

Portfolio Managament "M2GRA": Construction of a Portfolio Management Framework in Python

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Introduction

Ticker	Description
GBP=	GBP/USD FX pair
EUR=	EURO/US DOLLAR FX SPOT RATE
=USD	USD index
NOK=	US DOLLAR/NORWEGIAN KRONE FX SPOT RATE
JPY=	US DOLLAR/JAPANESE YEN FX SPOT RATE
CHF=	US DOLLAR/SWISS FRANC FX SPOT RATE
AUD=	AUSTRALIAN DOLLAR/US DOLLAR FX SPOT RATE
NZD=	NEW ZEALAND DOLLAR/US DOLLAR FX SPOT RATE
CAD=	US DOLLAR/CANADIAN DOLLAR FX SPOT RATE
SEK=	US DOLLAR/SWEDISH KRONA FX SPOT RATE
GBP3MD=	GBP3MD 3 Month Deposit
EUR3MD=	EUR3MD 3 Month Deposit
USD3MD=	USD3MD 3 Month Deposit
NOK3MD=	NOK3MD 3 Month Deposit
JPY3MD=	JPY3MD 3 Month Deposit
CHF3MD=	CHF3MD 3 Month Deposit
AUD3MD=	AUD3MD 3 Month Deposit
NZD3MD=	NZD3MD 3 Month Deposit
CAD3MD=	CAD3MD 3 Month Deposit
SEK3MD=	SEK3MD 3 Month Deposit
GLD	SPDR Gold Shares (Gold ETF)
UCO	ProShares Ultra Bloomberg Crude Oil (Oil ETF)
URTH.K	iShares MSCI World ETF (Equity index ETF)

Table: Tickers and their descriptions

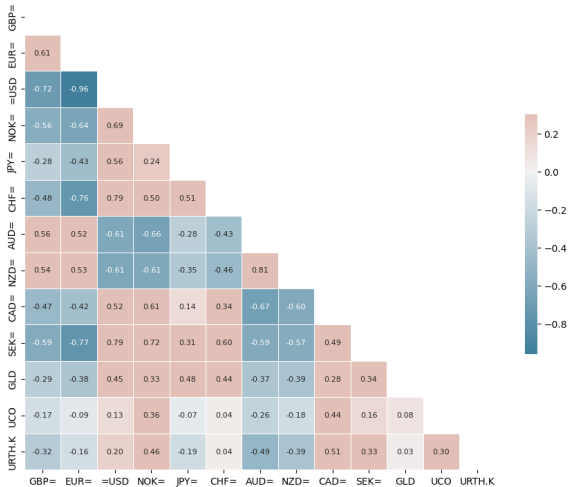
Data manipulation and data cleaning

- Selection of the investment universe and structure of the data.
- Inversion of the FX rates to harmonize the dataset and consolidation of the dataset.

Risk-return of assets

Ticker	Annualized Mean Return	Annualized Volatility
GBP=	2.25	9.31
EUR=	2.17	8.01
=USD	-2.28	6.86
NOK=	-4.64	12.03
JPY=	-2.95	8.96
CHF=	-0.56	8.05
AUD=	2.73	10.33
NZD=	2.62	10.59
CAD=	-2.15	7.57
SEK=	-4.28	10.26
GLD	5.01	14.12
UCO	-2.50	49.44
URTH.K	7.67	16.28

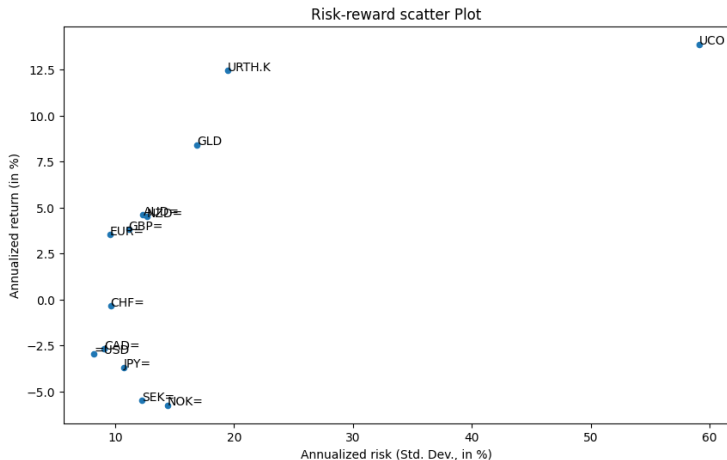
Correlation structure of assets



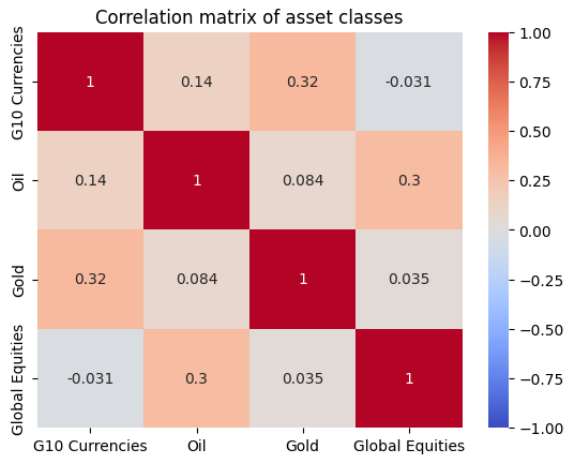
Risk-Reward analysis



Risk-Reward analysis (II)

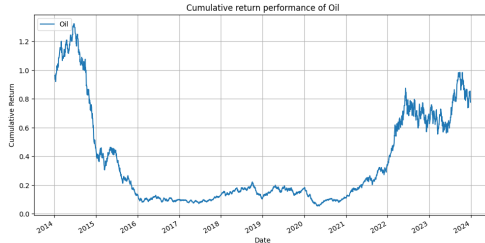
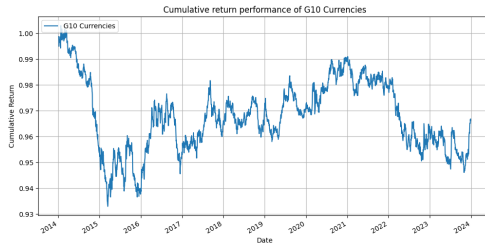


Correlation of asset class returns



- └ Risk return analysis of assets
- └ Data analysis of asset returns

Cumulative returns of asset class



Cumulative returns of asset class (II)

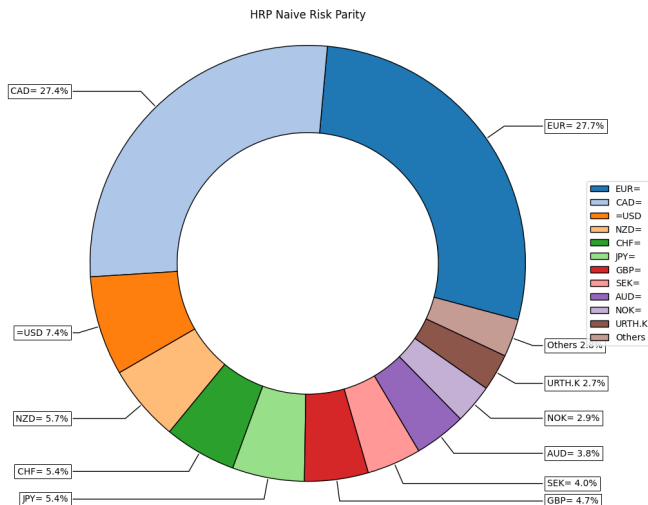


- └ Risk return analysis of assets
 - └ Data analysis of asset returns

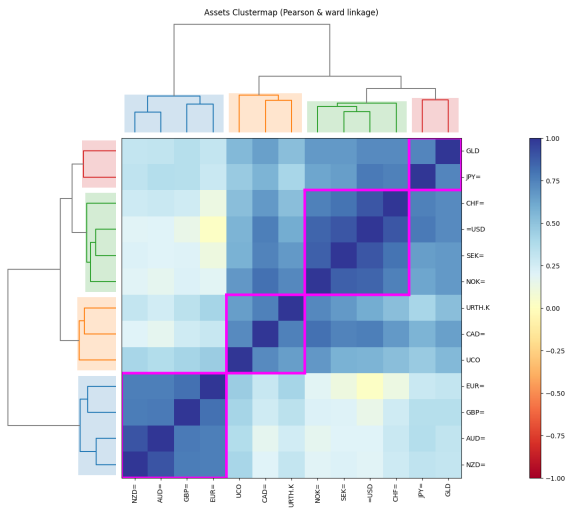
Data analysis of asset returns

Category	Mean (%)	Std Dev (%)	Skewness	Kurtosis
G10 Currencies	-0.45	2.59	0.27	1.91
Oil	13.88	59.10	-0.09	-1.02
Gold	8.40	16.87	0.01	2.78
Global Equities	12.44	19.46	-0.31	3.88

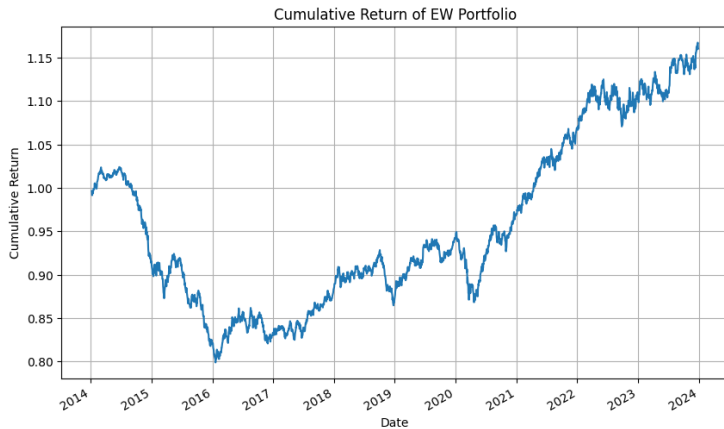
Implementation of the HRP portfolio



Implementation of the HRP portfolio (II)



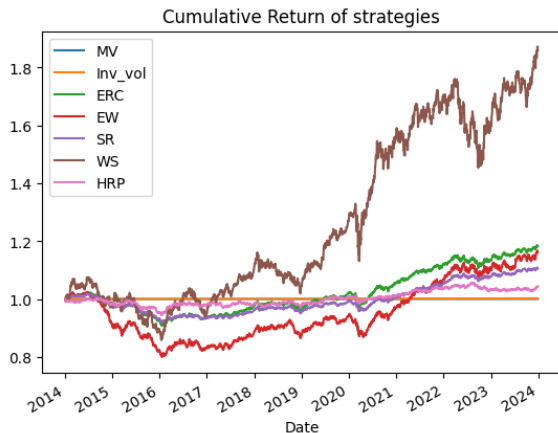
Risk return analysis of strategies



Wall-Street portfolio

- The Wall-Street portfolio is a benchmark portfolio strategy that we want to test and add in our overall analysis. It is based on the market outlook and recommendation from three main Wall-Street actors (JP Morgan AM, Goldman Sachs AM and BlackRock).
- This portfolio is based on Wall-Street outlook on the economy and the overall macro environment.

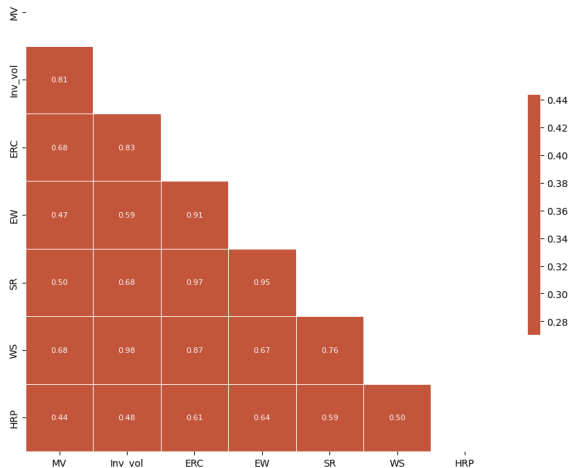
Cumulative return for each strategy



Drawdown for each strategy



Correlation between strategies



Results and comments

	Annualized Return (%)	Annualized Volatility (%)	Skewness	Excess Kurtosis	Sortino Ratio	VaR 95%	CVaR 95%	Max Drawdown (%)
MV	0.00	0.00	-0.312	0.881	0.505	-0.000	-0.000	-0.01
Inv_vol	0.02	0.04	-0.100	1.283	0.652	-0.000	-0.000	-0.07
ERC	1.72	3.10	-0.198	-1.940	0.541	-0.003	-0.004	-11.48
EW	1.63	5.14	-0.038	-3.238	0.317	-0.005	-0.006	-21.97
SR	1.03	2.25	-0.129	-3.023	0.450	-0.002	-0.003	-9.76
WS	6.78	10.47	-0.096	0.531	0.639	-0.010	-0.015	-20.15
HRP	0.45	2.26	-0.127	-1.669	0.194	-0.002	-0.003	-5.88

Figure: Strategy performance analysis. Data: Refinitiv Eikon.

Conclusion

- Mixed results on the strategies implemented.
- Wall Street (WS) exhibits the highest return but also the highest risk, which could reflect a more aggressive strategy or a high concentration in assets that have performed exceptionally well during the period.
- In terms of Sortino ratio (modified Sharpe ratio), all strategies performed better than the benchmark EW except for HRP.