

margin call explntn

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0.1 Margin Call Detection Rule

A margin call occurs when: $\text{Current Equity} < \text{Maintenance Margin Required}$

0.1.1 Detailed Breakdown:

Current Equity Calculation:

$\text{Current Equity} = \text{Portfolio Value} - \text{Margin Loan}$
 $\text{Portfolio Value} = \text{Shares Held} \times \text{Current ETF Price}$

Maintenance Margin Required:

$\text{Maintenance Margin Required} = \text{Portfolio Value} \times \text{Maintenance Margin Percentage}$

Maintenance Margin Percentages by Account Type: - **Reg-T Account (Long):** 25% of portfolio value - **Portfolio Margin (Long):** 15% of portfolio value
- **Reg-T Account (Short):** 30% of portfolio value - **Portfolio Margin (Short):** 20% of portfolio value

0.1.2 Example:

Let's say you have: - Portfolio Value: \$2,000,000 - Margin Loan: \$1,600,000
- Current Equity: \$400,000 - Reg-T Account (25% maintenance)

Maintenance Margin Required: $\$2,000,000 \times 25\% = \$500,000$

Margin Call Check: $\$400,000 < \$500,000 \rightarrow \text{MARGIN CALL TRIGGERED}$

0.1.3 Key Code from `historical_backtest.py`:

Ran tool

Ran tool

Read file: Margin App/historical_backtest.py

Ran tool

Here's the **exact margin call rule** the historical backtest uses:

0.2 Margin Call Trigger Rule

0.2.1 Primary Rule:

`is_margin_call = current_equity_in_position < maintenance_margin_required`

0.2.2 Variable Definitions:

Current Equity:

```
current_equity_in_position = portfolio_value - margin_loan  
portfolio_value = shares_held * current_price
```

Maintenance Margin Required:

```
maintenance_margin_required = portfolio_value * (maintenance_margin_pct / 100.0)
```

Maintenance Margin Percentages:

```
# From calculate_margin_params() function:  
if account_type == 'reg_t':  
    maintenance_margin_pct = 25.0 # 25% for Reg-T accounts  
else: # portfolio margin  
    maintenance_margin_pct = 15.0 # 15% for Portfolio Margin accounts
```

0.3 Margin Call Price Formula

The app also calculates the **exact price** at which a margin call would trigger:

```
margin_call_price = margin_loan / (shares_held * (1 - maintenance_margin_pct / 100.0))
```

0.3.1 Real Example:

Let's say you have: - **Account:** Reg-T (25% maintenance requirement) - **Shares Held:** 10,000 shares - **Current Price:** \$400/share

- **Portfolio Value:** \$4,000,000 - **Margin Loan:** \$3,200,000 - **Current Equity:** \$800,000

Maintenance Margin Required: $\$4,000,000 \times 25\% = \$1,000,000$

Margin Call Check: $\$800,000 < \$1,000,000 \rightarrow$ **MARGIN CALL TRIGGERED!**

Margin Call Price: $\$3,200,000 \div (10,000 \times 0.75) = \426.67

So if the ETF price drops to \$426.67 or below, you get margin called.

0.4 Daily Sequence:

1. **Update Interest:** Add daily interest to margin loan
2. **Reinvest Dividends:** Buy more shares with dividend payments
3. **Calculate Current Equity:** Portfolio Value - Updated Margin Loan
4. **Check Maintenance:** Is Current Equity $<$ 25% of Portfolio Value?
5. **If YES \rightarrow IMMEDIATE LIQUIDATION \rightarrow Wait 2 days \rightarrow Re-enter with remaining equity**

This rule runs **every single trading day** throughout the entire backtest period!