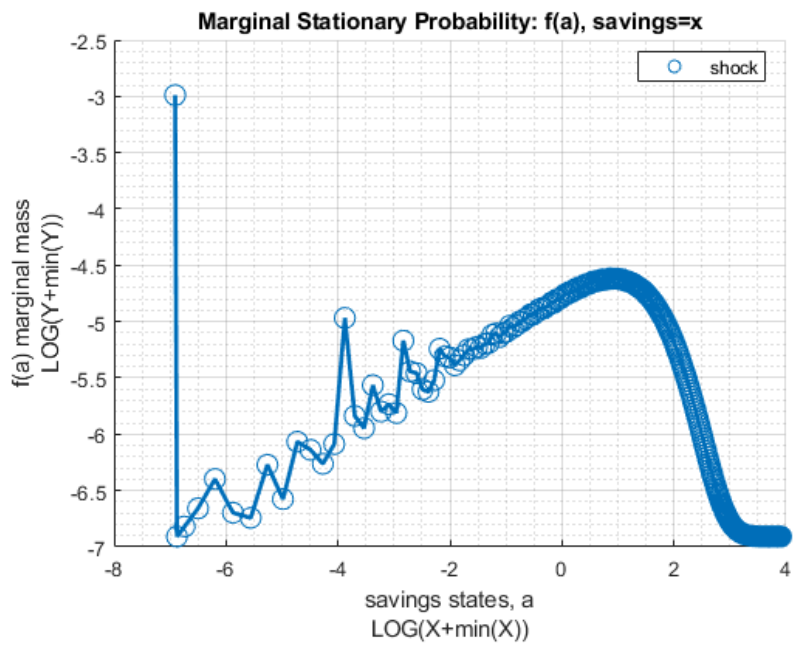
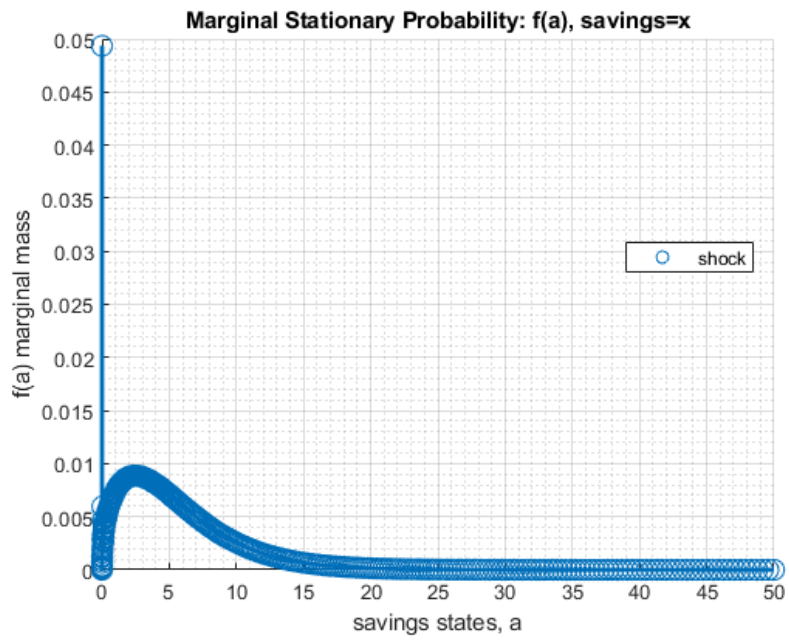
```

mp_support = containers.Map('KeyType','char','ValueType','any');
mp_support('bl_timer') = true;
mp_support('ls_ffcmd') = {};
mp_support('ls_ddcmd') = {};
mp_support('ls_ddgrh') = {'faz','fa'};
mp_support('bl_show_stats_table') = true;
mp_params = containers.Map('KeyType','char','ValueType','any');
mp_params('it_a_n') = 300;
mp_params('it_z_n') = 50;
ff_ds_az_cts_loop(mp_params, mp_support);

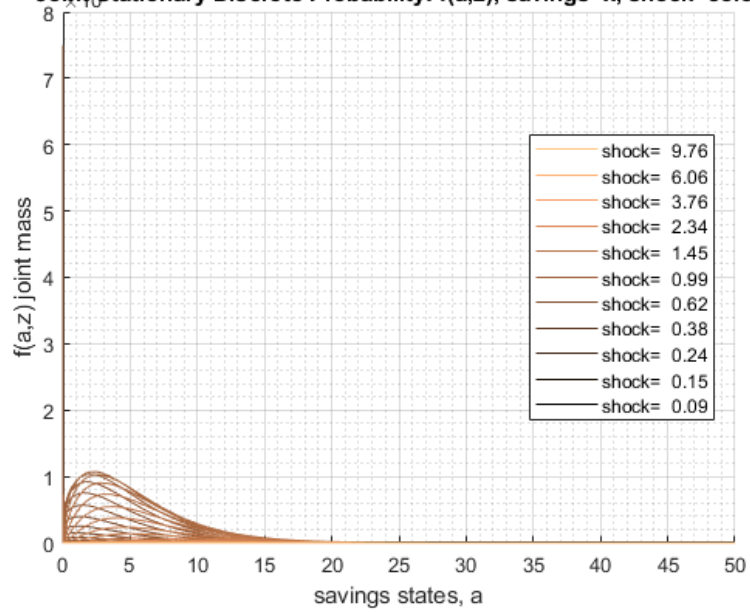
```

Elapsed time is 20.983438 seconds.

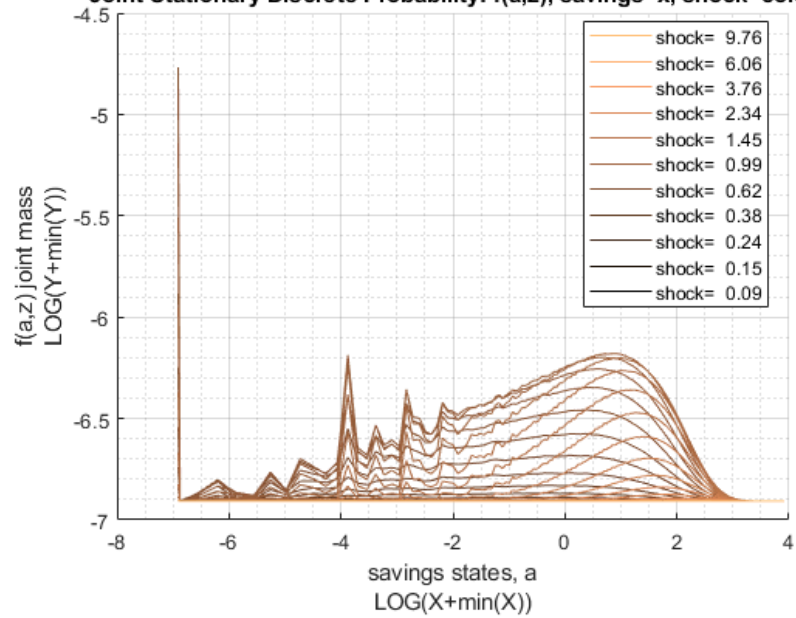
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 5.2169

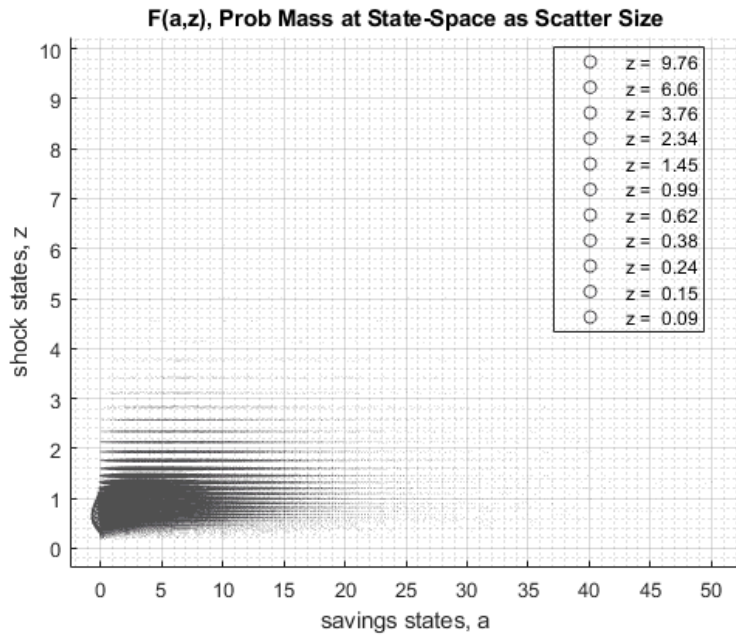


Joint Stationary Discrete Probability:  $f(a,z)$ , savings= $x$ , shock= $color$



Joint Stationary Discrete Probability:  $f(a,z)$ , savings= $x$ , shock= $color$





xxx tb\_outcomes: all stats xxx

OriginalVariableNames	ap	v	c	y	coh	savefraccoh
{'mean' }	3.2794	6.957	1.5328	1.5312	4.8122	0.52801
{'sd' }	3.3623	2.1722	0.35142	0.53693	3.6772	0.25195
{'coefofvar' }	1.0253	0.31224	0.22927	0.35065	0.76415	0.47717
{'min' }	0	-7.6866	0.12843	0.12843	0.12843	0
{'max' }	61.275	22.164	4.3849	15.657	65.657	0.93325
{'pYis0' }	0.049376	0	0	0	0	0.049376
{'pYls0' }	0	0.00011917	0	0	0	0
{'pYgr0' }	0.95062	0.99988	1	1	1	0.95062
{'pYisMINY' }	0.049376	1.1048e-15	1.1048e-15	1.1048e-15	1.1048e-15	0.049376
{'pYisMAXY' }	1.584e-18	1.584e-18	5.0847e-19	1.584e-18	1.584e-18	1.584e-18
{'p0_01' }	0	-0.20427	0.40271	0.40271	0.40271	0
{'p0_1' }	0	1.2141	0.53589	0.48816	0.53589	0
{'p1' }	0	2.3693	0.71312	0.64833	0.71312	0
{'p5' }	0.001023	3.5435	0.94895	0.80724	0.96945	0.0010781
{'p10' }	0.11645	4.2417	1.0917	0.93681	1.2501	0.095192
{'p20' }	0.50875	5.08	1.2515	1.072	1.7735	0.2902
{'p25' }	0.75899	5.4247	1.3061	1.1504	2.0649	0.36356
{'p30' }	1.0156	5.7325	1.3564	1.2011	2.3741	0.42667
{'p40' }	1.6036	6.2932	1.4459	1.3198	3.0387	0.52518
{'p50' }	2.2768	6.8406	1.5297	1.4423	3.8053	0.59933
{'p60' }	3.0945	7.4051	1.6122	1.5771	4.7002	0.6586
{'p70' }	4.113	8.0338	1.7042	1.7334	5.8225	0.70999
{'p75' }	4.7604	8.3794	1.7554	1.8278	6.4985	0.73226
{'p80' }	5.5142	8.7771	1.8143	1.9295	7.3239	0.75424
{'p90' }	7.8048	9.8378	1.9756	2.2476	9.7629	0.80013
{'p95' }	10.007	10.714	2.1161	2.5336	12.107	0.82766
{'p99' }	14.9	12.348	2.407	3.1578	17.285	0.86312
{'p99_9' }	21.501	14.13	2.7694	4.0322	24.216	0.88766
{'p99_99' }	27.735	15.514	3.1037	4.8946	30.851	0.90127
{'fl_cov_ap' }	11.305	6.5234	1.0466	1.0907	12.352	0.66084
{'fl_cor_ap' }	1	0.89316	0.88579	0.60415	0.99902	0.78009
{'fl_cov_v' }	6.5234	4.7186	0.76066	0.98362	7.2841	0.46879
{'fl_cor_v' }	0.89316	1	0.99645	0.84334	0.9119	0.85658
{'fl_cov_c' }	1.0466	0.76066	0.1235	0.15645	1.1701	0.077707
{'fl_cor_c' }	0.88579	0.99645	1	0.82914	0.9055	0.87766
{'fl_cov_y' }	1.0907	0.98362	0.15645	0.2883	1.2471	0.0772
{'fl_cor_y' }	0.60415	0.84334	0.82914	1	0.63165	0.57067
{'fl_cov_coh' }	12.352	7.2841	1.1701	1.2471	13.522	0.73855

{'fl_cor_coh' }	0.99902	0.9119	0.9055	0.63165	1	0.79716
{'fl_cov_savefraccoh' }	0.66084	0.46879	0.077707	0.0772	0.73855	0.063478
{'fl_cor_savefraccoh' }	0.78009	0.85658	0.87766	0.57067	0.79716	1
{'fracByP0_01' }	0	-7.0657e-06	2.6272e-05	3.0716e-05	8.3673e-06	0
{'fracByP0_1' }	0	8.1733e-05	0.00058172	0.0003	0.00018482	0
{'fracByP1' }	0	0.0025825	0.0055755	0.0043105	0.0017358	0
{'fracByP5' }	1.3446e-07	0.020553	0.028388	0.023343	0.0084443	1.165e-06
{'fracByP10' }	0.00082822	0.048923	0.059616	0.051792	0.020041	0.0045383
{'fracByP20' }	0.010119	0.11678	0.1368	0.1176	0.051426	0.041679
{'fracByP25' }	0.019764	0.15445	0.17846	0.15402	0.071298	0.07291
{'fracByP30' }	0.033198	0.19437	0.22195	0.19279	0.094487	0.11072
{'fracByP40' }	0.072799	0.28088	0.31405	0.27516	0.15079	0.20093
{'fracByP50' }	0.13186	0.37535	0.41129	0.36559	0.22202	0.30846
{'fracByP60' }	0.21318	0.47748	0.51316	0.46495	0.30966	0.42828
{'fracByP70' }	0.32222	0.58845	0.62103	0.57307	0.41837	0.55682
{'fracByP75' }	0.39045	0.64744	0.67785	0.63075	0.48233	0.62537
{'fracByP80' }	0.46786	0.7092	0.73555	0.69205	0.55399	0.69588
{'fracByP90' }	0.66756	0.84275	0.8587	0.82726	0.72947	0.84385
{'fracByP95' }	0.80166	0.91607	0.92521	0.90478	0.84112	0.91991
{'fracByP99' }	0.94602	0.98111	0.98335	0.97699	0.95791	0.98349
{'fracByP99_9' }	0.99264	0.99789	0.9981	0.99714	0.99438	0.99831
{'fracByP99_99' }	0.99908	0.99977	0.99979	0.99966	0.9993	0.99983