

Gold

October 9, 2025

1 Illustrating performance of gold vs stocks

1.0.1 Import packages

```
[1]: import pandas as pd
pd.options.mode.chained_assignment = None # default='warn'

import os
import wrds
import fredapi
import math
import numpy

import matplotlib
import matplotlib.pyplot as plt
from scipy.optimize import minimize
```

1.0.2 Import data

Establish WRDS connection

```
[2]: conn = wrds.Connection(wrds_username='wmann')
```

Loading library list...

Done

One-month risk-free returns:

```
[3]: FF3F = conn.get_table(library='ff_all',table='factors_monthly')
FF3F['month'] = pd.to_datetime(FF3F['date']).dt.to_period('M')
FF3F = FF3F.drop('date',axis=1).drop('dateff',axis=1).set_index('month')
riskfree = FF3F.rf.astype('float64')
riskfree = round(riskfree,6)
riskfree = riskfree['1980':'2025']
```

Gold returns:

```
[4]: Gold = conn.raw_sql("""select comcode, of, date_ from trdstm.wrds_cmdy_data
    where comcode = '1865' and of is not null and of <> 5""")
Gold['date_'] = pd.to_datetime(Gold['date_'])
```

```

Gold = Gold.sort_values(by='date_')
Gold = Gold.reset_index().resample('ME',on='date_').agg(['last'])
Gold['month'] = Gold.index.to_period('M')
Gold['ret'] = (Gold['of']/Gold['of'].shift())-1
Gold = Gold.set_index('month')
Gold = Gold['ret']
Gold = round(Gold,6)
Gold = Gold['1980':'2025']

```

Market portfolio returns, measured with VFINX:

```

[5]: VFINX_crsp_fundno = conn.raw_sql("select crsp_fundno, ticker from_
    ↳crsp_q_mutualfunds.fund_hdr where ticker = 'VFINX'").reset_index().
    ↳crsp_fundno[0]
VFINX = conn.raw_sql("select caldt, mret from crsp_q_mutualfunds.
    ↳monthly_returns where crsp_fundno = " + str(VFINX_crsp_fundno))

[6]: conn.close()

[7]: # Convert string date to datetime
VFINX = VFINX.set_index( pd.to_datetime(VFINX.set_index('caldt').index) ).
    ↳drop('caldt',axis=1)
# Aggregate to monthly level
VFINX['month'] = VFINX.index.to_period('M')
VFINX = (VFINX.set_index('month') + 1).groupby('month').prod() - 1
VFINX.columns = ['VFINX']
VFINX = round(VFINX,6)
VFINX = VFINX['1980':'2025']

```

Merge the datasets together:

```

[8]: HWdata = pd.concat([VFINX, Gold.to_frame(name='Gold'), riskfree.
    ↳to_frame(name='rf')],axis=1)['1980':'2025']

```

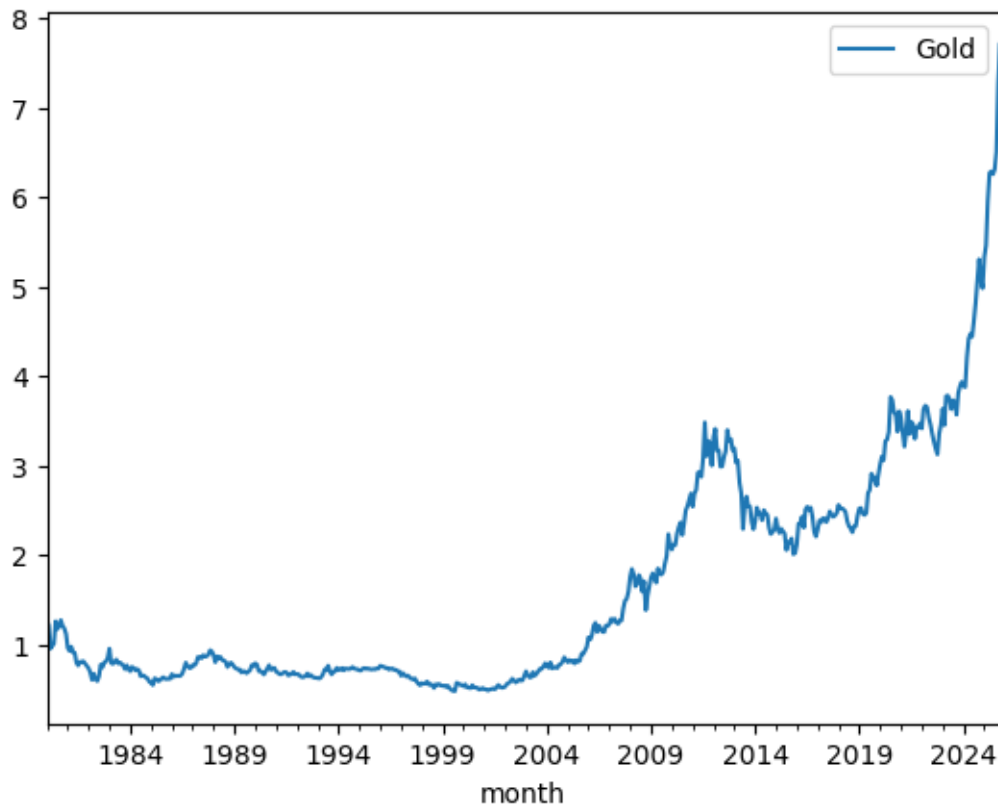
1.0.3 Figures

The price of gold since 1980, rescaled to 1980 = \$1.00:

```

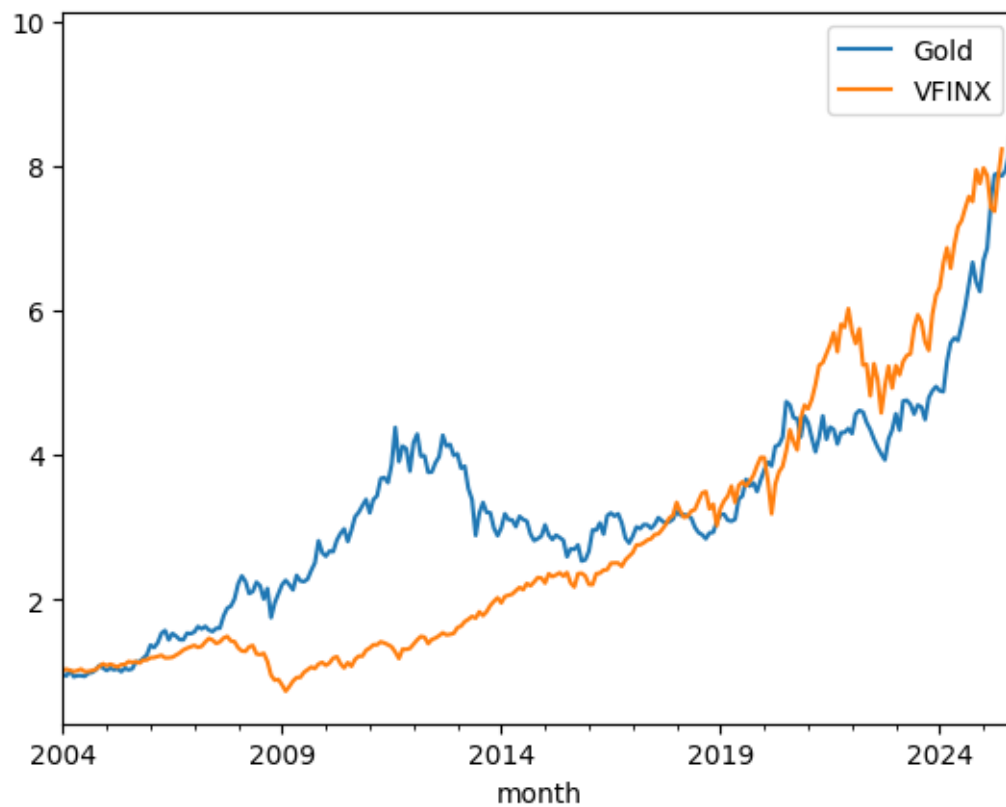
[9]: fig = (1+HWdata).cumprod()[['Gold']].plot().get_figure()
fig.savefig('gold_price.png')

```



Performance of gold vs stocks since 2004: Compare with GLD ETF vs S&P 500 total return (or your favorite index ETF)

```
[10]: HWdata04 = HWdata['2004':]
fig = (1+HWdata04).cumprod()[['Gold', 'VFINX']].plot().get_figure()
fig.savefig('gold_stocks_2004.png')
```



Performance of gold vs stocks since 1980:

```
[11]: fig = (1+HWdata).cumprod()[['Gold', 'VFINX']].plot().get_figure()
fig.savefig('gold_stocks.png')
```

