

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](#)
- Distribution for States Grid + Continuous Exact Savings as Share of Cash-on-Hand **Vectorized**: [ff_ds_az_cts_vec](#)

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 1.912182 seconds.

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

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari	min	max
ap	1	1	2	3000	200	15	42703	14.234	14.307	1.0051	0	51.591

```

xxx TABLE:ap XXXXXXXXXXXXXXXXXXXXXXX
      c1      c2      c3      c4      c5      c11      c12      c13      c14      c15
-----
r1      0      0      0      0      0      0.58655    0.89911    1.2884    1.7803    2.3861
r2      0      0      0      0      0      0.58671    0.89914    1.2885    1.7804    2.3862
r3      0      0      0      0      0      0.5871     0.89961    1.2888    1.7808    2.3867
r4      0      0      0      0      0      0.58803    0.90058    1.2898    1.7817    2.3877
r5      0      0      0      0      0      0.58953    0.90208    1.2914    1.7831    2.3891
r196    45.655    45.699    45.725    45.798    45.889    47.025     47.404    47.828    48.358    49.028
r197    46.257    46.303    46.326    46.401    46.492    47.626     48.005    48.432    48.965    49.651
r198    46.863     46.91    46.931    47.007    47.097    48.232     48.611    49.041    49.59     50.294
r199    47.472    47.521    47.542    47.617    47.711    48.843     49.222    49.658    50.235    50.94
r200    48.088    48.134    48.157    48.232    48.326    49.459     49.841    50.311    50.885    51.591
```

FF_DS_AZ_CTS_LOOP finished. Distribution took = 0.69766

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

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari	min
	—	—	—	—	—	—	—	—	—	—	—
fa	1	1	2	200	200	1	1	0.005	0.0096174	1.9235	0
faz	2	2	2	3000	200	15	1	0.00033333	0.0011636	3.4908	0
fz	3	3	2	15	15	1	1	0.066667	0.076895	1.1534	6.1035e-05

xxx TABLE:fa xxxxxxxxxxxxxxxxxxxx

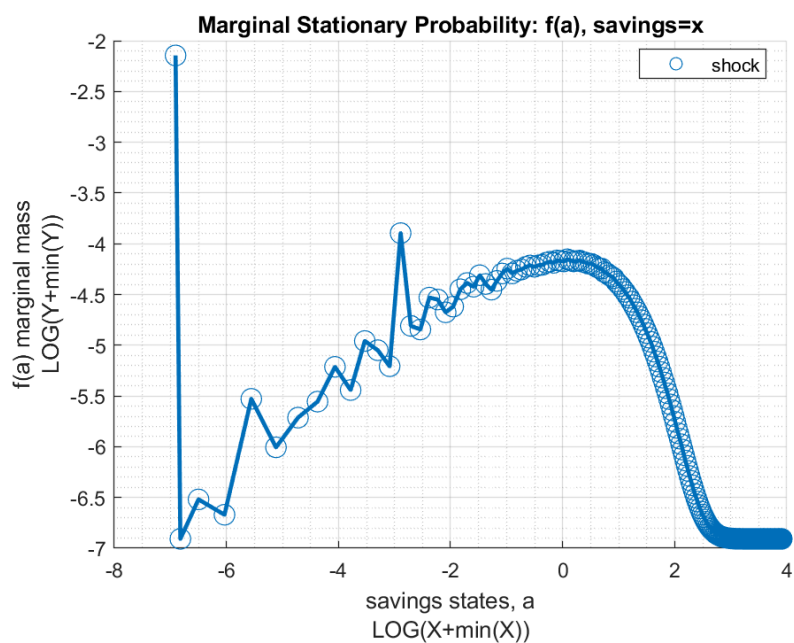
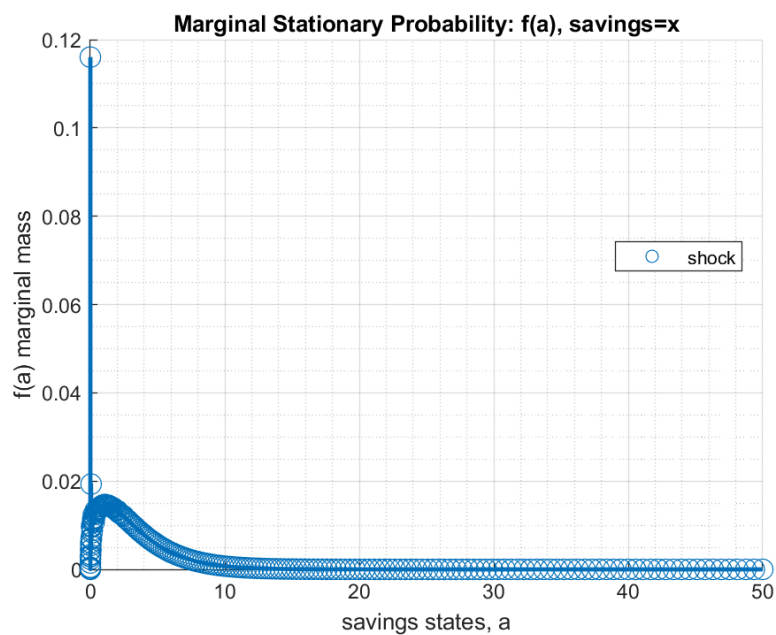
	c1
	—
r1	0.11604
r2	0
r3	0.0004751
r4	0.00026799
r5	0.0029727
r196	3.5618e-14
r197	2.1735e-14
r198	1.329e-14
r199	8.3938e-15
r200	8.2751e-15

xxx TABLE:faz xxxxxxxxxxxxxxxxxxxx

	c1	c2	c3	c4	c5	c11	c12	c13
	—	—	—	—	—	—	—	—
r1	4.1559e-05	0.00053618	0.0031141	0.010616	0.023097	9.8338e-05	8.1894e-06	4.3385
r2	0	0	0	0	0	0	0	0
r3	2.0452e-10	1.1226e-08	2.5837e-07	3.2065e-06	2.2865e-05	1.2294e-06	1.0693e-07	5.8481
r4	8.6656e-10	2.8074e-08	3.684e-07	2.7287e-06	1.4098e-05	6.831e-07	5.9408e-08	3.249
r5	9.2776e-08	2.9148e-06	3.479e-05	0.00019689	0.00056423	2.3628e-06	1.9305e-07	1.0072
r196	1.6685e-22	7.5909e-21	1.5483e-19	1.8762e-18	1.5117e-17	7.3723e-15	8.1882e-15	6.5347
r197	4.6363e-23	2.3916e-21	5.523e-20	7.5562e-19	6.8327e-18	4.5113e-15	5.0046e-15	4.0053
r198	8.2487e-24	4.9336e-22	1.3328e-20	2.1488e-19	2.2991e-18	2.8157e-15	3.0885e-15	2.4579
r199	6.6913e-25	5.3279e-23	1.9003e-21	4.0019e-20	5.5219e-19	1.9017e-15	2.0244e-15	1.5281
r200	2.8381e-26	2.725e-24	1.1911e-22	3.1319e-21	5.5136e-20	1.4819e-15	2.2618e-15	2.1457

xxx TABLE:fz xxxxxxxxxxxxxxxxxxxx

	c1
	—
r1	6.1035e-05
r2	0.00085449
r3	0.0055542
r4	0.022217
r5	0.061096
r11	0.061096
r12	0.022217
r13	0.0055542
r14	0.00085449
r15	6.1035e-05



xxx tb_outcomes: all stats xxx

OriginalVariableNames	ap	v	c	y	coh	savefraccoh
{'mean' }	1.675	5.0913	1.4673	1.467	3.1423	0.37474
{'unweighted_sum' }	42703	26797	7295.8	6979.8	49998	1657.9
{'sd' }	2.0062	1.7215	0.36267	0.51485	2.3189	0.24932
{'coefofvar' }	1.1977	0.33813	0.24717	0.35095	0.73794	0.66532
{'gini' }	0.59404	0.19113	0.13962	0.19161	0.37632	0.39022
{'min' }	0	-1.2641	0.38052	0.38052	0.38052	0
{'max' }	51.591	16.787	5.0209	6.6099	56.61	0.91805
{'pYis0' }	0.11606	0	0	0	0	0.11606
{'pYls0' }	0	0.00066766	0	0	0	0
{'pYgr0' }	0.88394	0.99933	1	1	1	0.88394
{'pYisMINY' }	0.11606	4.1559e-05	4.1559e-05	4.1559e-05	4.1559e-05	0.11606
{'pYisMAXY' }	3.1409e-16	3.1409e-16	5.148e-16	3.1409e-16	3.1409e-16	2.8381e-26
{'p0_01' }	0	-0.34507	0.45473	0.45473	0.45473	0
{'p0_1' }	0	0.52204	0.54342	0.54342	0.54342	0
{'p1' }	0	1.3412	0.6494	0.6494	0.6494	0

{ 'p5' }	0	2.1813	0.85431	0.77605	0.88697	0
{ 'p10' }	0	2.8514	0.96477	0.92741	1.002	0
{ 'p20' }	0.10665	3.5986	1.1516	1.0358	1.3244	0.083657
{ 'p25' }	0.21483	3.8501	1.2354	1.1105	1.4524	0.14274
{ 'p30' }	0.32994	4.2218	1.284	1.129	1.6395	0.20194
{ 'p40' }	0.60561	4.5759	1.3788	1.3244	1.999	0.30454
{ 'p50' }	0.9866	5.0443	1.4671	1.363	2.4484	0.39896
{ 'p60' }	1.4331	5.4957	1.5615	1.5828	2.9924	0.48032
{ 'p70' }	2.0261	5.9595	1.6562	1.6429	3.671	0.556
{ 'p75' }	2.4055	6.2377	1.7089	1.7094	4.0981	0.59225
{ 'p80' }	2.8929	6.5441	1.7669	1.9106	4.6329	0.62436
{ 'p90' }	4.3431	7.3623	1.9254	2.123	6.2699	0.69668
{ 'p95' }	5.7881	8.0262	2.0625	2.4019	7.7831	0.74075
{ 'p99' }	8.9453	9.2776	2.3421	2.9539	11.327	0.79763
{ 'p99_9' }	13.367	10.599	2.6636	3.7357	15.962	0.83767
{ 'p99_99' }	17.333	11.639	2.9483	4.3328	20.294	0.85903
{ 'fl_cov_ap' }	4.0248	2.8944	0.61038	0.64355	4.6352	0.41772
{ 'fl_cor_ap' }	1	0.83807	0.83891	0.62307	0.99637	0.83512
{ 'fl_cov_v' }	2.8944	2.9636	0.62238	0.79332	3.5168	0.36874
{ 'fl_cor_v' }	0.83807	1	0.99685	0.89507	0.88097	0.85912
{ 'fl_cov_c' }	0.61038	0.62238	0.13153	0.16405	0.74192	0.079746
{ 'fl_cor_c' }	0.83891	0.99685	1	0.87859	0.8822	0.88192
{ 'fl_cov_y' }	0.64355	0.79332	0.16405	0.26507	0.80761	0.079867
{ 'fl_cor_y' }	0.62307	0.89507	0.87859	1	0.67647	0.6222
{ 'fl_cov_coh' }	4.6352	3.5168	0.74192	0.80761	5.3771	0.49746
{ 'fl_cor_coh' }	0.99637	0.88097	0.8822	0.67647	1	0.86045
{ 'fl_cov_savefraccoh' }	0.41772	0.36874	0.079746	0.079867	0.49746	0.062162
{ 'fl_cor_savefraccoh' }	0.83512	0.85912	0.88192	0.6222	0.86045	1
{ 'fracByP0_01' }	0	-4.8153e-05	0.00017799	0.00018159	8.3115e-05	0
{ 'fracByP0_1' }	0	0.00027167	0.0013548	0.0014279	0.00063242	0
{ 'fracByP1' }	0	0.0032852	0.0063125	0.0069982	0.0029338	0
{ 'fracByP5' }	0	0.016969	0.025021	0.024262	0.011819	0
{ 'fracByP10' }	0	0.044207	0.05664	0.064855	0.026579	0
{ 'fracByP20' }	0.0026834	0.1115	0.13073	0.11733	0.067668	0.0099043
{ 'fracByP25' }	0.0076113	0.14492	0.17311	0.15549	0.086	0.025483
{ 'fracByP30' }	0.015302	0.19105	0.21762	0.19333	0.11182	0.048984
{ 'fracByP40' }	0.043894	0.27218	0.30467	0.27748	0.16912	0.11643
{ 'fracByP50' }	0.089861	0.36738	0.40369	0.36807	0.23805	0.21205
{ 'fracByP60' }	0.16112	0.46928	0.50828	0.46652	0.3263	0.32962
{ 'fracByP70' }	0.26525	0.58046	0.61519	0.57507	0.4298	0.46793
{ 'fracByP75' }	0.33325	0.64122	0.67431	0.63025	0.49166	0.54754
{ 'fracByP80' }	0.41265	0.70474	0.73277	0.69273	0.56293	0.62653
{ 'fracByP90' }	0.62139	0.84051	0.85792	0.82668	0.73375	0.80195
{ 'fracByP95' }	0.77085	0.91406	0.9245	0.90615	0.84324	0.89716
{ 'fracByP99' }	0.93558	0.98098	0.98317	0.97729	0.95807	0.97822
{ 'fracByP99_9' }	0.99103	0.99787	0.99814	0.9972	0.99438	0.99775
{ 'fracByP99_99' }	0.99886	0.99977	0.99979	0.99969	0.99931	0.99977

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 0.466529 seconds.
FF_DS_AZ_CTS_LOOP finished. Distribution took = 0.065434

```
% 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 0.930211 seconds.
FF_DS_AZ_CTS_LOOP finished. Distribution took = 0.20136

```
% 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);
```

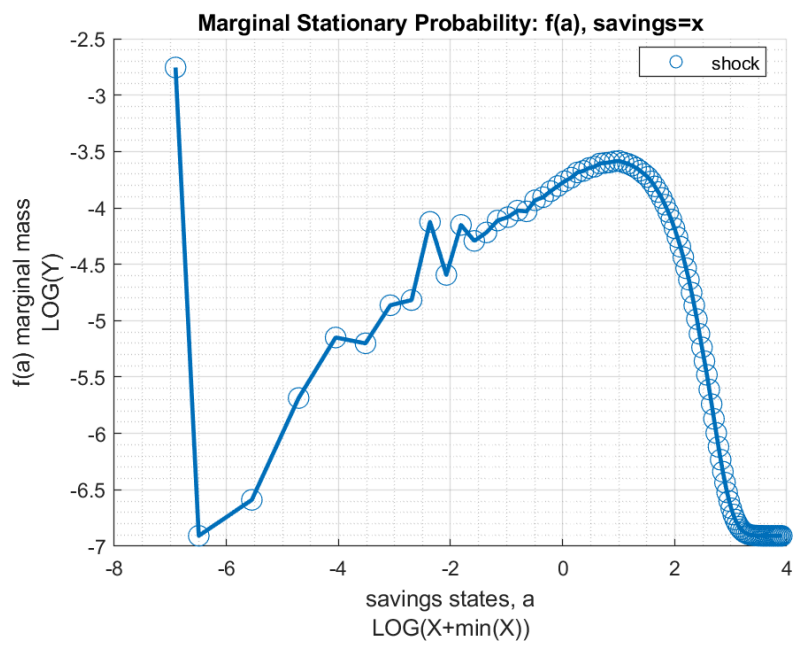
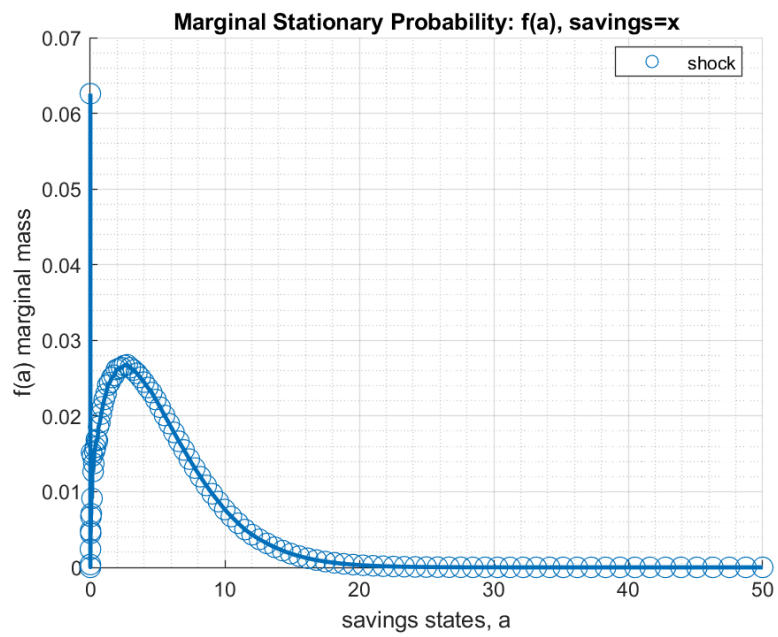
Elapsed time is 1.614469 seconds.
FF_DS_AZ_CTS_LOOP finished. Distribution took = 0.52925

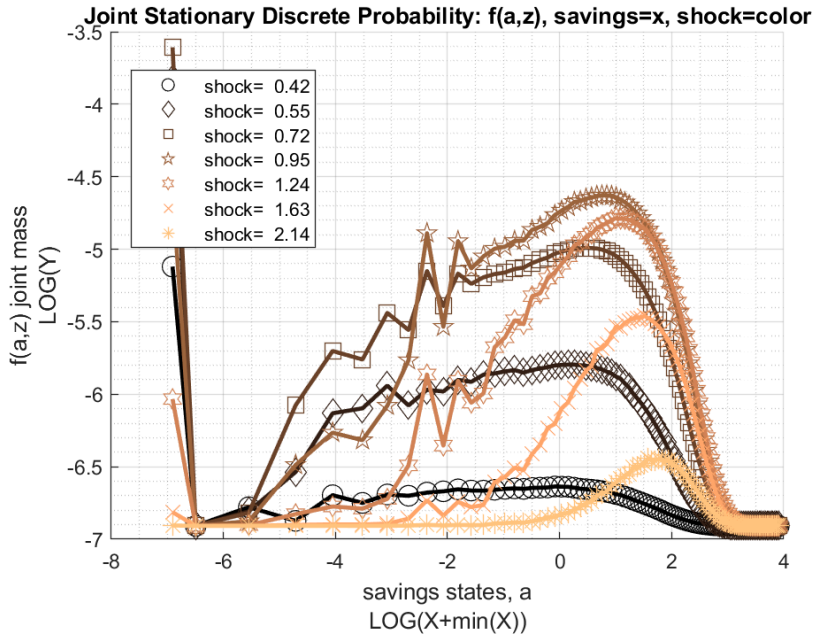
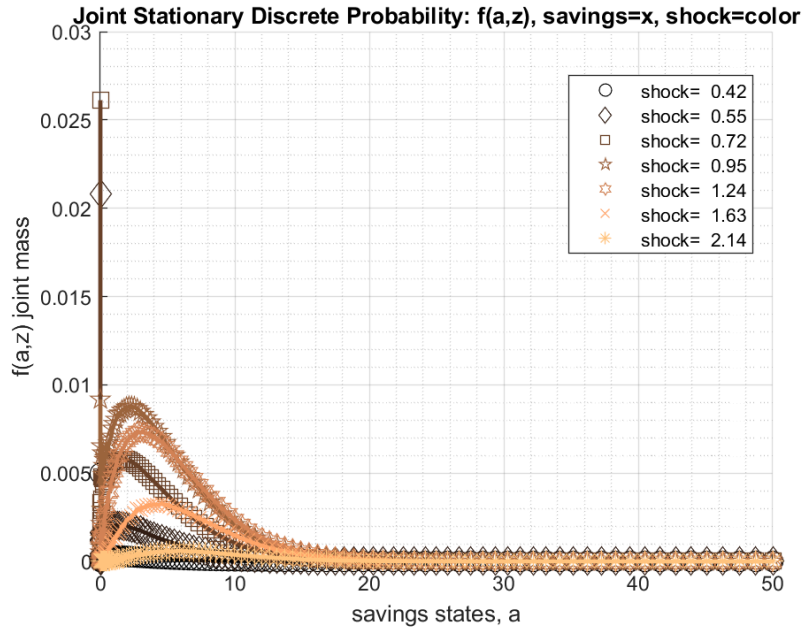
Test FF_DS_AZ_CTS_LOOP A grid 100 Shock grid 7

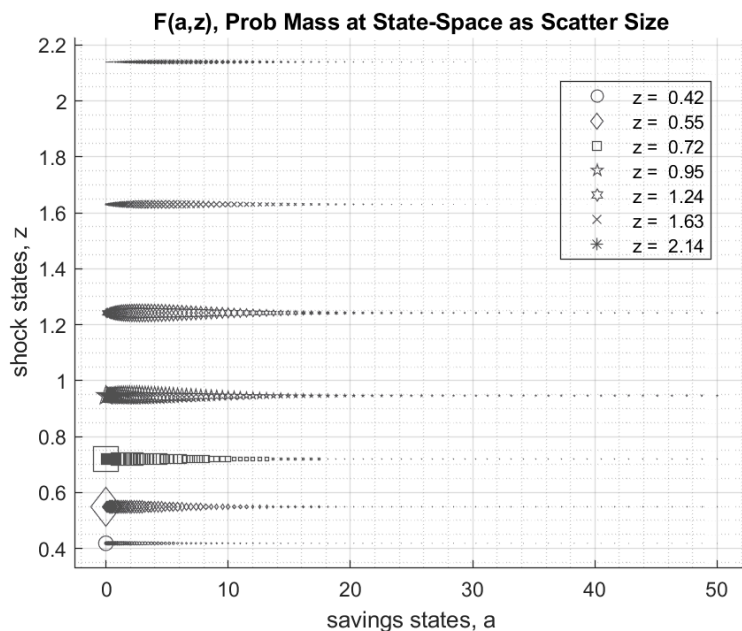
Call the function with different a and z grid size, print out speed:

```
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 0.899597 seconds.
FF_DS_AZ_CTS_LOOP finished. Distribution took = 0.25939







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
{'unweighted_sum'}	}	10019	7323.6	1530.6	1473.6	11549	457.17
{'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
{'gini'}	}	0.52352	0.17526	0.12797	0.19065	0.3936	0.2723
{'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

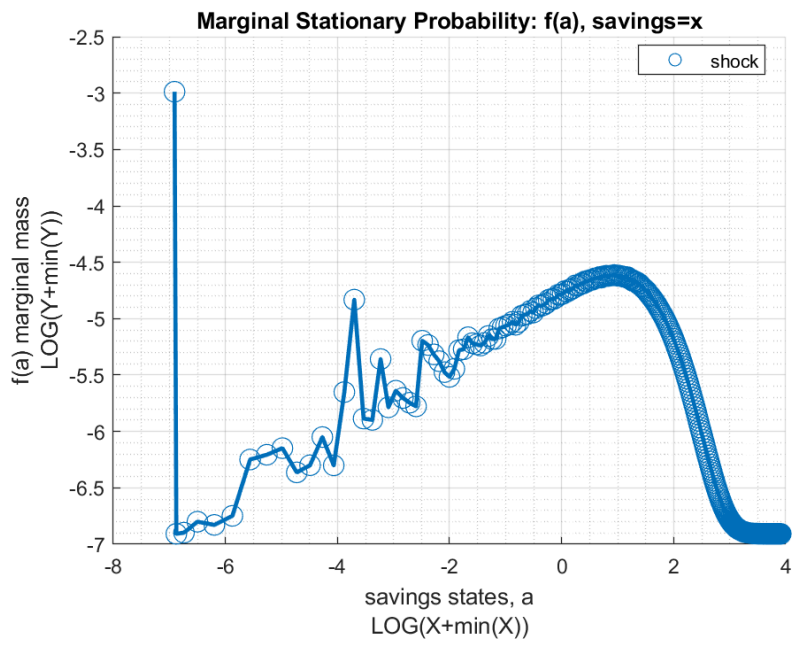
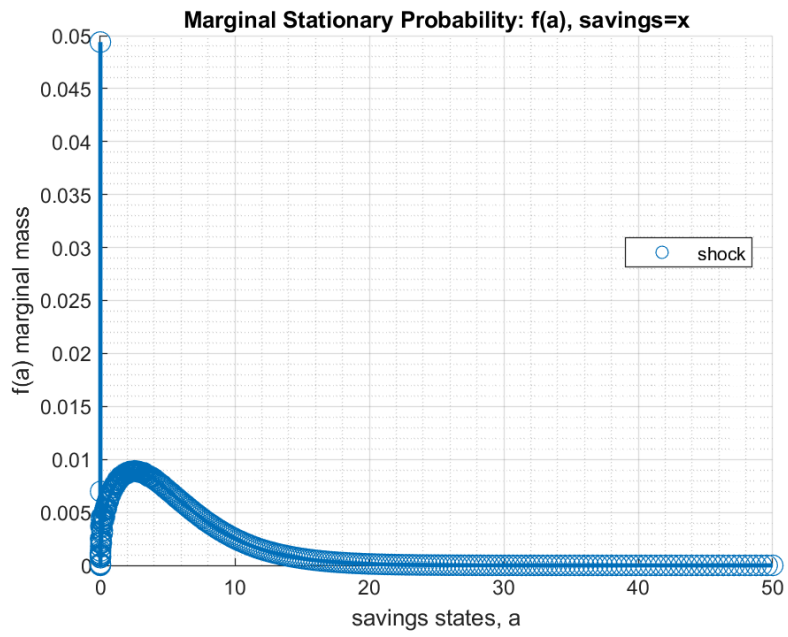
```

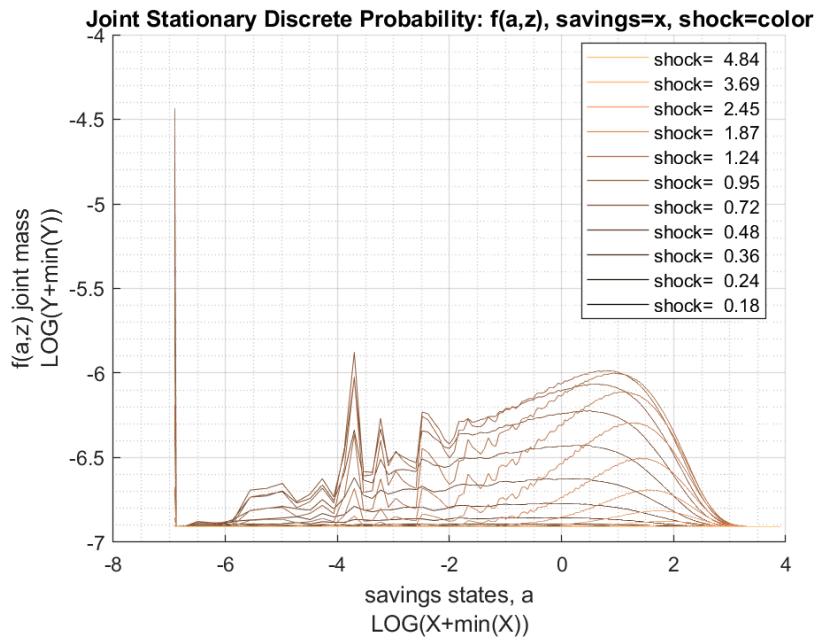
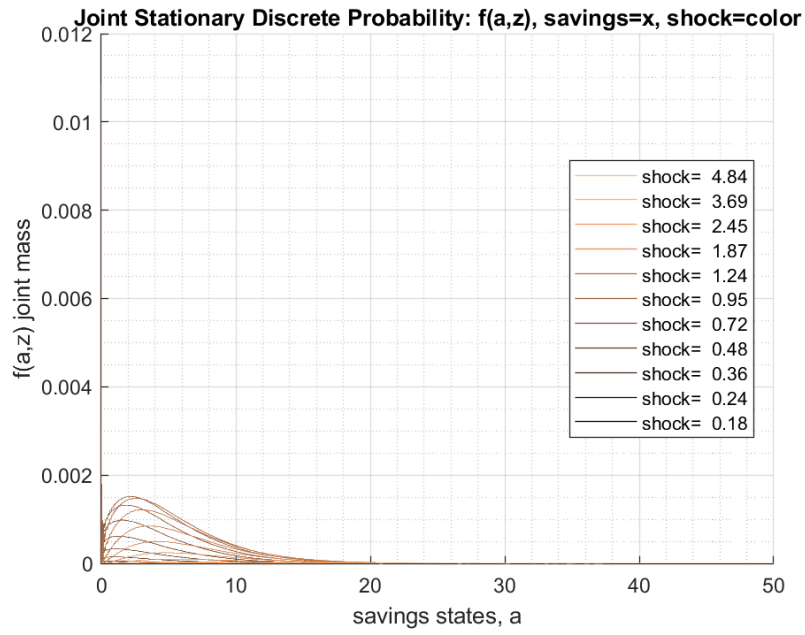
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_timer') = true;
mp_support('ls_ffcmd') = {};
mp_support('ls_ddcmd') = {};
mp_support('ls_ddgrh') = {'faz','fa'};
mp_support('bl_show_stats_table') = true;
mp_params = containers.Map('KeyType','char', 'ValueType','any');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

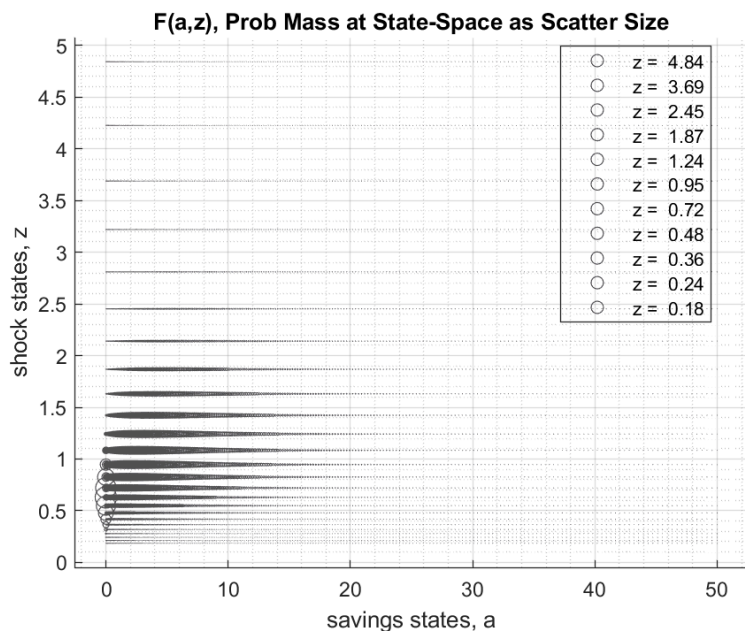
```

Elapsed time is 7.769713 seconds.

FF_DS_AZ_CTS_LOOP finished. Distribution took = 2.2408







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
{'unweighted_sum' }	1.1043e+05	79555	16733	19751	1.2716e+05	3442.8
{'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
{'gini' }	0.52534	0.17597	0.12824	0.19145	0.39608	0.26748
{'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

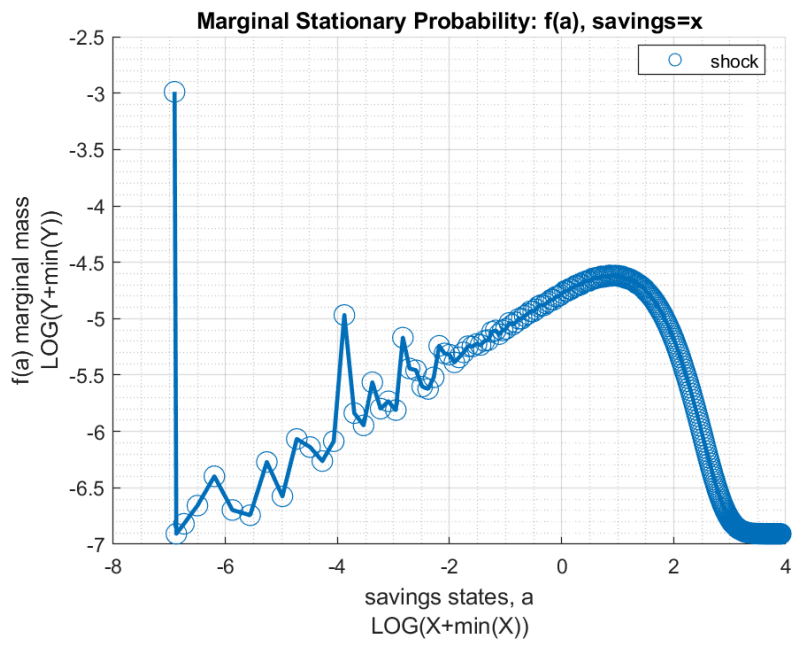
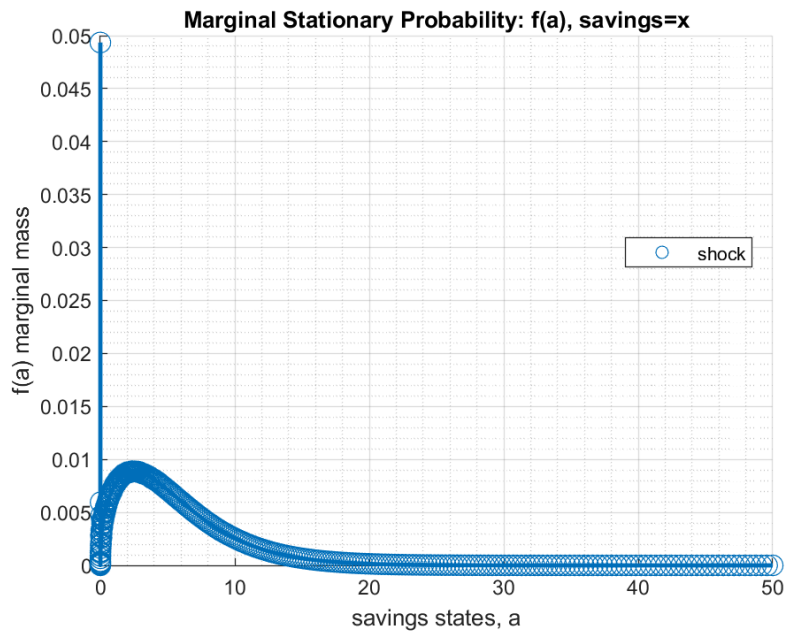
```

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);

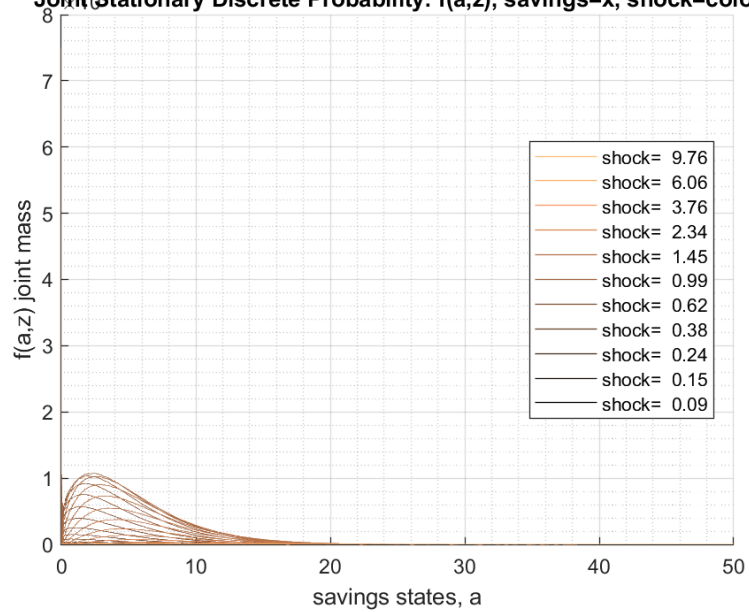
```

Elapsed time is 13.966894 seconds.

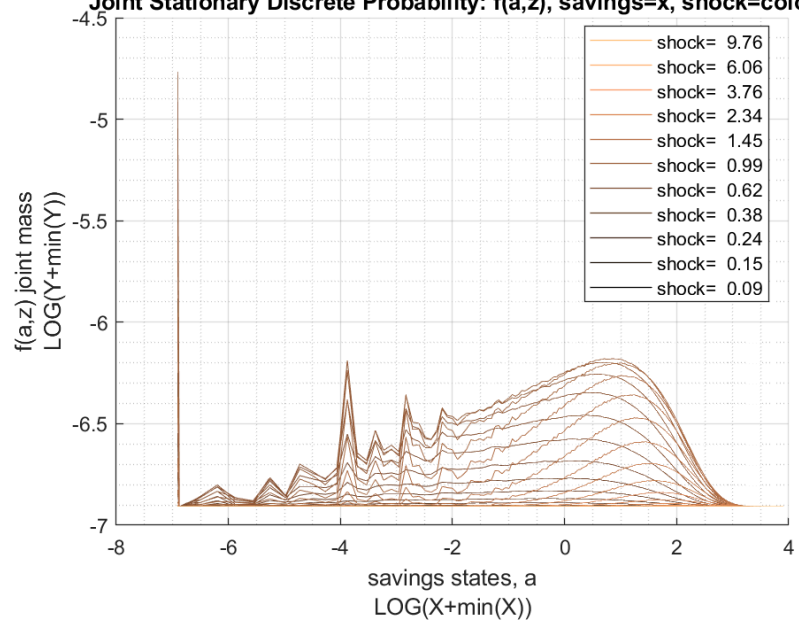
FF_DS_AZ_CTS_LOOP finished. Distribution took = 5.0619

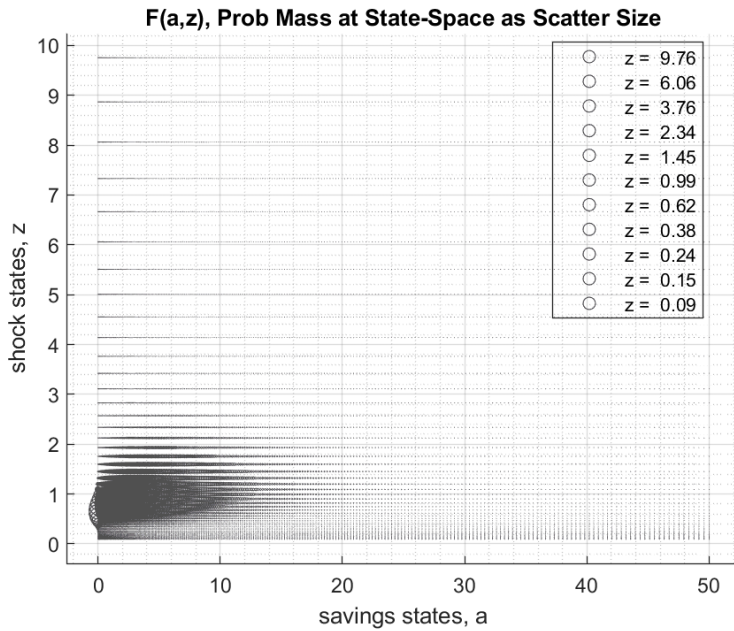


Joint Stationary Discrete Probability: $f(a,z)$, savings= x , shock= $color$



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
{'unweighted_sum' }	2.3346e+05	1.6237e+05	34668	53309	2.6813e+05	5324.8
{'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
{'gini' }	0.52595	0.17618	0.12829	0.19144	0.3969	0.26705
{'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
{'f1_cov_ap' }	11.305	6.5234	1.0466	1.0907	12.352	0.66084
{'f1_cor_ap' }	1	0.89316	0.88579	0.60415	0.99902	0.78009
{'f1_cov_v' }	6.5234	4.7186	0.76066	0.98362	7.2841	0.46879
{'f1_cor_v' }	0.89316	1	0.99645	0.84334	0.9119	0.85658
{'f1_cov_c' }	1.0466	0.76066	0.1235	0.15645	1.1701	0.077707
{'f1_cor_c' }	0.88579	0.99645	1	0.82914	0.9055	0.87766
{'f1_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