

# PROBLEM\_C

February 4, 2023

```
[27]: #impoer dependencies

import yfinance as yf
import numpy as np
import pandas as pd
from pandas import Series, DataFrame
import matplotlib.pyplot as plt
import mplfinance as mpf
import pandas_datareader.data as reader

import scipy
from scipy import stats
import os
import seaborn as sns

% matplotlib inline
```

UsageError: Line magic function `%` not found.

```
[11]: #load data

ten_fact = pd.read_csv(r'/home/dsm/PART_A/10_Industry_Portfolio.csv',
    ↪skiprows=11)

ten_fact = ten_fact.head(252)
```

```
[12]: ten_fact.dropna()
```

```
[12]:
```

	8.14	5.93	5.07	4.82	7.37	3.35	2.34	4.12	9.21	6.54
0	-1.79	-3.00	-2.77	-3.16	3.28	-2.14	-0.62	0.54	-3.57	-2.15
1	4.81	13.09	12.07	2.85	12.16	3.73	9.84	9.84	5.31	6.04
2	2.76	6.98	2.89	-0.04	5.71	0.43	7.34	0.28	3.43	-1.03
3	5.24	5.67	4.76	3.32	1.21	6.53	7.50	5.65	8.29	4.59
4	-0.80	-4.38	-6.69	-2.04	-7.23	-2.09	-4.93	5.13	-4.34	-3.82
..	...	...	...	...	...	...	...	...	...	...
247	-2.69	-5.35	-4.08	-7.43	-5.53	0.10	-3.29	-8.23	-0.22	-0.87
248	-6.12	-5.42	-5.33	-2.96	-3.94	-1.06	-3.80	-3.53	-3.46	-4.11
249	5.46	7.25	9.62	9.93	11.10	1.95	6.67	6.33	6.61	9.94

```
250  1.31   1.17   2.51  11.22  -0.59  2.65  5.08  2.14  1.50  3.25
251  5.09  14.43   7.87   6.08  12.77  2.49  8.57  6.78  5.73  6.76
```

[252 rows x 10 columns]

```
[13]: ten_fact.drop(columns=ten_fact.columns[0], axis=1, inplace=True)
```

```
[14]: ten_fact
```

```
[14]:      5.93   5.07   4.82   7.37   3.35   2.34   4.12   9.21   6.54
0    -3.00  -2.77  -3.16   3.28  -2.14  -0.62   0.54  -3.57  -2.15
1    13.09  12.07   2.85  12.16   3.73   9.84   9.84   5.31   6.04
2     6.98   2.89  -0.04   5.71   0.43   7.34   0.28   3.43  -1.03
3     5.67   4.76   3.32   1.21   6.53   7.50   5.65   8.29   4.59
4    -4.38  -6.69  -2.04  -7.23  -2.09  -4.93   5.13  -4.34  -3.82
..     ...     ...     ...     ...     ...     ...     ...     ...
247  -5.35  -4.08  -7.43  -5.53   0.10  -3.29  -8.23  -0.22  -0.87
248  -5.42  -5.33  -2.96  -3.94  -1.06  -3.80  -3.53  -3.46  -4.11
249   7.25   9.62   9.93  11.10   1.95   6.67   6.33   6.61   9.94
250   1.17   2.51  11.22  -0.59   2.65   5.08   2.14   1.50   3.25
251  14.43   7.87   6.08  12.77   2.49   8.57   6.78   5.73   6.76
```

[252 rows x 9 columns]

```
[15]: ten_fact.describe()
```

```
[15]:      5.93      5.07      4.82      7.37      3.35      2.34  \
count  252.000000  252.000000  252.000000  252.000000  252.000000  252.000000
mean     1.235357    0.977579    0.899802    1.020516    0.679921    0.918413
std     11.735075    9.735341    8.337927   10.233705    5.558449    8.466330
min    -34.800000  -29.820000  -29.840000  -33.870000  -21.560000  -30.240000
25%    -3.815000   -3.032500   -3.357500   -3.325000   -2.100000   -3.270000
50%     1.395000    1.550000    0.520000    1.260000    0.815000    1.035000
75%     6.017500    5.387500    5.190000    5.827500    2.990000    5.477500
max     79.790000   57.200000   38.990000   53.490000   28.170000   42.450000

      4.12      9.21      6.54
count  252.000000  252.000000  252.000000
mean     0.780159    0.700952    0.657460
std     7.630796    9.216550    9.834948
min    -34.080000  -33.050000  -30.020000
25%    -2.945000   -3.602500   -3.745000
50%     0.825000    0.795000    0.485000
75%     4.095000    5.380000    4.850000
max     37.130000   43.460000   58.670000
```

```
[16]: ten_fact.mean()
```

```
[16]: 5.93    1.235357
      5.07    0.977579
      4.82    0.899802
      7.37    1.020516
      3.35    0.679921
      2.34    0.918413
      4.12    0.780159
      9.21    0.700952
      6.54    0.657460
      dtype: float64
```

```
[17]: ten_fact.median()
```

```
[17]: 5.93    1.395
      5.07    1.550
      4.82    0.520
      7.37    1.260
      3.35    0.815
      2.34    1.035
      4.12    0.825
      9.21    0.795
      6.54    0.485
      dtype: float64
```

```
[18]: ten_fact.std()
```

```
[18]: 5.93    11.735075
      5.07     9.735341
      4.82     8.337927
      7.37    10.233705
      3.35     5.558449
      2.34     8.466330
      4.12     7.630796
      9.21     9.216550
      6.54     9.834948
      dtype: float64
```

```
[19]: ten_fact.kurtosis()
```

```
[19]: 5.93    9.242919
      5.07    7.350760
      4.82    3.420473
      7.37    5.380604
      3.35    3.790001
      2.34    4.143482
      4.12    6.539962
      9.21    2.876187
```

```
6.54    9.078535
dtype: float64
```

```
[20]: ten_fact.var()
```

```
[20]: 5.93    137.711977
      5.07    94.776862
      4.82    69.521027
      7.37   104.728718
      3.35    30.896357
      2.34    71.678746
      4.12    58.229053
      9.21    84.944797
      6.54    96.726212
dtype: float64
```

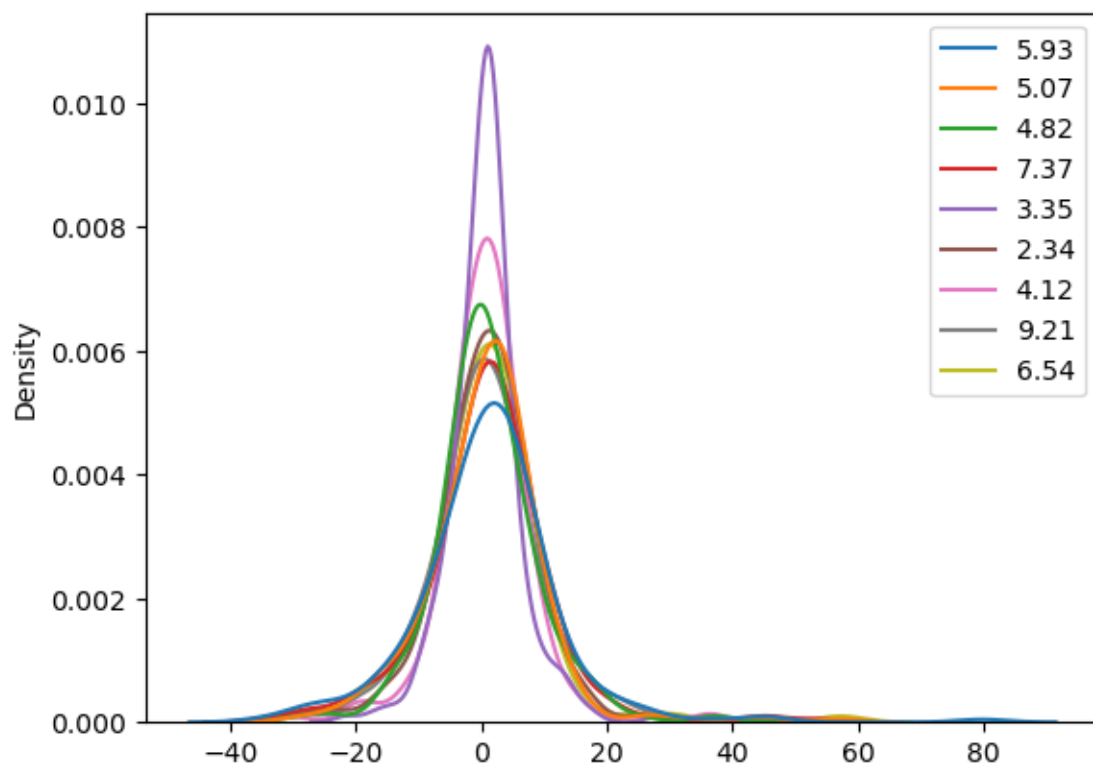
```
[21]: ten_fact.skew()
```

```
[21]: 5.93    1.302108
      5.07    1.183606
      4.82    0.454133
      7.37    0.622082
      3.35    0.228264
      2.34    0.156319
      4.12    0.184773
      9.21    0.163535
      6.54    1.276942
dtype: float64
```

## 0.0.1 C 2

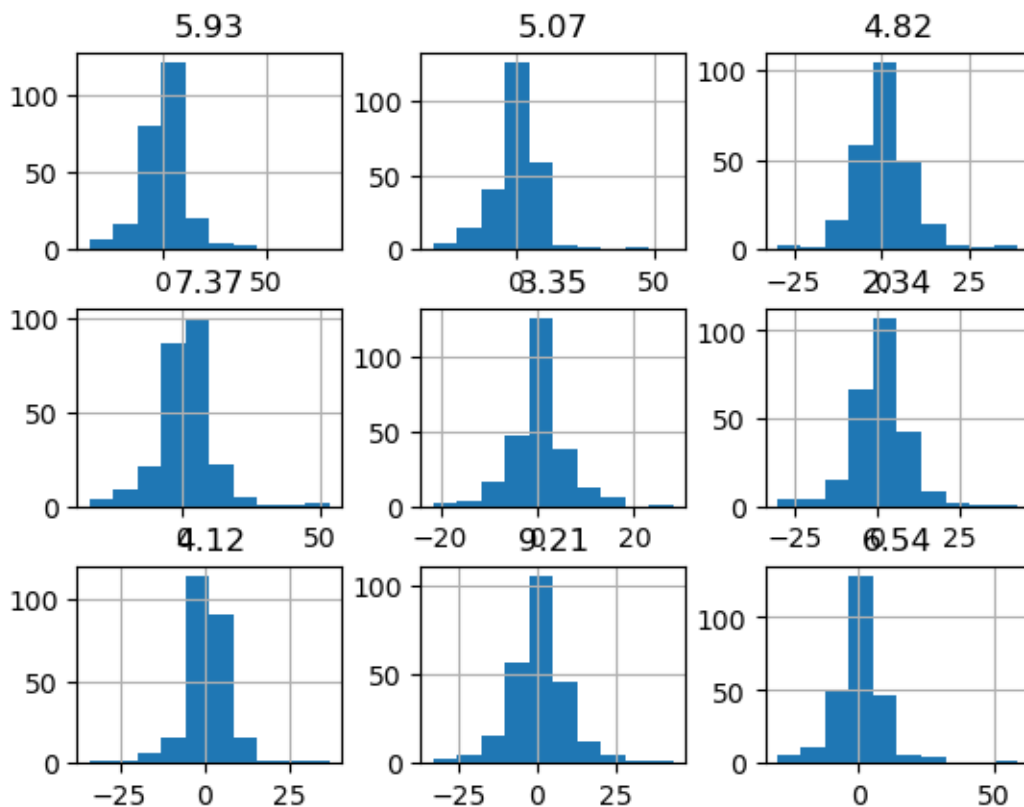
```
[23]: sns.kdeplot(ten_fact)
```

```
[23]: <AxesSubplot:ylabel='Density'>
```



```
[24]: ten_fact.hist()
```

```
[24]: array([[<AxesSubplot:title={'center': '5.93'}>,
  <AxesSubplot:title={'center': '5.07'}>,
  <AxesSubplot:title={'center': '4.82'}>],
  [<AxesSubplot:title={'center': '7.37'}>,
  <AxesSubplot:title={'center': '3.35'}>,
  <AxesSubplot:title={'center': '2.34'}>],
  [<AxesSubplot:title={'center': '4.12'}>,
  <AxesSubplot:title={'center': '9.21'}>,
  <AxesSubplot:title={'center': '6.54'}>]], dtype=object)
```



## 0.0.2 C3

```
[28]: factors = reader.DataReader('10_Industry_Portfolios', 'famafrench')
```

```
[29]: factors
```

```
[29]: {0:      Mkt-RF   SMB    HML    RF
      Date
      2018-02   -3.65   0.23   -1.07   0.11
      2018-03   -2.35   4.05   -0.23   0.11
      2018-04    0.28   1.14    0.54   0.14
      2018-05    2.65   5.26   -3.18   0.14
      2018-06    0.48   1.15   -2.33   0.14
      2018-07    3.19  -2.22    0.47   0.16
      2018-08    3.44   1.12   -3.99   0.16
      2018-09    0.06  -2.28   -1.69   0.15
      2018-10   -7.68  -4.77    3.44   0.19
      2018-11    1.69  -0.68    0.27   0.18
      2018-12   -9.57  -2.38   -1.86   0.20
      2019-01    8.40   2.90   -0.45   0.21
      2019-02    3.40   2.05   -2.68   0.18
```

2019-03	1.10	-3.03	-4.10	0.19
2019-04	3.97	-1.74	2.14	0.21
2019-05	-6.94	-1.31	-2.34	0.21
2019-06	6.93	0.28	-0.72	0.18
2019-07	1.19	-1.93	0.47	0.19
2019-08	-2.58	-2.36	-4.76	0.16
2019-09	1.43	-0.97	6.74	0.18
2019-10	2.06	0.29	-1.92	0.16
2019-11	3.87	0.78	-2.01	0.12
2019-12	2.77	0.73	1.76	0.14
2020-01	-0.11	-3.10	-6.22	0.13
2020-02	-8.13	1.07	-3.79	0.12
2020-03	-13.39	-4.88	-13.97	0.13
2020-04	13.65	2.49	-1.23	0.00
2020-05	5.58	2.48	-4.89	0.01
2020-06	2.46	2.70	-2.17	0.01
2020-07	5.77	-2.32	-1.38	0.01
2020-08	7.63	-0.22	-2.95	0.01
2020-09	-3.63	0.04	-2.68	0.01
2020-10	-2.10	4.36	4.21	0.01
2020-11	12.47	5.82	2.14	0.01
2020-12	4.63	4.89	-1.51	0.01
2021-01	-0.03	7.34	2.96	0.01
2021-02	2.78	2.06	7.18	0.00
2021-03	3.08	-2.37	7.40	0.00
2021-04	4.93	-3.19	-0.94	0.00
2021-05	0.29	-0.25	7.08	0.00
2021-06	2.75	1.70	-7.82	0.00
2021-07	1.27	-3.99	-1.76	0.00
2021-08	2.91	-0.43	-0.16	0.00
2021-09	-4.37	0.72	5.08	0.00
2021-10	6.65	-2.35	-0.48	0.00
2021-11	-1.55	-1.32	-0.44	0.00
2021-12	3.10	-1.66	3.28	0.01
2022-01	-6.25	-5.94	12.75	0.00
2022-02	-2.29	2.23	3.04	0.00
2022-03	3.05	-1.60	-1.80	0.01
2022-04	-9.46	-1.41	6.19	0.01
2022-05	-0.34	-1.85	8.41	0.03
2022-06	-8.43	2.09	-5.97	0.06
2022-07	9.57	2.81	-4.10	0.08
2022-08	-3.77	1.39	0.31	0.19
2022-09	-9.35	-0.82	0.03	0.19
2022-10	7.83	0.10	8.05	0.23
2022-11	4.60	-3.40	1.39	0.29
2022-12	-6.41	-0.64	1.36	0.33,
1:	Mkt-RF	SMB	HML	RF

```

Date
2018   -6.95  -3.21  -9.73   1.83
2019   28.28  -6.10 -10.34   2.15
2020   23.66  13.17 -46.57   0.45
2021   23.56  -3.92  25.57   0.04
2022  -21.60  -6.79  25.85   1.43,
'DESCR': 'F-F Research Data Factors\n-----\n\nThis file was
created by CMPT_ME_BEME_RETS using the 202212 CRSP database. The 1-month TBill
return is from Ibbotson and Associates, Inc. Copyright 2022 Kenneth R.
French\n\n 0 : (59 rows x 4 cols)\n 1 : Annual Factors: January-December (5
rows x 4 cols)'}

```

### 0.0.3 C4

```

[34]: #load data

ten_fact = pd.read_csv(r'/home/dsm/PART_A/F-F_Research_Data_Factors.csv',
    ↪skiprows=3)

ten_fact = ten_fact.head(252)

```

```
[35]: ten_fact
```

```

[35]:      Unnamed: 0      Mkt-RF      SMB      HML      RF
0      192607      2.96      -2.56      -2.43      0.22
1      192608      2.64      -1.17      3.82      0.25
2      192609      0.36      -1.40      0.13      0.23
3      192610     -3.24      -0.09      0.70      0.32
4      192611      2.53     -0.10     -0.51      0.31
..      ...      ...      ...      ...      ...
247    194702     -1.08      0.68      0.15      0.03
248    194703     -1.67     -1.62      0.61      0.03
249    194704     -4.80     -3.96      0.85      0.03
250    194705     -0.97     -3.26      0.33      0.03
251    194706      5.29     -0.30     -0.59      0.03

```

[252 rows x 5 columns]

```
[36]: ten_fact.dropna()
```

```

[36]:      Unnamed: 0      Mkt-RF      SMB      HML      RF
0      192607      2.96      -2.56      -2.43      0.22
1      192608      2.64      -1.17      3.82      0.25
2      192609      0.36      -1.40      0.13      0.23
3      192610     -3.24      -0.09      0.70      0.32
4      192611      2.53     -0.10     -0.51      0.31
..      ...      ...      ...      ...      ...

```



247	194702	-1.08	0.68	0.15	0.03
248	194703	-1.67	-1.62	0.61	0.03
249	194704	-4.80	-3.96	0.85	0.03
250	194705	-0.97	-3.26	0.33	0.03
251	194706	5.29	-0.30	-0.59	0.03

[252 rows x 5 columns]

```
[37]: ten_fact.drop(columns=ten_fact.columns[0], axis=1, inplace=True)
```

```
[40]: factors = reader.DataReader('F-F_Research_Data_Factors', 'famafrench')
```

```
[39]: factors
```

```
[39]: {0:      Mkt-RF  SMB  HML  RF
      Date
2018-02  -3.65  0.23  -1.07  0.11
2018-03  -2.35  4.05  -0.23  0.11
2018-04   0.28  1.14   0.54  0.14
2018-05   2.65  5.26  -3.18  0.14
2018-06   0.48  1.15  -2.33  0.14
2018-07   3.19 -2.22   0.47  0.16
2018-08   3.44  1.12  -3.99  0.16
2018-09   0.06 -2.28  -1.69  0.15
2018-10  -7.68 -4.77   3.44  0.19
2018-11   1.69 -0.68   0.27  0.18
2018-12  -9.57 -2.38  -1.86  0.20
2019-01   8.40  2.90  -0.45  0.21
2019-02   3.40  2.05  -2.68  0.18
2019-03   1.10 -3.03  -4.10  0.19
2019-04   3.97 -1.74   2.14  0.21
2019-05  -6.94 -1.31  -2.34  0.21
2019-06   6.93  0.28  -0.72  0.18
2019-07   1.19 -1.93   0.47  0.19
2019-08  -2.58 -2.36  -4.76  0.16
2019-09   1.43 -0.97   6.74  0.18
2019-10   2.06  0.29  -1.92  0.16
2019-11   3.87  0.78  -2.01  0.12
2019-12   2.77  0.73   1.76  0.14
2020-01  -0.11 -3.10  -6.22  0.13
2020-02  -8.13  1.07  -3.79  0.12
2020-03 -13.39 -4.88 -13.97  0.13
2020-04  13.65  2.49  -1.23  0.00
2020-05   5.58  2.48  -4.89  0.01
2020-06   2.46  2.70  -2.17  0.01
2020-07   5.77 -2.32  -1.38  0.01
2020-08   7.63 -0.22  -2.95  0.01
```

2020-09	-3.63	0.04	-2.68	0.01
2020-10	-2.10	4.36	4.21	0.01
2020-11	12.47	5.82	2.14	0.01
2020-12	4.63	4.89	-1.51	0.01
2021-01	-0.03	7.34	2.96	0.01
2021-02	2.78	2.06	7.18	0.00
2021-03	3.08	-2.37	7.40	0.00
2021-04	4.93	-3.19	-0.94	0.00
2021-05	0.29	-0.25	7.08	0.00
2021-06	2.75	1.70	-7.82	0.00
2021-07	1.27	-3.99	-1.76	0.00
2021-08	2.91	-0.43	-0.16	0.00
2021-09	-4.37	0.72	5.08	0.00
2021-10	6.65	-2.35	-0.48	0.00
2021-11	-1.55	-1.32	-0.44	0.00
2021-12	3.10	-1.66	3.28	0.01
2022-01	-6.25	-5.94	12.75	0.00
2022-02	-2.29	2.23	3.04	0.00
2022-03	3.05	-1.60	-1.80	0.01
2022-04	-9.46	-1.41	6.19	0.01
2022-05	-0.34	-1.85	8.41	0.03
2022-06	-8.43	2.09	-5.97	0.06
2022-07	9.57	2.81	-4.10	0.08
2022-08	-3.77	1.39	0.31	0.19
2022-09	-9.35	-0.82	0.03	0.19
2022-10	7.83	0.10	8.05	0.23
2022-11	4.60	-3.40	1.39	0.29
2022-12	-6.41	-0.64	1.36	0.33,

1:	Mkt-RF	SMB	HML	RF
----	--------	-----	-----	----

Date

2018	-6.95	-3.21	-9.73	1.83
2019	28.28	-6.10	-10.34	2.15
2020	23.66	13.17	-46.57	0.45
2021	23.56	-3.92	25.57	0.04
2022	-21.60	-6.79	25.85	1.43,

'DESCR': 'F-F Research Data Factors\n-----\n\nThis file was created by CMPT\_ME\_BEME\_RETS using the 202212 CRSP database. The 1-month TBill return is from Ibbotson and Associates, Inc. Copyright 2022 Kenneth R. French\n\n 0 : (59 rows x 4 cols)\n 1 : Annual Factors: January-December (5 rows x 4 cols)'}\n

#### 0.0.4 C5

[42]: `#load data`

```
ten_fact = pd.read_csv(r'/home/dsm/PART_A/5_Industry_Portfolios.csv',
↪skiprows=11)
```

```
ten_fact = ten_fact.head(252)
```

```
[43]: ten_fact.dropna()
```

```
[43]:
```

	Unnamed: 0	Cnsmr	Manuf	HiTec	Hlth	Other
0	192607	5.43	2.73	1.83	1.77	2.13
1	192608	2.76	2.33	2.41	4.25	4.35
2	192609	2.16	-0.44	1.06	0.69	0.29
3	192610	-3.90	-2.42	-2.26	-0.57	-2.84
4	192611	3.70	2.50	3.07	5.42	2.11
..	...	...	...	...	...	...
247	194702	0.18	-1.27	-2.06	-4.19	-1.28
248	194703	-2.34	-0.67	-2.21	-1.26	-3.33
249	194704	-6.31	-3.98	-2.59	-8.60	-6.27
250	194705	-0.93	-0.77	-0.72	-2.68	-2.07
251	194706	7.26	6.15	0.09	4.19	3.19

[252 rows x 6 columns]

```
[44]: ten_fact.drop(columns=ten_fact.columns[0], axis=1, inplace=True)
```

```
[45]: ten_fact
```

```
[45]:
```

	Cnsmr	Manuf	HiTec	Hlth	Other
0	5.43	2.73	1.83	1.77	2.13
1	2.76	2.33	2.41	4.25	4.35
2	2.16	-0.44	1.06	0.69	0.29
3	-3.90	-2.42	-2.26	-0.57	-2.84
4	3.70	2.50	3.07	5.42	2.11
..	...	...	...	...	...
247	0.18	-1.27	-2.06	-4.19	-1.28
248	-2.34	-0.67	-2.21	-1.26	-3.33
249	-6.31	-3.98	-2.59	-8.60	-6.27
250	-0.93	-0.77	-0.72	-2.68	-2.07
251	7.26	6.15	0.09	4.19	3.19

[252 rows x 5 columns]

```
[46]: factors = reader.DataReader('5_Industry_Portfolios', 'famafrench')
factors
```

```
[46]: {0:      Cnsmr  Manuf  HiTec  Hlth  Other
      Date
2018-02 -5.30 -5.91 -1.18 -3.53 -3.31
2018-03 -2.29  0.11 -3.19 -2.42 -2.68
2018-04  1.06  1.32 -0.40 -0.04  0.47
```

2018-05	0.62	2.38	5.70	2.29	1.22
2018-06	3.31	0.14	0.57	1.49	-1.04
2018-07	2.72	3.32	2.33	5.99	3.97
2018-08	4.71	-0.79	6.73	4.40	2.46
2018-09	0.34	1.56	0.04	2.14	-1.21
2018-10	-6.00	-8.68	-7.68	-8.70	-6.62
2018-11	2.06	2.47	-0.96	6.46	3.02
2018-12	-9.87	-9.03	-8.19	-8.18	-10.62
2019-01	8.12	8.98	8.97	5.25	9.18
2019-02	1.19	4.23	5.32	3.23	2.71
2019-03	2.82	0.71	3.31	0.48	-1.32
2019-04	4.10	2.47	6.00	-3.13	6.66
2019-05	-6.31	-8.29	-7.75	-3.37	-6.30
2019-06	6.87	7.34	7.51	6.84	6.72
2019-07	1.16	-0.39	3.38	-2.19	1.64
2019-08	-0.63	-2.18	-2.33	-0.61	-4.47
2019-09	1.25	3.86	1.01	-0.94	2.01
2019-10	0.93	-0.84	3.06	4.73	3.04
2019-11	2.21	1.59	4.66	5.53	4.98
2019-12	2.26	3.04	3.37	3.45	2.40
2020-01	0.89	-3.16	2.63	-2.01	-1.37
2020-02	-7.40	-10.23	-6.80	-5.39	-9.84
2020-03	-9.84	-19.18	-10.17	-5.00	-18.87
2020-04	15.70	12.67	14.59	13.41	10.54
2020-05	4.31	4.66	7.87	4.05	3.88
2020-06	3.80	0.19	5.11	-1.52	-0.07
2020-07	9.33	3.38	6.75	4.43	3.83
2020-08	10.07	3.15	10.00	2.45	7.21
2020-09	-4.01	-2.24	-4.82	-1.48	-2.97
2020-10	-2.64	-0.03	-2.02	-4.42	-1.90
2020-11	11.44	12.91	11.17	9.52	15.76
2020-12	4.09	2.65	4.99	4.76	5.31
2021-01	0.67	-1.06	0.17	3.22	-2.85
2021-02	-1.97	5.95	1.91	-1.35	9.53
2021-03	5.19	7.20	0.82	0.13	5.62
2021-04	5.82	2.53	6.22	2.87	5.81
2021-05	-1.70	2.46	-0.87	0.01	2.94
2021-06	2.38	0.10	6.27	4.28	-2.46
2021-07	0.05	-0.04	3.01	3.04	-0.38
2021-08	1.66	0.75	4.39	2.81	2.51
2021-09	-3.36	-3.15	-6.16	-5.99	-2.32
2021-10	8.55	6.04	6.67	2.31	7.14
2021-11	0.40	-1.73	0.18	-4.29	-4.92
2021-12	1.53	5.88	1.88	6.72	4.96
2022-01	-7.49	-1.18	-7.88	-8.66	-2.88
2022-02	-2.26	0.61	-4.78	-1.01	-0.88
2022-03	4.20	4.48	2.74	5.13	1.52

2022-04	-8.50	-4.01	-12.50	-6.80	-8.95
2022-05	-4.27	4.34	-1.32	0.99	0.40
2022-06	-7.36	-10.59	-8.20	-2.05	-10.01
2022-07	13.95	8.44	10.54	2.75	8.76
2022-08	-3.29	-0.93	-5.00	-5.07	-2.82
2022-09	-7.62	-10.90	-11.61	-1.91	-7.91
2022-10	3.80	13.46	5.33	8.84	11.60
2022-11	2.42	6.18	5.00	5.46	6.00
2022-12	-9.36	-2.62	-7.79	-1.73	-5.27,
1:	Cnsmr	Manuf	HiTec	Hlth	Other
Date					
2018-02	-4.77	-6.43	-1.78	-3.51	-3.91
2018-03	0.65	1.76	0.10	0.22	1.40
2018-04	0.92	2.10	0.00	-0.17	0.95
2018-05	3.96	5.00	5.65	7.70	3.48
2018-06	4.02	2.00	1.26	-2.59	0.30
2018-07	0.18	1.61	-0.25	-1.47	1.21
2018-08	4.37	-0.83	7.48	5.86	1.61
2018-09	-2.12	-0.46	-1.90	-1.17	-2.35
2018-10	-8.36	-11.62	-10.16	-14.50	-8.26
2018-11	-1.25	-1.91	0.59	-0.45	0.70
2018-12	-12.94	-14.08	-10.11	-18.41	-11.25
2019-01	12.25	14.16	15.41	18.35	11.06
2019-02	4.24	4.21	6.44	6.55	4.85
2019-03	-3.47	-1.87	-0.73	2.98	-3.23
2019-04	2.52	2.73	4.45	-2.36	4.38
2019-05	-10.71	-11.06	-7.98	-8.25	-5.91
2019-06	6.44	6.78	4.81	4.40	5.70
2019-07	-0.07	-2.93	0.92	-5.15	1.21
2019-08	-3.94	-8.51	-5.44	-4.73	-4.40
2019-09	5.58	5.63	0.39	-3.45	3.45
2019-10	-0.02	-2.04	0.11	-0.42	1.88
2019-11	3.22	-0.22	4.69	8.71	2.70
2019-12	2.17	7.27	3.48	9.82	3.07
2020-01	-4.58	-6.26	1.26	4.66	-3.21
2020-02	-9.56	-11.22	-7.19	-0.79	-8.79
2020-03	-24.07	-27.26	-18.66	-17.46	-25.07
2020-04	21.24	26.98	20.35	21.68	12.02
2020-05	8.63	3.97	10.00	13.92	4.40
2020-06	8.47	6.47	8.57	4.81	5.54
2020-07	6.22	3.47	9.61	3.67	0.56
2020-08	9.83	3.39	3.79	1.29	5.80
2020-09	-1.94	-4.15	-2.91	-1.20	-3.43
2020-10	2.56	0.97	0.26	-2.73	4.05
2020-11	22.37	23.25	22.37	18.62	18.39
2020-12	6.16	9.22	11.49	9.78	8.96
2021-01	18.34	10.03	9.53	19.43	4.64

2021-02	7.51	12.64	7.41	6.44	11.51
2021-03	5.79	3.57	0.52	-5.09	6.53
2021-04	3.20	1.47	2.65	-2.16	2.60
2021-05	4.72	5.29	0.02	-3.29	2.72
2021-06	1.38	2.70	7.34	5.35	-1.44
2021-07	-3.81	-3.94	-2.90	-8.80	-1.83
2021-08	-0.48	0.89	2.01	5.01	2.72
2021-09	-4.64	1.03	-4.70	-5.69	-1.17
2021-10	2.61	5.10	4.13	-3.62	3.49
2021-11	-3.09	-4.30	-6.76	-9.88	-3.04
2021-12	1.69	2.69	-1.07	-5.53	1.83
2022-01	-8.61	-2.75	-11.43	-15.31	-5.03
2022-02	-0.47	4.05	-0.92	-4.50	0.11
2022-03	-0.83	5.89	0.46	3.02	1.07
2022-04	-7.10	-6.36	-13.84	-19.95	-8.25
2022-05	-2.39	3.48	-3.20	-7.47	-0.50
2022-06	-8.67	-11.44	-9.23	2.25	-8.36
2022-07	8.37	10.53	10.32	7.24	6.47
2022-08	-0.82	0.60	-1.42	2.45	-1.29
2022-09	-13.56	-13.18	-12.43	-10.19	-8.20
2022-10	9.72	13.22	6.46	0.99	6.59
2022-11	3.64	3.44	-0.43	-3.64	0.87
2022-12	-8.86	-5.97	-7.40	-3.51	-5.02,

2:            Cnsmr    Manuf    HiTec    Hlth    Other  
Date

2018	-3.58	-11.10	-0.59	4.82	-9.22
2019	25.88	21.21	41.76	20.20	29.51
2020	37.64	0.26	42.69	18.31	6.92
2021	20.24	27.16	26.52	13.86	27.35
2022	-25.01	4.46	-32.39	-5.43	-12.30,

3:            Cnsmr    Manuf    HiTec    Hlth    Other  
Date

2018	-14.25	-22.04	-6.61	-22.48	-13.65
2019	17.60	12.04	27.65	25.96	26.30
2020	42.68	18.60	65.98	63.63	12.58
2021	36.13	42.45	18.16	-10.86	31.47
2022	-28.07	-2.27	-37.62	-41.54	-20.80,

4:            Cnsmr    Manuf    HiTec    Hlth    Other  
Date

2018-02	504	598	641	587	1011
2018-03	500	596	638	584	1008
2018-04	496	592	635	580	1000
2018-05	495	590	631	579	998
2018-06	492	587	627	577	993
2018-07	506	605	670	642	1052
2018-08	505	604	665	640	1048
2018-09	504	603	663	638	1045

2018-10	499	599	658	635	1037
2018-11	496	593	655	631	1031
2018-12	493	591	647	628	1027
2019-01	491	589	642	626	1020
2019-02	491	585	634	624	1017
2019-03	488	583	627	621	1012
2019-04	485	580	624	617	1007
2019-05	483	578	623	617	1003
2019-06	481	577	621	614	1002
2019-07	498	598	654	694	1033
2019-08	495	595	649	693	1027
2019-09	491	592	643	692	1021
2019-10	488	587	638	690	1017
2019-11	484	584	637	685	1010
2019-12	482	579	632	681	1001
2020-01	481	575	631	675	995
2020-02	477	572	630	672	992
2020-03	475	570	625	672	991
2020-04	475	566	619	668	988
2020-05	470	563	617	666	984
2020-06	465	557	614	663	980
2020-07	484	559	637	722	1026
2020-08	480	557	632	722	1020
2020-09	478	554	629	721	1018
2020-10	478	550	627	715	1011
2020-11	478	548	626	712	1010
2020-12	474	548	623	708	1009
2021-01	471	545	621	705	1008
2021-02	471	544	618	702	1005
2021-03	471	543	616	699	1002
2021-04	470	542	607	696	999
2021-05	469	542	603	696	994
2021-06	468	541	599	695	990
2021-07	511	564	699	822	1260
2021-08	511	562	696	820	1255
2021-09	509	561	692	819	1250
2021-10	508	559	687	817	1239
2021-11	507	554	684	813	1229
2021-12	505	552	681	810	1223
2022-01	504	552	681	809	1213
2022-02	504	550	678	809	1205
2022-03	502	546	674	805	1202
2022-04	500	544	671	804	1195
2022-05	498	541	668	800	1188
2022-06	497	538	664	797	1184
2022-07	535	564	742	868	1456
2022-08	534	563	739	862	1450

2022-09	533	562	731	860	1447
2022-10	532	560	723	855	1432
2022-11	531	558	720	852	1424
2022-12	528	556	715	846	1361,
5:	Cnsmr	Manuf	HiTec	Hlth	Other
Date					
2018-02	9721.28	8561.98	13305.89	4709.31	8087.73
2018-03	9251.70	8052.57	13170.97	4520.81	7820.01
2018-04	9068.63	8101.22	12783.46	4435.69	7657.18
2018-05	9176.21	8227.15	12782.09	4426.50	7703.68
2018-06	9154.80	8408.25	13444.57	4530.78	7819.25
2018-07	9014.28	8405.66	12932.01	4224.27	7250.28
2018-08	9270.89	8688.79	13309.38	4483.63	7559.52
2018-09	9707.87	8603.84	14228.30	4685.76	7749.59
2018-10	9793.52	8666.09	14327.16	4795.67	7697.70
2018-11	9254.68	7927.74	13243.18	4394.21	7153.15
2018-12	9372.58	8117.10	13220.25	4687.59	7376.28
2019-01	8459.04	7385.65	12197.11	4307.09	6624.10
2019-02	9138.82	8075.88	13425.18	4525.04	7238.96
2019-03	9287.17	8412.03	14118.07	4685.12	7451.00
2019-04	9582.73	8492.64	14632.27	4732.74	7377.68
2019-05	10009.42	8722.97	15503.64	4579.42	7891.60
2019-06	9399.98	7971.07	14323.04	4435.72	7386.02
2019-07	9792.92	8306.71	14537.07	4263.66	7597.81
2019-08	9956.64	8244.90	15101.62	4172.14	7755.41
2019-09	9953.22	8071.48	14853.76	4143.25	7412.19
2019-10	10116.26	8430.23	15100.35	4109.17	7574.59
2019-11	10283.72	8390.30	15568.35	4213.76	7847.63
2019-12	10535.04	8561.97	16379.73	4454.11	8258.40
2020-01	10768.79	8859.36	16950.00	4623.12	8476.68
2020-02	10946.16	8610.19	17403.88	4541.28	8373.82
2020-03	10166.16	7719.40	16296.00	4289.69	7540.17
2020-04	9136.48	6262.60	14645.19	4087.52	6122.91
2020-05	10660.81	7084.42	16820.72	4644.36	6787.99
2020-06	11206.61	7461.61	18205.33	4843.22	7062.53
2020-07	11226.59	7565.40	18603.74	4522.39	6635.58
2020-08	12369.45	7837.49	19992.24	4714.83	6917.05
2020-09	13656.80	8094.48	22074.05	4826.03	7418.82
2020-10	13086.51	7942.45	21068.14	4733.11	7203.66
2020-11	12733.24	7957.86	20658.14	4522.61	7066.11
2020-12	14252.86	8951.70	23038.23	4973.33	8175.75
2021-01	14854.78	9185.76	24254.84	5218.32	8602.56
2021-02	14948.82	9094.73	24391.19	5397.94	8369.70
2021-03	14642.19	9617.44	24907.99	5337.21	9182.63
2021-04	15399.34	10314.40	25434.96	5333.48	9711.34
2021-05	16322.84	10564.75	27151.21	5482.60	10313.68
2021-06	16062.65	10803.24	27050.26	5476.22	10640.36



2021-07	15591.95	10556.58	25435.30	5164.14	8456.83
2021-08	15592.14	10574.29	26238.46	5325.45	8449.84
2021-09	15893.42	10629.06	27524.17	5472.46	8684.62
2021-10	15363.81	10301.26	25981.31	5151.27	8543.05
2021-11	16702.62	10994.30	27804.49	5276.01	9210.47
2021-12	16790.76	10804.86	27914.34	5055.56	8765.78
2022-01	17056.57	11423.42	28430.74	5397.15	9244.05
2022-02	15770.92	11316.88	26213.13	4920.98	9019.59
2022-03	15460.45	11423.55	25053.79	4877.37	8946.17
2022-04	16130.17	11951.44	25828.93	5127.73	9113.34
2022-05	14808.79	11523.62	22652.04	4795.80	8332.12
2022-06	14189.58	12041.56	22397.24	4849.79	8379.04
2022-07	11968.99	10293.04	18348.89	4520.26	6102.84
2022-08	13653.56	11168.87	20339.53	4664.17	6657.61
2022-09	13206.98	11038.96	19481.51	4431.71	6472.49
2022-10	12199.08	9846.24	17316.35	4356.75	5999.92
2022-11	12671.21	11150.97	18285.98	4751.21	6726.12
2022-12	13028.64	11832.30	19303.38	5015.90	7433.17,

6: Cnsmr Manuf HiTec Hlth Other

Date

2018	0.22	0.38	0.21	0.19	0.46
2019	0.22	0.41	0.20	0.19	0.46
2020	0.22	0.48	0.18	0.19	0.57
2021	0.16	0.32	0.13	0.16	0.39
2022	0.21	0.36	0.19	0.22	0.50,

7: Cnsmr Manuf HiTec Hlth Other

Date

2018	0.21	0.39	0.22	0.20	0.44
2019	0.24	0.45	0.25	0.21	0.53
2020	0.20	0.52	0.18	0.19	0.42
2021	0.19	0.40	0.15	0.17	0.49
2022	0.16	0.37	0.15	0.19	0.41,

'DESCR': '5 Industry Portfolios\n-----\n\nThis file was created by CMPT\_IND\_RETS using the 202212 CRSP database. It contains value- and equal-weighted returns for 5 industry portfolios. The portfolios are constructed at the end of June. The annual returns are from January to December. Missing data are indicated by -99.99 or -999. Copyright 2022 Kenneth R. French\n\n 0 : Average Value Weighted Returns -- Monthly (59 rows x 5 cols)\n 1 : Average Equal Weighted Returns -- Monthly (59 rows x 5 cols)\n 2 : Average Value Weighted Returns -- Annual (5 rows x 5 cols)\n 3 : Average Equal Weighted Returns -- Annual (5 rows x 5 cols)\n 4 : Number of Firms in Portfolios (59 rows x 5 cols)\n 5 : Average Firm Size (59 rows x 5 cols)\n 6 : Sum of BE / Sum of ME (5 rows x 5 cols)\n 7 : Value-Weighted Average of BE/ME (5 rows x 5 cols)'}\n