FF_DISC_RAND_VAR_STATS Examples

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This is the example vignette for function: **ff_disc_rand_var_stats** from the **MEconTools Package.** This function summarizes statistics of matrixes stored in a container map, as well as scalar, string, function and other values stored in container maps.

Test FF_DISC_RAND_VAR_STATS Defaults

Call the function with defaults.

```
ff_disc_rand_var_stats();
```

```
-----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Summary Statistics for: binom
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
-----------------------------------------
fl_choice_mean
    -1.0000

fl_choice_sd
    2.5100

fl_choice_coefofvar
    -2.5100

fl_choice_prob_zero
    0.1416

fl_choice_prob_below_zero
    0.5888

fl_choice_prob_above_zero
    0.2696

fl_choice_prob_max
    2.0589e-16

tb_disc_cumu
```

binomDiscreteVal	binomDiscreteValProbMass	CDF	cumsumFrac
-10	2.2539e-05	0.0022539	0.00022539
-9	0.00028979	0.031233	0.0028335
-8	0.0018008	0.21132	0.01724
-7	0.0072034	0.93166	0.067664
-6	0.020838	3.0155	0.19269
-5	0.04644	7.6595	0.42489
-4	0.082928	15.952	0.75661
-3	0.12185	28.138	1.1222
-2	0.15014	43.152	1.4224
-1	0.15729	58.881	1.5797

binomDiscreteVal	binomDiscreteValProbMass	CDF	cumsumFrac
11	6.0392e-06	100	1
12	1.0588e-06	100	1
13	1.5784e-07	100	1

```
    14               1.973e-08       100     1
    15               2.0293e-09      100     1
    16               1.6725e-10      100     1
    17               1.0619e-11      100     1
    18               4.8762e-13      100     1
    19               1.4412e-14      100     1
    20               2.0589e-16      100     1
```

tb_prob_drv

percentiles	binomDiscreteValPercentileValues	fracOfSumHeldBelowThisPercentile
0.1	-8	0.01724
1	-6	0.19269
5	-5	0.42489
10	-4	0.75661
15	-4	0.75661
20	-3	1.1222
25	-3	1.1222
35	-2	1.4224
50	-1	1.5797
65	0	1.5797
75	1	1.4694
80	1	1.4694
85	2	1.3197
90	2	1.3197
95	3	1.1865
99	5	1.0412
99.9	7	1.0052

Test FF_DISC_RAND_VAR_STATS 0 and 1 Random Variable

The simplest discrete random variable has two values, zero or one. The probability of zero is 30 percent, and 70 percent is the probability of one.

```matlab
% Parameters
% 1. specify the random variable
st_var_name = 'bernoulli';
ar_choice_unique_sorted = [0, 1];
ar_choice_prob = [0.3, 0.7];
% 2. percentiles of interest
ar_fl_percentiles = [0.1 5 25 50 75 95 99.9];
% 3. print resutls
bl_display_drvstats = true;
% Call Function
[ds_stats_map] = ff_disc_rand_var_stats(st_var_name, ...
    ar_choice_unique_sorted, ar_choice_prob, ...
    ar_fl_percentiles, bl_display_drvstats);
```

```
-----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Summary Statistics for: bernoulli
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
-----------------------------------------
fl_choice_mean
    0.7000

fl_choice_sd
    0.4583
```

2

```
fl_choice_coefofvar
    0.6547

fl_choice_prob_zero
    0.3000

fl_choice_prob_below_zero
     0

fl_choice_prob_above_zero
    0.7000

fl_choice_prob_max
    0.7000

tb_disc_cumu
    bernoulliDiscreteVal    bernoulliDiscreteValProbMass    CDF    cumsumFrac
    _____    _____    ___    _____

             0                          0.3                 30         0
             1                          0.7                 100        1


    bernoulliDiscreteVal    bernoulliDiscreteValProbMass    CDF    cumsumFrac
    _____    _____    ___    _____

             0                          0.3                 30         0
             1                          0.7                 100        1

tb_prob_drv
    percentiles    bernoulliDiscreteValPercentileValues    fracOfSumHeldBelowThisPercentile
    _____    _____    _____

       0.1                          0                                      0
        5                           0                                      0
        25                          0                                      0
        50                          1                                      1
        75                          1                                      1
        95                          1                                      1
       99.9                         1                                      1
```

Test FF_DISC_RAND_VAR_STATS with Poisson

Poisson random variable, with mean equals to ten, summarize over umsymmetric percentiles. Note that the poisson random variable has no upper bound.

```matlab
% Parameters
% 1. specify the random variable
st_var_name = 'poisson';
mu = 10;
ar_choice_unique_sorted = 0:1:50;
ar_choice_prob = poisspdf(ar_choice_unique_sorted, mu);
% 2. percentiles of interest, unsymmetric
ar_fl_percentiles = [0.1 5 10 25 50 90 95 99 99.9 99.99 99.999 99.9999];
% 3. print resutls
bl_display_drvstats = true;
% Call Function
[ds_stats_map] = ff_disc_rand_var_stats(st_var_name, ...
    ar_choice_unique_sorted, ar_choice_prob, ...
    ar_fl_percentiles, bl_display_drvstats);
```

```
----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Summary Statistics for: poisson
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
----------------------------------------
fl_choice_mean
     10

fl_choice_sd
     3.1623

fl_choice_coefofvar
     0.3162

fl_choice_prob_zero
   4.5400e-05

fl_choice_prob_below_zero
      0

fl_choice_prob_above_zero
     1.0000

fl_choice_prob_max
   1.4927e-19

tb_disc_cumu
```

tb_disc_cumu

poissonDiscreteVal	poissonDiscreteValProbMass	CDF	cumsumFrac
0	4.54e-05	0.00454	0
1	0.000454	0.04994	4.54e-05
2	0.00227	0.27694	0.0004994
3	0.0075667	1.0336	0.0027694
4	0.018917	2.9253	0.010336
5	0.037833	6.7086	0.029253
6	0.063055	13.014	0.067086
7	0.090079	22.022	0.13014
8	0.1126	33.282	0.22022
9	0.12511	45.793	0.33282

poissonDiscreteVal	poissonDiscreteValProbMass	CDF	cumsumFrac
41	1.3571e-13	100	1
42	3.2313e-14	100	1
43	7.5146e-15	100	1
44	1.7079e-15	100	1
45	3.7953e-16	100	1
46	8.2506e-17	100	1
47	1.7554e-17	100	1
48	3.6572e-18	100	1
49	7.4636e-19	100	1
50	1.4927e-19	100	1

tb_prob_drv

percentiles	poissonDiscreteValPercentileValues	fracOfSumHeldBelowThisPercentile
0.1	2	0.0004994
5	5	0.029253
10	6	0.067086
25	8	0.22022
50	10	0.45793

```
           90                    14                          0.86446
           95                    15                          0.91654
           99                    18                          0.98572
         99.9                    21                          0.99841
        99.99                    24                          0.99988
       99.999                    26                          0.99998
          100                    28                               1
```

```
% Print out full Stored Matrix
% Note that the outputs are single row arrays.
ff_container_map_display(ds_stats_map, 100, 100)
```

```
-----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: ds_stats_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari
ar_choice_perc_fracheld	1	1	2	12	1	12	7.54	0.62833	0.435	0.69231
ar_choice_percentiles	2	2	2	12	1	12	177	14.75	8.7399	0.59254
ar_fl_percentiles	3	3	2	12	1	12	773.99	64.499	42.887	0.66492

```
xxx TABLE:ar_choice_perc_fracheld xxxxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c
r1	0.0004994	0.029253	0.067086	0.22022	0.45793	0.86446	0.91654	0.98572	0.99841	0.9

```
xxx TABLE:ar_choice_percentiles xxxxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12
r1	2	5	6	8	10	14	15	18	21	24	26	28

```
xxx TABLE:ar_fl_percentiles xxxxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12
r1	0.1	5	10	25	50	90	95	99	99.9	99.99	99.999	100

```
-----------------------------------------
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: ds_stats_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	value
fl_choice_coefofvar	1	4	0.31623
fl_choice_max	2	5	50
fl_choice_mean	3	6	10
fl_choice_min	4	7	0
fl_choice_prob_above_zero	5	8	0.99995
fl_choice_prob_below_zero	6	9	0
fl_choice_prob_max	7	10	1.4927e-19
fl_choice_prob_min	8	11	4.54e-05
fl_choice_prob_zero	9	12	4.54e-05
fl_choice_sd	10	13	3.1623