

# FFY\_TAUCHEN AR1 Shock Discretization Example

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This is the example vignette for function: [ffynet\\_tauschen](#) from the [MEconTools Package](#). : See also the [ffynet\\_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.

```
ffynet_tauschen();
```

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

	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 xxxxxxxxxxxxxxxxxxxxxxx  
c1
```

	—
r1	-1
r2	-0.5
r3	0
r4	0.5
r5	1

```
xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxxxxxx
```

	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

```
-----  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
CONTAINER NAME: mp_container_map Scalars  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

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

	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 XXXXXXXXXXXXXXXXXXXXX
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 XXXXXXXXXXXXXXXXXXXXX
```

	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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XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
CONTAINER NAME: mp_container_map Scalars
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

	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);
ffyy_tauschen(fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose);
```

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

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coef
ar_disc_ar1	1	1	2	7	7	1	-5.5511e-17	-7.9302e-18	0.20418	-2.57
mt_disc_ar1_trans	2	6	2	49	7	7	7	0.14286	0.35355	

```
xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxxxx
c1
```

r1	-0.28355
r2	-0.18903
r3	-0.094517
r4	-2.7756e-17
r5	0.094517
r6	0.18903
r7	0.28355

```
xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c6	c7
r1	1	4.4497e-06	0	0	0	0	0
r2	4.4412e-07	1	2.8552e-06	0	0	0	0
r3	1.632e-46	7.1638e-07	1	1.8164e-06	0	0	0
r4	9.6185e-124	6.3021e-46	1.1456e-06	1	1.1456e-06	0	0
r5	6.3206e-239	8.9712e-123	2.4121e-45	1.8164e-06	1	7.1638e-07	0
r6	0	1.426e-237	8.2932e-122	9.1503e-45	2.8552e-06	1	4.4412e-07
r7	0	0	3.1885e-236	7.5984e-121	3.4405e-44	4.4497e-06	1

```
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XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
CONTAINER NAME: mp_container_map Scalars
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

	i	idx	value
fl_ar1_persistence	1	2	0.99
fl_ar1_step	2	3	0.094517
fl_shk_std	3	4	0.01
it_std_bound	4	5	4

## 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);
ffyy_tauschen(fl_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose);
```

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

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari	m
	—	—	—	—	—	—	—	—	—	—	—
ar_disc_ar1	1	1	2	7	7	1	0	0	0.028805	Inf	-0.0
mt_disc_ar1_trans	2	6	2	49	7	7	7	0.14286	0.17448	1.2213	0.00

```
xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxxxx
c1
```

```
r1 -0.040002
r2 -0.026668
r3 -0.013334
r4 0
r5 0.013334
r6 0.026668
r7 0.040002
```

```
xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c6	c7
	—	—	—	—	—	—	—
r1	0.00049475	0.024497	0.24044	0.4947	0.21921	0.020299	0.00037109
r2	0.00047179	0.023751	0.23685	0.49488	0.2227	0.020954	0.00038948
r3	0.00044982	0.023024	0.23329	0.495	0.22621	0.021626	0.0004087
r4	0.0004288	0.022316	0.22974	0.49504	0.22974	0.022316	0.0004288
r5	0.0004087	0.021626	0.22621	0.495	0.23329	0.023024	0.00044982
r6	0.00038948	0.020954	0.2227	0.49488	0.23685	0.023751	0.00047179
r7	0.00037109	0.020299	0.21921	0.4947	0.24044	0.024497	0.00049475

```
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xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	value
	—	—	—
fl_ar1_persistence	1	2	0.01
fl_ar1_step	2	3	0.013334
fl_shk_std	3	4	0.01
it_std_bound	4	5	4

## 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);
ffynet(fly_ar1_persistence, fly_shk_std, it_disc_points, bl_verbose);
```

```
-----
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coef
	—	—	—	—	—	—	—	—	—	—
ar_disc_ar1	1	1	2	7	7	1	-3.5527e-15	-5.0753e-16	20.214	-3.98
mt_disc_ar1_trans	2	6	2	49	7	7	7	0.14286	0.35355	

```
xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxxxx
c1
```

```
r1 -28.072
```

```

r2    -18.714
r3    -9.3572
r4      0
r5     9.3572
r6     18.714
r7     28.072

```

```
xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxxx
```

	c1	c2	c3	c4	c5	c6	c7
r1	1	4.4497e-06	0	0	0	0	0
r2	4.4412e-07	1	2.8552e-06	0	0	0	0
r3	1.632e-46	7.1638e-07	1	1.8164e-06	0	0	0
r4	9.6185e-124	6.3021e-46	1.1456e-06	1	1.1456e-06	0	0
r5	6.3206e-239	8.9712e-123	2.4121e-45	1.8164e-06	1	7.1638e-07	0
r6	0	1.426e-237	8.2932e-122	9.1503e-45	2.8552e-06	1	4.4412e-07
r7	0	0	3.1885e-236	7.5984e-121	3.4405e-44	4.4497e-06	1

```

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xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map Scalars
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

```

	i	idx	value
fl_ar1_persistence	1	2	0.99
fl_ar1_step	2	3	9.3572
fl_shk_std	3	4	0.99
it_std_bound	4	5	4

## 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);
ffynet(fly_ar1_persistence, fl_shk_std, it_disc_points, bl_verbose);

```

```

-----
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
CONTAINER NAME: mp_container_map ND Array (Matrix etc)
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

```

	i	idx	ndim	numel	rowN	colN	sum	mean	std	coefvari	m
ar_disc_ar1	1	1	2	7	7	1	0	0	0.028805	Inf	-0.000000
mt_disc_ar1_trans	2	6	2	49	7	7	7	0.14286	0.17448	1.2213	0.000000

```
xxx TABLE:ar_disc_ar1 xxxxxxxxxxxxxxxxxxxx
```

	c1
r1	-0.040002
r2	-0.026668
r3	-0.013334
r4	0
r5	0.013334
r6	0.026668
r7	0.040002

```
xxx TABLE:mt_disc_ar1_trans xxxxxxxxxxxxxxxxxxxx
```

c1	c2	c3	c4	c5	c6	c7
----	----	----	----	----	----	----

r1	0.00049475	0.024497	0.24044	0.4947	0.21921	0.020299	0.00037109
r2	0.00047179	0.023751	0.23685	0.49488	0.2227	0.020954	0.00038948
r3	0.00044982	0.023024	0.23329	0.495	0.22621	0.021626	0.0004087
r4	0.0004288	0.022316	0.22974	0.49504	0.22974	0.022316	0.0004288
r5	0.0004087	0.021626	0.22621	0.495	0.23329	0.023024	0.00044982
r6	0.00038948	0.020954	0.2227	0.49488	0.23685	0.023751	0.00047179
r7	0.00037109	0.020299	0.21921	0.4947	0.24044	0.024497	0.00049475

```

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XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
CONTAINER NAME: mp_container_map Scalars
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

	i	idx	value
	—	—	—
fl_ar1_persistence	1	2	0.01
fl_ar1_step	2	3	0.013334
fl_shk_std	3	4	0.01
it_std_bound	4	5	4