QF621 FX Quant Trading

FOREX advantages

1. minimal idiosyncratic risk
2. minimal country risk
3. minimal liquidity risk
4. higher AUM capacity
5. Short is allowed
6. Leveraging by nature

FOREX pairs

- say both major and minor currencies (size risk factor),
- some commodity-sensitive currencies (idiosyncratic risk),
- and geometry-diversity currencies (country risk)

```
["USDJPY", "USDEUR", "USDGBP",\
 "USDAUD", "USDCAD", "USDCHF",\
 "USDNZD", "USDSGD", "USDZAR"]
```

methodology

1. some trend following logic, as we are forming our strategy based on certain rolling windows
2. some risk based technic, as we are discussing on risk adjusted returns, and Value-at-Risk metrics
3. Some higher portfolio level money management, to identify on potential Regime change / failure of portfolio strategy

Portfolio formation

1. explore the behaviours on back-testing results by different sub-formations,
    1. Higher Sharpe,
    2. low PnL correlatio
2. Strategy formation on portfolio.
    - Equal weightage
    - Sharpe adjusted weightage
    - Risk adjusted weightage
    - Nomination wightage (may reserve cash portions)

3. 2-strike VaR risk control.
    1. 2-strike stop loss
    2. 1-strike overloading

strategies

- 1. allocation: Max Return
- 2. allocation: Min Vol
- 3. Pairs trading
- 4. TA trading

Allocation Max Return / Min Vol

- Consider momentum long short
- Consider size long short
- Efficiency frontier algorithm, min inverse Sharpe, min portfolio Std

Allocation Max Return

	ylf_1 In Sample PERFORMANCE
Daily annualized sharpe	0.650196
Average annual returns %	9.924048
Total returns %	102.548493
Max drawdown %	-23.849357
%VaR1d 1% - para	2.197805
%VaR1d 1% - hist	2.365217
%VaR1d 5% - para	1.542431
%VaR1d 5% - hist	1.383993
Stressed %return during Covid19	0.000000
Stressed %return during Dec18	5.148855
Stressed %return during Fall2015	-2.074963
Stressed %return during Oct14	-0.538661
Stressed %return during Aug2013	0.671847

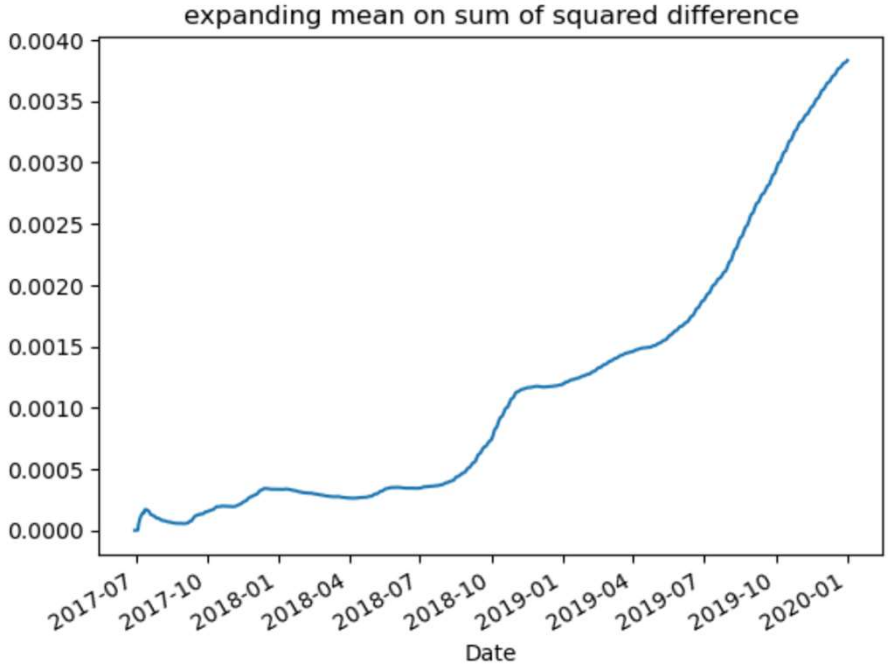
Allocation Min Vol

	ylf_2 In Sample PERFORMANCE
Daily annualized sharpe	0.386489
Average annual returns %	2.544307
Total returns %	26.291171
Max drawdown %	-14.962448
%VaR1d 1% - para	0.954820
%VaR1d 1% - hist	0.987635
%VaR1d 5% - para	0.672152
%VaR1d 5% - hist	0.556455
Stressed %return during Covid19	0.000000
Stressed %return during Dec18	-0.255934
Stressed %return during Fall2015	4.677173
Stressed %return during Oct14	1.062601
Stressed %return during Aug2013	0.612943

Pairs

- Similarity measurement
- Spread trading
- De-coupling detection

Effectiveness of spread trading



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Pairs 1 In-Sample performance (to fill)

Pairs 2 In-Sample performance (to fill)

Portfolio strategy selection (to update)

- Highest Sharpe first
- Low corr threshold

```
In [231]:  1  Sharpe_order

Out[231]: [0, 1, 2, 3]
```

```
27  portfolio_w
```

```
Equal weight          1.0
Sharpe adjusted       1.0
Risk adjusted         1.0
Nomination weight     0.6
dtype: float64
```

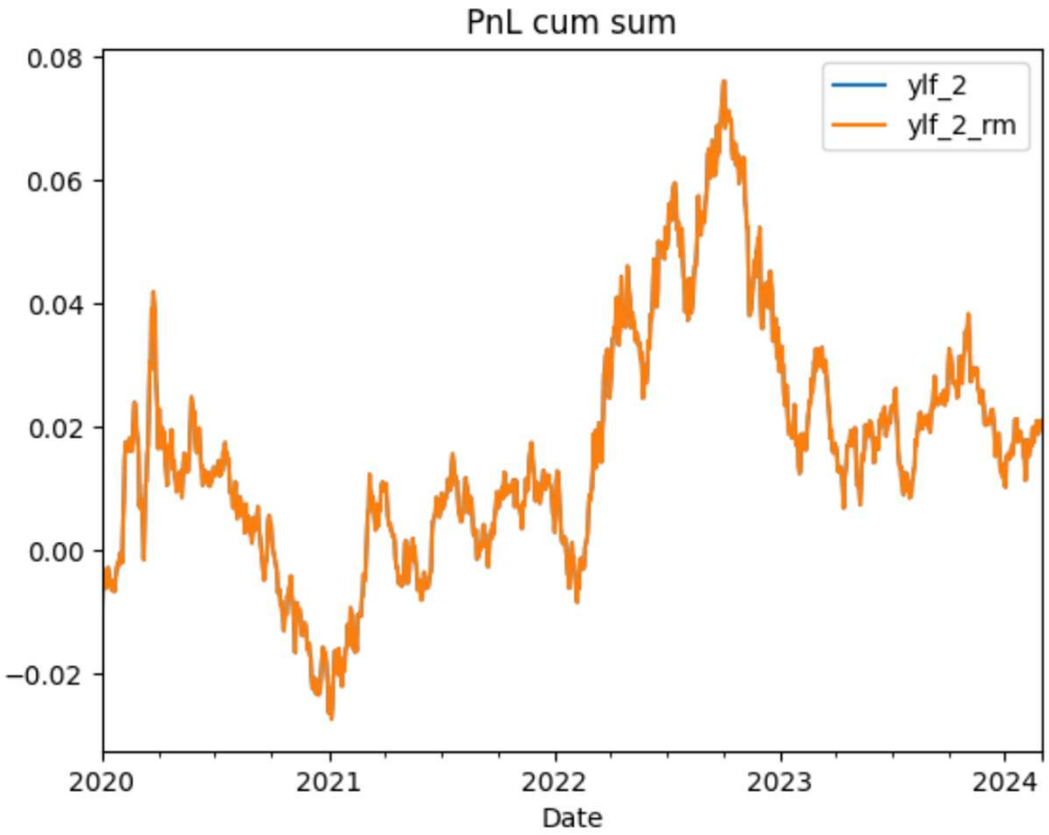
Out[238]:

	Equal weight	Sharpe adjusted	Risk adjusted	Nomination weight	Strategy Sharpe
ylf_1	0.5	0.627187	0.301338	0.5	0.650196
ylf_2	0.5	0.372813	0.698662	0.1	0.386489

```
1  portfolio_IS.corr()
```

	llw_1	llw_2	ylf_1	ylf_2
llw_1	1.000000	-0.014077	0.064652	0.013114
llw_2	-0.014077	1.000000	-0.050512	0.017084
ylf_1	0.064652	-0.050512	1.000000	0.472774
ylf_2	0.013114	0.017084	0.472774	1.000000

2-Strike risk control

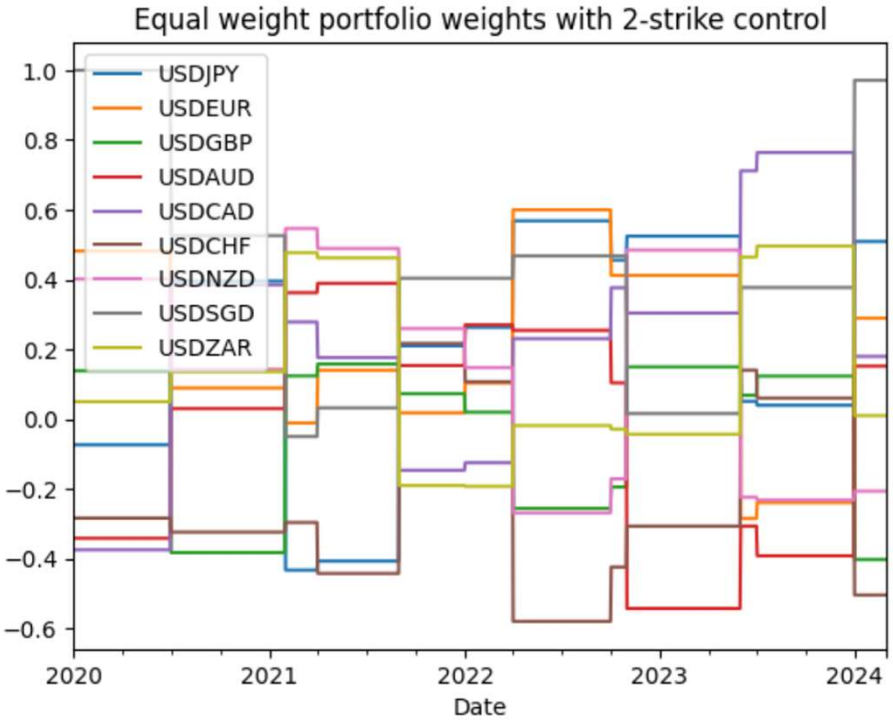


Individual Strategy Out of Sample Sharpe ratio

```
1 portfolio_select_OS.mean()/portfolio_select_OS.std()*np.sqrt(252)
2
```

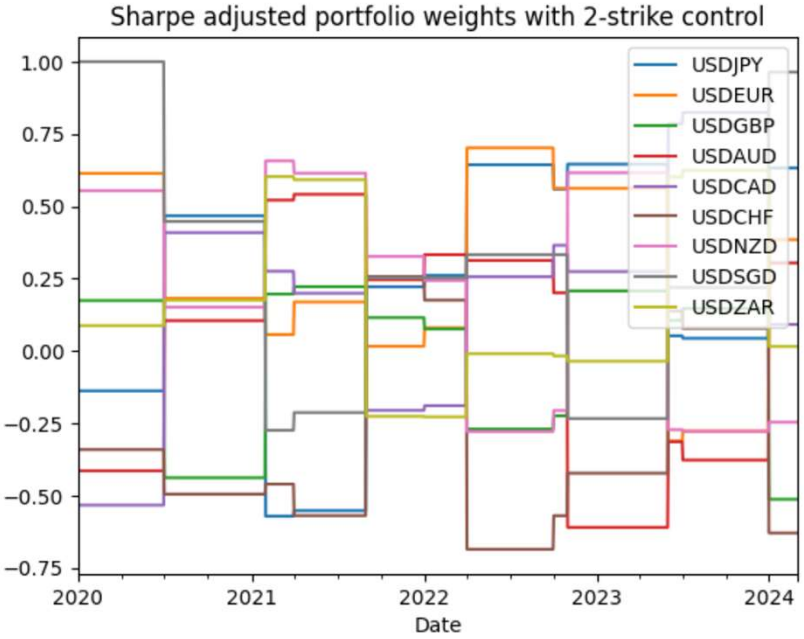
```
ylf_1    0.327778
ylf_2    0.122320
dtype: float64
```

Final portfolio – equal weight



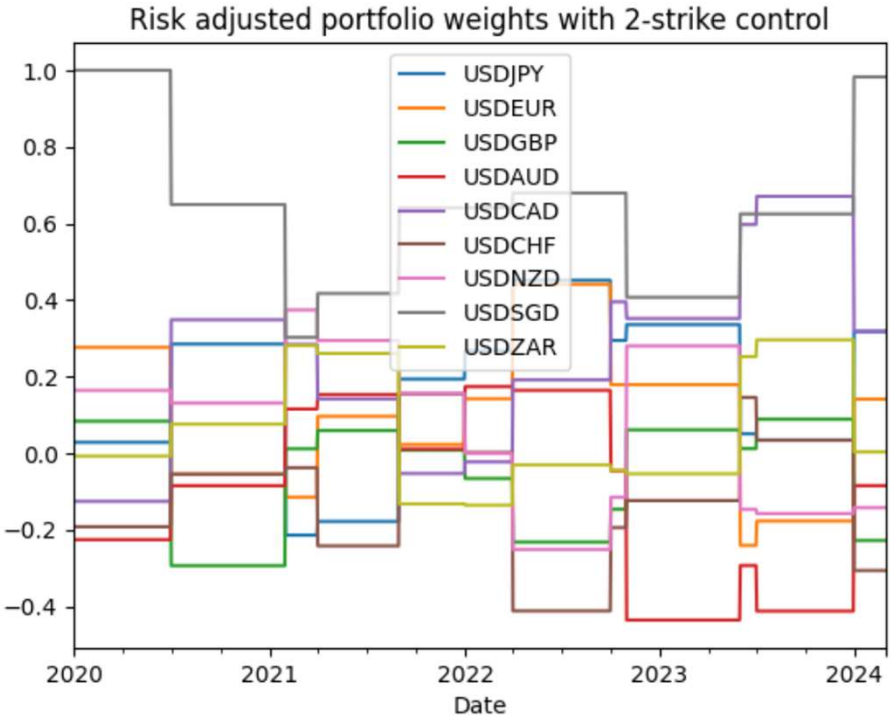
	Equal weight Out of Sample with 2-strike VaR control PERFORMANCE
Daily annualized sharpe	0.321253
Average annual returns %	2.748945
Total returns %	11.857552
Max drawdown %	-18.054772
%VaR1d 1% - para	1.243657
%VaR1d 1% - hist	1.416016
%VaR1d 5% - para	0.876137
%VaR1d 5% - hist	0.847792
Stressed %return during Covid19	0.593579
Stressed %return during Dec18	0.000000
Stressed %return during Fall2015	0.000000
Stressed %return during Oct14	0.000000
Stressed %return during Aug2013	0.000000

Final portfolio – sharpe adjusted



Sharpe adjusted Out of Sample with 2-strike VaR control PERFORMANCE	
Daily annualized sharpe	0.325482
Average annual returns %	3.328609
Total returns %	14.357928
Max drawdown %	-22.138222
%VaR1d 1% - para	1.486166
%VaR1d 1% - hist	1.644473
%VaR1d 5% - para	1.046930
%VaR1d 5% - hist	1.031281
Stressed %return during Covid19	0.541353
Stressed %return during Dec18	0.000000
Stressed %return during Fall2015	0.000000
Stressed %return during Oct14	0.000000
Stressed %return during Aug2013	0.000000

Final portfolio – risk adjusted



Nomination weight Out of Sample with 2-strike VaR control PERFORMANCE	
Daily annualized sharpe	0.327709
Average annual returns %	2.560878
Total returns %	11.046328
Max drawdown %	-17.254014
%VaR1d 1% - para	1.135548
%VaR1d 1% - hist	1.295635
%VaR1d 5% - para	0.799917
%VaR1d 5% - hist	0.778819
Stressed %return during Covid19	0.274022
Stressed %return during Dec18	0.000000
Stressed %return during Fall2015	0.000000
Stressed %return during Oct14	0.000000
Stressed %return during Aug2013	0.000000

Conclusion – hedge fund

- High Sharpe in-sample strategy
- Low corr in-sample strategy
- Weightage scheme
- Risk control