



QF 621

## FX Quant Trading

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01

# Introduction

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## 1.1 FOREX Pairs

### Factors to consider:



- ✓ Size risk → select major and minor currencies
- ✓ Idiosyncratic risk → select commodity-sensitive currencies
- ✓ Country risk → select geometry-diversity currencies

### Advantages:



- ✓ Offer minimal idiosyncratic risk
- ✓ Provide minimal country risk
- ✓ Control liquidity risk
- ✓ Increase capacity for AUM
- ✓ Use leverage

### Selected PAIRS(9)

USDJPY USDEUR

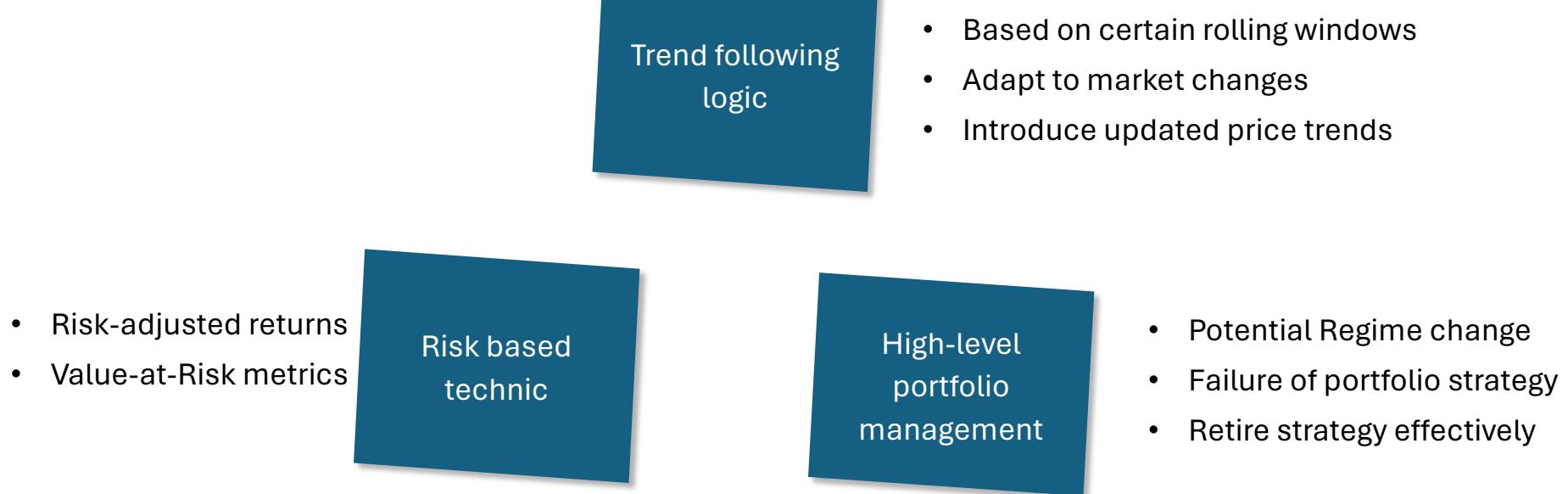
USDGBP USDAUD

USDCAD USDCHF

USDNZD USDSGD

USDZAR

## 1.2 Methodology



## 1.3 Portfolio Formation



### Explore the behavior

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explore the behaviors on back-testing results by different sub-formations:

- higher Sharpe Ratio
- low PnL correlation



### Strategy formation

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- Equal weightage
- Sharpe adjusted weightage
- Risk adjusted weightage
- Nomination weightage (may reserve cash portions)



### 2-strike VaR risk control

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- 2-strike stop loss
- 1-strike overloading

P A R T  
**02**

# Strategy

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Allocation

Pairs Trading

Technical Indicator

## 2.1 Allocation: Max Ret / Min Vol

TARGET → Combine 9 FOREX assets and identify the best assets allocation to get better performance.

METHOD → Maximum return and Minimize volatility portfolio

FACTOR → **3 points** to Utilize market dynamics and value differentials to better asset allocation.

Size long short

Momentum long  
and short

Efficient  
Frontier  
Algorithm

- Min reverse Sharpe
- Min portfolio Std

## STEPS:

- Data tag generation** → split the timeframe
- Target Function** → maximize return / minimize vol
- Strategy optimization** → fine-tuning method on rolling window
- Performance evaluation** → metrics including Sharpe ratio...

Allocation Max Return		Allocation Min Vol	
	ylf_1 In Sample PERFORMANCE		ylf_2 In Sample PERFORMANCE
Daily annualized sharpe	0. 650196	Daily annualized sharpe	0. 386489
Average annual returns %	9. 924048	Average annual returns %	2. 544307
Total returns %	102. 548493	Total returns %	26. 291171
Max drawdown %	-23. 849357	Max drawdown %	-14. 962448
%VaR1d 1% - para	2. 197805	%VaR1d 1% - para	0. 954820
%VaR1d 1% - hist	2. 365217	%VaR1d 1% - hist	0. 987635
%VaR1d 5% - para	1. 542431	%VaR1d 5% - para	0. 672152
%VaR1d 5% - hist	1. 383993	%VaR1d 5% - hist	0. 556455
Stressed %return during Covid19	0. 000000	Stressed %return during Covid19	0. 000000
Stressed %return during Dec18	5. 148855	Stressed %return during Dec18	-0. 255934
Stressed %return during Fall2015	-2. 074963	Stressed %return during Fall2015	4. 677173
Stressed %return during Oct14	-0. 538661	Stressed %return during Oct14	1. 062601
Stressed %return during Aug2013	0. 671847	Stressed %return during Aug2013	0. 612943

## 2.2 Pairs Trading

### STEP 1 Correlation Cointegration

- Establish the trades
- Difference in prices
  - Long/Short the spread

### --> Determine the tradability

- Cointegration testing
- 2nd momentum difference measurements

### STEP 1 Normalization Of historical value

- Post-trade monitor
- De-pair ineffective assets
  - Dynamic adjustment

### STEP 2 Spread Trading

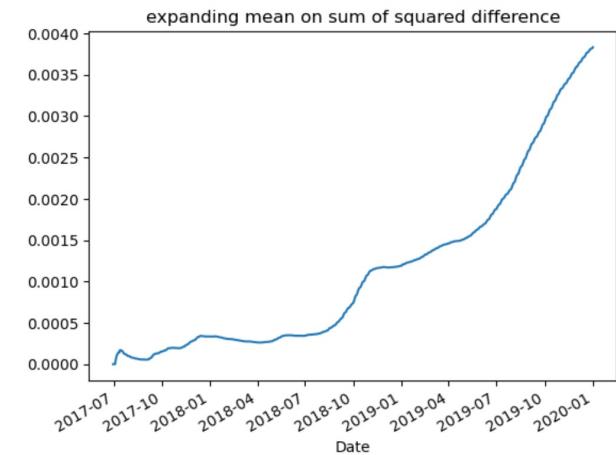
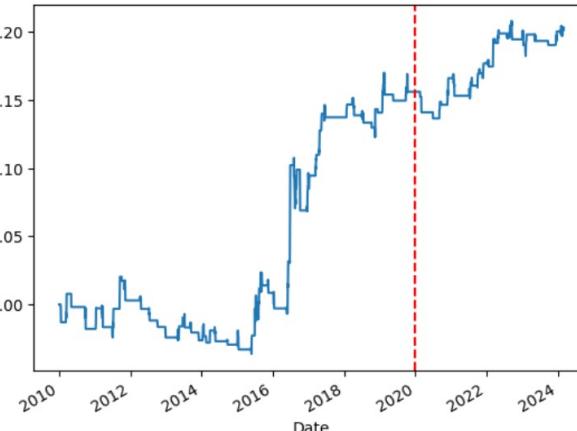
### STEP 3 De-coupling Detection

## ✓ Execute the strategy

- Measure similarity
- Identity the difference

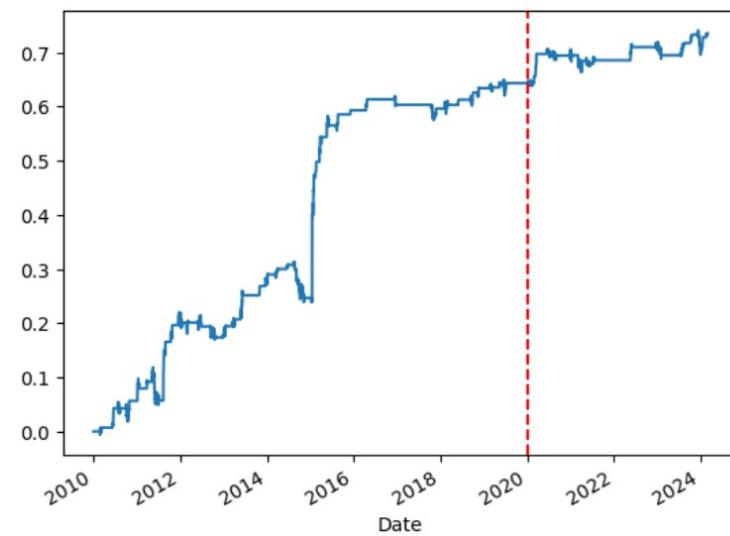
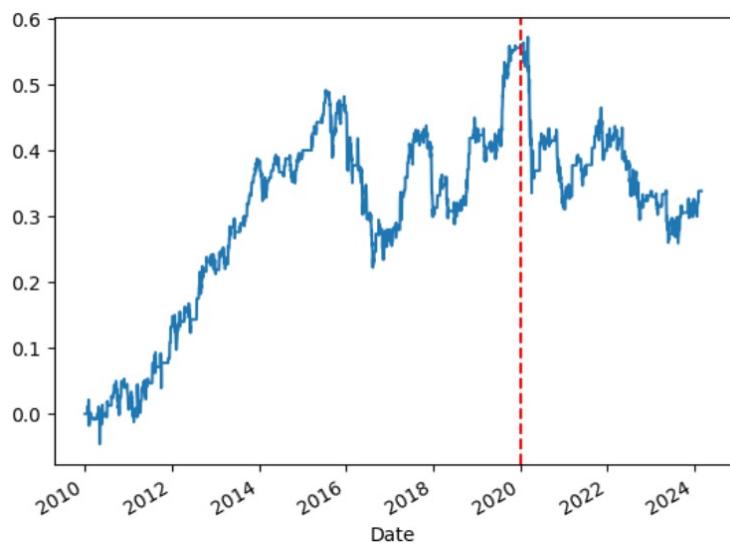
- Standard: 2 sigma  
short the spread when deviate  
from the standard  
- Risk control  
Set stop-loss level

- Monitor stale pairs  
Calculate sum of squared diff  
to decide whether to de-pair



## 2.3 Technical Indicator - RSI

- Do **in-sample analysis** based on varying window lengths and different performances
- **Select** USDCAD, USDCHF, USDZAR with highest Sharpe ratio.
- Do **out-of-sample** test based on the optimal parameters
- **Identify** robust pairs under the strategy – USECHF USDZAR



# Strategy summary

- Allocation -- maximize return & minimize volatility
- Pairs Trading
- Technical indicator --RSI

--> 5 Strategies with the Highest Sharpe Ratio

	Equal weight	Sharpe adjusted	Risk adjusted	Nomination weight	Strategy Sharpe
<b>hwy_2</b>	0.083333	0.132568	0.035424	0.50	0.863155
<b>llw_2</b>	0.083333	0.117862	0.100033	0.10	0.767403
<b>llw_1</b>	0.083333	0.100477	0.126791	0.10	0.654209
<b>ylf_6</b>	0.083333	0.100184	0.092585	0.10	0.652298
<b>ylf_1</b>	0.083333	0.099861	0.017055	0.05	0.650196

PART

03

## Strategy Composition

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## 3.1 Portfolio Strategy Selection

1

### Selection Rules

- Highest Sharpe Ratio
- Low corr threshold

2

### Manual Selection

Based on external  
information

3

### Weightage Assignment

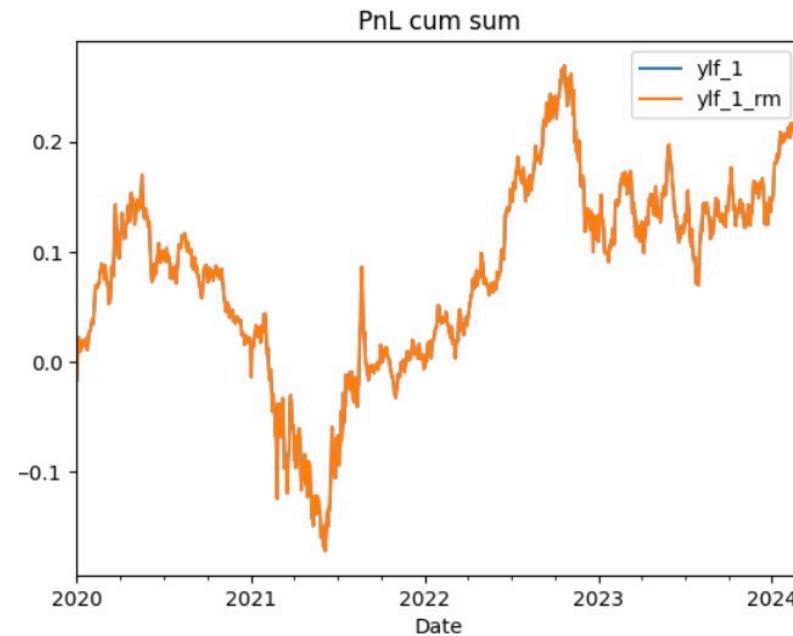
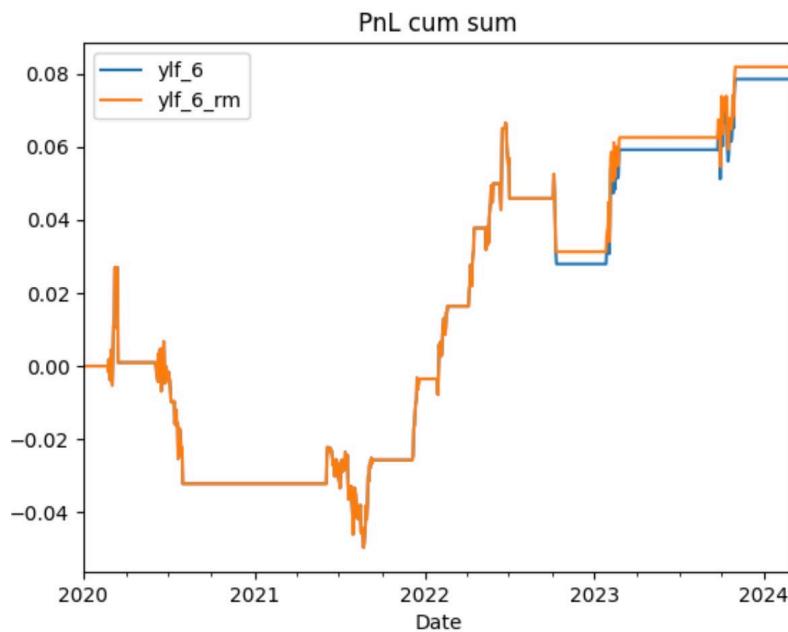
Aim to optimize risk-  
adjusted returns on selected  
strategies

4

### Performance Evaluation

Validate the chosen  
allocation and composition  
strategies

## 3.2 2-Strike Risk Control



the “**2-strike**” Value at Risk(VaR) control

→ to mitigate downside risk based on specified VaR thresholds, indicating a deviation from risk tolerance levels.

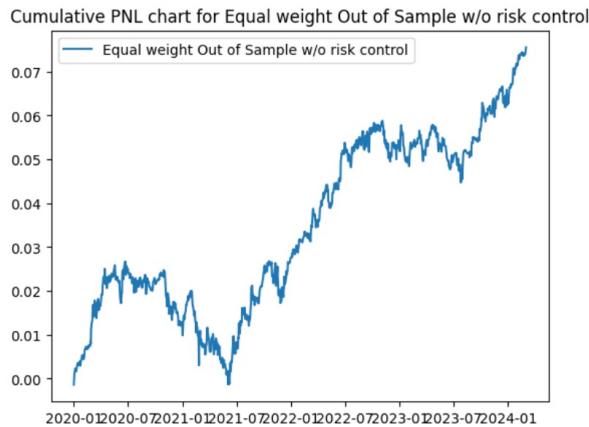
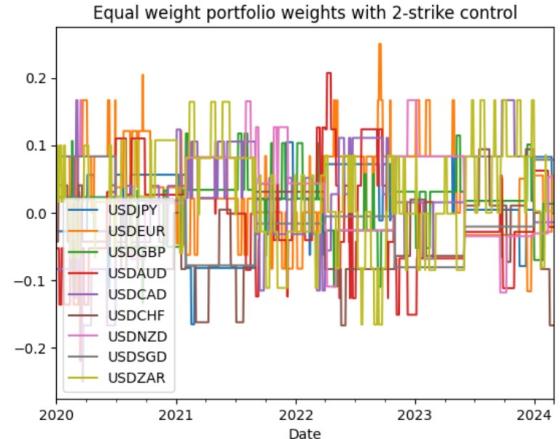
PART  
**04**

# Final Portfolio

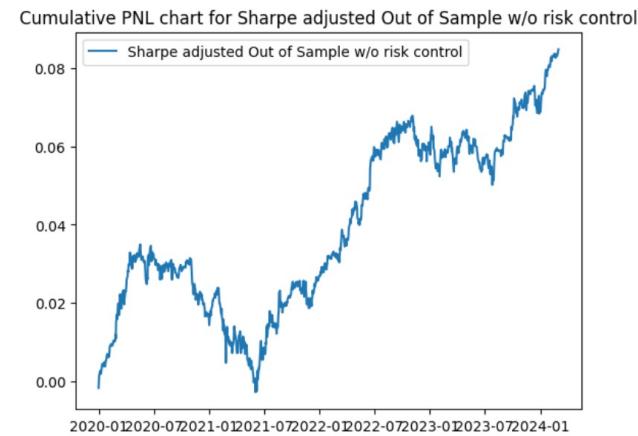
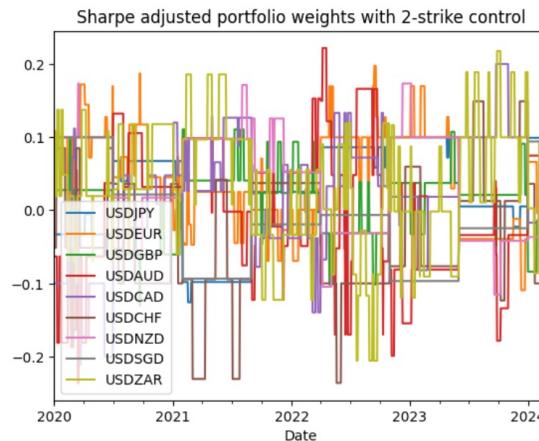
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# 4 Final Portfolio

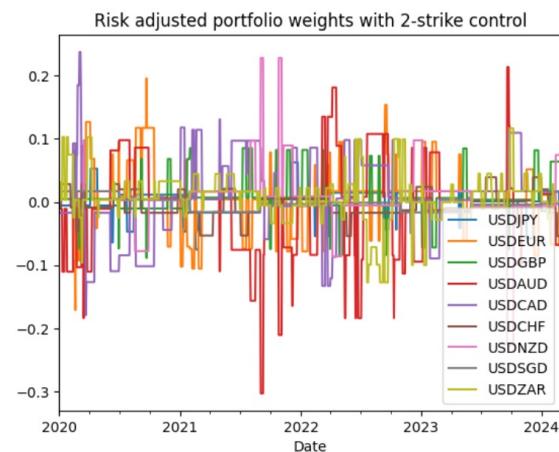
## – Equal weight



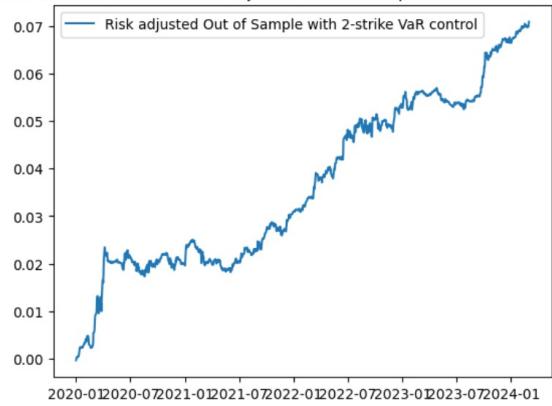
## – Sharpe Adjusted



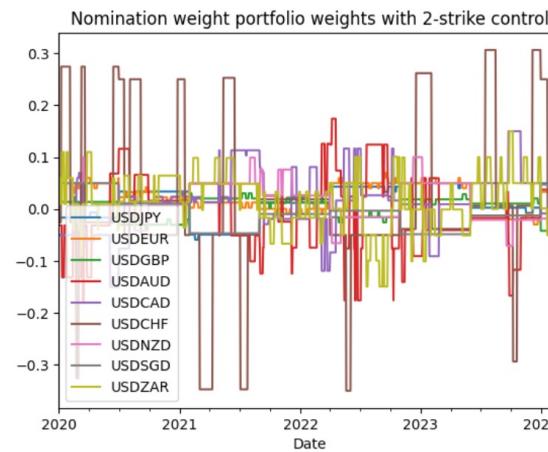
– Risk Adjusted(inverse risk)



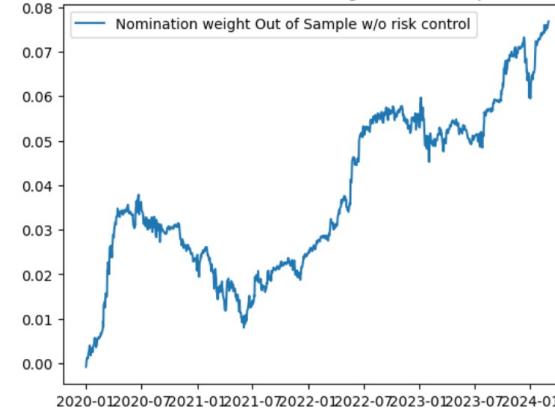
Cumulative PNL chart for Risk adjusted Out of Sample with 2-strike VaR control



– Nomination Weight(may reserve cash portions)



Cumulative PNL chart for Nomination weight Out of Sample w/o risk control



# Conclusion – hedge fund



**High Sharpe in-sample strategy**



**Low corr in-sample strategy**



**Weightage scheme**



**Risk control**

- Performance summary:

	Risk Adjust	Equal Weight	Sharpe Adjust
<b>Annualized Sharpe</b>	<b>1.840116</b>	1.102058	1.035989
<b>Avg. Annual return</b>	1.641620%	1.928202%	<b>2.096704%</b>
<b>Total return</b>	7.087630%	8.324936%	<b>9.052438%</b>
<b>Max Drawdown</b>	<b>-0.683249%</b>	-2.642975%	-3.571785%
<b>VaR 1% para</b>	<b>0.124284%</b>	0.248869%	0.288406%
<b>VaR 1% hist</b>	<b>0.143352%</b>	0.274199%	0.300047%
<b>VaR 5% para</b>	<b>0.085967%</b>	0.173722%	0.201481%
<b>VaR 5% hist</b>	<b>0.071380%</b>	0.169162%	0.195653%
<b>Stressed period Covid19</b>	0.415027%	0.414853%	<b>0.477848%</b>

PART

Thank you

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