import numpy as np

def initialize(context):

# Check status of the pair every day 60 minutes before market close

schedule\_function(check\_pair\_status, date\_rules.every\_day(), time\_rules.market\_close(minutes=60))

context.stock1 = sid(48421) # This is JP Morgan Diversified Return Emerging Markets Equity ETF.

context.stock2 = sid(47135) # This is JP Morgan Diversified Return Global Equity ETF.

# We set the thresholds for entering or exiting the position.

context.entry\_threshold = 0.5

context.exit\_threshold = 0.1

# Moving average lengths

context.ma\_long\_length = 5 # this is the long horizon

context.ma\_short\_length = 2 # this is the short horizon

# Indicators for whether we are in a trade or not. False means that we are not in the trade. We start of with False, because we are currently not in any long or short positions.

context.currently\_long\_the\_spread = False

context.currently\_short\_the\_spread = False

def check\_pair\_status(context, data):

# Define the stocks

s1 = context.stock1

s2 = context.stock2

# Get pricing history for the long horizon

prices = data.history([s1, s2], "price", context.ma\_long\_length, '1d')

# Get pricing history for the short horizon

short\_prices = prices.iloc[-context.ma\_short\_length:]

# Get the mean of the spread over the long horizon

ma\_long = np.mean(prices[s1] - prices[s2])

# Get the standard deviation of the spread over the long horizon

stdev = np.std(prices[s1] - prices[s2])

# Get the mean of the spread over the short horizon

ma\_short = np.mean(short\_prices[s1] - short\_prices[s2])

# Compute the zscore of the spread. This tells us how extreme the spread is.

if stdev > 0:

zscore = (ma\_short - ma\_long)/stdev

# There are two entry cases; one for taking a short position, the other for taking a long position.

# The first case is when zscore is above the zscore threshold and we are currently not in a SHORT trade.

if zscore > context.entry\_threshold and (not context.currently\_short\_the\_spread):

order\_target\_percent(s1, -0.5) # short Emerging Market Equity ETF

order\_target\_percent(s2, 0.5) # long Global Equity ETF

context.currently\_short\_the\_spread = True # Now that we have taken a short position on the spread, we assign the value of True to this variable.

context.currently\_long\_the\_spread = False # Now that we have taken a short position on the spread, we assign the value of False to this variable.

# The second case is when zscore is below the zscore threshold and we are currently not in a LONG trade.

elif zscore < -context.entry\_threshold and (not context.currently\_long\_the\_spread):

order\_target\_percent(s1, 0.5) # long Emerging Market Equity ETF

order\_target\_percent(s2, -0.5) # short Global Equity ETF

context.currently\_short\_the\_spread = False # Now that we have taken a long position on the spread, we assign the value of False to this variable.

context.currently\_long\_the\_spread = True # Now that we have taken a long position on the spread, we assign the value of True to this variable.

# This is the exit case.

# When the zscore is less than the exit threshold, that is, when the zscore approaches zero, we exit the position.

elif abs(zscore) < context.exit\_threshold:

order\_target\_percent(s1, 0) # Do not long or short any ETF.

order\_target\_percent(s2, 0) # Do not long or short any ETF.

context.currently\_short\_the\_spread = False # Now that we have exited the position, the value of this is assigned back to its initial value False.

context.currently\_long\_the\_spread = False # Now that we have exited the position, the value of this is assigned back to its initial value False.

record('zscore', zscore) # To create the zscore graph.