

# FF\_DS\_AZ\_CTS\_VEC Dynamic Savings Vectorized 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\\_vec](#) from the [MEconTools Package](#). F(a,z) discrete probability mass function given policy function solution with continuous savings choices, vectorized.

- 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\_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_ds_az_cts_vec(mp_params);
```

Elapsed time is 2.185467 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 = 0.13145

```
-----
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

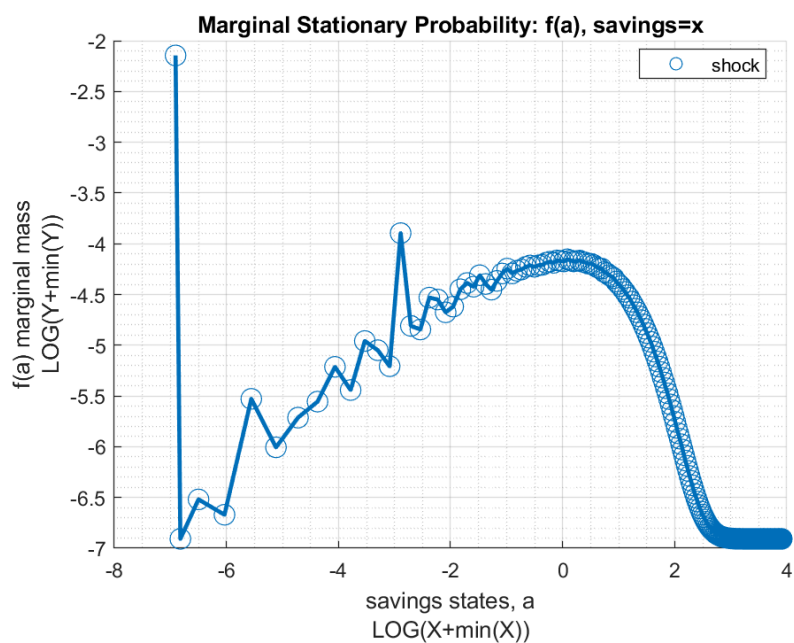
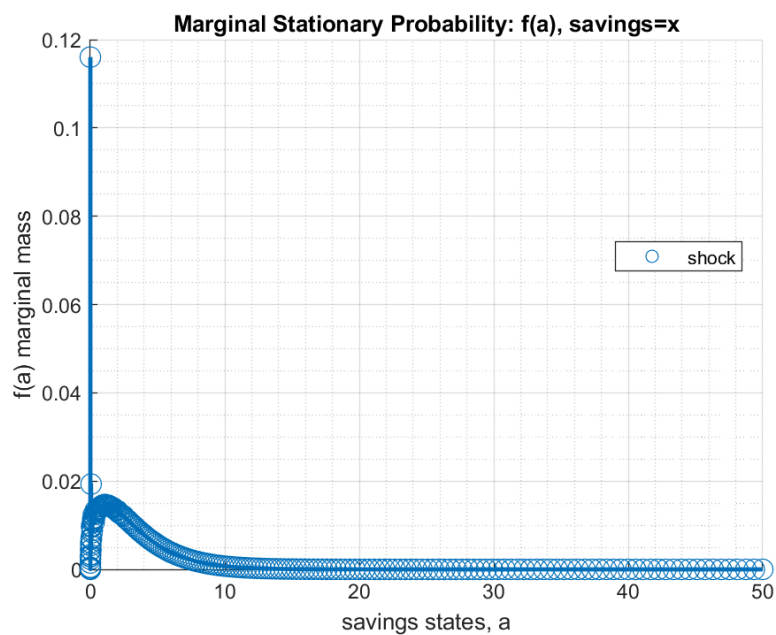
	c1
	—
r1	0.11604
r2	0
r3	0.0004751
r4	0.00026799
r5	0.0029727
r196	3.5618e-14
r197	2.1735e-14
r198	1.329e-14
r199	8.3938e-15
r200	8.2751e-15

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\_VEC 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_vec(mp_params, mp_support);
```

Elapsed time is 0.459956 seconds.  
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.015748

```
% 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_vec(mp_params, mp_support);
```

Elapsed time is 0.938024 seconds.  
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.046035

```
% 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_vec(mp_params, mp_support);
```

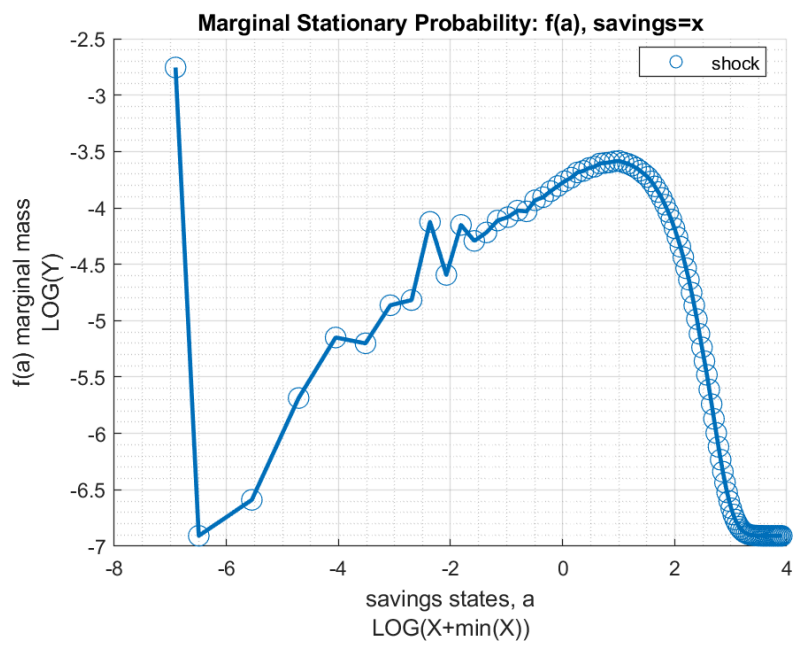
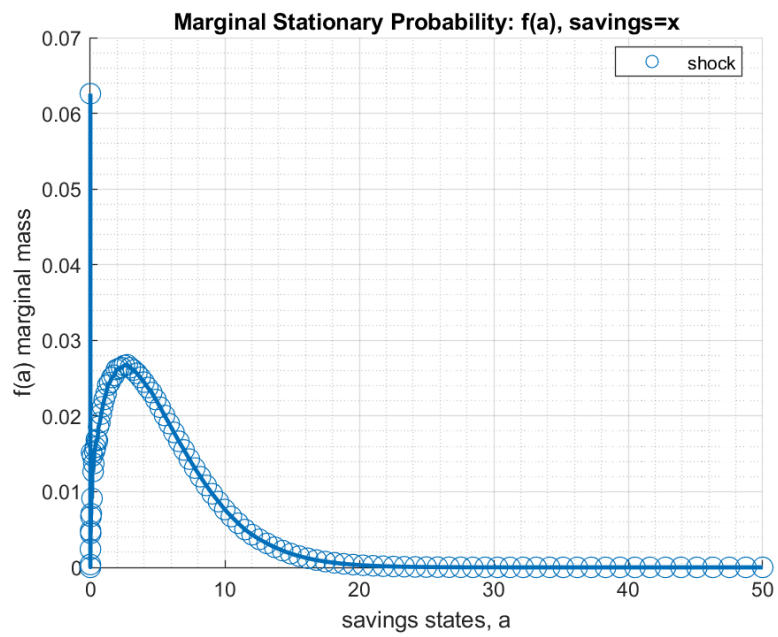
Elapsed time is 1.696573 seconds.  
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.12795

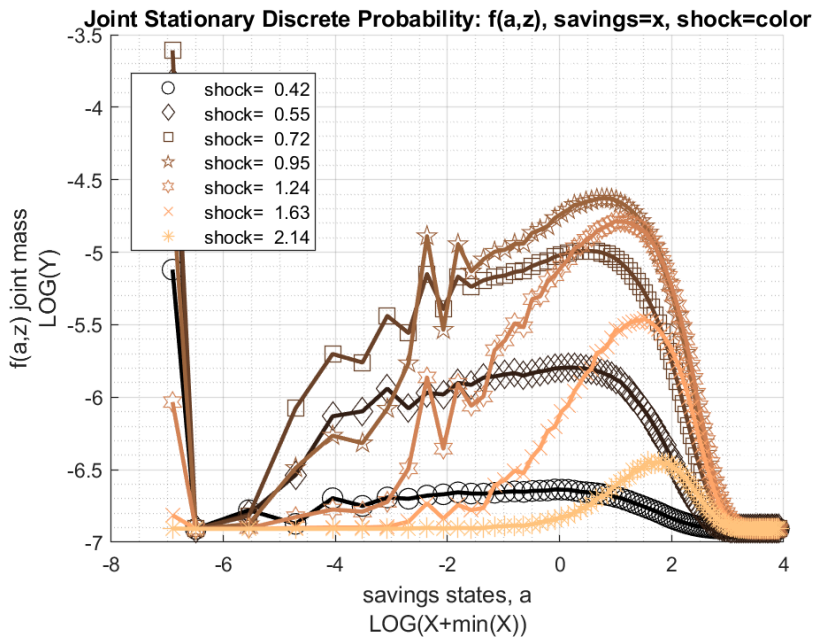
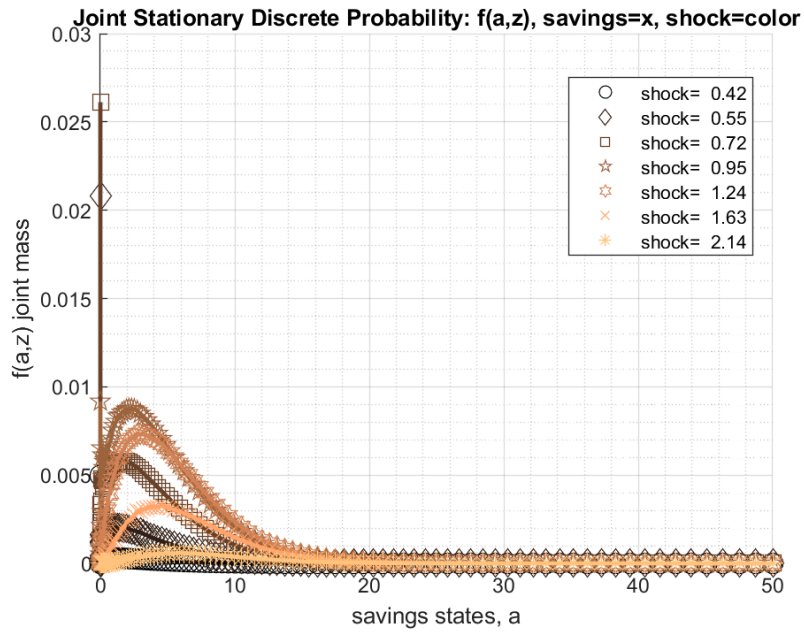
## Test FF\_DS\_AZ\_CTS\_VEC A grid 100 Shock grid 7

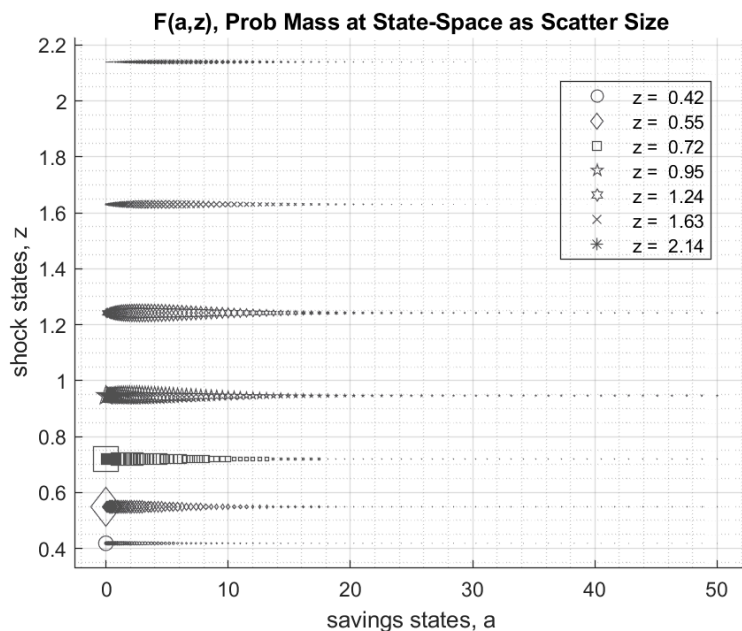
Call the function with different a and z grid size, print out speed:

```
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_vec(mp_params, mp_support);
```

Elapsed time is 0.931254 seconds.  
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.069571







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\_VEC A grid 300 Shock grid 25

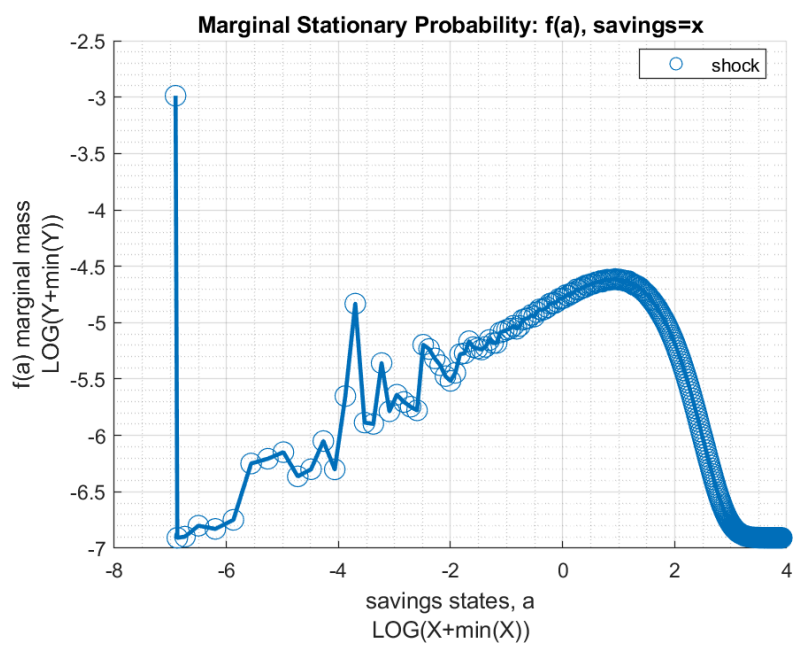
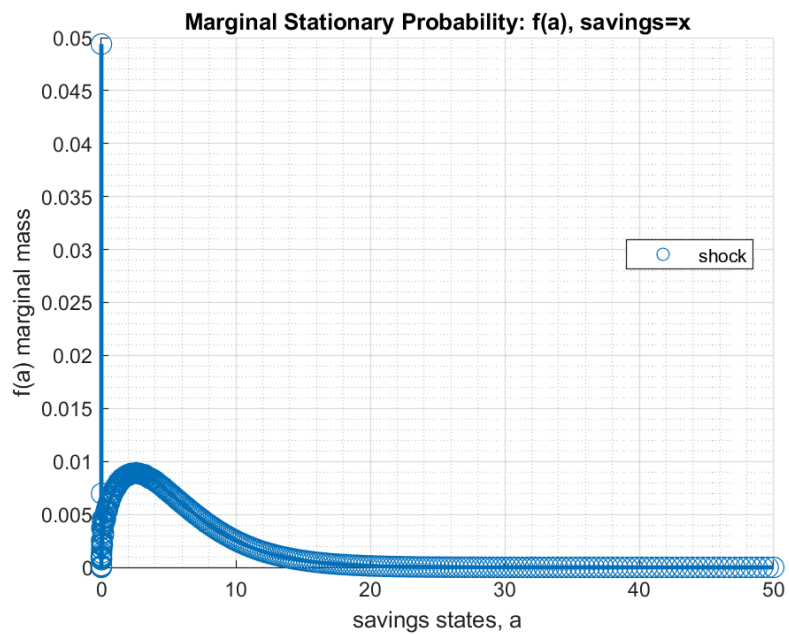
```

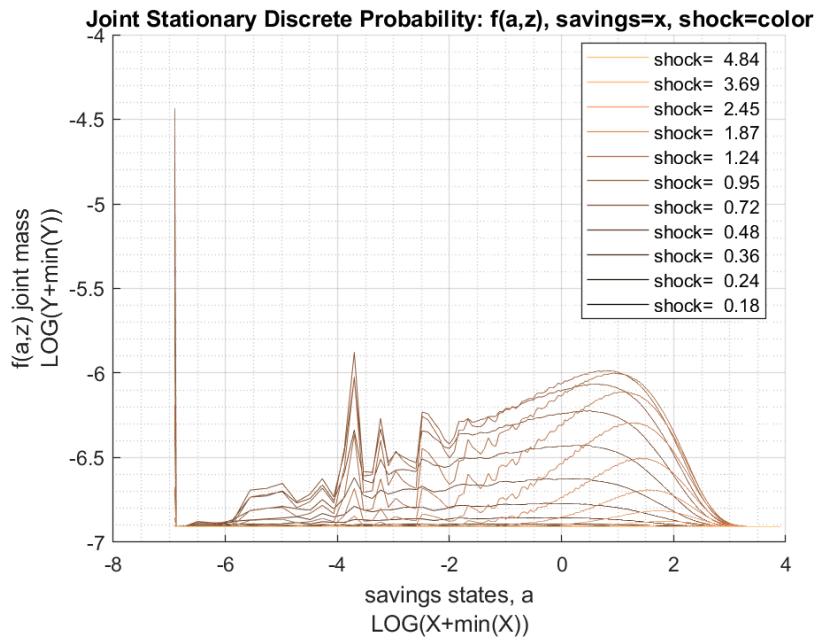
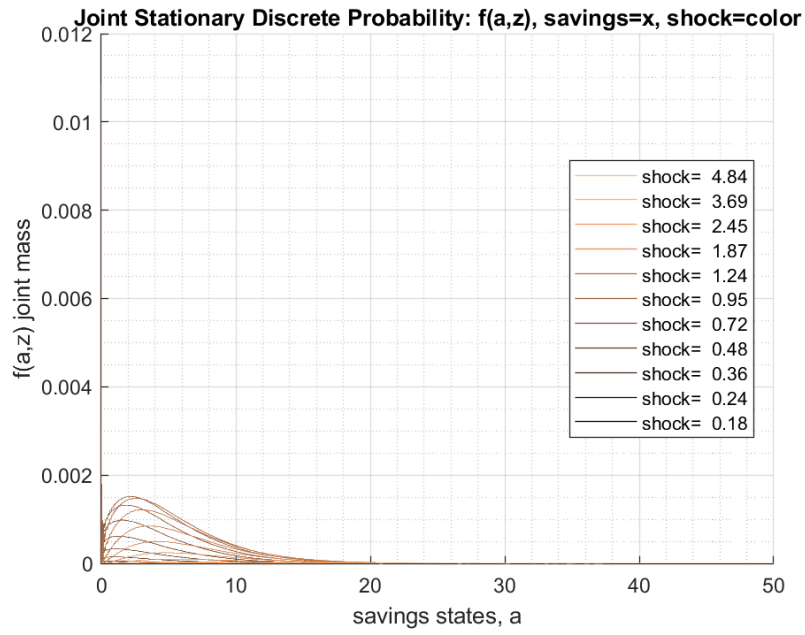
mp_support = containers.Map('KeyType','char', 'ValueType','any');
mp_support('bl_timer') = true;
mp_support('ls_ffcmd') = {};
mp_support('ls_ddcmd') = {};
mp_support('ls_ddgrh') = {'faz','fa'};
mp_support('bl_show_stats_table') = true;
mp_params = containers.Map('KeyType','char', 'ValueType','any');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

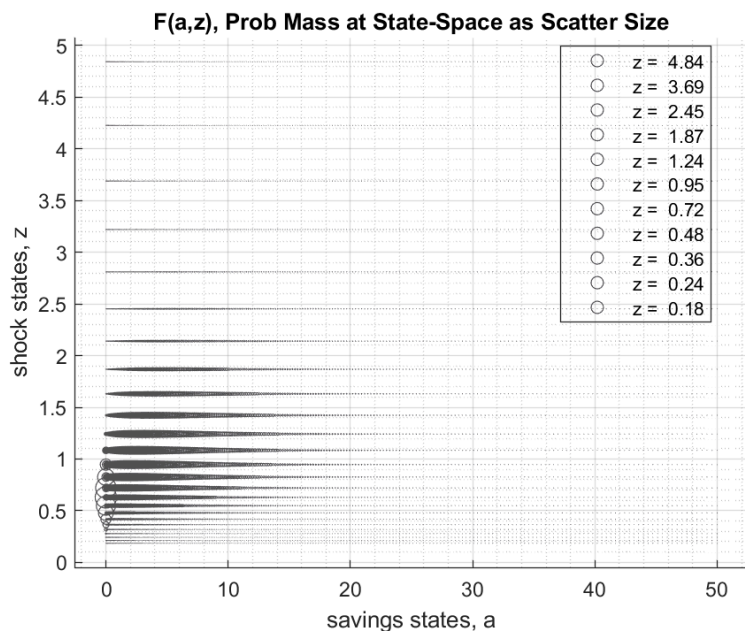
```

Elapsed time is 7.884421 seconds.

FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 0.34095







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\_VEC A grid 300 Shock grid 50

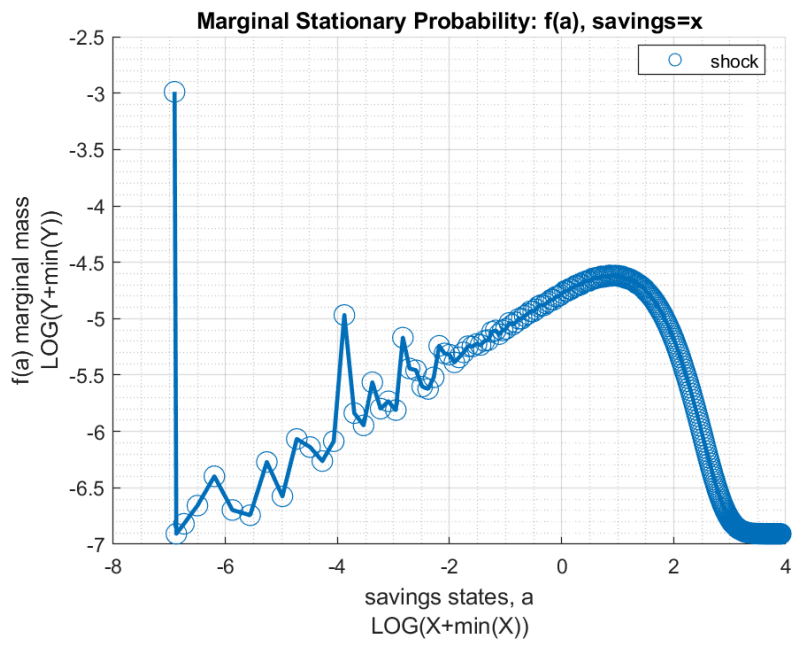
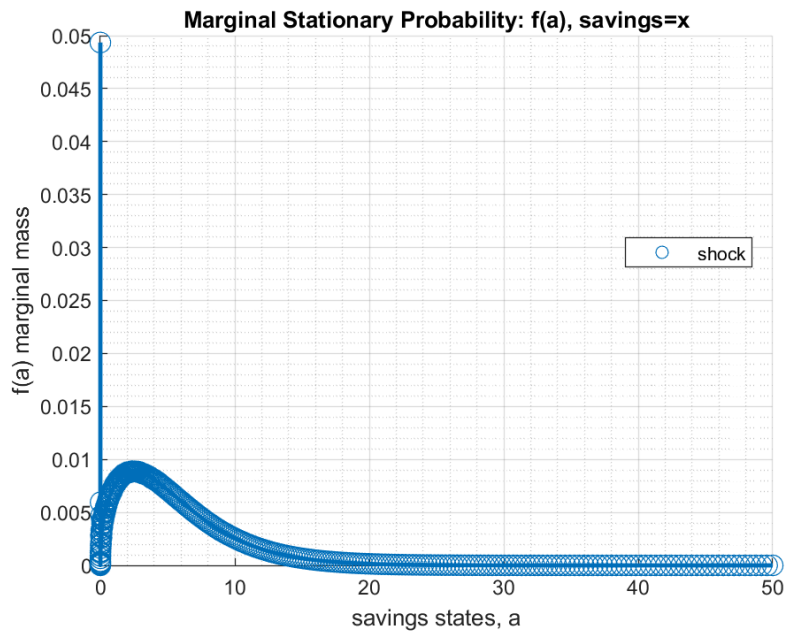
```

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_vec(mp_params, mp_support);

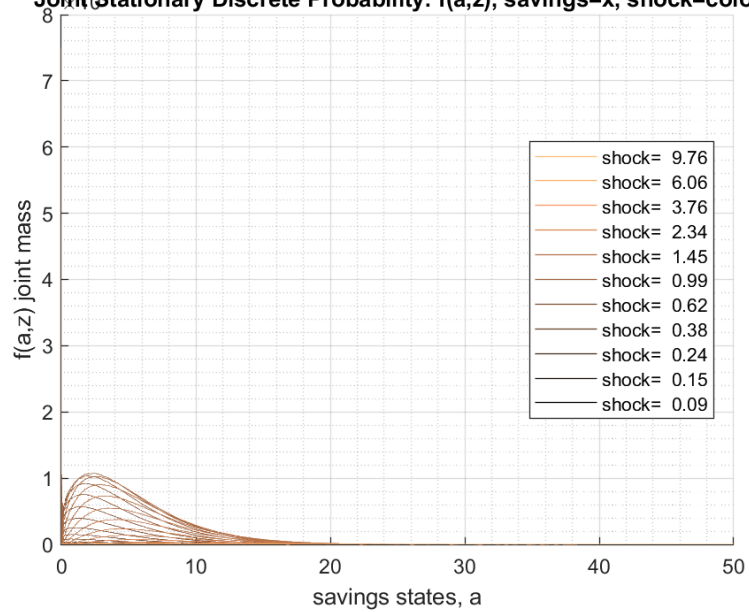
```

Elapsed time is 14.233149 seconds.

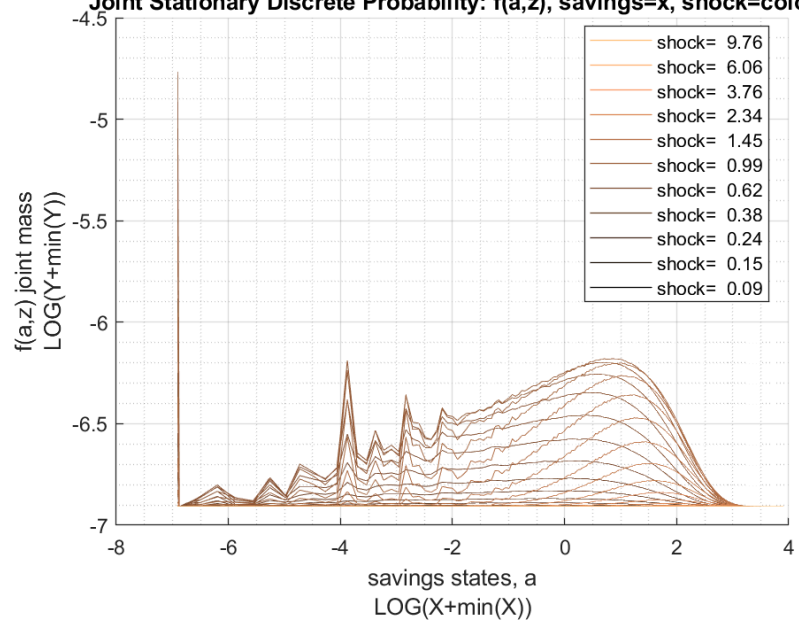
FF\_DS\_AZ\_CTS\_LOOP finished. Distribution took = 1.2257

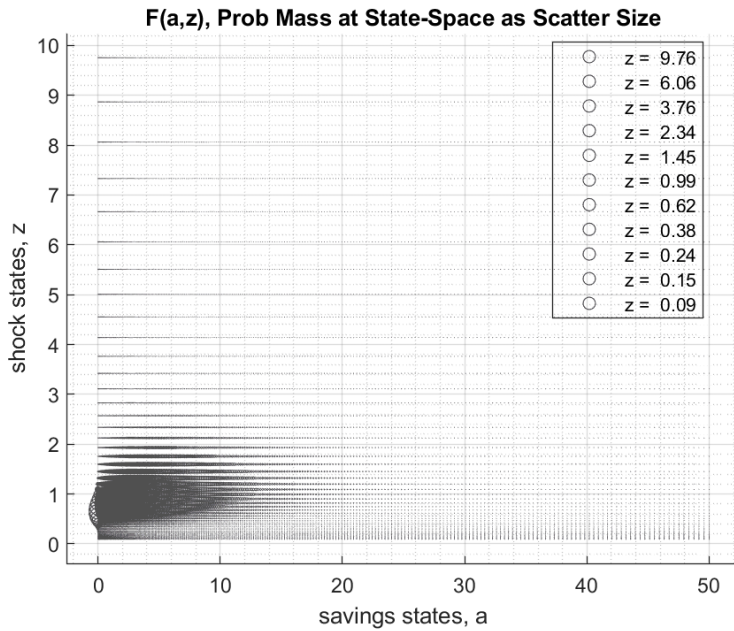


Joint Stationary Discrete Probability:  $f(a,z)$ , savings= $x$ , shock= $color$



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
{'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