

```

(pid=23996) 'infos': np.ndarray((32,), dtype=object,
head={'delta': -1.0654576204105404}),
(pid=23996) 'new_obs': np.ndarray((32, 2), dtype=float32,
min=-1.526, max=1.286, mean=-0.265),
(pid=23996) 'obs': np.ndarray((32, 2), dtype=float32,
min=-1.526, max=1.286, mean=-0.264),
(pid=23996) 'prev_actions': np.ndarray((32,),
dtype=int64, min=0.0, max=4.0, mean=2.062),
(pid=23996) 'prev_rewards': np.ndarray((32,),
dtype=float32, min=0.0, max=0.349, mean=0.17),
(pid=23996) 'q_values': np.ndarray((32, 5),
dtype=float32, min=-0.938, max=1.647, mean=0.13),
(pid=23996) 'rewards': np.ndarray((32,), dtype=float32,
min=0.2, max=0.936, mean=0.507),
(pid=23996) 't': np.ndarray((32,), dtype=int64, min=0.0,
max=31.0, mean=15.5),
(pid=23996) 'unroll_id': np.ndarray((32,), dtype=int64,
min=0.0, max=0.0, mean=0.0),
(pid=23996) 'weights': np.ndarray((32,), dtype=float32,
min=2.219, max=2.556, mean=2.362)},
(pid=23996) 'type': 'SampleBatch'}}
(pid=23996) 2019-09-21 11:46:34,471 INFO rollout_worker.py:485 -- Completed
sample batch:
(pid=23996) { 'count': 256,
(pid=23996) 'policy_batches': { 'agent_0': { 'data': { 'actions':
np.ndarray((256,), dtype=int64, min=0.0, max=4.0, mean=1.812),
(pid=23996) 'agent_index':
np.ndarray((256,), dtype=int64, min=0.0, max=0.0, mean=0.0),
(pid=23996) 'dones':
np.ndarray((256,), dtype=bool, min=0.0, max=0.0, mean=0.0),
(pid=23996) 'eps_id':
np.ndarray((256,), dtype=int64, min=21651687.0, max=1929541873.0,
mean=1301732864.875),
(pid=23996) 'infos':
np.ndarray((256,), dtype=object, head={'delta': -1.070352770441319}),
(pid=23996) 'new_obs':
np.ndarray((256, 2), dtype=float32, min=-2.229, max=1.83, mean=-0.057),
(pid=23996) 'obs': np.ndarray((256,
2), dtype=float32, min=-2.229, max=1.83, mean=-0.015),
(pid=23996) 'prev_actions':
np.ndarray((256,), dtype=int64, min=0.0, max=4.0, mean=1.758),
(pid=23996) 'prev_rewards':
np.ndarray((256,), dtype=float32, min=0.0, max=0.414, mean=0.244),
(pid=23996) 'q_values':
np.ndarray((256, 5), dtype=float32, min=-1.638, max=3.088, mean=0.384),
(pid=23996) 'rewards':
np.ndarray((256,), dtype=float32, min=0.154, max=1.195, mean=0.713),
(pid=23996) 't': np.ndarray((256,),
dtype=int64, min=0.0, max=31.0, mean=15.5),
(pid=23996) 'unroll_id':
np.ndarray((256,), dtype=int64, min=0.0, max=0.0, mean=0.0),
(pid=23996) 'weights':
np.ndarray((256,), dtype=float32, min=2.222, max=3.119, mean=2.47)},
(pid=23996) 'type': 'SampleBatch'},
(pid=23996) 'agent_1': { 'data': { 'actions':
np.ndarray((256,), dtype=int64, min=0.0, max=4.0, mean=1.965),
(pid=23996) 'agent_index':

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np.ndarray((256,), dtype=int64, min=1.0, max=1.0, mean=1.0),
(pid=23996)                                     'done':
np.ndarray((256,), dtype=bool, min=0.0, max=0.0, mean=0.0),
(pid=23996)                                     'eps_id':
np.ndarray((256,), dtype=int64, min=21651687.0, max=1929541873.0,
mean=1301732864.875),
(pid=23996)                                     'infos':
np.ndarray((256,), dtype=object, head={'delta': -1.0654576204105404}),
(pid=23996)                                     'new_obs':
np.ndarray((256, 2), dtype=float32, min=-2.229, max=1.83, mean=-0.057),
(pid=23996)                                     'obs': np.ndarray((256,
2), dtype=float32, min=-2.229, max=1.83, mean=-0.015),
(pid=23996)                                     'prev_actions':
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(pid=23996)                                     'prev_rewards':
np.ndarray((256,), dtype=float32, min=0.0, max=0.419, mean=0.214),
(pid=23996)                                     'q_values':
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(pid=23996)                                     't': np.ndarray((256,),
dtype=int64, min=0.0, max=31.0, mean=15.5),
(pid=23996)                                     'unroll_id':
np.ndarray((256,), dtype=int64, min=0.0, max=0.0, mean=0.0),
(pid=23996)                                     'weights':
np.ndarray((256,), dtype=float32, min=2.165, max=3.319, mean=2.427)},
(pid=23996)                                     'type': 'SampleBatch'}},
(pid=23996)   'type': 'MultiAgentBatch'}
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorflow/python/framework/dtypes.py:516: FutureWarning: Passing (type, 1) or
'type' as a synonym of type is deprecated; in a future version of numpy, it will
be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_qint8 = np.dtype [("qint8", np.int8, 1)])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorflow/python/framework/dtypes.py:517: FutureWarning: Passing (type, 1) or
'type' as a synonym of type is deprecated; in a future version of numpy, it will
be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_quint8 = np.dtype [("quint8", np.uint8, 1)])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorflow/python/framework/dtypes.py:518: FutureWarning: Passing (type, 1) or
'type' as a synonym of type is deprecated; in a future version of numpy, it will
be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_qint16 = np.dtype [("qint16", np.int16, 1)])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorflow/python/framework/dtypes.py:519: FutureWarning: Passing (type, 1) or
'type' as a synonym of type is deprecated; in a future version of numpy, it will
be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_quint16 = np.dtype [("quint16", np.uint16, 1)])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorflow/python/framework/dtypes.py:520: FutureWarning: Passing (type, 1) or
'type' as a synonym of type is deprecated; in a future version of numpy, it will
be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_qint32 = np.dtype [("qint32", np.int32, 1)])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorflow/python/framework/dtypes.py:525: FutureWarning: Passing (type, 1) or
'type' as a synonym of type is deprecated; in a future version of numpy, it will
be understood as (type, (1,)) / '(1,)type'.
(pid=24008) np_resource = np.dtype [("resource", np.ubyte, 1)])

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(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorboard/compat/tensorflow_stub/dtypes.py:541: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it
will be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_qint8 = np.dtype(["qint8", np.int8, 1])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorboard/compat/tensorflow_stub/dtypes.py:542: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it
will be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_quint8 = np.dtype(["quint8", np.uint8, 1])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorboard/compat/tensorflow_stub/dtypes.py:543: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it
will be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_qint16 = np.dtype(["qint16", np.int16, 1])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorboard/compat/tensorflow_stub/dtypes.py:544: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it
will be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_quint16 = np.dtype(["quint16", np.uint16, 1])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorboard/compat/tensorflow_stub/dtypes.py:545: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it
will be understood as (type, (1,)) / '(1,)type'.
(pid=24008) _np_qint32 = np.dtype(["qint32", np.int32, 1])
(pid=24008) /home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/
tensorboard/compat/tensorflow_stub/dtypes.py:550: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it
will be understood as (type, (1,)) / '(1,)type'.
(pid=24008) np_resource = np.dtype(["resource", np.ubyte, 1])
(pid=24008) WARNING:tensorflow:From /home/lorenzo/anaconda3/envs/py36/lib/
python3.6/site-packages/tensorflow/python/compat/v2_compat.py:61:
disable_resource_variables (from tensorflow.python.ops.variable_scope) is
deprecated and will be removed in a future version.
(pid=24008) Instructions for updating:
(pid=24008) non-resource variables are not supported in the long term
Episode reward 6552.297416532157
Episode 1 of 100
Episode reward 6548.646049177689
Episode 2 of 100
Episode reward 6555.262436371518
Episode 3 of 100
Episode reward 6567.554932958424
Episode 4 of 100
Episode reward 6568.175531710819
Episode 5 of 100
Episode reward 6560.0769039057
Episode 6 of 100
Episode reward 6557.312303085205
Episode 7 of 100
Episode reward 6557.878627533787
Episode 8 of 100
Episode reward 6559.245565000511
Episode 9 of 100
Episode reward 6557.348261675561
Episode 10 of 100
Episode reward 6552.897036063339
Episode 11 of 100
Episode reward 6543.347241186741

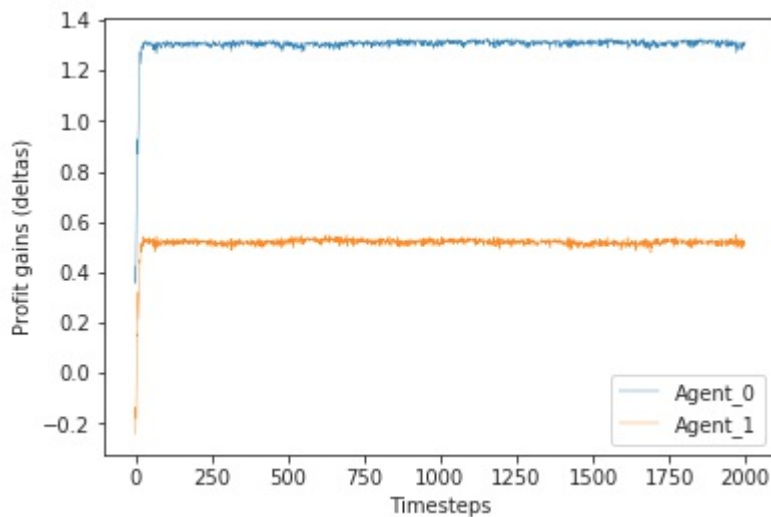
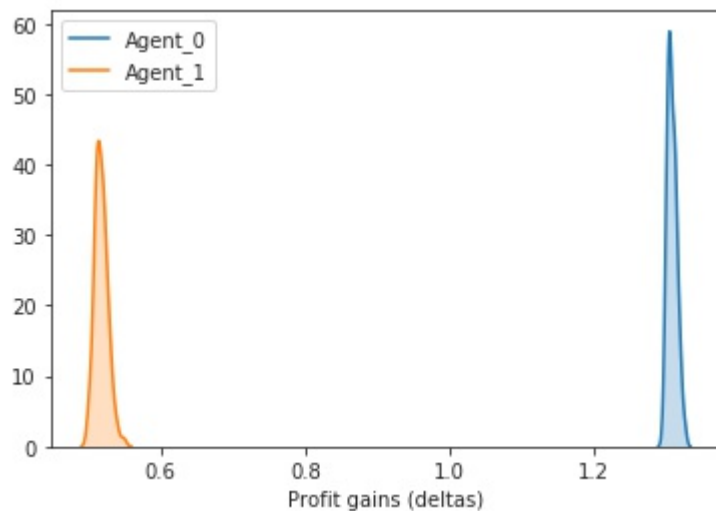
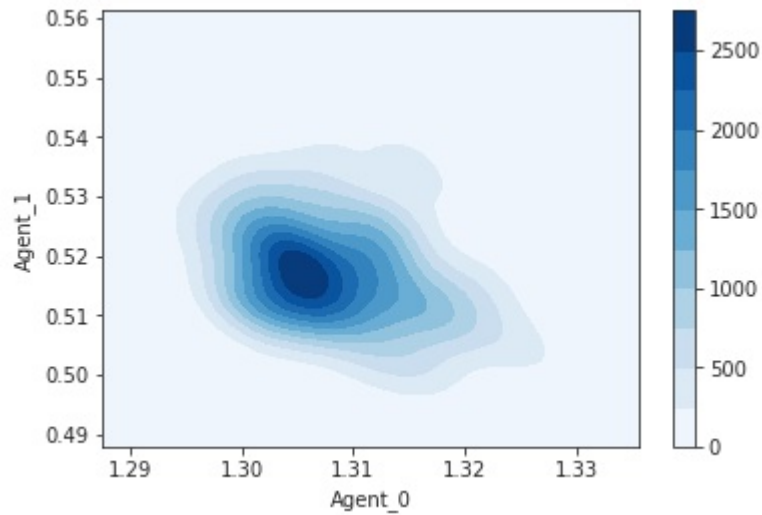
```

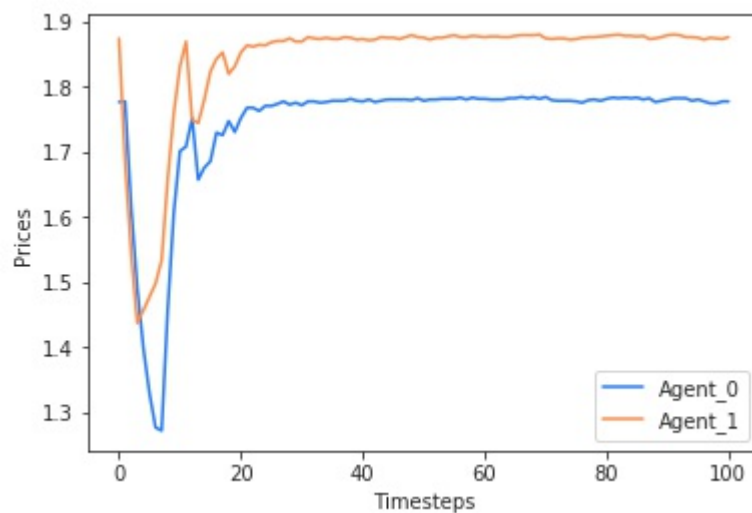
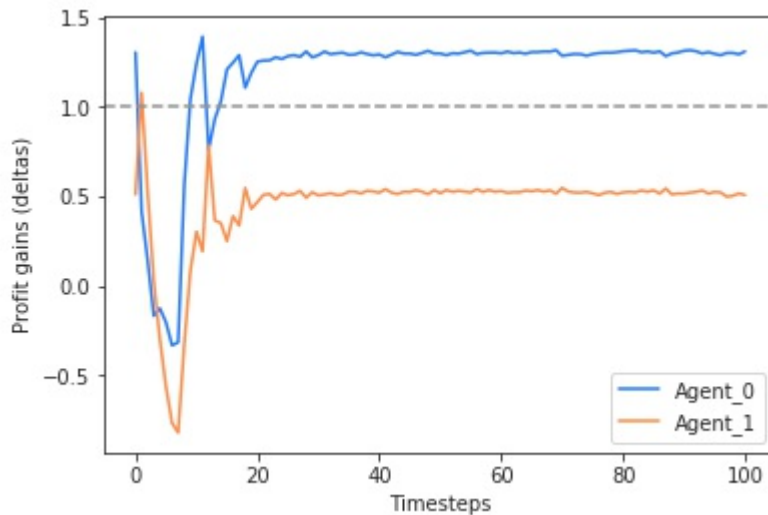
Episode 12 of 100
Episode reward 6556.7349029681345
Episode 13 of 100
Episode reward 6580.716505547091
Episode 14 of 100
Episode reward 6557.678749423818
Episode 15 of 100
Episode reward 6565.544152503998
Episode 16 of 100
Episode reward 6546.5871387666675
Episode 17 of 100
Episode reward 6564.652347595495
Episode 18 of 100
Episode reward 6552.366083757013
Episode 19 of 100
Episode reward 6553.707877992422
Episode 20 of 100
Episode reward 6560.034639377242
Episode 21 of 100
Episode reward 6551.086874672832
Episode 22 of 100
Episode reward 6563.857129524197
Episode 23 of 100
Episode reward 6584.055225097733
Episode 24 of 100
Episode reward 6567.665391870613
Episode 25 of 100
Episode reward 6544.938538481639
Episode 26 of 100
Episode reward 6557.149688425961
Episode 27 of 100
Episode reward 6554.118746606927
Episode 28 of 100
Episode reward 6541.957971935145
Episode 29 of 100
Episode reward 6557.443545953051
Episode 30 of 100
Episode reward 6562.024032331279
Episode 31 of 100
Episode reward 6573.615294152808
Episode 32 of 100
Episode reward 6545.581959088983
Episode 33 of 100
Episode reward 6547.4342822545095
Episode 34 of 100
Episode reward 6551.620794527276
Episode 35 of 100
Episode reward 6546.111517931559
Episode 36 of 100
Episode reward 6560.549459186684
Episode 37 of 100
Episode reward 6553.2191997627215
Episode 38 of 100
Episode reward 6550.69997866304
Episode 39 of 100
Episode reward 6547.7516642982055
Episode 40 of 100
Episode reward 6545.509522713096
Episode 41 of 100

Episode reward 6553.443102910839
Episode 42 of 100
Episode reward 6542.685791596578
Episode 43 of 100
Episode reward 6557.31543711419
Episode 44 of 100
Episode reward 6539.699963907833
Episode 45 of 100
Episode reward 6565.947986849066
Episode 46 of 100
Episode reward 6568.873907288312
Episode 47 of 100
Episode reward 6550.511495233453
Episode 48 of 100
Episode reward 6558.306126651588
Episode 49 of 100
Episode reward 6556.081928179
Episode 50 of 100
Episode reward 6547.589895559968
Episode 51 of 100
Episode reward 6562.36870809502
Episode 52 of 100
Episode reward 6561.230145183028
Episode 53 of 100
Episode reward 6552.999929120805
Episode 54 of 100
Episode reward 6563.967168377005
Episode 55 of 100
Episode reward 6567.494073260562
Episode 56 of 100
Episode reward 6551.136614877445
Episode 57 of 100
Episode reward 6558.265511731319
Episode 58 of 100
Episode reward 6545.487553692859
Episode 59 of 100
Episode reward 6548.401522597296
Episode 60 of 100
Episode reward 6554.663111293621
Episode 61 of 100
Episode reward 6540.3901475262155
Episode 62 of 100
Episode reward 6554.839294428808
Episode 63 of 100
Episode reward 6548.322128619405
Episode 64 of 100
Episode reward 6543.086442337775
Episode 65 of 100
Episode reward 6550.362121167337
Episode 66 of 100
Episode reward 6547.3706023534605
Episode 67 of 100
Episode reward 6585.971427334603
Episode 68 of 100
Episode reward 6553.598820286466
Episode 69 of 100
Episode reward 6552.984290664106
Episode 70 of 100
Episode reward 6566.874249384954

Episode 71 of 100
Episode reward 6555.3530486268155
Episode 72 of 100
Episode reward 6555.673122541888
Episode 73 of 100
Episode reward 6571.80717814261
Episode 74 of 100
Episode reward 6561.968201703605
Episode 75 of 100
Episode reward 6567.892926249052
Episode 76 of 100
Episode reward 6542.558372880925
Episode 77 of 100
Episode reward 6564.6425261737995
Episode 78 of 100
Episode reward 6541.002222974236
Episode 79 of 100
Episode reward 6541.589397193843
Episode 80 of 100
Episode reward 6581.354109570634
Episode 81 of 100
Episode reward 6545.023055249575
Episode 82 of 100
Episode reward 6555.6251197235915
Episode 83 of 100
Episode reward 6560.416478187807
Episode 84 of 100
Episode reward 6581.694810452703
Episode 85 of 100
Episode reward 6562.930301483342
Episode 86 of 100
Episode reward 6551.607098598844
Episode 87 of 100
Episode reward 6539.800698080015
Episode 88 of 100
Episode reward 6552.96613410771
Episode 89 of 100
Episode reward 6543.384249740285
Episode 90 of 100
Episode reward 6550.103203247198
Episode 91 of 100
Episode reward 6559.1312848162615
Episode 92 of 100
Episode reward 6559.262120326812
Episode 93 of 100
Episode reward 6546.87626252175
Episode 94 of 100
Episode reward 6545.667538433723
Episode 95 of 100
Episode reward 6554.514096023518
Episode 96 of 100
Episode reward 6550.57535305069
Episode 97 of 100
Episode reward 6540.0523597240235
Episode 98 of 100
Episode reward 6537.875582683836
Episode 99 of 100
Episode reward 6559.026421267646
Overall deltas mean: 0.9131181476044887

Overall deltas standard deviation: 0.4069235254559514
/home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/seaborn/distributions.py:679: UserWarning: Passing a 2D dataset for a bivariate plot is deprecated in favor of kdeplot(x, y), and it will cause an error in future versions. Please update your code.
warnings.warn(warn_msg, UserWarning)





Traceback (most recent call last):

```
File "<ipython-input-1-9a5c5fa40a36>", line 1, in <module>
    runfile('/home/lorenzo/algorithmic-pricing/rollout/rollout.py', args='/home/lorenzo/algorithmic-pricing/train_results/Azure_ApexDQN_Cont/azure06_cont_DQN_res2/APEX_MultiAgentFirmsPricingContinuous_0_2019-09-06_10-17-13df1x7oyx/checkpoint_1150/checkpoint-1150 --run APEX --env env_cont', wdir='/home/lorenzo/algorithmic-pricing/rollout')
```

```
File "/home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/spyder_kernels/customize/spydercustomize.py", line 827, in runfile
    execfile(filename, namespace)
```

```
File "/home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/spyder_kernels/customize/spydercustomize.py", line 110, in execfile
    exec(compile(f.read(), filename, 'exec'), namespace)
```

```
File "/home/lorenzo/algorithmic-pricing/rollout/rollout.py", line 403, in <module>
    Deltas_df = pd.DataFrame(d_array)
```

```
File "/home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/pandas/core/frame.py", line 440, in __init__
```



```
mgr = init_ndarray(data, index, columns, dtype=dtype, copy=copy)
```

```
File "/home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/pandas/core/
internals/construction.py", line 171, in init_ndarray
    values = prep_ndarray(values, copy=copy)
```

```
File "/home/lorenzo/anaconda3/envs/py36/lib/python3.6/site-packages/pandas/core/
internals/construction.py", line 295, in prep_ndarray
    raise ValueError("Must pass 2-d input")
```

ValueError: Must pass 2-d input

In [2]:

```
In [2]: print(f'Overall deltas mean: {d_array.mean()}')
...: print(f'Overall deltas standard deviation: {d_array_avgts.std()}')
Overall deltas mean: 0.9131181476044887
Overall deltas standard deviation: 0.3954682568364683
```

In [3]: d_array_avgts

Out[3]:

```
array([[1.29987134, 0.52344911],
       [1.31298313, 0.50706495],
       [1.31445472, 0.51152298],
       [1.31364809, 0.52334617],
       [1.32169403, 0.51585641],
       [1.31096647, 0.51932596],
       [1.30443463, 0.52338016],
       [1.30749076, 0.52083157],
       [1.31978899, 0.50975839],
       [1.30240354, 0.52544348],
       [1.30524347, 0.51861435],
       [1.30131847, 0.5139808 ],
       [1.29959774, 0.52769958],
       [1.31465467, 0.53413502],
       [1.30203616, 0.52610704],
       [1.32059098, 0.51460121],
       [1.30671402, 0.51148886],
       [1.31171826, 0.52267469],
       [1.30647876, 0.51690323],
       [1.30218746, 0.52239704],
       [1.30983222, 0.52042234],
       [1.30730459, 0.51493096],
       [1.30605433, 0.52762595],
       [1.30313639, 0.54864546],
       [1.30550353, 0.53158972],
       [1.30909303, 0.50763237],
       [1.31072649, 0.51694257],
       [1.30420516, 0.52074756],
       [1.30155509, 0.51249913],
       [1.31089101, 0.5170414 ],
       [1.31095234, 0.52108511],
       [1.30672291, 0.53570266],
       [1.30757376, 0.50972827],
       [1.29821525, 0.52074685],
       [1.30339489, 0.51931917],
       [1.30826149, 0.50951514],
       [1.31233221, 0.51838373],
```

[1.31083809, 0.51330846],
[1.30329657, 0.51859225],
[1.30448869, 0.51475784],
[1.30674406, 0.51049305],
[1.30551522, 0.51883199],
[1.31343747, 0.50126902],
[1.31766884, 0.51014876],
[1.30110428, 0.51092631],
[1.31150694, 0.52404717],
[1.31153918, 0.52663715],
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[1.30587056, 0.5228349],
[1.3049083, 0.52180383],
[1.30699652, 0.51210504],
[1.30266674, 0.52967961],
[1.32475254, 0.50657343],
[1.30276816, 0.52118187],
[1.31299037, 0.52078853],
[1.30850106, 0.52843866],
[1.30999814, 0.51228199],
[1.32658764, 0.50208142],
[1.30527976, 0.51193767],
[1.31283742, 0.50699151],
[1.31672999, 0.5087106],
[1.31076685, 0.50188227],
[1.29796942, 0.52762905],
[1.30987024, 0.50988754],
[1.30092722, 0.51413833],
[1.30523193, 0.5163541],
[1.29973889, 0.51916613],
[1.31497758, 0.53852157],
[1.31934724, 0.50513953],
[1.31109997, 0.51283605],
[1.31263077, 0.52375346],
[1.31524913, 0.51080978],
[1.3075773, 0.51876846],
[1.31399718, 0.52680795],
[1.3016526, 0.53033482],
[1.30760118, 0.52969598],
[1.30453321, 0.51005909],
[1.30102098, 0.53336317],
[1.29987276, 0.51332491],
[1.29974078, 0.51398312],
[1.30891752, 0.54044359],
[1.31638773, 0.50041341],
[1.30375257, 0.52255016],
[1.31337793, 0.51721884],
[1.31904368, 0.53062277],
[1.31779644, 0.51505322],
[1.30319007, 0.51951171],
[1.30422521, 0.50789565],
[1.3060726, 0.51784715],
[1.30396835, 0.51136409],
[1.30569586, 0.51565813],
[1.3172679, 0.51217707],
[1.32162866, 0.50793356],
[1.30505982, 0.51340217],
[1.31573818, 0.50164055],
[1.31233244, 0.51297459],

```
[1.30593552, 0.51584161],
[1.30129184, 0.51105456],
[1.30208196, 0.50831361],
[1.3158124 , 0.51353859]])
```

```
In [4]: d_array_avgts.std()
```

```
Out[4]: 0.3954682568364683
```

```
In [5]: d_array_avgts[:,0].std()
```

```
Out[5]: 0.0063802299435189724
```

```
In [6]: d_array_avgts[:,1].std()
```

```
Out[6]: 0.008953314564398384
```

```
In [7]: print(f'Overall deltas mean: {d_array.mean()}')
....: print(f'Overall deltas standard deviation: {d_array_avgts.std()}')
....: print(f'Agent0 deltas standard deviation: {d_array_avgts[:,0].std()}')
....: print(f'Agent1 deltas standard deviation: {d_array_avgts[:,1].std()}')
```

```
Overall deltas mean: 0.9131181476044887
```

```
Overall deltas standard deviation: 0.3954682568364683
```

```
Agent0 deltas standard deviation: 0.0063802299435189724
```

```
Agent1 deltas standard deviation: 0.008953314564398384
```

```
In [8]: print(f'Overall deltas mean: {d_array_avgts.mean()}')
....: print(f'Overall deltas standard deviation: {d_array_avgts.std()}')
....: print(f'Agent0 deltas standard deviation: {d_array_avgts[:,0].std()}')
....: print(f'Agent1 deltas standard deviation: {d_array_avgts[:,1].std()}')
```

```
File "<ipython-input-8-5a7abdc5893b>", line 3
```

```
    print(f'Agent0 deltas standard deviation: {d_array_avgts[:,0].std()}')
```

```
    ^
```

```
SyntaxError: f-string: expecting '}'
```

```
In [9]:
```

```
In [9]: print(f'Overall deltas mean: {d_array_avgts.mean()}')
....: print(f'Overall deltas standard deviation: {d_array_avgts.std()}')
....: print(f'Agent0 deltas standard deviation: {d_array_avgts[:,0].std()}')
....: print(f'Agent1 deltas standard deviation: {d_array_avgts[:,1].std()}')
```

```
Overall deltas mean: 0.9131181476044972
```

```
Overall deltas standard deviation: 0.3954682568364683
```

```
Agent0 deltas standard deviation: 0.0063802299435189724
```

```
Agent1 deltas standard deviation: 0.008953314564398384
```

```
In [10]: print(f'Overall deltas mean: {d_array_avgts.mean().2f}')
```

```
File "<fstring>", line 1
```

```
    (d_array_avgts.mean().2f)
```

```
    ^
```

```
SyntaxError: invalid syntax
```

```
In [11]:
```

```
In [11]: print(f'Overall deltas mean: {d_array_avgts.mean(),.2f}')
```

```
File "<fstring>", line 1
```

```
    (d_array_avgts.mean(),.2f)
```

```
    ^
```

```
SyntaxError: invalid syntax
```

In [12]:

```
In [12]: print(f'Overall deltas mean: {d_array_avgts.mean():,.2f}')  
Overall deltas mean: 0.91
```

```
In [13]: print(f'Overall deltas mean: {d_array_avgts.mean():,.4f}')  
...: print(f'Overall deltas standard deviation: {d_array_avgts.std():,.4f}')  
...: print(f'Agent0 deltas standard deviation: {d_array_avgts[:,0].std():,.4f}')  
...: print(f'Agent1 deltas standard deviation: {d_array_avgts[:,1].std():,.4f}')  
Overall deltas mean: 0.9131  
Overall deltas standard deviation: 0.3955  
Agent0 deltas standard deviation: 0.0064  
Agent1 deltas standard deviation: 0.0090
```

```
In [14]: print(f'Overall deltas mean: {d_array_avgts.mean():,.4f} and std:  
{d_array_avgts.std():,.4f}')  
...: print(f'Agent0 deltas mean: {d_array_avgts[:,0].mean():,.4f} and std:  
{d_array_avgts[:,0].std():,.4f}')  
...: print(f'Agent1 deltas mean: {d_array_avgts[:,1].mean():,.4f} and std:  
{d_array_avgts[:,1].std():,.4f}')  
Overall deltas mean: 0.9131 and std: 0.3955  
Agent0 deltas mean: 1.3085 and std: 0.0064  
Agent1 deltas mean: 0.5177 and std: 0.0090
```

In [15]: