FFY_TAUCHEN AR1 Shock Discretization Example

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This is the example vignette for function: **ffy_tauchen** from the **MEconTools Package**. : See also the **ffy_rouwenhorst** function from the **MEconTools Package.** This function discretize a mean zero AR1 process, uses Tauchen (1986). See AR 1 Example for some details on how the AR1 process works. And See Kopecky and Suen (2010).

Test FFY_TAUCHEN Defaults

Call the function with defaults. Default sd bounds arer plus and minus 4. This is used in the following examples, unless otherwise specified as the 5th parameter.

```
ffy_tauchen();
```

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xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari	min
ar_disc_ar1	1	1	2	5	5	1	0	0	0.79057	Inf	
mt_disc_ar1_trans	2	6	2	25	5	5	5	0.2	0.27623	1.3812	7.3923e-

```
xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxxx
```

	c1
r1	-1
r2	-0.5
r3	0
r4	0.5
r5	1

```
xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5
r1	0.22663	0.73331	0.040048	1.0689e-05	7.3923e-12
r2	0.012224	0.58648	0.39831	0.0029797	7.605e-08
r3	8.8417e-05	0.10556	0.7887	0.10556	8.8417e-05
r4	7.605e-08	0.0029797	0.39831	0.58648	0.012224
r5	7.3923e-12	1.0689e-05	0.040048	0.73331	0.22663

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CONTAINER NAME: mp_container_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
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	i	idx	value
fl_ar1_persistence	1	2	0.6
fl_ar1_step	2	3	0.5
fl_shk_std	3	4	0.2
it_std_bound	4	5	4

Test FFY_TAUCHEN Specify Parameters

With a grid of 10 points, the sd bounds on Tauchen and Rouwenhorst are identical. With the not extremely persistent shock process here, the Tauchen and Rouwenhorst Results are very similar.

```
[fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose, it_std_bound] = ...
    deal(0.60, 0.10, 10, true, 3);
ffy_tauchen(fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose, it_std_bound);
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xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                         i    idx   ndim   numel   rowN   colN       sum         mean         std      coef

                         _    ___   ____   _____   ____   ____    _____   _____    _____    ____

    ar_disc_ar1          1    1      2      10      10     1     -7.2164e-16  -7.2164e-17    0.2523    -3.49
    mt_disc_ar1_trans    2    6      2      100     10     10                          10        0.1    0.11456
```

```
xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxxx
          c1

        _____

    r1        -0.375
    r2      -0.29167
    r3      -0.20833
    r4        -0.125
    r5     -0.041667
    r6      0.041667
    r7         0.125
    r8       0.20833
    r9       0.29167
    r10        0.375
```

```
xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxxx
           c1          c2          c3          c4          c5         c6          c7          c8

        _____  _____  _____  _____  _____  _____  _____  _____

    r1     0.13933     0.26196     0.31887     0.20154    0.066066   0.011201   0.00097859  4.3874e-05
    r2    0.056673     0.16995     0.30658     0.28713      0.1396   0.035167   0.0045756   0.00030628
    r3     0.01861    0.087039     0.23281     0.32308     0.23281   0.087039   0.016841    0.0016806
    r4   0.0048925    0.035167      0.1396     0.28713     0.30658    0.16995   0.048841    0.0072547
    r5   0.0010235    0.011201    0.066066     0.20154     0.31887    0.26196   0.11169       0.02466
    r6  0.00016962   0.0028101     0.02466     0.11169     0.26196    0.31887   0.20154      0.066066
    r7   2.2197e-05  0.00055483   0.0072547    0.048841     0.16995    0.30658   0.28713        0.1396
    r8   2.2881e-06  8.6129e-05   0.0016806    0.016841    0.087039    0.23281   0.32308       0.23281
    r9   1.8543e-07  1.0503e-05  0.00030628   0.0045756    0.035167     0.1396   0.28713       0.30658
    r10  1.1798e-08  1.0053e-06  4.3874e-05  0.00097859    0.011201   0.066066   0.20154       0.31887
```

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CONTAINER NAME: mp_container_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
                         i    idx     value

                         _    ___    _____

    fl_ar1_persistence   1    2         0.6
    fl_ar1_step          2    3      0.083333
    fl_shk_std           3    4         0.1
    it_std_bound         4    5           3
```

Test FFY_TAUCHEN High Persistence, Low SD

```
[fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose] = ...
    deal(0.99, 0.01, 7, true);
ffy_tauchen(fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose);
```

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CONTAINER NAME: mp_container_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari	mir
	_	___	____	_____	____	____	___	_____	_____	_____	___
ar_disc_ar1	1	1	2	7	7	1	0	0	0.15314	Inf	-0.21
mt_disc_ar1_trans	2	6	2	49	7	7	7	0.14286	0.35338	2.4737	

```
xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxx
```

	c1
	_____
r1	-0.21266
r2	-0.14178
r3	-0.070888
r4	0
r5	0.070888
r6	0.14178
r7	0.21266

```
xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c6	c7
	_____	_____	_____	_____	_____	_____	_____
r1	0.99957	0.00043152	0	0	0	0	0
r2	0.00011382	0.99955	0.0003337	0	0	0	0
r3	4.8683e-27	0.00015	0.99959	0.00025684	0	0	0
r4	1.4175e-70	1.0439e-26	0.00019675	0.99961	0.00019675	0	0
r5	1.9884e-135	4.986e-70	2.2273e-26	0.00025684	0.99959	0.00015	0
r6	1.2359e-221	1.149e-134	1.7451e-69	4.7287e-26	0.0003337	0.99955	0.00011382
r7	0	1.1738e-220	6.6059e-134	6.077e-69	9.9893e-26	0.00043152	0.99957

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CONTAINER NAME: mp_container_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	value
	_	___	_____
fl_ar1_persistence	1	2	0.99
fl_ar1_step	2	3	0.070888
fl_shk_std	3	4	0.01
it_std_bound	4	5	3

Test FFY_TAUCHEN Low Persistence, Low SD

```
[fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose] = ...
    deal(0.01, 0.01, 7, true);
ffy_tauchen(fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose);
```

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xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefv
ar_disc_ar1	1	1	2	7	7	1	3.4694e-18	4.9564e-19	0.021604	4.3588
mt_disc_ar1_trans	2	6	2	49	7	7	7	0.14286	0.13667	0.9

xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxx

	c1
r1	-0.030002
r2	-0.020001
r3	-0.010001
r4	0
r5	0.010001
r6	0.020001
r7	0.030002

xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxx

	c1	c2	c3	c4	c5	c6	c7
r1	0.0067533	0.064018	0.2484	0.38278	0.23505	0.057298	0.0057011
r2	0.0065668	0.06286	0.24618	0.38287	0.23728	0.05838	0.0058656
r3	0.0063849	0.061717	0.24396	0.38292	0.2395	0.059478	0.0060344
r4	0.0062075	0.06059	0.24173	0.38294	0.24173	0.06059	0.0062075
r5	0.0060344	0.059478	0.2395	0.38292	0.24396	0.061717	0.0063849
r6	0.0058656	0.05838	0.23728	0.38287	0.24618	0.06286	0.0065668
r7	0.0057011	0.057298	0.23505	0.38278	0.2484	0.064018	0.0067533

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CONTAINER NAME: mp_container_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	value
fl_ar1_persistence	1	2	0.01
fl_ar1_step	2	3	0.010001
fl_shk_std	3	4	0.01
it_std_bound	4	5	3

Test FFY_TAUCHEN High Persistence, High SD

```
[fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose] = ...
    deal(0.99, 0.99, 7, true);
ffy_tauchen(fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose);
```

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xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coef
ar_disc_ar1	1	1	2	7	7	1	-7.1054e-15	-1.0151e-15	15.16	-1.49
mt_disc_ar1_trans	2	6	2	49	7	7	7	0.14286	0.35338	

xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxx

	c1
r1	-21.054

```
          r2       -14.036
          r3       -7.0179
          r4   -1.7764e-15
          r5        7.0179
          r6        14.036
          r7        21.054
```

xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxx

	c1	c2	c3	c4	c5	c6	c7
r1	0.99957	0.00043152	0	0	0	0	0
r2	0.00011382	0.99955	0.0003337	0	0	0	0
r3	4.8683e-27	0.00015	0.99959	0.00025684	0	0	0
r4	1.4175e-70	1.0439e-26	0.00019675	0.99961	0.00019675	0	0
r5	1.9884e-135	4.986e-70	2.2273e-26	0.00025684	0.99959	0.00015	0
r6	1.2359e-221	1.149e-134	1.7451e-69	4.7287e-26	0.0003337	0.99955	0.00011382
r7	0	1.1738e-220	6.6059e-134	6.077e-69	9.9893e-26	0.00043152	0.99957

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xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	value
fl_ar1_persistence	1	2	0.99
fl_ar1_step	2	3	7.0179
fl_shk_std	3	4	0.99
it_std_bound	4	5	3

Test FFY_TAUCHEN Low Persistence, Low SD

```
[fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose] = ...
    deal(0.01, 0.01, 7, true);
ffy_tauchen(fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose);
```

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CONTAINER NAME: mp_container_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefv
ar_disc_ar1	1	1	2	7	7	1	3.4694e-18	4.9564e-19	0.021604	4.3588
mt_disc_ar1_trans	2	6	2	49	7	7	7	0.14286	0.13667	0.9

xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxxx

	c1
r1	-0.030002
r2	-0.020001
r3	-0.010001
r4	0
r5	0.010001
r6	0.020001
r7	0.030002

xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxx

	c1	c2	c3	c4	c5	c6	c7

```
r1    0.0067533    0.064018    0.2484     0.38278    0.23505    0.057298    0.0057011
r2    0.0065668    0.06286     0.24618    0.38287    0.23728    0.05838     0.0058656
r3    0.0063849    0.061717    0.24396    0.38292    0.2395     0.059478    0.0060344
r4    0.0062075    0.06059     0.24173    0.38294    0.24173    0.06059     0.0062075
r5    0.0060344    0.059478    0.2395     0.38292    0.24396    0.061717    0.0063849
r6    0.0058656    0.05838     0.23728    0.38287    0.24618    0.06286     0.0065668
r7    0.0057011    0.057298    0.23505    0.38278    0.2484     0.064018    0.0067533


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CONTAINER NAME: mp_container_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	value
fl_ar1_persistence	1	2	0.01
fl_ar1_step	2	3	0.010001
fl_shk_std	3	4	0.01
it_std_bound	4	5	3