00. Requirements

In [2]:

```
# 기본 라이브러리 import
import os

import pandas as pd
import numpy as np
import pandas_datareader.data as pdr
import itertools as it

from dateutil.relativedelta import relativedelta
from datetime import *
import calendar
from scipy import stats
import math

# 경고 무시
import warnings
warnings.filterwarnings(action='ignore')

pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

# 시각화
import matplotlib.pyplot as plt
import seaborn as sns
plt.style.use('seaborn-whitegrid')
sns.set_style('white')
%matplotlib inline

# 정상성 검정 adf
from statsmodels.tsa.stattools import adfuller



# LabelEncoding
from sklearn.preprocessing import LabelEncoder

# 머신러닝
from sklearn.svm import SVR
from xgboost import XGBRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.pipeline import make_pipeline, Pipeline
from sklearn.ensemble import GradientBoostingRegressor
from sklearn.model_selection import KFold, cross_val_score, GridSearchCV, train_test_split
from sklearn.preprocessing import MinMaxScaler
from sklearn.linear_model import LinearRegression, Ridge, Lasso, ElasticNet
from sklearn.ensemble import RandomForestRegressor
from xgboost import XGBRegressor
from lightgbm import LGBMRegressor
from math import sqrt

# 시계열분석
import statsmodels.api as sm
from statsmodels.graphics.tsaplots import plot_acf, plot_pacf
from statsmodels.tsa.arima_model import ARIMA
from statsmodels.tsa.statespace.sarimax import SARIMAX
from pmdarima.arima import auto_arima
from statsmodels.tools.sm_exceptions import ConvergenceWarning

# 메타데이터 예측용(Prophet)
```

```
from fbprophet import Prophet

# 평가지표
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import mean_squared_error
```

```
Importing plotly failed. Interactive plots will not work.
```

01. Data Load

In [3]:

```
os.getcwd()
```

Out[3]:

```
'C:₩₩Users₩₩200824₩₩PycharmProjects₩₩Study₩₩BigContest'
```

In [88]:

```
train = pd.read_excel('../Python_Dataset/2021_BigContest_수산Biz/2021 빅콘테스트_데이터분석분야_챔피
check = pd.read_excel('../Python_Dataset/2021_BigContest_수산Biz/자율평가데이터.xlsx')
```

02. Preparing Data

In [5]:

```
# META-DATA 예측용 Data Preparation
def prepare_df_meta(df, subject):
    # 품목별 저장
    df = train.loc[train['P_NAME'] == subject]

    #불필요 column 제거
    df.drop(['P_TYPE', 'CATEGORY_1', 'CATEGORY_2', 'P_NAME'], axis=1, inplace=True)

    # Label Encoding
    encoder = LabelEncoder()

    cat_features = ['CTRY_1', 'CTRY_2', 'P_PURPOSE', 'P_IMPORT_TYPE']

    for i in cat_features:
        df[i] = encoder.fit_transform(df[i])

    meta_df = df

    return meta_df
```

In [6]:

```
# 회귀분석 모델용 Data Preparation
def prepare_df_modeling(df, subject):
    # 품목별 저장
    df = train.loc[train['P_NAME'] == subject]

    #불필요 column 제거
    df.drop(['P_TYPE', 'CATEGORY_1', 'CATEGORY_2', 'P_NAME'], axis=1, inplace=True)

    # index 설정
    df  = df.set_index('REG_DATE')

    # Label Encoding
    encoder = LabelEncoder()

    cat_features = ['CTRY_1', 'CTRY_2', 'P_PURPOSE', 'P_IMPORT_TYPE']

    for i in cat_features:
        df[i] = encoder.fit_transform(df[i])

    model_df = df

    return model_df
```

In [7]:

```
# 시계열분석 모델용 Data Preparation
def prepare_df_arima(df, subject):
    # 품목별 저장
    df = train.loc[train['P_NAME'] == subject]
    arima_df = df.groupby('REG_DATE').mean()

    return arima_df
```

03. Predicting Meta-Data

In [8]:

```
# Predicting META-DATA
def meta_predict(df, subject, year):

    # Preparation
    df = prepare_df_meta(df, subject)

    # 주어진 데이터셋의 META-DATA 대상
    meta_col  = ['CTRY_1', 'CTRY_2', 'P_PURPOSE', 'P_IMPORT_TYPE']

    weekly_predict= []
    weekly_predict = pd.DataFrame(weekly_predict)

    for col in meta_col:
        # y column 중복시 제거
        j = df.columns.isin(['y'])
        dropYN = np.any(j==True)

        if dropYN == True:
            df.drop(['y'], axis=1, inplace=True)

        # ds column 중복시 제거
        k = df.columns.isin(['ds'])
        renameYN = np.any(k==True)
        if renameYN ==  True:
            df.rename(columns = {col : 'y'}, inplace=True)
        else:
            df.rename(columns = {'REG_DATE' : 'ds', col : 'y'}, inplace=True)

        df_prophet = Prophet(changepoint_prior_scale = 0.15, daily_seasonality = True)
        df_prophet.fit(df)

        global df_forecast
        fcast_time = 78 # 2020.01 ~ 2021.06까지 추출
        df_forecast = df_prophet.make_future_dataframe(periods = fcast_time, freq = 'W-MON')
        df_forecast = df_prophet.predict(df_forecast)

        weekly_predict_dup = df_forecast.groupby('ds')['yhat'].agg(**{col : 'mean'}).reset_index()
        weekly_predict_dup[col] = weekly_predict_dup[col].astype(int)
        weekly_predict[col] = weekly_predict_dup[col]

    weekly_predict['ds'] = weekly_predict_dup['ds']
    weekly_predict = weekly_predict.loc[weekly_predict['ds'].dt.year == year]
    weekly_predict = weekly_predict.set_index('ds')

    return weekly_predict
```

04. Modeling

04-1. Parameters

In [9]:

```
# 파라미터 지정

# lgb_params_grid = {
#     'num_leaves': [5,10,20,30],
#     'min_data_in_leaf': [10,50, 100, 500],
#     'lambda_l1': [0, 1, 1.5],
#     'lambda_l2': [0, 1]
# }

lgb_params_grid = {
    'num_leaves': [10,20,30,40],
    'min_data_in_leaf': [10,100, 500, 1000],
    'lambda_l1': [0, 1, 2.0],
    'lambda_l2': [0, 1]
}

svr_params_grid = {
    'kernel':['rbf','poly'],
    'degree':[2,3,4,5,6,7],
    'epsilon':[0.1,0.2,1,10,20,30]
}

# svr_params_grid = {
#     'kernel':['rbf','poly'],
#     'degree':[2,4,6,8,10,12],
#     'epsilon':[0.1,0.2,1,10,20,30]
# }

# rf_params_grid = {
#     'n_estimators': [10, 100, 1000],
#     'max_depth': [6,8,10,12],
#     'min_samples_leaf': [8,12,18],
#     'min_samples_split': [8,16,20]
# }

rf_params_grid = {
    'n_estimators': [10, 100, 1000],
    'max_depth': [8,10,12, 14],
    'min_samples_leaf': [8,12,18],
    'min_samples_split': [8,16,20]
}
```

04-2. 회귀모델 구축

In [10]:

```
# 회귀모델
def Regression_model(df, subject, year, model_type):

    # test set 만들기용
    test_df = meta_predict(df, subject, year)

    # train set 만들기용
    tr = prepare_df_modeling(df, subject)
    ## 나중에 여기서 혜린님이 추가해준 소비자물가지수 등의 excel(2015~2019)과 concat ## ==> df_all

    ## 2015 ~ 2019 데이터로 학습
    X = tr.drop(columns = ['P_PRICE'])
    y = tr['P_PRICE']

    ## train_test_split (validation set : 15%)
    X_train, X_val, y_train, y_val = train_test_split(X, y, test_size = 0.15, shuffle = True, rando

    ## 인식불가 문자 제거
    X_train.columns = ["".join (c if c.isalnum() else "_" for c in str(x)) for x in X_train.columr
    X_val.columns = ["".join (c if c.isalnum() else "_" for c in str(x)) for x in X_val.columns]

    if(model_type=="lgbm"):
        # LGBM 학습
        m = LGBMRegressor(boosting_type='gbdt', num_boost_round=2000, learning_rate=0.01)
        m_grid = GridSearchCV(estimator=m,param_grid=lgb_params_grid,n_jobs=10,verbose=3)
        m_grid.fit(X_train,y_train)
        m = m_grid

    elif(model_type=="rf"):
        # RF 학습
        m = RandomForestRegressor(random_state=0, n_jobs=1)
        m_grid = GridSearchCV(m, param_grid = rf_params_grid, cv = 3, n_jobs = -1)
        m_grid.fit(X_train,y_train)
        m = m_grid

    elif(model_type=="svr"):
        # SVR 학습
        m = SVR(kernel='rbf')
        m_grid = GridSearchCV(estimator=m, param_grid=svr_params_grid)
        m_grid.fit(X_train, y_train)
        m = m_grid

    P1 = m.predict(X_val)
    P1_rmse = mean_squared_error(y_val, P1)
    P1_rmse = P1_rmse**0.5

    print('Validation Check (train vs validation) {0} {1}의 {2}년 RMSE : {3}'.format(subject, model_
    print('WnWn========== Predicted ==========')

    final_predict = m.predict(test_df)

    final_predict = np.round(final_predict,2)
    final_predict = pd.DataFrame(final_predict)
    final_predict = final_predict.rename(columns={0 : 'P_PRICE'})
    test_df = test_df.reset_index()
    final_predict['REG_DATE'] = test_df['ds']
    final_predict = final_predict.set_index('REG_DATE')
```

```
    return final_predict
```

04-3. 시계열분석 모델 구축

In [11]:

```
# ARIMA 예측모델
def ARIMA_model_2020(df):
    import warnings

    from statsmodels.tsa.arima.model import ARIMA
    from statsmodels.tools.sm_exceptions import ConvergenceWarning

    warnings.simplefilter('ignore', ConvergenceWarning)
    # Ignore convergence warning

    p = [1, 2, 4, 6, 8]
    d = q = range(0, 2)
    params_arima = list(it.product(p,d,q))

    combs = {}
    aics = []

    for i, param in enumerate(params_arima):
        try:
            m = ARIMA(df,
                      order=param,
                      enforce_invertibility=False,
                      enforce_stationarity=False)
            m_fit = m.fit()
            combs.update({m_fit.aic : param})
            aics.append(m_fit.aic)

        except: continue

    m_arima_best_aic_idx = min(aics)
    m_arima = ARIMA(df,
                    order=combs[m_arima_best_aic_idx],
                    enforce_invertibility=False,
                    enforce_stationarity=False)
    m_arima_fit = m_arima.fit()

    return m_arima_fit.forecast(52)



def ARIMA_model_2021(df):
    import warnings

    from statsmodels.tsa.arima.model import ARIMA
    from statsmodels.tools.sm_exceptions import ConvergenceWarning

    warnings.simplefilter('ignore', ConvergenceWarning)
    # Ignore convergence warning

    p = [1, 2, 4, 6, 8]
    d = q = range(0, 2)
    params_arima = list(it.product(p,d,q))

    combs = {}
    aics = []

    for i, param in enumerate(params_arima):
        try:
            m = ARIMA(df,
```

```
                    order=param,
                    enforce_invertibility=False,
                    enforce_stationarity=False)
            m_fit = m.fit()
            combs.update({m_fit.aic : param})
            aics.append(m_fit.aic)

        except: continue

    m_arima_best_aic_idx = min(aics)
    m_arima = ARIMA(df,
                    order=combs[m_arima_best_aic_idx],
                    enforce_invertibility=False,
                    enforce_stationarity=False)
    m_arima_fit = m_arima.fit()

    return m_arima_fit.forecast(26)
```

In [12]:

```
# ARIMA 실행 모델
def ARIMA_Predict_2020(df):
    y_pred = ARIMA_model_2020(df)
    y_pred = pd.DataFrame(y_pred)
    y_pred['DateTime'] = pd.date_range('2020-01-06','2020-12-28 ', freq='W-MON')
    y_pred = y_pred.rename(columns={'DateTime': 'DateTime','predicted_mean' : 'P_PRICE'})
    y_pred = y_pred[['DateTime','P_PRICE']]
    y_pred = round(y_pred, 2)
    y_pred.set_index('DateTime', inplace=True)
    print('WnWn========== A R I M A ==========')
    print('WnWn========== Predicted ==========')
    return y_pred

def ARIMA_Predict_2021(df):
    y_pred = ARIMA_model_2021(df)
    y_pred = pd.DataFrame(y_pred)
    y_pred['DateTime'] = pd.date_range('2021-01-04','2021-06-28', freq='W-MON')
    y_pred = y_pred.rename(columns={'DateTime': 'DateTime','predicted_mean' : 'P_PRICE'})
    y_pred = y_pred[['DateTime','P_PRICE']]
    y_pred = round(y_pred, 2)
    y_pred.set_index('DateTime', inplace=True)
    print('WnWn========== A R I M A ==========')
    print('WnWn========== Predicted ==========')
    return y_pred
```

04-4. Ensemble

In [13]:

```
def Ensemble_v(df, subject):
    # 가중치 모델

    global obj1_v
    global obj2_v
    global obj3_v
    global obj4_v

    t_df = prepare_df_arima(train,subject)

    ###############################################
    ######## 2020년 P_PRICE 예측값 구하기#########
    ###############################################
    obj1_v = Regression_model(df, subject, 2020, 'lgbm')
    obj2_v = Regression_model(df, subject, 2020, 'rf')
    obj3_v = Regression_model(df, subject, 2020, 'svr')
    obj4_v = ARIMA_Predict_2020(t_df)

    ###############################################
    ######## 2021년 P_PRICE 예측값 구하기#########
    ###############################################
    pred1 = Regression_model(df, subject, 2021, 'lgbm')
    pred2 = Regression_model(df, subject, 2021, 'rf')
    pred3 = Regression_model(df, subject, 2021, 'svr')
    pred4 = ARIMA_Predict_2021(t_df)

    # 2021년 row 수에 맞는 변수 선언
    global s_v
    s_v = pred1.shape[0]

    # List 생성
    global list_2021_v
    list_2021_v = []
    for i,v in enumerate(pred1.index):
        if str(v).split('-')[0] == '2021':
            list_2021_v.append(i)

    list_2021_v = pd.DataFrame(list_2021_v)

    # 예측값 List에 저장
    ## p1 (LGBM)
    pred1 = pred1.reset_index()
    list_2021_v['PRED_PRICE_LGBM'] = pred1['P_PRICE']

    ## p2 (RF)
    pred2 = pred2.reset_index()
    list_2021_v['PRED_PRICE_RF'] = pred2['P_PRICE']

    ## p3 (SVR)
    pred3 = pred3.reset_index()
    list_2021_v['PRED_PRICE_SVR'] = pred3['P_PRICE']

    ## p4 (ARIMA)
    pred4 = pred4.reset_index()
    list_2021_v['PRED_PRICE_ARIMA'] = pred4['P_PRICE']

    ## 2020년 기반 주차별로 제일 정확값 도출한 모델 선정
    vote_df = VoteModel(check, subject)
    list_2021_v['PREDICT_MODEL'] = vote_df['PREDICT_MODEL']
```

```
    # FINAL_PRICE 도출
    list_2021_v['FINAL_PRICE'] = '0'

    for i in range(list_2021_v.shape[0]):
        j= i+1
        if (list_2021_v[i:j][['PREDICT_MODEL']] == 'LGBM').bool():
            a = str(list_2021_v.iloc[i]['PRED_PRICE_LGBM'])
            list_2021_v[i:j]['FINAL_PRICE'] = list_2021_v[i:j]['FINAL_PRICE'].replace('0',a)
        elif (list_2021_v[i:j][['PREDICT_MODEL']] == 'RF').bool():
            a = str(list_2021_v.iloc[i]['PRED_PRICE_RF'])
            list_2021_v[i:j]['FINAL_PRICE'] = list_2021_v[i:j]['FINAL_PRICE'].replace('0',a)
        elif (list_2021_v[i:j]['PREDICT_MODEL'] == 'SVR').bool():
            a = str(list_2021_v.iloc[i]['PRED_PRICE_SVR'])
            list_2021_v[i:j]['FINAL_PRICE'] = list_2021_v[i:j]['FINAL_PRICE'].replace('0',a)
        elif (list_2021_v[i:j]['PREDICT_MODEL'] == 'ARIMA').bool():
            a = str(list_2021_v.iloc[i]['PRED_PRICE_ARIMA'])
            list_2021_v[i:j]['FINAL_PRICE'] = list_2021_v[i:j]['FINAL_PRICE'].replace('0',a)

    # 모델 결과값들의 평균 P_PRICE
    n = 4 # 모델의 갯수
    list_2021_v['MEAN_PRICE'] = (list_2021_v['PRED_PRICE_LGBM'] + list_2021_v['PRED_PRICE_RF'] + lis
    #list_2021_v['MEAN_PRICE'] = (list_2021_v['PRED_PRICE_LGBM'] + list_2021_v['PRED_PRICE_RF']) / n
    list_2021_v['MEAN_PRICE'] = round(list_2021_v['MEAN_PRICE'],2)

    list_2021_v.drop([0], axis=1, inplace=True)
    list_2021_v['REG_DATE']= pd.date_range('2021-01-04','2021-06-28', freq='W-MON')
    list_2021_v = list_2021_v.set_index('REG_DATE')

    return list_2021_v
```

In [14]:

```
def VoteModel(re_df, subject):
     #re_df : 자율평가데이터(2020년)

    # 자율평가데이터 DF 정리
    re_df = re_df.loc[check['P_NAME'] == subject]
    re_df = re_df.groupby('REG_DATE')['P_PRICE'].agg(**{'P_PRICE' : 'mean'})

    global vote_df
    vote_df = re_df['P_PRICE']
    vote_df = pd.DataFrame(vote_df)

    vote_df['LGBM_PRICE']   = obj1_v['P_PRICE']
    vote_df['RF_PRICE']     = obj2_v['P_PRICE']
    vote_df['SVR_PRICE']    = obj3_v['P_PRICE']
    vote_df['ARIMA_PRICE']  = obj4_v['P_PRICE']

    vote_df['LGBM_diff']   = abs(vote_df['P_PRICE'] - vote_df['LGBM_PRICE'])
    vote_df['RF_diff']     = abs(vote_df['P_PRICE'] - vote_df['RF_PRICE'])
    vote_df['SVR_diff']    = abs(vote_df['P_PRICE'] - vote_df['SVR_PRICE'])
    vote_df['ARIMA_diff']  = abs(vote_df['P_PRICE'] - vote_df['ARIMA_PRICE'])

    #vote_df.drop(['P_PRICE'], axis=1, inplace=True)
    vote_df['MIN_diff'] = vote_df.min(axis=1)
    vote_df['PREDICT_MODEL'] = 'X'
    vote_df['PREDICT_PRICE'] = '0'


    for i in range(vote_df.shape[0]):
        j= i+1
        if (vote_df[i:j]['MIN_diff'] == vote_df[i:j]['LGBM_diff']).bool():
            a = str(vote_df.iloc[i]['LGBM_PRICE'])
            vote_df[i:j]['PREDICT_MODEL'] = vote_df[i:j]['PREDICT_MODEL'].replace('X','LGBM')
            vote_df[i:j]['PREDICT_PRICE'] = vote_df[i:j]['PREDICT_PRICE'].replace('0',a)
        elif (vote_df[i:j]['MIN_diff'] == vote_df[i:j]['RF_diff']).bool():
            a = str(vote_df.iloc[i]['RF_PRICE'])
            vote_df[i:j]['PREDICT_MODEL'] = vote_df[i:j]['PREDICT_MODEL'].replace('X','RF')
            vote_df[i:j]['PREDICT_PRICE'] = vote_df[i:j]['PREDICT_PRICE'].replace('0',a)
        elif (vote_df[i:j]['MIN_diff'] == vote_df[i:j]['SVR_diff']).bool():
            a = str(vote_df.iloc[i]['SVR_PRICE'])
            vote_df[i:j]['PREDICT_MODEL'] = vote_df[i:j]['PREDICT_MODEL'].replace('X','SVR')
            vote_df[i:j]['PREDICT_PRICE'] = vote_df[i:j]['PREDICT_PRICE'].replace('0',a)
        elif (vote_df[i:j]['MIN_diff'] == vote_df[i:j]['ARIMA_diff']).bool():
            a = str(vote_df.iloc[i]['ARIMA_PRICE'])
            vote_df[i:j]['PREDICT_MODEL'] = vote_df[i:j]['PREDICT_MODEL'].replace('X','ARIMA')
            vote_df[i:j]['PREDICT_PRICE'] = vote_df[i:j]['PREDICT_PRICE'].replace('0',a)
    #vote_df = vote_df[:s_v]['PREDICT_MODEL']
    vote_df = pd.DataFrame(vote_df)
    vote_df = vote_df.reset_index()
    return vote_df
```

05. 결과값 시각화

In [15]:

```
def visualization(df):
    global vote_df

    # 시각화 데이터셋 준비
    s_2020 = obj1_v.copy()
    s_2020 = s_2020.reset_index()

    #global sa
    sa = s_2020.copy()
    sa = sa.reset_index()
    sa.drop(['index'], axis=1, inplace=True)
    sa = sa.set_index('REG_DATE')

    vote_df = vote_df.reset_index()
    vote_df = vote_df.set_index('REG_DATE')
    sa['Actual'] = vote_df['P_PRICE']
    sa['Predict'] = vote_df['PREDICT_PRICE']
    sa.drop(['P_PRICE'], axis=1, inplace=True)

    #global s_2021
    df_forecast2 = df_forecast.loc[df_forecast['ds'].dt.year > 2020]
    s_2021 = df_forecast2['ds']
    s_2021 = s_2021.reset_index()
    s_2021.drop(['index'], axis=1, inplace=True)
    df = df.reset_index()

    s_2021['Predict'] = '0'
    for i in df.index:
        j = i+1
        if (s_2021[i:j]['ds'] == df[i:j]['REG_DATE']).bool():
            a = str(df.iloc[i]['PREDICT_PRICE'])
            s_2021[i:j]['Predict'] =  s_2021[i:j]['Predict'].replace('0',a)
    s_2021['Predict'] = s_2021['Predict'].astype(float)
    sa['Predict'] = sa['Predict']
    s_2021 = s_2021.set_index('ds')
    sa = pd.concat([sa, s_2021], axis=0)
    sa['Predict'] = sa['Predict'].astype(float)

    fig, ax = plt.subplots(1,1, figsize=(15, 10))
    plt.plot(sa['Actual'], label='Actual')
    plt.plot(sa['Predict'], label='Predicted')
    plt.legend()
    plt.show()
```

06. Run Predict

In [74]:

```
def Run_Predict(df, subject):

    # Vote model
    final_v  = Ensemble_v(df, subject)

    # 2nd Ensemble
    # final_v와 final_w중에  더 자율평가데이터와 유사한 값의 주차별을 최종 P_PRICE로 선정

    #  vote의 final_price weight의 final_value 비교해야함 (vote의 MEAN_PRICE = weight의 PRED_PRICE)


    # 결과값(DataFrame)
    final_v.drop(['PRED_PRICE_LGBM'], axis=1, inplace=True)
    final_v.drop(['PRED_PRICE_RF'], axis=1, inplace=True)
    final_v.drop(['PRED_PRICE_SVR'], axis=1, inplace=True)
    final_v.drop(['PRED_PRICE_ARIMA'], axis=1, inplace=True)

    final_v.rename(columns = {'FINAL_PRICE' : 'PREDICT_PRICE', 'MEAN_PRICE' : 'MODEL_MEAN_PRICE'}, i

    final_v['PREDICT_PRICE']    = final_v['PREDICT_PRICE'].astype(float)
    final_v['MODEL_MEAN_PRICE'] = final_v['MODEL_MEAN_PRICE'].astype(float)

    final_v['FINAL_VALUE'] = (final_v['PREDICT_PRICE'] + final_v['MODEL_MEAN_PRICE']) / 2
    final_v['FINAL_VALUE'] = round(final_v['FINAL_VALUE'],2)

    final_v.drop(['MODEL_MEAN_PRICE'], axis=1, inplace=True)
    final_v.drop(['FINAL_VALUE'], axis=1, inplace=True)

    final_v.rename(columns = {'PREDICT_PRICE' : 'FINAL_VALUE'}, inplace=True)

    # 결과값(시각화)
    visualization(final_v)

    return final_v
```

Ensemble 모델 실행 (오징어)

In [75]:

```
squid = Run_Predict(train, '오징어')
```

```
Fitting 5 folds for each of 96 candidates, totalling 480 fits

[Parallel(n_jobs=10)]: Using backend LokyBackend with 10 concurrent workers.
[Parallel(n_jobs=10)]: Done  12 tasks      | elapsed:    4.7s
[Parallel(n_jobs=10)]: Done 108 tasks      | elapsed:   11.8s
[Parallel(n_jobs=10)]: Done 288 tasks      | elapsed:   21.9s
[Parallel(n_jobs=10)]: Done 480 out of 480 | elapsed:   32.0s finished

[LightGBM] [Warning] min_data_in_leaf is set=10, min_child_samples=20 will be ignore
d. Current value: min_data_in_leaf=10
[LightGBM] [Warning] lambda_l1 is set=0, reg_alpha=0.0 will be ignored. Current valu
e: lambda_l1=0
[LightGBM] [Warning] lambda_l2 is set=0, reg_lambda=0.0 will be ignored. Current val
ue: lambda_l2=0
[LightGBM] [Warning] num_iterations is set=2000, num_boost_round=2000 will be ignore
d. Current value: num_iterations=2000
Validation Check (train vs validation) 오징어 lgbm의 2020년 RMSE : 0.840239726288452
8


========== Predicted ==========
Validation Check (train vs validation) 오징어 rf의 2020년 RMSE : 0.8851973550675027


========== Predicted ==========
Validation Check (train vs validation) 오징어 svr의 2020년 RMSE : 1.0310037701254626


========== Predicted ==========

C:\ProgramData\Anaconda3\envs\tensorflow\lib\site-packages\statsmodels\tsa\base\ts
a_model.py:583: ValueWarning: A date index has been provided, but it has no associ
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model.py:379: ValueWarning: No supported index is available. Prediction results will
be given with an integer index beginning at `start`.
  ValueWarning)



========== A R I M A ==========



========== Predicted ==========
Fitting 5 folds for each of 96 candidates, totalling 480 fits

[Parallel(n_jobs=10)]: Using backend LokyBackend with 10 concurrent workers.
[Parallel(n_jobs=10)]: Done  12 tasks      | elapsed:    3.1s
[Parallel(n_jobs=10)]: Done 116 tasks      | elapsed:   10.7s
[Parallel(n_jobs=10)]: Done 288 tasks      | elapsed:   20.2s
[Parallel(n_jobs=10)]: Done 480 out of 480 | elapsed:   29.3s finished
```

```
[LightGBM] [Warning] min_data_in_leaf is set=10, min_child_samples=20 will be ignore
d. Current value: min_data_in_leaf=10
[LightGBM] [Warning] lambda_l1 is set=0, reg_alpha=0.0 will be ignored. Current valu
e: lambda_l1=0
[LightGBM] [Warning] lambda_l2 is set=0, reg_lambda=0.0 will be ignored. Current val
ue: lambda_l2=0
[LightGBM] [Warning] num_iterations is set=2000, num_boost_round=2000 will be ignore
d. Current value: num_iterations=2000
Validation Check (train vs validation) 오징어 lgbm의 2021년 RMSE : 0.840239726288452
8


========== Predicted ==========
Validation Check (train vs validation) 오징어 rf의 2021년 RMSE : 0.8851973550675027


========== Predicted ==========
Validation Check (train vs validation) 오징어 svr의 2021년 RMSE : 1.0310037701254626


========== Predicted ==========

C:₩ProgramData₩Anaconda3₩envs₩tensorflow₩lib₩site-packages₩statsmodels₩tsa₩base₩tsa_
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C:\ProgramData\Anaconda3\envs\tensorflow\lib\site-packages\statsmodels\tsa\base\ts
a_model.py:583: ValueWarning: A date index has been provided, but it has no associ
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C:\ProgramData\Anaconda3\envs\tensorflow\lib\site-packages\statsmodels\tsa\base\tsa_
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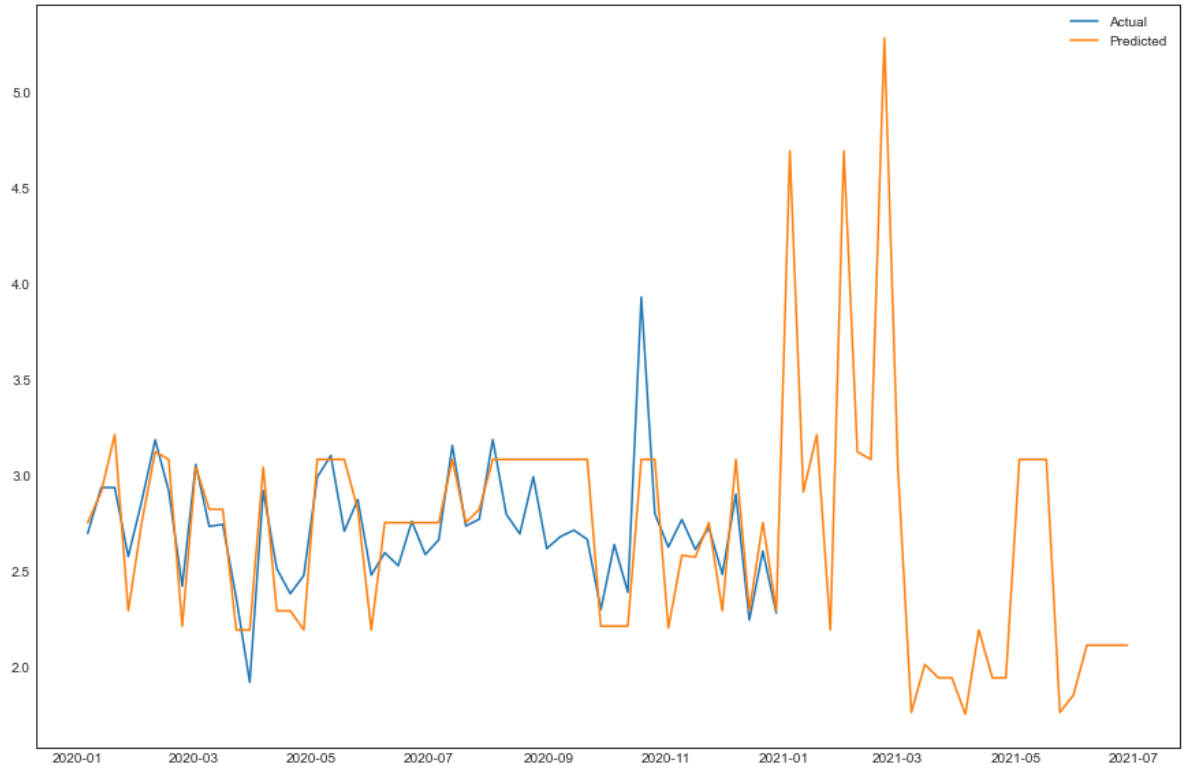
  ' ignored when e.g. forecasting.', ValueWarning)
C:\ProgramData\Anaconda3\envs\tensorflow\lib\site-packages\statsmodels\tsa\base\tsa_
model.py:379: ValueWarning: No supported index is available. Prediction results will
be given with an integer index beginning at `start`.
  ValueWarning)



========== A R I M A ==========


========== Predicted ==========
```



Ensemble 모델 2020년 RMSE (오징어) by 자율평가데이터

In [76]:

```
vote_df_squid = vote_df.copy()
vote_df_squid = vote_df_squid['PREDICT_PRICE']

check2 = check.loc[check['P_NAME'] == '오징어']
check2 = check2.groupby('REG_DATE').mean()
check3 = check2['P_PRICE']

squid_rmse = mean_squared_error(vote_df_squid, check3)
squid_rmse = squid_rmse **0.5
squid_rmse
```

Out[76]:

0.24567840219745726

Ensemble 모델 실행 (연어)

In [78]:

```
salmon = Run_Predict(train, '연어')
```

```
Fitting 5 folds for each of 96 candidates, totalling 480 fits

[Parallel(n_jobs=10)]: Using backend LokyBackend with 10 concurrent workers.
[Parallel(n_jobs=10)]: Done  12 tasks      | elapsed:    1.8s
[Parallel(n_jobs=10)]: Done 126 tasks      | elapsed:    6.3s
[Parallel(n_jobs=10)]: Done 346 tasks      | elapsed:   13.9s
[Parallel(n_jobs=10)]: Done 480 out of 480 | elapsed:   17.0s finished

[LightGBM] [Warning] min_data_in_leaf is set=10, min_child_samples=20 will be ignore
d. Current value: min_data_in_leaf=10
[LightGBM] [Warning] lambda_l1 is set=0, reg_alpha=0.0 will be ignored. Current valu
e: lambda_l1=0
[LightGBM] [Warning] lambda_l2 is set=0, reg_lambda=0.0 will be ignored. Current val
ue: lambda_l2=0
[LightGBM] [Warning] num_iterations is set=2000, num_boost_round=2000 will be ignore
d. Current value: num_iterations=2000
Validation Check (train vs validation) 연어 lgbm의 2020년 RMSE : 2.8408646875486485



========== Predicted ==========
Validation Check (train vs validation) 연어 rf의 2020년 RMSE : 2.8430310415287288



========== Predicted ==========
Validation Check (train vs validation) 연어 svr의 2020년 RMSE : 5.861413974602532



========== Predicted ==========

C:\ProgramData\Anaconda3\envs\tensorflow\lib\site-packages\statsmodels\tsa\base\tsa_
model.py:583: ValueWarning: A date index has been provided, but it has no associated
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model.py:379: ValueWarning: No supported index is available. Prediction results will
be given with an integer index beginning at `start`.
  ValueWarning)



========== A R I M A ==========



========== Predicted ==========
Fitting 5 folds for each of 96 candidates, totalling 480 fits

[Parallel(n_jobs=10)]: Using backend LokyBackend with 10 concurrent workers.
[Parallel(n_jobs=10)]: Done  12 tasks      | elapsed:    1.6s
[Parallel(n_jobs=10)]: Done 136 tasks      | elapsed:    6.5s
[Parallel(n_jobs=10)]: Done 366 tasks      | elapsed:   14.2s
[Parallel(n_jobs=10)]: Done 480 out of 480 | elapsed:   17.1s finished

[LightGBM] [Warning] min_data_in_leaf is set=10, min_child_samples=20 will be igno
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red. Current value: min_data_in_leaf=10
[LightGBM] [Warning] lambda_l1 is set=0, reg_alpha=0.0 will be ignored. Current va
lue: lambda_l1=0
[LightGBM] [Warning] lambda_l2 is set=0, reg_lambda=0.0 will be ignored. Current v
alue: lambda_l2=0
[LightGBM] [Warning] num_iterations is set=2000, num_boost_round=2000 will be igno
red. Current value: num_iterations=2000
Validation Check (train vs validation) 연어 lgbm의 2021년 RMSE : 2.840864687548648
5


========== Predicted ==========
Validation Check (train vs validation) 연어 rf의 2021년 RMSE : 2.8430310415287288


========== Predicted ==========
Validation Check (train vs validation) 연어 svr의 2021년 RMSE : 5.861413974602532


========== Predicted ==========
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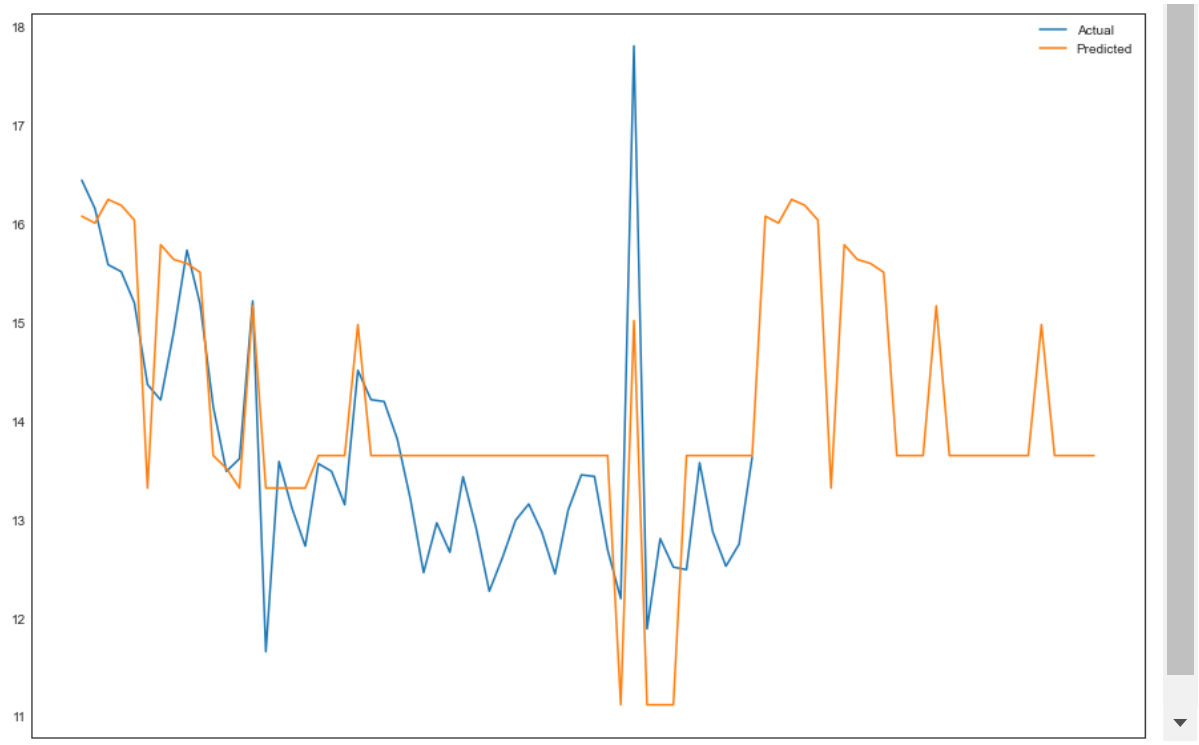
model.py:379: ValueWarning: No supported index is available. Prediction results will
be given with an integer index beginning at `start`.
  ValueWarning)



========== A R I M A ==========


========== Predicted ==========
```



Ensemble 모델 2020년 RMSE (연어) by 자율평가데이터

In [79]:

```
vote_df_salmon = vote_df.copy()
vote_df_salmon = vote_df_salmon['PREDICT_PRICE']

check2 = check.loc[check['P_NAME'] == '연어']
check2 = check2.groupby('REG_DATE').mean()
check3 = check2['P_PRICE']

salmon_rmse = mean_squared_error(vote_df_salmon, check3)
salmon_rmse = salmon_rmse **0.5
salmon_rmse
```

Out[79]:

0.8735772860521902

Ensemble 모델 실행 (흰다리새우)

In [80]:

```
shrimp = Run_Predict(train, '흰다리새우')
```

```
Fitting 5 folds for each of 96 candidates, totalling 480 fits

[Parallel(n_jobs=10)]: Using backend LokyBackend with 10 concurrent workers.
[Parallel(n_jobs=10)]: Done  12 tasks      | elapsed:    2.9s
[Parallel(n_jobs=10)]: Done 108 tasks      | elapsed:   10.4s
[Parallel(n_jobs=10)]: Done 268 tasks      | elapsed:   20.1s
[Parallel(n_jobs=10)]: Done 461 out of 480 | elapsed:   31.0s remaining:    1.2s
[Parallel(n_jobs=10)]: Done 480 out of 480 | elapsed:   31.3s finished

[LightGBM] [Warning] min_data_in_leaf is set=10, min_child_samples=20 will be ignore
d. Current value: min_data_in_leaf=10
[LightGBM] [Warning] lambda_l1 is set=2.0, reg_alpha=0.0 will be ignored. Current va
lue: lambda_l1=2.0
[LightGBM] [Warning] lambda_l2 is set=1, reg_lambda=0.0 will be ignored. Current val
ue: lambda_l2=1
[LightGBM] [Warning] num_iterations is set=2000, num_boost_round=2000 will be ignore
d. Current value: num_iterations=2000
Validation Check (train vs validation) 흰다리새우 lgbm의 2020년 RMSE : 1.39336502761
1202


========== Predicted ==========
Validation Check (train vs validation) 흰다리새우 rf의 2020년 RMSE : 1.3958849330166
787


========== Predicted ==========
Validation Check (train vs validation) 흰다리새우 svr의 2020년 RMSE : 2.844161422896
6325


========== Predicted ==========


C:\ProgramData\Anaconda3\envs\tensorflow\lib\site-packages\statsmodels\tsa\base\tsa_
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model.py:379: ValueWarning: No supported index is available. Prediction results will
be given with an integer index beginning at `start`.
  ValueWarning)




========== A R I M A ==========


========== Predicted ==========
Fitting 5 folds for each of 96 candidates, totalling 480 fits
```

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[Parallel(n_jobs=10)]: Using backend LokyBackend with 10 concurrent workers.
[Parallel(n_jobs=10)]: Done  12 tasks      | elapsed:    2.8s
[Parallel(n_jobs=10)]: Done 108 tasks      | elapsed:   10.6s
[Parallel(n_jobs=10)]: Done 268 tasks      | elapsed:   20.3s
[Parallel(n_jobs=10)]: Done 480 out of 480 | elapsed:   31.0s finished

[LightGBM] [Warning] min_data_in_leaf is set=10, min_child_samples=20 will be ignore
d. Current value: min_data_in_leaf=10
[LightGBM] [Warning] lambda_l1 is set=2.0, reg_alpha=0.0 will be ignored. Current va
lue: lambda_l1=2.0
[LightGBM] [Warning] lambda_l2 is set=1, reg_lambda=0.0 will be ignored. Current val
ue: lambda_l2=1
[LightGBM] [Warning] num_iterations is set=2000, num_boost_round=2000 will be ignore
d. Current value: num_iterations=2000
Validation Check (train vs validation) 흰다리새우 lgbm의 2021년 RMSE : 1.39336502761
1202


========== Predicted ==========
Validation Check (train vs validation) 흰다리새우 rf의 2021년 RMSE : 1.3958849330166
787


========== Predicted ==========
Validation Check (train vs validation) 흰다리새우 svr의 2021년 RMSE : 2.844161422896
6325


========== Predicted ==========

C:\ProgramData\Anaconda3\envs\tensorflow\lib\site-packages\statsmodels\tsa\base\ts
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C:₩ProgramData₩Anaconda3₩envs₩tensorflow₩lib₩site-packages₩statsmodels₩tsa₩base₩tsa_
model.py:583: ValueWarning: A date index has been provided, but it has no associated
frequency information and so will be ignored when e.g. forecasting.
  ' ignored when e.g. forecasting.', ValueWarning)
C:₩ProgramData₩Anaconda3₩envs₩tensorflow₩lib₩site-packages₩statsmodels₩tsa₩base₩tsa_
model.py:583: ValueWarning: A date index has been provided, but it has no associated
frequency information and so will be ignored when e.g. forecasting.
  ' ignored when e.g. forecasting.', ValueWarning)

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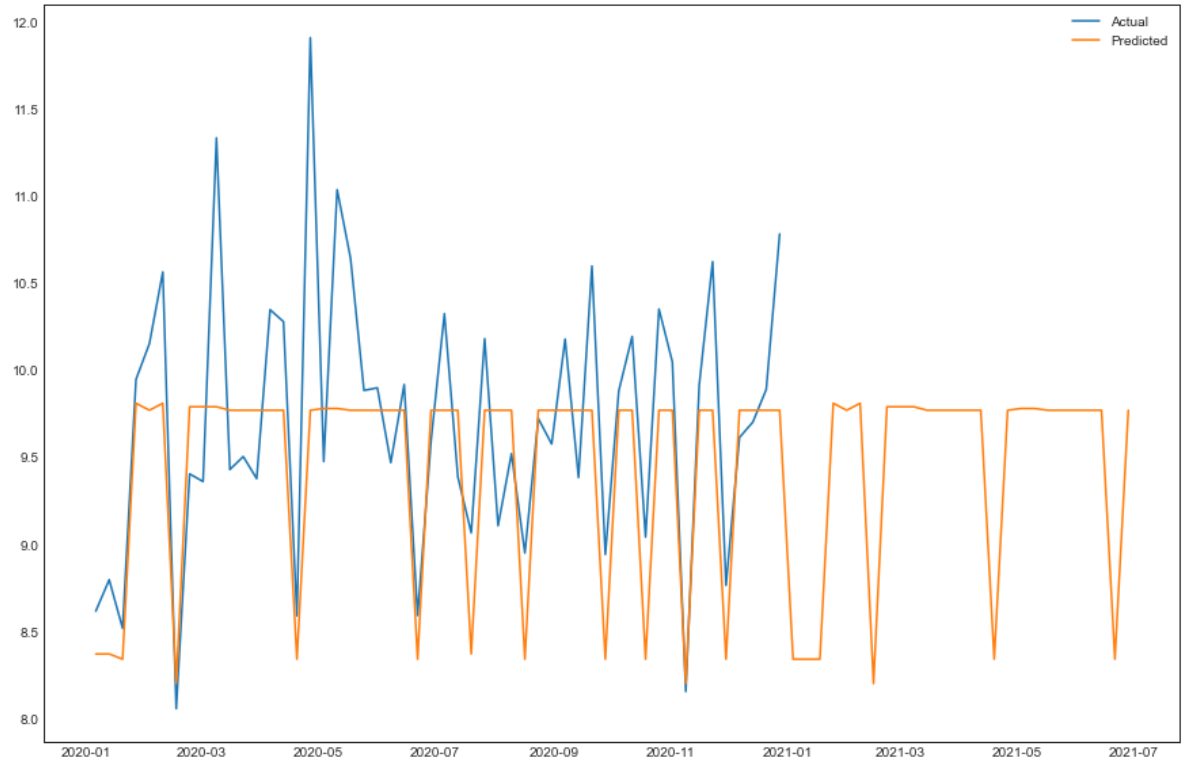
model.py:583: ValueWarning: A date index has been provided, but it has no associated
frequency information and so will be ignored when e.g. forecasting.
  ' ignored when e.g. forecasting.', ValueWarning)
C:₩ProgramData₩Anaconda3₩envs₩tensorflow₩lib₩site-packages₩statsmodels₩tsa₩base₩tsa_
model.py:583: ValueWarning: A date index has been provided, but it has no associated
frequency information and so will be ignored when e.g. forecasting.
  ' ignored when e.g. forecasting.', ValueWarning)
C:₩ProgramData₩Anaconda3₩envs₩tensorflow₩lib₩site-packages₩statsmodels₩tsa₩base₩tsa_
model.py:583: ValueWarning: A date index has been provided, but it has no associated
frequency information and so will be ignored when e.g. forecasting.
  ' ignored when e.g. forecasting.', ValueWarning)
C:₩ProgramData₩Anaconda3₩envs₩tensorflow₩lib₩site-packages₩statsmodels₩tsa₩base₩tsa_
model.py:379: ValueWarning: No supported index is available. Prediction results will
be given with an integer index beginning at `start`.
  ValueWarning)




========== A R I M A ==========


========== Predicted ==========
```



Ensemble 모델 2020년 RMSE (흰다리새우) by 자율평가데이터

In [81]:

```
vote_df_shrimp = vote_df.copy()
vote_df_shrimp = vote_df_shrimp['PREDICT_PRICE'].astype(float)

check2 = check.loc[check['P_NAME'] == '흰다리새우']
check2 = check2.groupby('REG_DATE').mean()
check3 = check2['P_PRICE']

shrimp_rmse = mean_squared_error(vote_df_shrimp, check3)
shrimp_rmse = shrimp_rmse **0.5
shrimp_rmse
```

Out[81]:

0.5961251734550552

In [82]:

```
squid
```

Out[82]:

REG_DATE	PREDICT_MODEL	FINAL_VALUE
2021-01-04	SVR	4.69
2021-01-11	ARIMA	2.91
2021-01-18	ARIMA	3.21
2021-01-25	RF	2.19
2021-02-01	SVR	4.69
2021-02-08	ARIMA	3.12
2021-02-15	ARIMA	3.08
2021-02-22	SVR	5.28
2021-03-01	ARIMA	3.04
2021-03-08	LGBM	1.76
2021-03-15	LGBM	2.01
2021-03-22	RF	1.94
2021-03-29	RF	1.94
2021-04-05	LGBM	1.75
2021-04-12	RF	2.19
2021-04-19	RF	1.94
2021-04-26	RF	1.94
2021-05-03	ARIMA	3.08
2021-05-10	ARIMA	3.08
2021-05-17	ARIMA	3.08
2021-05-24	LGBM	1.76
2021-05-31	RF	1.85
2021-06-07	SVR	2.11
2021-06-14	SVR	2.11
2021-06-21	SVR	2.11
2021-06-28	SVR	2.11

In [83]:

```
salmon
```

Out[83]:

REG_DATE	PREDICT_MODEL	FINAL_VALUE
2021-01-04	ARIMA	16.08
2021-01-11	ARIMA	16.01
2021-01-18	ARIMA	16.25
2021-01-25	ARIMA	16.19
2021-02-01	ARIMA	16.04
2021-02-08	SVR	13.32
2021-02-15	ARIMA	15.79
2021-02-22	ARIMA	15.64
2021-03-01	ARIMA	15.60
2021-03-08	ARIMA	15.51
2021-03-15	SVR	13.65
2021-03-22	SVR	13.65
2021-03-29	SVR	13.65
2021-04-05	ARIMA	15.17
2021-04-12	SVR	13.65
2021-04-19	SVR	13.65
2021-04-26	SVR	13.65
2021-05-03	SVR	13.65
2021-05-10	SVR	13.65
2021-05-17	SVR	13.65
2021-05-24	SVR	13.65
2021-05-31	ARIMA	14.98
2021-06-07	SVR	13.65
2021-06-14	SVR	13.65
2021-06-21	SVR	13.65
2021-06-28	SVR	13.65

In [84]:

```
shrimp
```

Out[84]:

REG_DATE	PREDICT_MODEL	FINAL_VALUE
2021-01-04	LGBM	8.34
2021-01-11	LGBM	8.34
2021-01-18	LGBM	8.34
2021-01-25	ARIMA	9.81
2021-02-01	ARIMA	9.77
2021-02-08	ARIMA	9.81
2021-02-15	SVR	8.20
2021-02-22	ARIMA	9.79
2021-03-01	ARIMA	9.79
2021-03-08	ARIMA	9.79
2021-03-15	ARIMA	9.77
2021-03-22	ARIMA	9.77
2021-03-29	ARIMA	9.77
2021-04-05	ARIMA	9.77
2021-04-12	ARIMA	9.77
2021-04-19	LGBM	8.34
2021-04-26	ARIMA	9.77
2021-05-03	ARIMA	9.78
2021-05-10	ARIMA	9.78
2021-05-17	ARIMA	9.77
2021-05-24	ARIMA	9.77
2021-05-31	ARIMA	9.77
2021-06-07	ARIMA	9.77
2021-06-14	ARIMA	9.77
2021-06-21	LGBM	8.34
2021-06-28	ARIMA	9.77

In [87]:

```
squid.to_csv('BigContact_result_squid.csv', encoding='utf-8-sig')
salmon.to_csv('BigContact_result_salmon.csv', encoding='utf-8-sig')
shrimp.to_csv('BigContact_result_shrimp.csv', encoding='utf-8-sig')
```

In [ ]:

```
```