

sklearn LinearRegression: The API

sklearn Code Pattern

```
# sklearn Linear Regression
from sklearn.linear_model import LinearRegression

# Step 1: Create the model
model = LinearRegression()

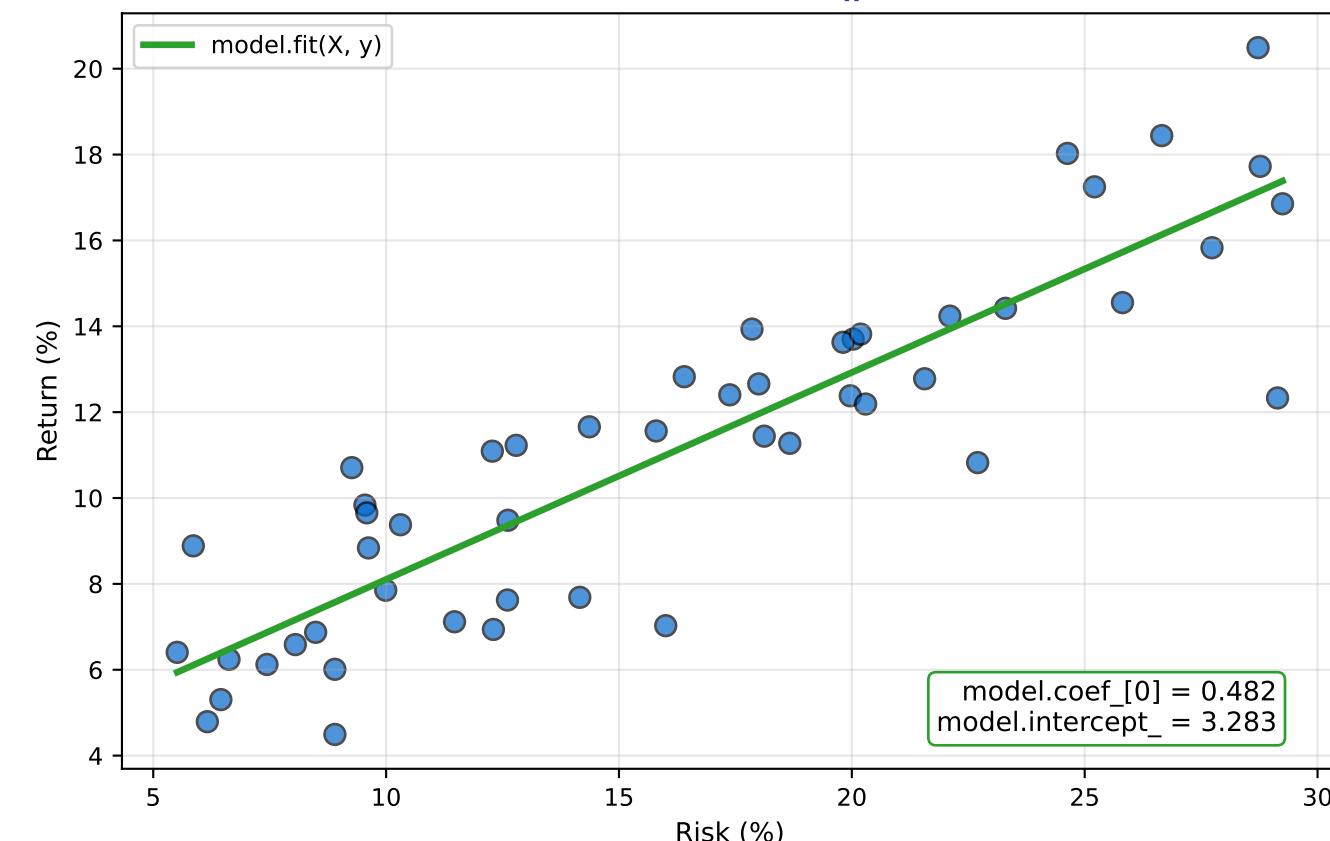
# Step 2: Fit to data
# X must be 2D: (n_samples, n_features)
X = risk.values.reshape(-1, 1)
y = returns.values
model.fit(X, y)

# Step 3: Access coefficients
slope = model.coef_[0]      # 0.52
intercept = model.intercept_ # 2.87

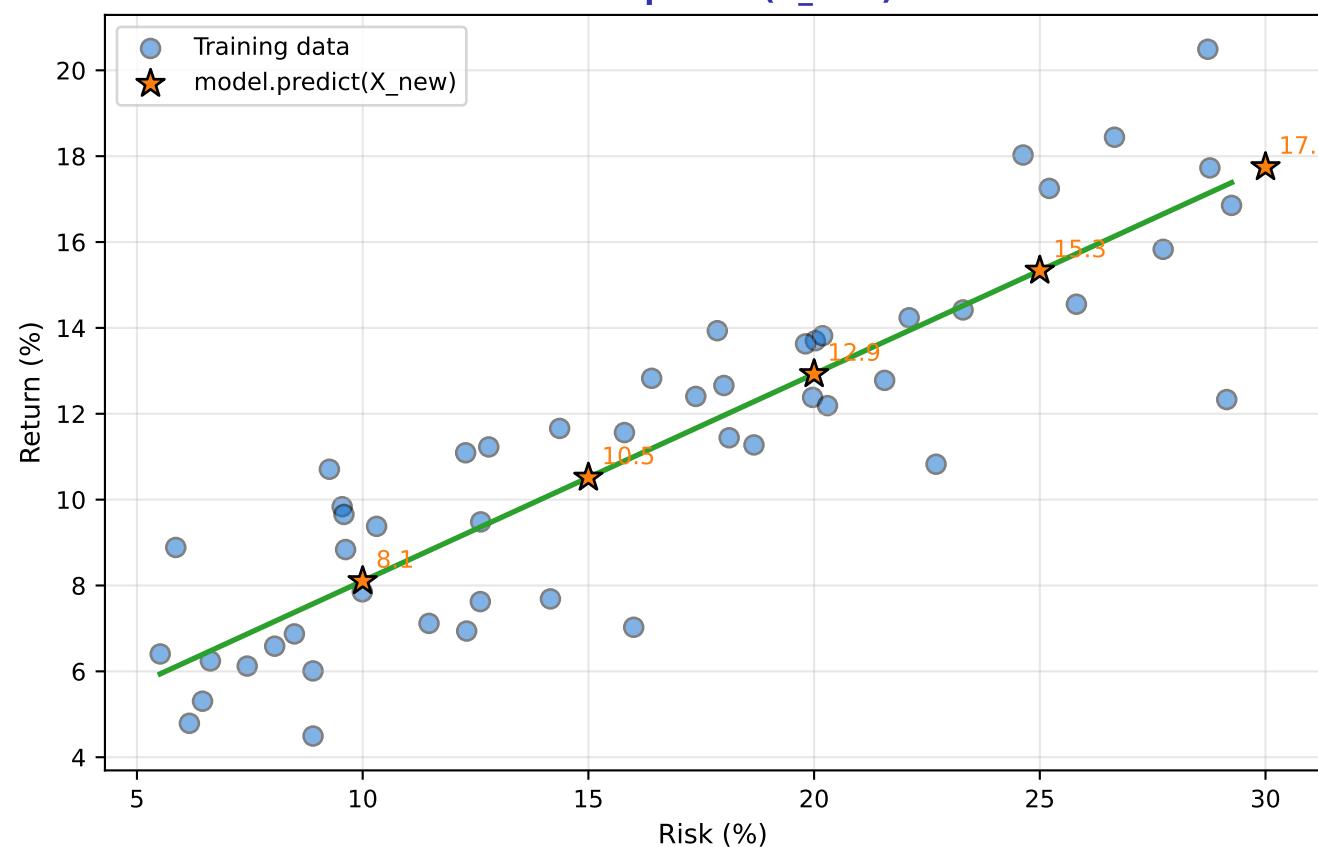
# Step 4: Make predictions
y_pred = model.predict(X)

# Step 5: Evaluate
r_squared = model.score(X, y) # 0.76
```

After model.fit()



model.predict(X_new)



model.score() and Metrics

Model Evaluation Methods

```
# R-squared (coefficient of determination)
r2 = model.score(X, y)
# Result: 0.7830
```

Interpretation:

- R-squared = 78.30% of variance explained
- Range: 0 (no fit) to 1 (perfect fit)

Residuals analysis

```
residuals = y - model.predict(X)
```

Mean Squared Error (manual)

```
mse = np.mean(residuals ** 2)
# Result: 3.292
```

RMSE (in same units as y)

```
rmse = np.sqrt(mse)
# Result: 1.814
```

Or use sklearn.metrics

```
from sklearn.metrics import mean_squared_error, r2_score
```