12_pandas_stack

January 15, 2020

Reshape dataframe using stack/unstack

```
[1]: import pandas as pd
     df = pd.read_excel("stocks.xlsx",header=[0,1])
     df
```

```
[1]:    Unnamed: 0_level_0      Price                        Price to earnings ratio (P/E)  \
                    Company Facebook Google Microsoft                            Facebook
        0        2017-06-05      155    955        66                               37.10
        1        2017-06-06      150    987        69                               36.98
        2        2017-06-07      153    963        62                               36.78
        3        2017-06-08      155   1000        61                               36.11
        4        2017-06-09      156   1012        66                               37.07


          Google Microsoft
        0   32.0     30.31
        1   31.3     30.56
        2   31.7     30.46
        3   31.2     30.11
        4   30.0     31.00
```

```
[2]: df.stack()
```

```
[2]:              Price  Price to earnings ratio (P/E) Unnamed: 0_level_0
        0 Company     NaN                           NaN         2017-06-05
          Facebook  155.0                         37.10                NaT
          Google    955.0                         32.00                NaT
          Microsoft  66.0                         30.31                NaT
        1 Company     NaN                           NaN         2017-06-06
          Facebook  150.0                         36.98                NaT
          Google    987.0                         31.30                NaT
          Microsoft  69.0                         30.56                NaT
        2 Company     NaN                           NaN         2017-06-07
          Facebook  153.0                         36.78                NaT
          Google    963.0                         31.70                NaT
          Microsoft  62.0                         30.46                NaT
        3 Company     NaN                           NaN         2017-06-08
```

```
    Facebook    155.0                         36.11              NaT
    Google     1000.0                         31.20              NaT
    Microsoft    61.0                         30.11              NaT
  4 Company      NaN                           NaN       2017-06-09
    Facebook    156.0                         37.07              NaT
    Google     1012.0                         30.00              NaT
    Microsoft    66.0                         31.00              NaT
```

[3]: `df.stack(level=0)`

[3]:
```
                                     Company  Facebook  Google  Microsoft
  0 Price                                NaT    155.00   955.0      66.00
    Price to earnings ratio (P/E)        NaT     37.10    32.0      30.31
    Unnamed: 0_level_0            2017-06-05       NaN     NaN        NaN
  1 Price                                NaT    150.00   987.0      69.00
    Price to earnings ratio (P/E)        NaT     36.98    31.3      30.56
    Unnamed: 0_level_0            2017-06-06       NaN     NaN        NaN
  2 Price                                NaT    153.00   963.0      62.00
    Price to earnings ratio (P/E)        NaT     36.78    31.7      30.46
    Unnamed: 0_level_0            2017-06-07       NaN     NaN        NaN
  3 Price                                NaT    155.00  1000.0      61.00
    Price to earnings ratio (P/E)        NaT     36.11    31.2      30.11
    Unnamed: 0_level_0            2017-06-08       NaN     NaN        NaN
  4 Price                                NaT    156.00  1012.0      66.00
    Price to earnings ratio (P/E)        NaT     37.07    30.0      31.00
    Unnamed: 0_level_0            2017-06-09       NaN     NaN        NaN
```

[4]:
```
df_stacked=df.stack()
df_stacked
```

[4]:
```
              Price  Price to earnings ratio (P/E) Unnamed: 0_level_0
  0 Company     NaN                           NaN         2017-06-05
    Facebook   155.0                         37.10                NaT
    Google     955.0                         32.00                NaT
    Microsoft   66.0                         30.31                NaT
  1 Company     NaN                           NaN         2017-06-06
    Facebook   150.0                         36.98                NaT
    Google     987.0                         31.30                NaT
    Microsoft   69.0                         30.56                NaT
  2 Company     NaN                           NaN         2017-06-07
    Facebook   153.0                         36.78                NaT
    Google     963.0                         31.70                NaT
    Microsoft   62.0                         30.46                NaT
  3 Company     NaN                           NaN         2017-06-08
    Facebook   155.0                         36.11                NaT
    Google    1000.0                         31.20                NaT
    Microsoft   61.0                         30.11                NaT
```

```
4 Company       NaN                          NaN      2017-06-09
  Facebook    156.0                        37.07             NaT
  Google     1012.0                        30.00             NaT
  Microsoft    66.0                        31.00             NaT
```

[5]: `df_stacked.unstack()`

[5]:
```
      Price                          Price to earnings ratio (P/E)                \
      Company Facebook  Google Microsoft                          Company Facebook
    0      NaN   155.0   955.0      66.0                              NaN    37.10
    1      NaN   150.0   987.0      69.0                              NaN    36.98
    2      NaN   153.0   963.0      62.0                              NaN    36.78
    3      NaN   155.0  1000.0      61.0                              NaN    36.11
    4      NaN   156.0  1012.0      66.0                              NaN    37.07

                      Unnamed: 0_level_0
      Google Microsoft       Company Facebook Google Microsoft
    0   32.0    30.31    2017-06-05      NaT    NaT      NaT
    1   31.3    30.56    2017-06-06      NaT    NaT      NaT
    2   31.7    30.46    2017-06-07      NaT    NaT      NaT
    3   31.2    30.11    2017-06-08      NaT    NaT      NaT
    4   30.0    31.00    2017-06-09      NaT    NaT      NaT
```

3 levels of column headers

[10]:
```
df2 = pd.read_excel("stocks_3_levels.xlsx",header=[0,1,2])
df2
```

[10]:
```
      Unnamed: 0_level_0 Price Ratios                      \
      Unnamed: 0_level_1       Price
                     Company    Facebook Google Microsoft
    0              Q1 2016         155    955         66
    1              Q2 2016         150    987         69
    2              Q3 2016         153    963         62
    3              Q4 2016         155   1000         61
    4              Q1 2017         156   1012         66

                                          Income Statement          \
      Price to earnings ratio (P/E)                 Net Sales
                     Facebook Google Microsoft       Facebook Google
    0                  37.10   32.0    30.31             2.6     20
    1                  36.98   31.3    30.56             3.1     22
    2                  36.78   31.7    30.46             4.3     24
    3                  36.11   31.2    30.11             6.7     26
    4                  37.07   30.0    31.00             8.1     31
```

```
                Net Profit
     Microsoft     Facebook  Google  Microsoft
0       18.70          0.80    5.43       4.56
1       21.30          0.97    5.89       5.10
2       21.45          1.20    6.10       5.43
3       21.88          1.67    6.50       5.89
4       22.34          2.03    6.40       6.09
```

`df2.stack()`

```
                    Income Statement                Price Ratios   \
                    Net Profit  Net Sales                  Price
0  Company                 NaN        NaN                    NaN
   Facebook               0.80       2.60                  155.0
   Google                 5.43      20.00                  955.0
   Microsoft              4.56      18.70                   66.0
1  Company                 NaN        NaN                    NaN
   Facebook               0.97       3.10                  150.0
   Google                 5.89      22.00                  987.0
   Microsoft              5.10      21.30                   69.0
2  Company                 NaN        NaN                    NaN
   Facebook               1.20       4.30                  153.0
   Google                 6.10      24.00                  963.0
   Microsoft              5.43      21.45                   62.0
3  Company                 NaN        NaN                    NaN
   Facebook               1.67       6.70                  155.0
   Google                 6.50      26.00                 1000.0
   Microsoft              5.89      21.88                   61.0
4  Company                 NaN        NaN                    NaN
   Facebook               2.03       8.10                  156.0
   Google                 6.40      31.00                 1012.0
   Microsoft              6.09      22.34                   66.0

                                            Unnamed: 0_level_0
                    Price to earnings ratio (P/E)  Unnamed: 0_level_1
0  Company                                   NaN             Q1 2016
   Facebook                                37.10                 NaN
   Google                                  32.00                 NaN
   Microsoft                               30.31                 NaN
1  Company                                   NaN             Q2 2016
   Facebook                                36.98                 NaN
   Google                                  31.30                 NaN
   Microsoft                               30.56                 NaN
2  Company                                   NaN             Q3 2016
   Facebook                                36.78                 NaN
   Google                                  31.70                 NaN
   Microsoft                               30.46                 NaN
```

```
3 Company                     NaN          Q4 2016
  Facebook               36.11               NaN
  Google                 31.20               NaN
  Microsoft              30.11               NaN
4 Company                     NaN          Q1 2017
  Facebook               37.07               NaN
  Google                 30.00               NaN
  Microsoft              31.00               NaN
```

[12]: `df2.stack(level=0)`

[12]:

		Net Profit			Net Sales			\
		Facebook	Google	Microsoft	Facebook	Google	Microsoft	
0	Income Statement	0.80	5.43	4.56	2.6	20.0	18.70	
	Price Ratios	NaN	NaN	NaN	NaN	NaN	NaN	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	NaN	NaN	
1	Income Statement	0.97	5.89	5.10	3.1	22.0	21.30	
	Price Ratios	NaN	NaN	NaN	NaN	NaN	NaN	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	NaN	NaN	
2	Income Statement	1.20	6.10	5.43	4.3	24.0	21.45	
	Price Ratios	NaN	NaN	NaN	NaN	NaN	NaN	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	NaN	NaN	
3	Income Statement	1.67	6.50	5.89	6.7	26.0	21.88	
	Price Ratios	NaN	NaN	NaN	NaN	NaN	NaN	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	NaN	NaN	
4	Income Statement	2.03	6.40	6.09	8.1	31.0	22.34	
	Price Ratios	NaN	NaN	NaN	NaN	NaN	NaN	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	NaN	NaN	

		Price			Price to earnings ratio (P/E)	\
		Facebook	Google	Microsoft	Facebook	
0	Income Statement	NaN	NaN	NaN	NaN	
	Price Ratios	155.0	955.0	66.0	37.10	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	
1	Income Statement	NaN	NaN	NaN	NaN	
	Price Ratios	150.0	987.0	69.0	36.98	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	
2	Income Statement	NaN	NaN	NaN	NaN	
	Price Ratios	153.0	963.0	62.0	36.78	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	
3	Income Statement	NaN	NaN	NaN	NaN	
	Price Ratios	155.0	1000.0	61.0	36.11	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	
4	Income Statement	NaN	NaN	NaN	NaN	
	Price Ratios	156.0	1012.0	66.0	37.07	
	Unnamed: 0_level_0	NaN	NaN	NaN	NaN	

```
                                        Unnamed: 0_level_1
                     Google  Microsoft          Company
0 Income Statement      NaN        NaN              NaN
  Price Ratios         32.0      30.31              NaN
  Unnamed: 0_level_0    NaN        NaN          Q1 2016
1 Income Statement      NaN        NaN              NaN
  Price Ratios         31.3      30.56              NaN
  Unnamed: 0_level_0    NaN        NaN          Q2 2016
2 Income Statement      NaN        NaN              NaN
  Price Ratios         31.7      30.46              NaN
  Unnamed: 0_level_0    NaN        NaN          Q3 2016
3 Income Statement      NaN        NaN              NaN
  Price Ratios         31.2      30.11              NaN
  Unnamed: 0_level_0    NaN        NaN          Q4 2016
4 Income Statement      NaN        NaN              NaN
  Price Ratios         30.0      31.00              NaN
  Unnamed: 0_level_0    NaN        NaN          Q1 2017
```

[13]: ```python
df2.stack(level=1)
```

[13]:
```
                                        Income Statement   \
                                        Facebook Google Microsoft
0 Net Profit   0.80   5.43   4.56
  Net Sales   2.60 20.00   18.70
  Price   NaN   NaN   NaN
  Price to earnings ratio (P/E)   NaN   NaN   NaN
  Unnamed: 0_level_1   NaN   NaN   NaN
1 Net Profit   0.97   5.89   5.10
  Net Sales   3.10 22.00   21.30
  Price   NaN   NaN   NaN
  Price to earnings ratio (P/E)   NaN   NaN   NaN
  Unnamed: 0_level_1   NaN   NaN   NaN
2 Net Profit   1.20   6.10   5.43
  Net Sales   4.30 24.00   21.45
  Price   NaN   NaN   NaN
  Price to earnings ratio (P/E)   NaN   NaN   NaN
  Unnamed: 0_level_1   NaN   NaN   NaN
3 Net Profit   1.67   6.50   5.89
  Net Sales   6.70 26.00   21.88
  Price   NaN   NaN   NaN
  Price to earnings ratio (P/E)   NaN   NaN   NaN
  Unnamed: 0_level_1   NaN   NaN   NaN
4 Net Profit   2.03   6.40   6.09
  Net Sales   8.10 31.00   22.34
  Price   NaN   NaN   NaN
  Price to earnings ratio (P/E)   NaN   NaN   NaN
  Unnamed: 0_level_1   NaN   NaN   NaN
```

```
                              Price Ratios                        \
                              Facebook  Google Microsoft
0 Net Profit                      NaN     NaN      NaN
  Net Sales                       NaN     NaN      NaN
  Price                        155.00   955.0    66.00
  Price to earnings ratio (P/E)  37.10    32.0    30.31
  Unnamed: 0_level_1              NaN     NaN      NaN
1 Net Profit                      NaN     NaN      NaN
  Net Sales                       NaN     NaN      NaN
  Price                        150.00   987.0    69.00
  Price to earnings ratio (P/E)  36.98    31.3    30.56
  Unnamed: 0_level_1              NaN     NaN      NaN
2 Net Profit                      NaN     NaN      NaN
  Net Sales                       NaN     NaN      NaN
  Price                        153.00   963.0    62.00
  Price to earnings ratio (P/E)  36.78    31.7    30.46
  Unnamed: 0_level_1              NaN     NaN      NaN
3 Net Profit                      NaN     NaN      NaN
  Net Sales                       NaN     NaN      NaN
  Price                        155.00  1000.0    61.00
  Price to earnings ratio (P/E)  36.11    31.2    30.11
  Unnamed: 0_level_1              NaN     NaN      NaN
4 Net Profit                      NaN     NaN      NaN
  Net Sales                       NaN     NaN      NaN
  Price                        156.00  1012.0    66.00
  Price to earnings ratio (P/E)  37.07    30.0    31.00
  Unnamed: 0_level_1              NaN     NaN      NaN

                              Unnamed: 0_level_0
                                         Company
0 Net Profit                                 NaN
  Net Sales                                  NaN
  Price                                      NaN
  Price to earnings ratio (P/E)              NaN
  Unnamed: 0_level_1                     Q1 2016
1 Net Profit                                 NaN
  Net Sales                                  NaN
  Price                                      NaN
  Price to earnings ratio (P/E)              NaN
  Unnamed: 0_level_1                     Q2 2016
2 Net Profit                                 NaN
  Net Sales                                  NaN
  Price                                      NaN
  Price to earnings ratio (P/E)              NaN
  Unnamed: 0_level_1                     Q3 2016
3 Net Profit                                 NaN
```

```
   Net Sales                              NaN
   Price                                  NaN
   Price to earnings ratio (P/E)          NaN
   Unnamed: 0_level_1                 Q4 2016
4  Net Profit                             NaN
   Net Sales                              NaN
   Price                                  NaN
   Price to earnings ratio (P/E)          NaN
   Unnamed: 0_level_1                 Q1 2017
```

[ ]: