Elspot Supply and Demand

August 24, 2020

1 Supply and Demand for Elspot

NordPool has provided the following information on the Elspot System Price bid curves. The document below describes how to adjust the buy and sell volumes using accepted blocks buy/sell and net flows.

[1]:
```
from IPython.display import IFrame
fileURL = "https://www.nordpoolgroup.com/globalassets/
 ↪information-in-market-cross-point-data-reports.pdf "
IFrame(fileURL, width=900, height=300)
```

[1]:
```
<IPython.lib.display.IFrame at 0x111f94890>
```

1.1 Cleaning data

[2]:
```
import numpy as np
import pandas as pd
```

[3]:
```
def cleaningData(date, hour):

    ## Extracting columns corresponding to hour and date
    hour = hour
    date = str(date)
    column1 = "Bid curve chart data (Reference time)." + str(hour)

    if hour < 10:
        hour = "0" + str(hour)
    else:
        hour = str(hour)
    column2 = date + " " + hour + ":00:00 +"

    df2 = pd.DataFrame({'name': df[column1],
                'value' : df[column2]})

    # Extracting net flows
```

```
    df2['net_flows'] = df2['value'].where(df2['name']=="Bid curve chart data␣
↪(Volume for net flows)")
    # Forward fill
    df2['net_flows'] = df2['net_flows'].ffill(axis = 0)

    # Extracting volume for accepted blocks buy
    df2['accepted_blocks_buy'] = df2['value'].where(df2['name']=="Bid curve␣
↪chart data (Volume for accepted blocks buy)")
    # Forward fill
    df2['accepted_blocks_buy'] = df2['accepted_blocks_buy'].ffill(axis = 0)

    # Extracting volume for accepted blocks sell
    df2['accepted_blocks_sell'] = df2['value'].where(df2['name']=="Bid curve␣
↪chart data (Volume for accepted blocks sell)")
    # Forward fill
    df2['accepted_blocks_sell'] = df2['accepted_blocks_sell'].ffill(axis = 0)

    # Identify the rows that have buy or sell "curve"
    df2['buy_sell'] = df2['name'].where(df2['name'].str.contains('curve'))
    # Forward fill
    df2['buy_sell'] = df2['buy_sell'].ffill(axis = 0)

    # Extract prices and volumes
    df2['price'] = df2['value'][df2['name']=='Price value']
    df2['volume'] = df2['value'][df2['name']=='Volume value']

    # Forward fill prices
    df2['price'] = df2['price'].ffill(axis = 0)
    # Backward fill volumes
    df2['volume'] = df2['volume'].bfill(axis=0)

    # Dropping duplicates
    df2.drop_duplicates(subset=['price','volume'], keep = 'first', inplace =␣
↪True)

    # Dropping "Buy curve" & "Sell curve" rows
    df2 = df2.drop(df2[(df2['name'] == "Buy curve") | (df2['name'] == "Sell␣
↪curve")].index)

    # Adjusting Buy and Sell volumes
    if df2['net_flows'].any() >= 0:
        df2['volume_adjusted'] = np.where(df2['buy_sell']=="Buy␣
↪curve",df2['volume']+df2['accepted_blocks_buy'],df2['volume'])
        df2['volume_adjusted'] = np.where(df2['buy_sell']=="Sell␣
↪curve",df2['volume']+df2['accepted_blocks_sell']+df2['net_flows'],df2['volume_adjusted'])
    if df2['net_flows'].any() < 0:
```

```
        df2['volume_adjusted'] = np.where(df2['buy_sell']=="Buy curve",df2['volume']+df2['accepted_blocks_buy']+df2['net_flows'],df2['volume'])
        df2['volume_adjusted'] = np.where(df2['buy_sell']=="Sell curve",df2['volume']+df2['accepted_blocks_sell'],df2['volume_adjusted'])

    # Keeping relevant data
    df2 = df2[['buy_sell','price','volume', 'volume_adjusted','accepted_blocks_buy', 'accepted_blocks_sell', 'net_flows']]
    df2 = df2.dropna()

    # Basic stats
    #print(df2.groupby('buy_sell').describe())

    return df2, date, hour
```

[4]:
```
file = "/Users/marcosdemetry/Dropbox/IFN/Programming/Python_projects/elspot_supply_demand/mcp_data_report_20-08-2020-00_00_00.xls.xlsm"
df = pd.read_excel(file)
```

[5]:
```
df2, date, hour = cleaningData("20.08.2020",8)
df2.groupby('buy_sell').price.describe()
```

[5]:
```
             count        mean         std    min       25%   50%      75%  \
buy_sell
Buy curve    682.0  127.526222  405.532865 -500.0  0.855265  37.6   87.275
Sell curve   873.0  447.120121  930.264224 -500.0  2.466325  35.5  239.000

                max
buy_sell
Buy curve    3000.0
Sell curve   3000.0
```

[6]:
```
df2.groupby('buy_sell').volume_adjusted.describe()
```

[6]:
```
             count         mean           std           min           25%  \
buy_sell
Buy curve    682.0  34632.76116   1463.236695  32829.700000  33573.868156
Sell curve   873.0  35377.61061  10655.943005  16499.840339  25793.393289

                      50%           75%           max
buy_sell
Buy curve    34319.122409  35430.024514  39479.325070
Sell curve   40868.556405  43132.378639  47288.049601
```

1.2 Creating figure

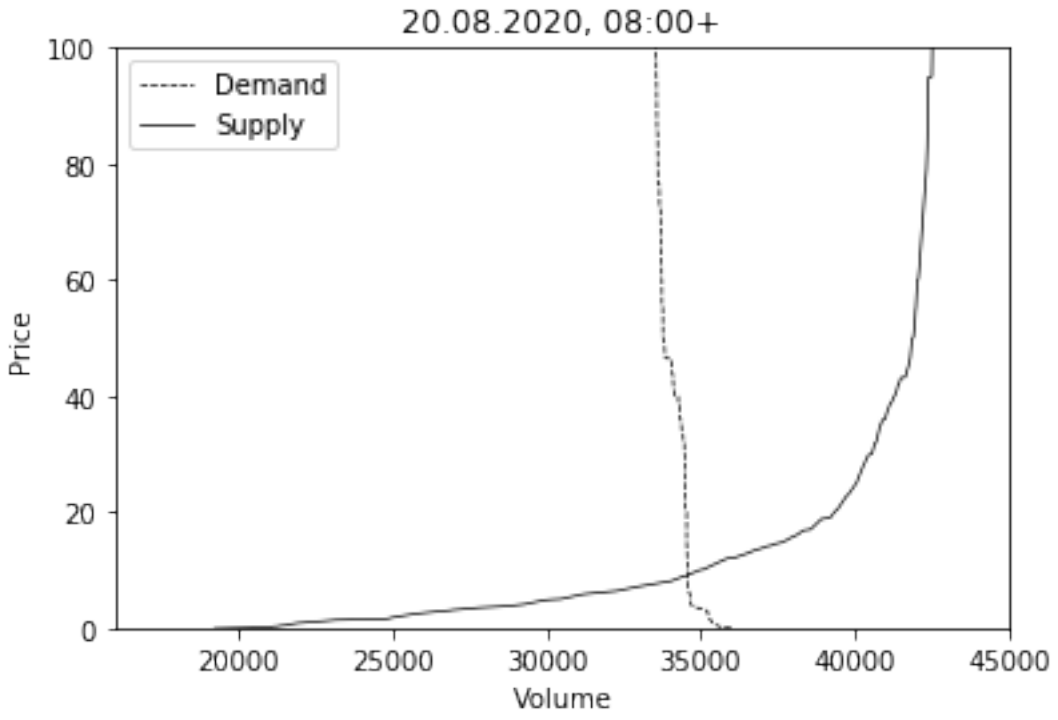
[7]:
```
from matplotlib import pyplot as plt
%matplotlib inline
```

[8]:
```
y_demand = df2['price'][df2['buy_sell']=="Buy curve"]
y_supply = df2['price'][df2['buy_sell']=="Sell curve"]

x_demand = df2['volume_adjusted'][df2['buy_sell']=="Buy curve"]
x_supply = df2['volume_adjusted'][df2['buy_sell']=="Sell curve"]

demand = plt.plot(x_demand, y_demand, 'k--', label= "Demand", linewidth=0.7)
supply = plt.plot(x_supply, y_supply, 'k-', label= "Supply", linewidth=0.7)
plt.ylabel('Price')
plt.xlabel('Volume')
plt.ylim((0, 100))
plt.xlim((16000,45000))
title = str(date) + ", " + str(hour) + ":00+"
plt.title(title)
plt.legend()

date = date.replace(".","_")
outfile = "/Users/marcosdemetry/Dropbox/IFN/Programming/Python_projects/
 ↪elspot_supply_demand/Figure_" + str(date) + "_hr" + str(hour) + ".pdf"
plt.savefig(outfile, bbox_inches='tight')
```



1.3 Exporting data

[9]:
```
outfile = "/Users/marcosdemetry/Dropbox/IFN/Programming/Python_projects/
 ↪elspot_supply_demand/Data_" + str(date) + "_hr" + str(hour) + ".xlsx"
df2.to_excel(outfile, index=False)
```