EiWD_zadanie_02

October 23, 2021

[1]:
```
# załadowanie bibliotek

import matplotlib.pyplot as plt
%matplotlib inline

import numpy as np

import pandas as pd
```

[2]:
```
# załadowanie danych
import os

path = r"C:
↪\Users\piotr\Downloads\EiWD_lab_zadanie02\IHME_DAH_DATABASE_1990_2020_Y2021M09D22.
↪CSV"
folder = r"C:\Users\piotr\Documents\Semestr 3\EiWD_zadanie_02_wykresy"

data = pd.read_csv(path, low_memory=False)
data.head()
```

[2]:

	year	source	channel	recipient_isocode	recipient_country	\
0	1990	Australia	BIL_AUS	AGO	Angola	
1	1990	Australia	BIL_AUS	BDI	Burundi	
2	1990	Australia	BIL_AUS	BEN	Benin	
3	1990	Australia	BIL_AUS	BFA	Burkina Faso	
4	1990	Australia	BIL_AUS	BWA	Botswana	

	gbd_location_id	wb_regioncode	wb_location_id	\
0	168	SSA	242	
1	175	SSA	242	
2	200	SSA	242	
3	201	SSA	242	
4	193	SSA	242	

	gbd_region	gbd_region_id	…	other_dah_20	rmh_dah_20	\
0	Sub-Saharan Africa, Central	167.0	…	0	5	
1	Sub-Saharan Africa, Eastern	174.0	…	0	6	
2	Sub-Saharan Africa, Western	199.0	…	0	6	

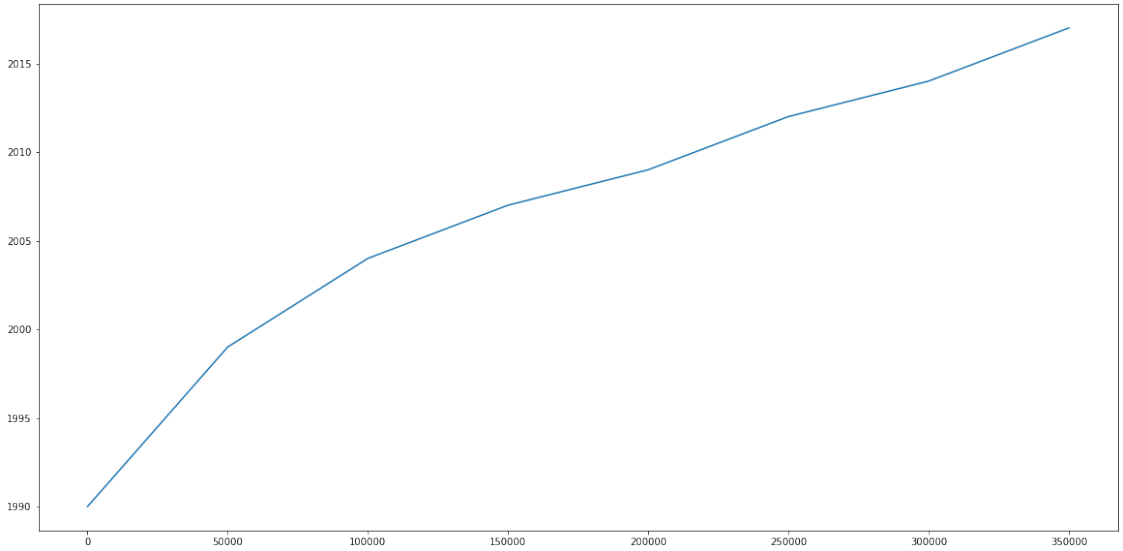
```
3   Sub-Saharan Africa, Western          199.0  …            0           5
4  Sub-Saharan Africa, Southern          192.0  …            0           1

   nch_dah_20  ncd_dah_20 hiv_dah_20 mal_dah_20 tb_dah_20  \
0           0           0          7          3         0
1           0           0          5          1         0
2           0           0          5          2         0
3           0           0          7          2         0
4           0           0         23          -         0

  swap_hss_total_dah_20 oid_dah_20 unalloc_dah_20
0                     0          0              -
1                     0          0              0
2                     0          0              0
3                     0          0              0
4                     0          0              -

[5 rows x 76 columns]
```

[3]:
```
num_data = data.select_dtypes(include='number')

num_data.describe()
```

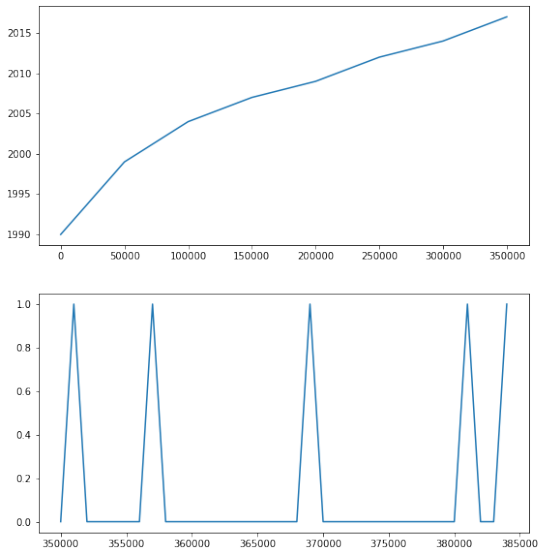
[3]:
```
                year  gbd_location_id  wb_location_id  gbd_region_id  \
count  384306.000000    384306.000000   384306.000000  383993.000000
mean     2008.127521      1765.935533     2240.752439    1745.812671
std         6.945191      8325.915434     9204.906147    8328.525983
min      1990.000000         1.000000      239.000000       1.000000
25%      2004.000000       110.000000      241.000000      96.000000
50%      2009.000000       169.000000      242.000000     159.000000
75%      2014.000000       200.000000      242.000000     192.000000
max      2020.000000     44598.000000    44621.000000   44598.000000

       gbd_superregion_id        elim_ch     prelim_est
count       383993.000000  384306.000000  384306.000000
mean          1733.144388       0.252052       0.014358
std           8330.949734       0.434191       0.118963
min              1.000000       0.000000       0.000000
25%             64.000000       0.000000       0.000000
50%            158.000000       0.000000       0.000000
75%            166.000000       1.000000       0.000000
max          44598.000000       1.000000       1.000000
```

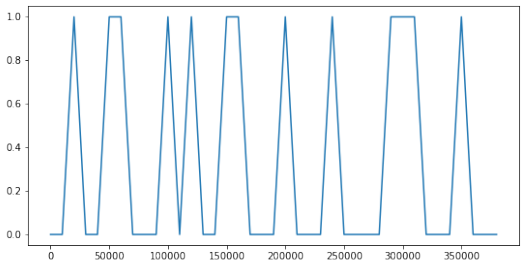
[4]:
```
# wykres liniowy

years = data['year'][::50_000]
```

```
plt.rcParams["figure.figsize"] = (20,10)
plt.plot(years)
plt.savefig(os.path.join(folder, 'wykres1.svg'), dpi=400, bbox_inches='tight')
```

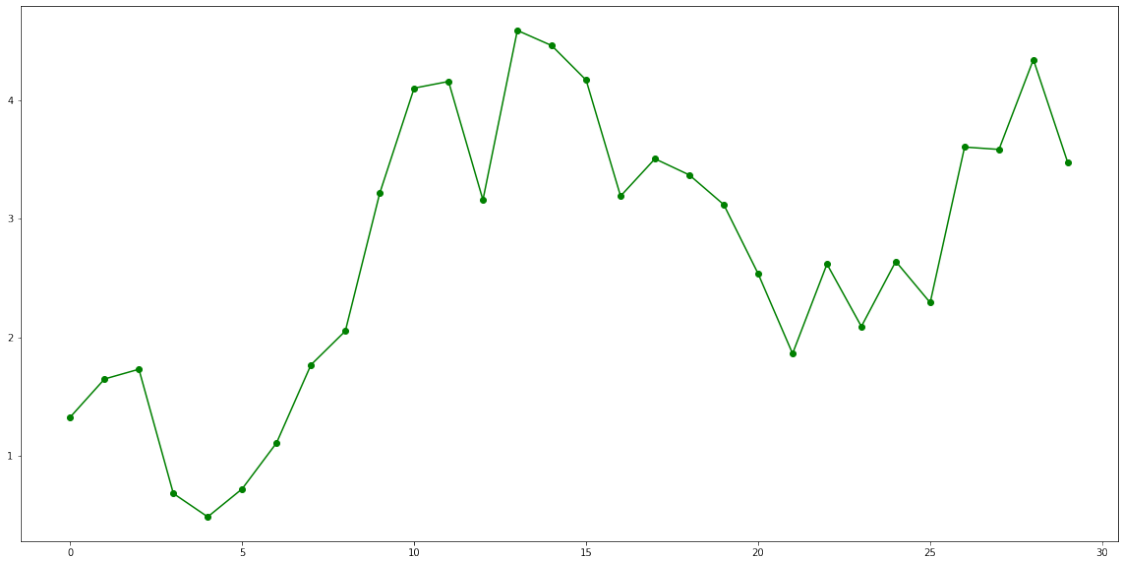


[5]:
```
# kilka podwykresów

fig = plt.figure()
ax0 = fig.add_subplot(2,2,1)
ax1 = fig.add_subplot(2,2,2)
ax2 = fig.add_subplot(2,2,3)

elim_ch = data['elim_ch'][::10_000]
prelim_est = data['prelim_est'][350_000::1_000]

ax0.plot(years)
ax1.plot(elim_ch)
ax2.plot(prelim_est)

plt.savefig(os.path.join(folder, 'wykres2.svg'), dpi=400, bbox_inches='tight')
```

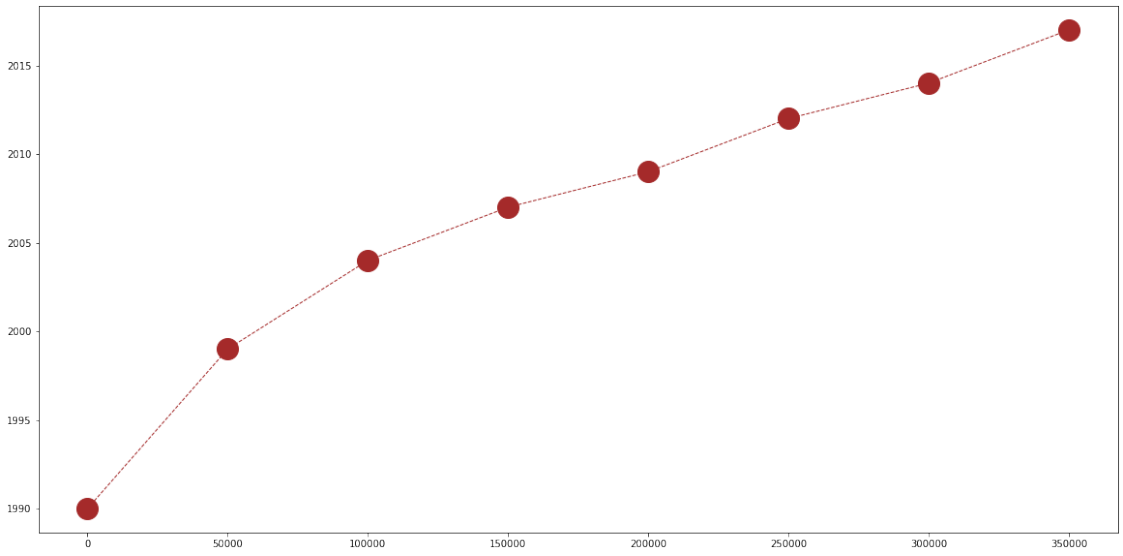




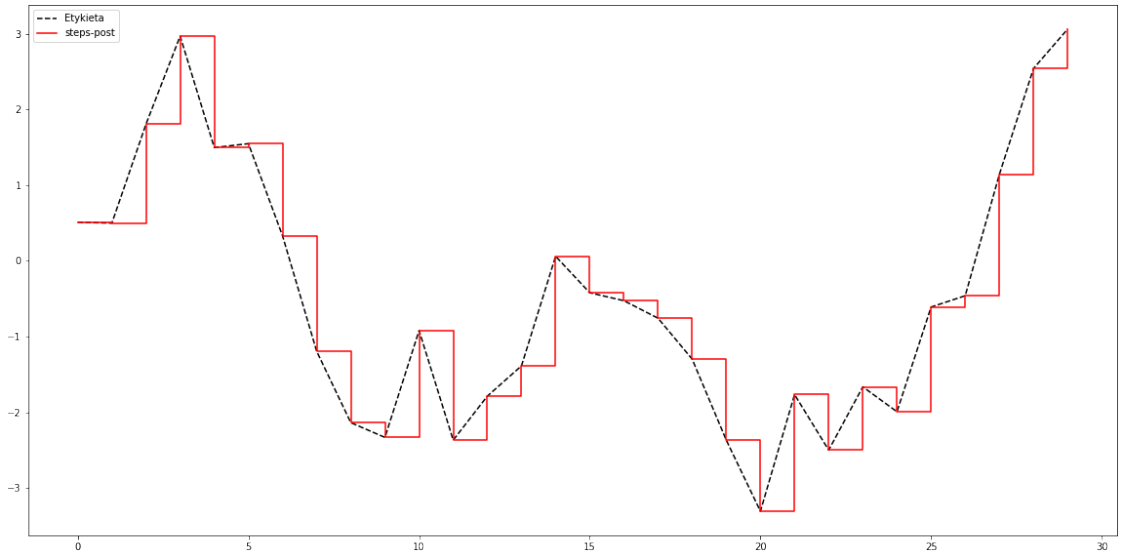
[6]:
```
# wykres punktowy ze zdefiniowanymi kolorami, stylem znaczników i linii

from numpy.random import randn
plt.plot(randn(30).cumsum(), 'go-')
plt.savefig(os.path.join(folder, 'wykres3.svg'), dpi=400, bbox_inches='tight')
```



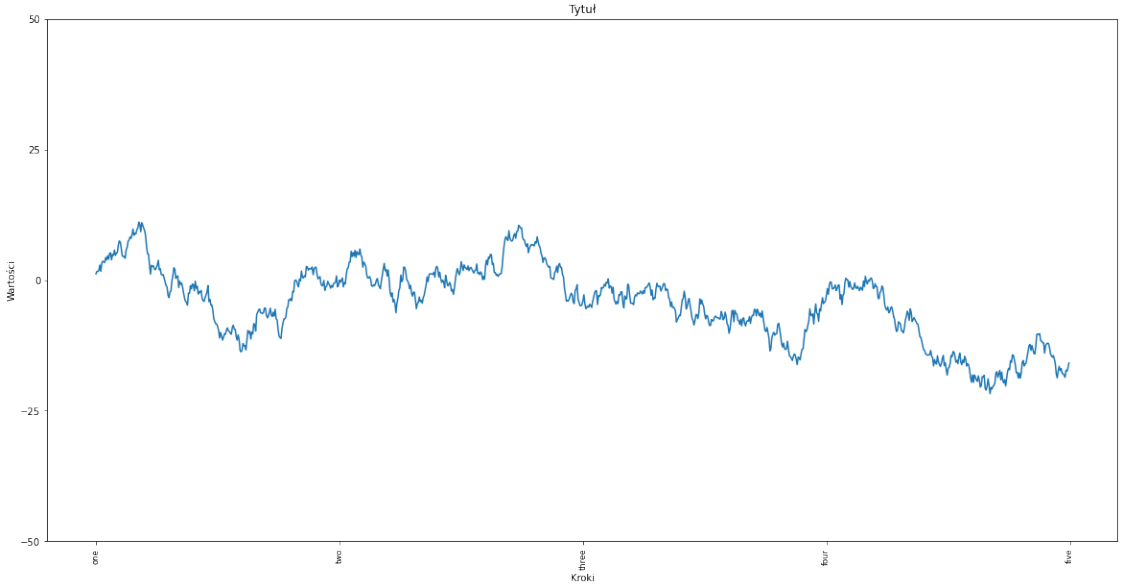
[7]:
```
plt.plot(years, color='brown', marker='o', markersize=22, linestyle='--',␣
↪linewidth=1)
plt.savefig(os.path.join(folder, 'wykres4.svg'), dpi=400, bbox_inches='tight')
```



[8]:
```
# wykres interpolacji liniowej

data = np.random.randn(30).cumsum()
plt.plot(data, 'k--', label='Etykieta')
plt.plot(data, 'r-',  label="steps-post", drawstyle="steps-post")
plt.legend(loc='best')

# normalizacja
# years_normal = years.div(years.sum())
# elim_ch_normal = elim_ch.div(elim_ch.sum())
# prelim_est_normal = prelim_est.div(prelim_est.sum())

# plt.plot(years_normal, 'k--', label='years', drawstyle='steps-pre')
# plt.plot(elim_ch_normal, 'g.', label='elim ch', drawstyle='steps-mid')
# plt.plot(prelim_est_normal, 'r-', label='elim ch', drawstyle='steps-post')
# plt.legend(loc='best')

plt.savefig(os.path.join(folder, 'wykres5.png'), dpi=400, bbox_inches='tight')
```



[9]:
```
# dodanie etykiet na osi

fig = plt.figure()
ax = fig.add_subplot(1,1,1)
ax.plot(np.random.randn(1000).cumsum())

ax.set_xticks([0, 250, 500, 750, 1000])
ax.set_yticks([-50, -25, 0, 25, 50])

ax.set_xticklabels(['one', 'two', 'three', 'four', 'five'], rotation=90,␣
 ↪fontsize='small')

# dodanie właściwości wykresu słownikiem

props = {
    'title': "Tytuł",
    'xlabel': "Kroki",
    'ylabel': "Wartości"
}
ax.set(**props)

plt.savefig(os.path.join(folder, 'wykres6.svg'), dpi=400, bbox_inches='tight')
```



[10]:
```
fig = plt.figure();
ax = fig.add_subplot(1,1,1)
ax.plot(randn(1000).cumsum(), 'k', label='one')
ax.plot(randn(1000).cumsum(), 'r--', label='two')
ax.plot(randn(1000).cumsum(), 'g.', label='three')
ax.legend(loc='best')

plt.savefig(os.path.join(folder, 'wykres7.svg'), dpi=400, bbox_inches='tight')
```

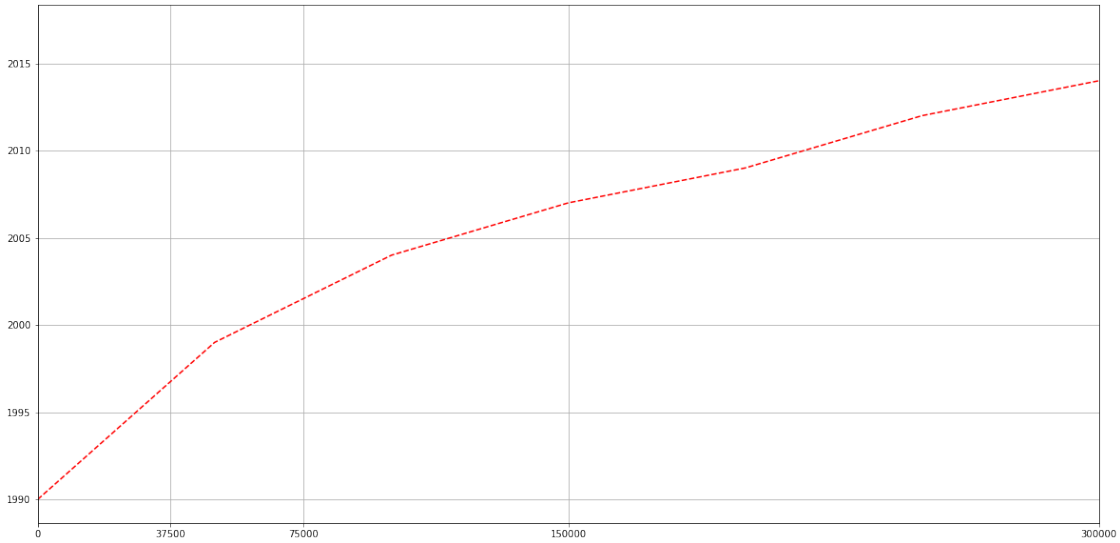
[11]:
```
# zapis wykresu do pliku

path = r"C:\Users\piotr\Downloads\wykres01.svg"
plt.savefig(path, dpi=400, bbox_inches='tight')
```

```
<Figure size 1440x720 with 0 Axes>
```

[12]:
```
x = np.arange(0, 300_00*50_000, 50_000)

print(len(x))

print(x)
```

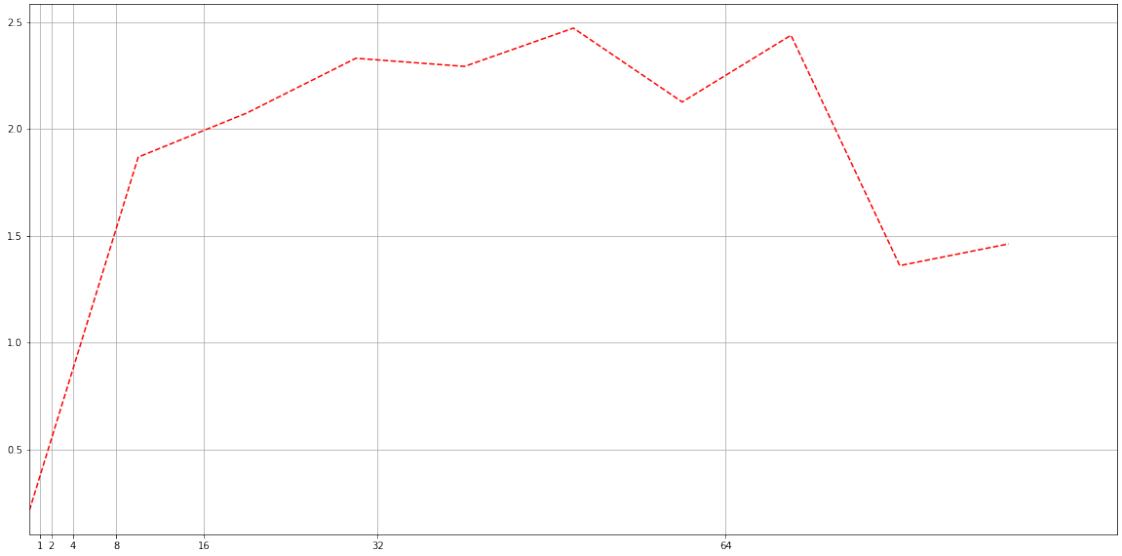
```
30000
[          0       50000      100000 … 1499850000 1499900000 1499950000]
```

[13]:
```
import numpy as np
import pandas as pd

xmax = 300_000

s = pd.Series(years, index=np.arange(0, xmax*50_000, 50_000))
s.plot(kind='line', logy=False, xticks=[0, xmax/8, xmax/4, xmax/2, xmax],␣
 ↪xlim=[0, xmax], grid=True, style='r--')

plt.savefig(os.path.join(folder, 'wykres8.svg'), dpi=400, bbox_inches='tight')
```

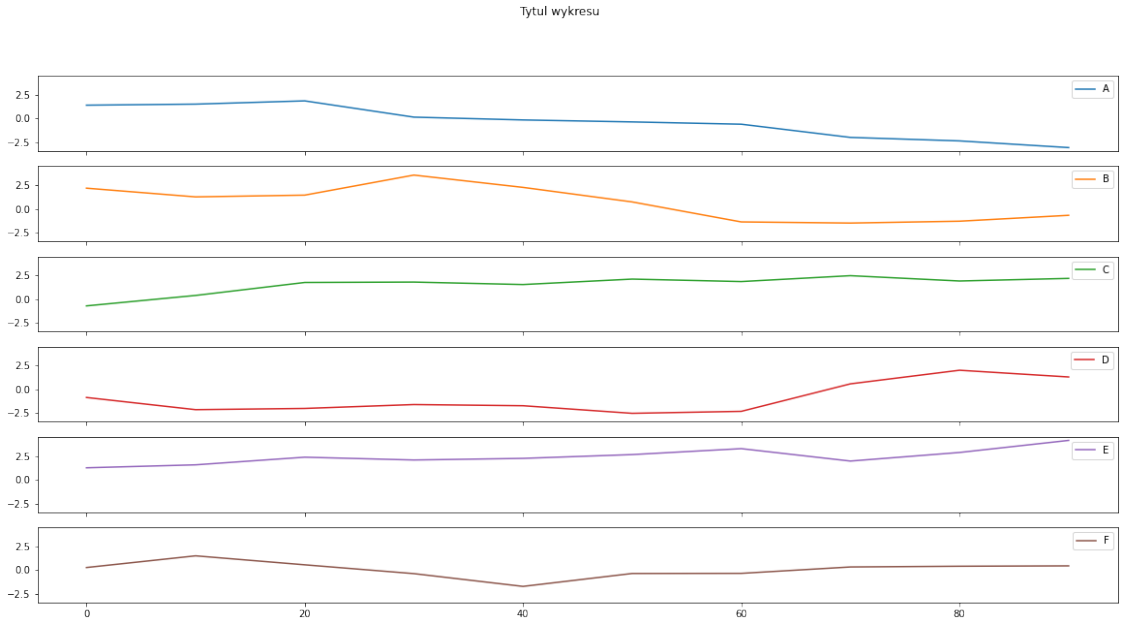


[14]:
```
s = pd.Series(np.random.randn(10).cumsum(), index=np.arange(0, 100, 10))
s.plot(kind='line', logy=False, xticks=[1, 2, 4, 8, 16, 32, 64, 128], xlim=[0,␣
 ↪100], grid=True, style='r--')
```

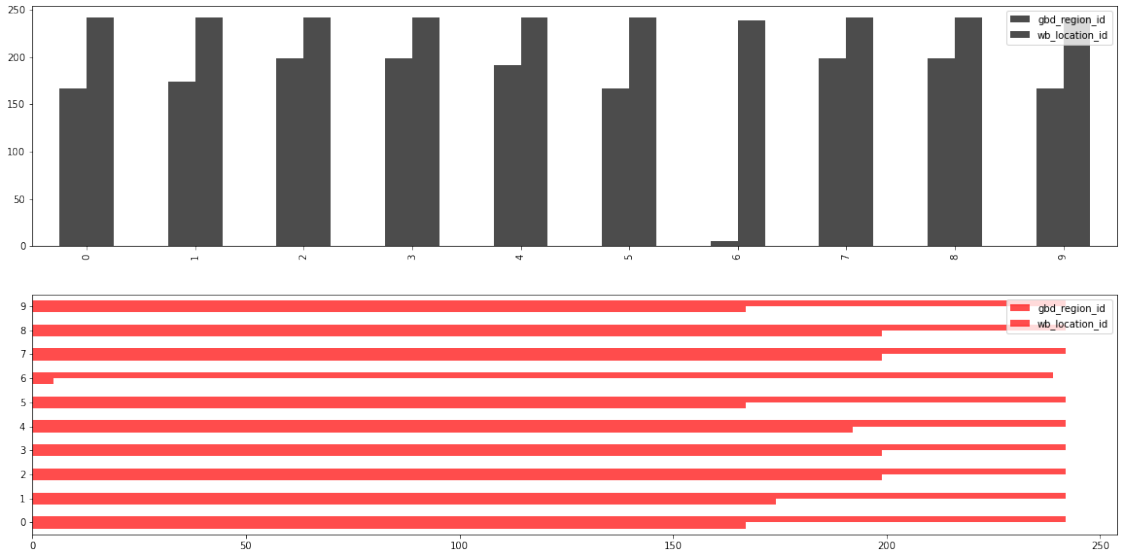
```
plt.savefig(os.path.join(folder, 'wykres8.svg'), dpi=400, bbox_inches='tight')
```



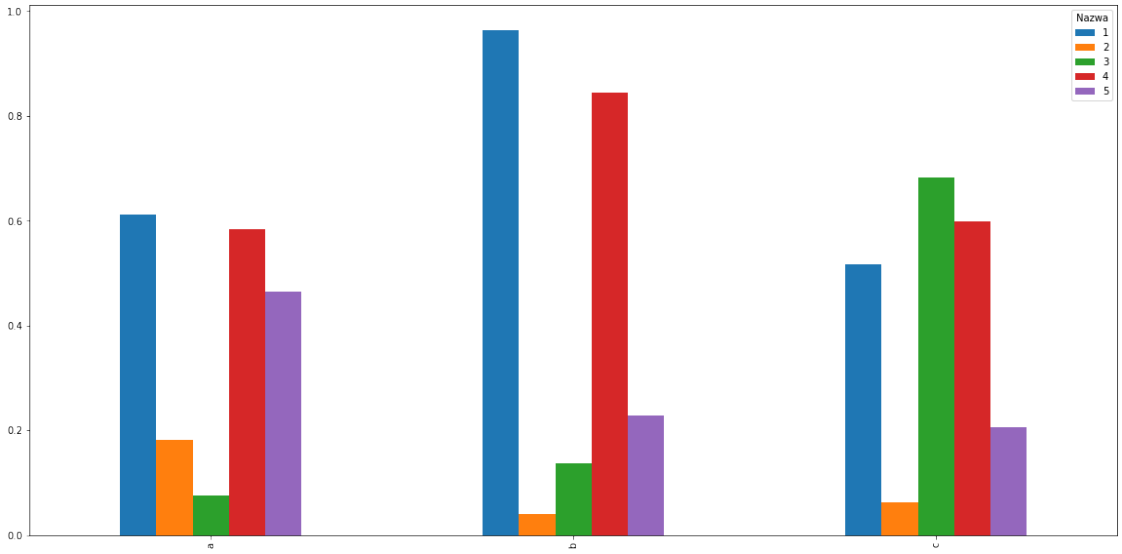
[15]:
```
df = pd.DataFrame(np.random.randn(10, 6).cumsum(0), columns=['A', 'B', 'C',␣
↪'D', 'E', 'F'], index=np.arange(0, 100, 10))
df.plot(subplots=True, sharex=True, sharey=True, title='Tytul wykresu',␣
↪sort_columns=True)

#df = num_data
#df.plot(subplots=True, sharex=True, sharey=True, title='Wykresy wartości␣
↪liczbowych', sort_columns=True)

plt.savefig(os.path.join(folder, 'wykres9.png'), dpi=400, bbox_inches='tight')
```



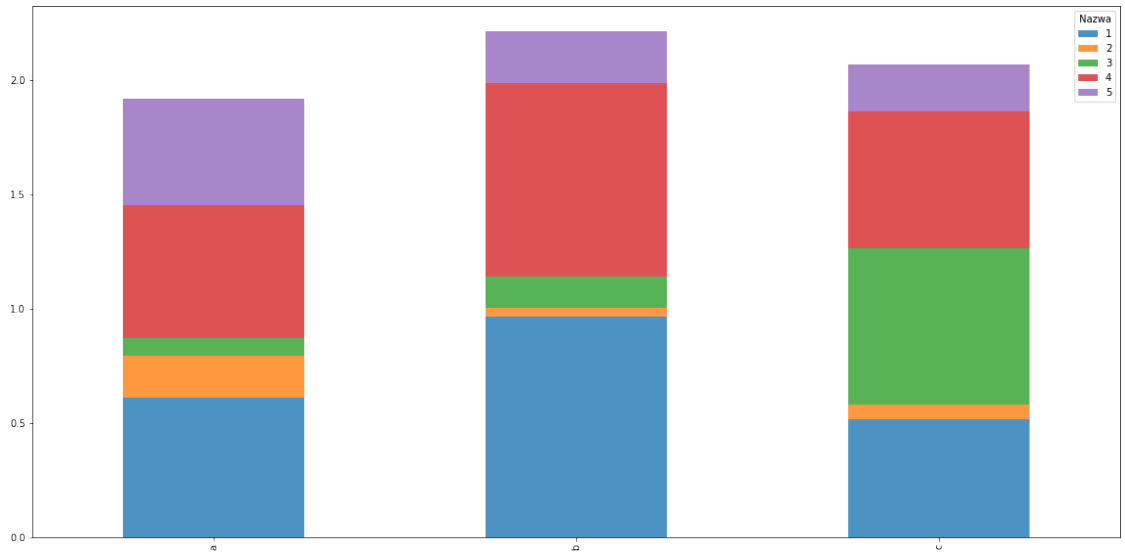
[16]:
```
#data = pd.Series(np.random.rand(16), index=list('abcdefghijklmnop'))
data = pd.DataFrame(num_data[['wb_location_id', 'gbd_region_id']][:10],␣
 ↪columns=['gbd_region_id', 'wb_location_id'])

fig, axes = plt.subplots(2, 1)

data.plot.bar(ax = axes[0], color='k', alpha=0.7)
data.plot.barh(ax = axes[1], color='r', alpha=0.7)

plt.savefig(os.path.join(folder, 'wykres10.png'), dpi=400, bbox_inches='tight')
```



[17]:
```
data = np.random.rand(3, 5)

df = pd.DataFrame(data, index=['a', 'b', 'c'], columns=pd.Index(['1', '2', '3',␣
↪'4', '5'], name='Nazwa'))
df.plot.bar()

plt.savefig(os.path.join(folder, 'wykres11.png'), dpi=400, bbox_inches='tight')
```



[18]:
```
df.plot.bar(stacked=True, alpha=0.8)

plt.savefig(os.path.join(folder, 'wykres12.png'), dpi=400, bbox_inches='tight')
```



[19]:
```
n = 1_000

total_bill = [x * 100 for x in np.random.rand(n)]
tip = [x * (np.random.rand(1)[0]/10) for x in total_bill]
sex = np.random.choice(['Female', 'Male'], n)
smoker = np.random.choice(['yes', 'no'], n, p=[0.3, 0.7])
day = np.random.choice(['Mon', 'Tue', 'Wed', 'Thu', 'Fri', 'Sat', 'Sun'], n)
size = np.random.choice([np.arange(1, 7)][0], n)

tips = pd.DataFrame(
    {
        'total_bill': total_bill,
        'tip': tip,
        'sex': sex,
        'smoke': smoker,
        'day': day,
        'size': size
    })

party_counts = pd.crosstab(tips['day'], tips['size'])
party_counts
```

[19]:

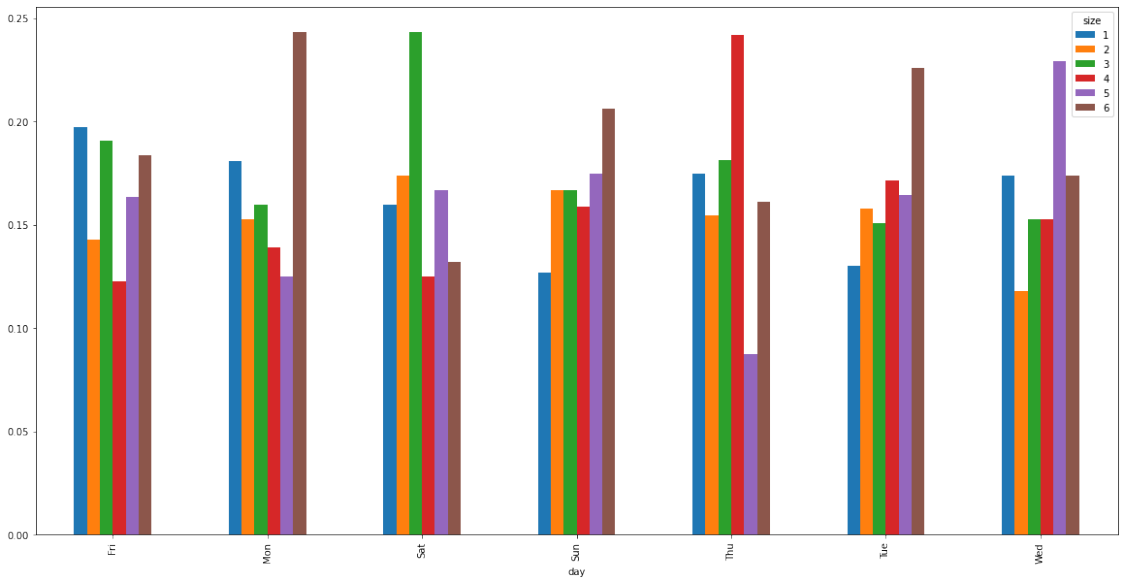
size	1	2	3	4	5	6
day						
Fri	29	21	28	18	24	27
Mon	26	22	23	20	18	35
Sat	23	25	35	18	24	19
Sun	16	21	21	20	22	26

```
Thu   26  23  27  36  13  24
Tue   19  23  22  25  24  33
Wed   25  17  22  22  33  25
```

[20]:
```
# normalizacja wartości

party_pcts = party_counts.div(party_counts.sum(1), axis=0)
party_pcts
```

[20]:
```
size         1         2         3         4         5         6
day
Fri   0.197279  0.142857  0.190476  0.122449  0.163265  0.183673
Mon   0.180556  0.152778  0.159722  0.138889  0.125000  0.243056
Sat   0.159722  0.173611  0.243056  0.125000  0.166667  0.131944
Sun   0.126984  0.166667  0.166667  0.158730  0.174603  0.206349
Thu   0.174497  0.154362  0.181208  0.241611  0.087248  0.161074
Tue   0.130137  0.157534  0.150685  0.171233  0.164384  0.226027
Wed   0.173611  0.118056  0.152778  0.152778  0.229167  0.173611
```

[21]:
```
party_pcts.plot.bar()

plt.savefig(os.path.join(folder, 'wykres13.svg'), dpi=400, bbox_inches='tight')
```



[22]:
```
import seaborn as sns
```

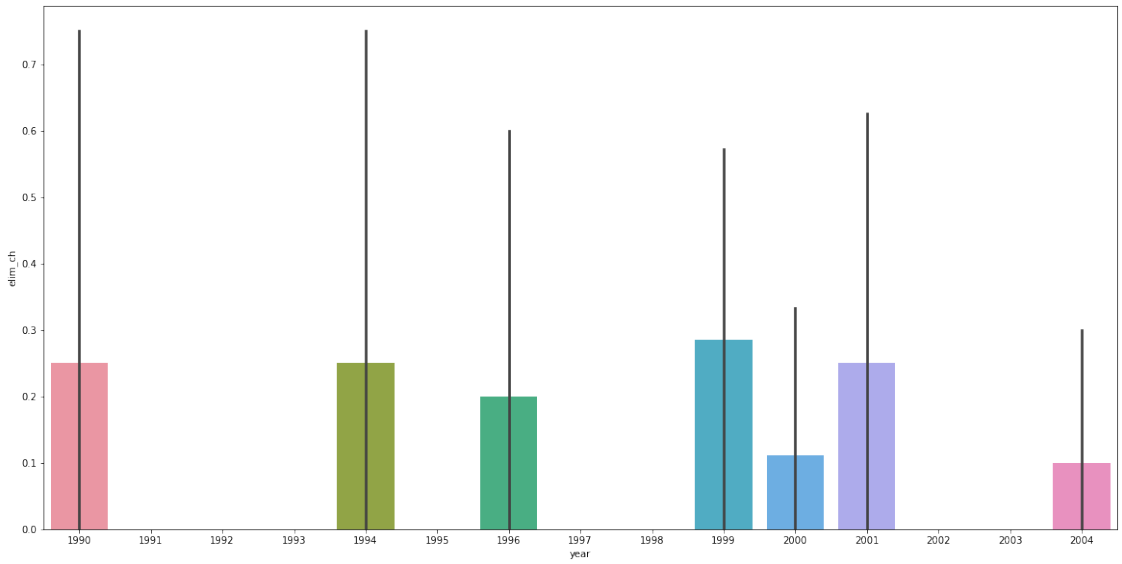
[23]:
```
tips['tip_pct'] = tips['tip']/(tips['total_bill'] - tips['tip'])
tips
```

[23]:

	total_bill	tip	sex	smoke	day	size	tip_pct
0	47.471453	3.387584	Female	yes	Sat	5	0.076844
1	20.884283	1.054613	Female	no	Sat	5	0.053184
2	72.251788	3.290142	Female	yes	Thu	4	0.047710
3	90.229426	8.299866	Female	yes	Wed	5	0.101305
4	45.037490	1.794138	Male	no	Thu	3	0.041489
..	…	…	…	…	…	…	…
995	1.411061	0.048835	Male	no	Sat	5	0.035850
996	2.541856	0.187627	Female	no	Mon	6	0.079698
997	68.370616	1.556100	Male	no	Fri	3	0.023290
998	39.703214	3.736314	Male	no	Sun	5	0.103882
999	18.452617	0.495109	Male	no	Mon	2	0.027571

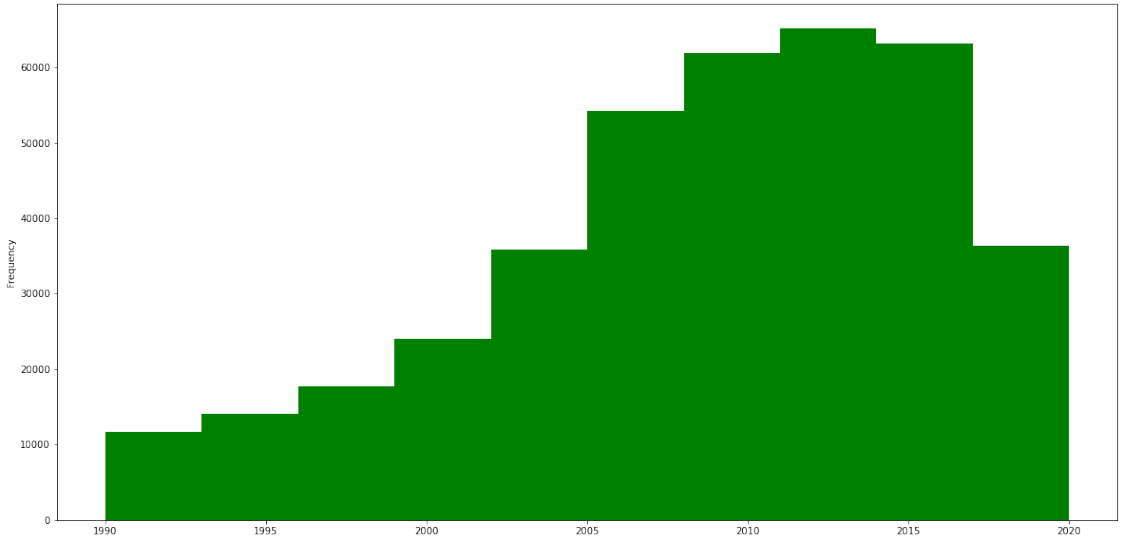
[1000 rows x 7 columns]

[24]:
```
#sns.barplot(x='tip_pct', y='day', data=tips, orient='h', hue='sex')
import seaborn as sns

max = 100_000
per = 1_000
sns.barplot(y=num_data.elim_ch[:max:per], x = num_data.year[:max:per])

plt.savefig(os.path.join(folder, 'wykres14.png'), dpi=400, bbox_inches='tight')
```

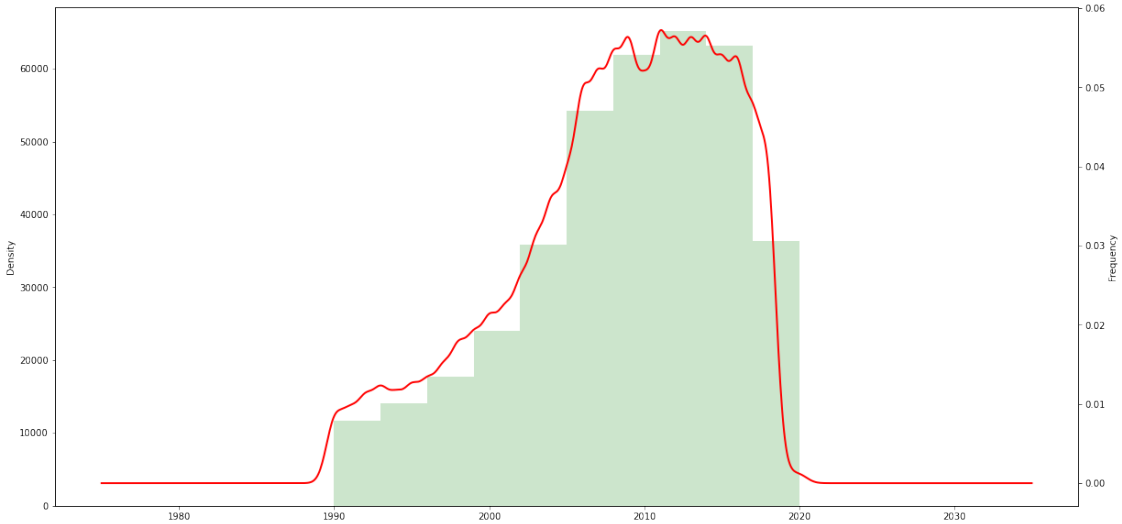


[25]:
```
# histogram
#tips['tip_pct'].plot.hist(bins=50)
num_data['year'].plot.hist(bins=10, color='green')
```

```
plt.savefig(os.path.join(folder, 'wykres15.png'), dpi=400, bbox_inches='tight')
```

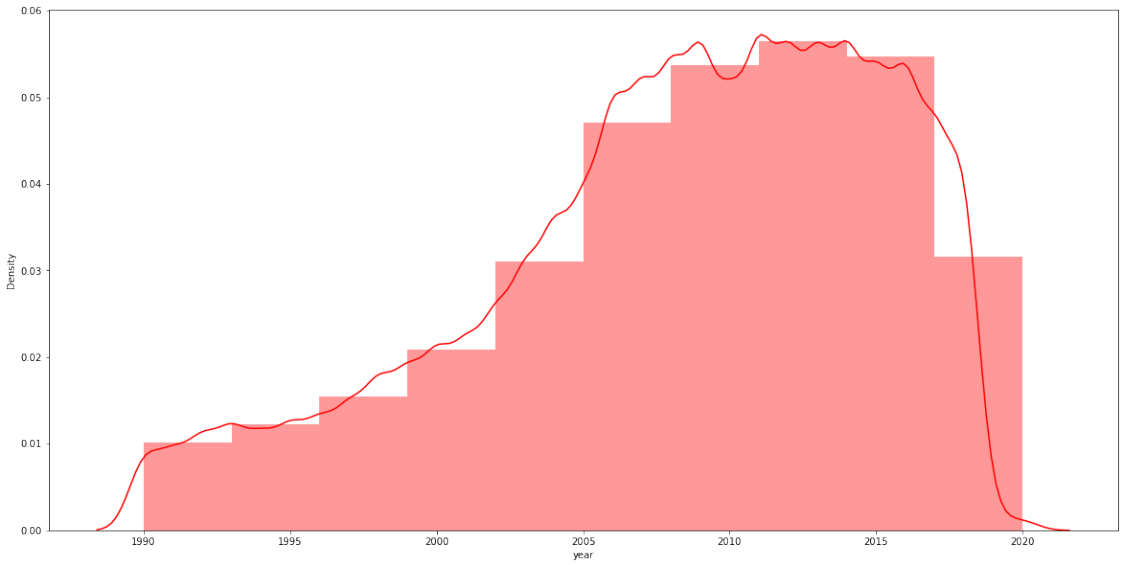


[26]:
```
# wykres gęstości

#tips['tip_pct'].plot.kde()
num_data['year'].plot.hist(bins=10, color='green', alpha=0.2)
ax = num_data['year'].plot.kde(color='red', linewidth=2.0, secondary_y=True)
ax.set_ylabel("Frequency", fontsize=10)

plt.savefig(os.path.join(folder, 'wykres16.png'), dpi=400, bbox_inches='tight')
```



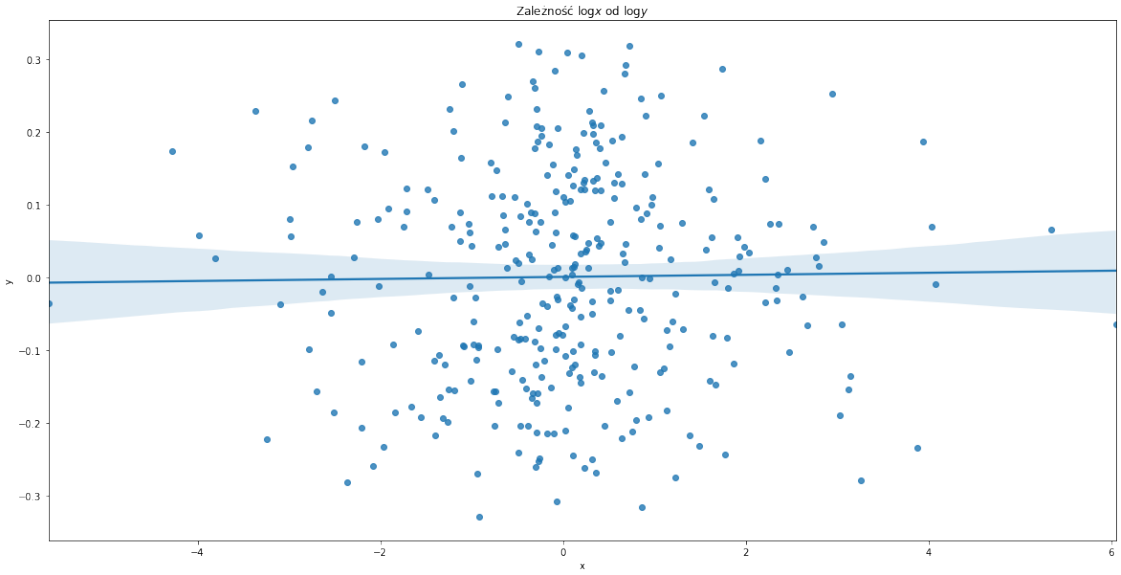
[27]:
```
# histogram i wykres gęstości na jednym wykresie
#comp1 = np.random.normal(0, 1, size=200)
#comp2 = np.random.normal(10, 2, size=200)

#vals = pd.Series(np.concatenate([comp1, comp2]))

#sns.distplot(vals, bins=100, color='r')
sns.distplot(num_data['year'], bins=10, color='r')

plt.savefig(os.path.join(folder, 'wykres17.png'), dpi=400, bbox_inches='tight')
```

```
C:\Users\piotr\anaconda3\lib\site-packages\seaborn\distributions.py:2557:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

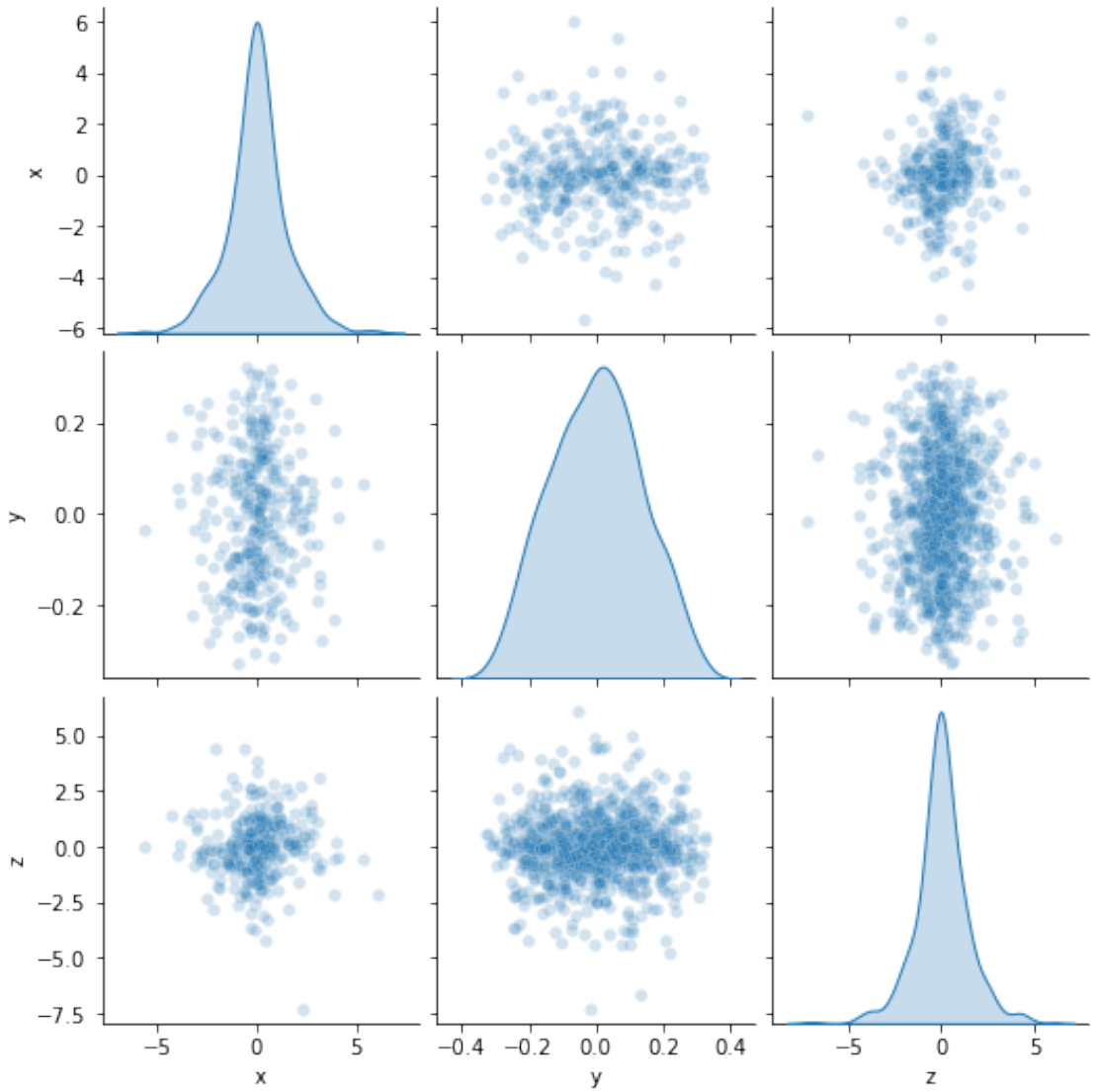


[28]:
```
# wykres regresji liniowej

# losowe dane
n = 1_000
data = pd.DataFrame({
    'x': np.random.rand(n)*5-2,
    'y': np.random.rand(n)*2+5,
    'z': np.random.rand(n)
})
# różnica logarytmów
```

```
data = np.log(data).diff()

sns.regplot(x='x', y='y', data=data)
plt.title('Zależność $\log{x}$ od $\log{y}$')

#sns.regplot(x='elim_ch', y='prelim_est', data=num_data)
#plt.title('Zależność $\log$ {} od $\log$ {}'.format('m1', 'unemp'))

plt.savefig(os.path.join(folder, 'wykres18.png'), dpi=400, bbox_inches='tight')
```



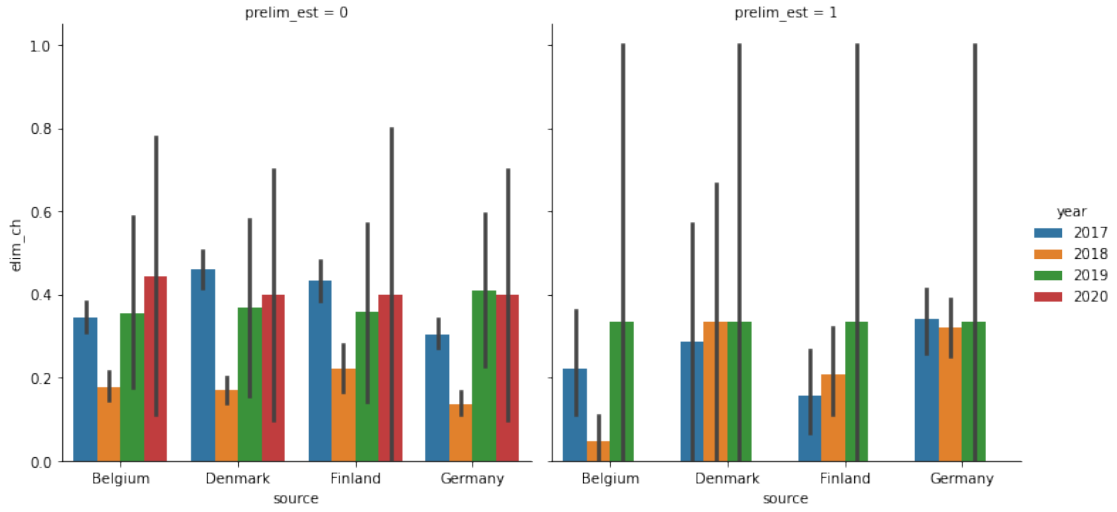
[29]:
```
# wszystkie wykresy rozrzutu

#sns.pairplot(trans_data, diag_kind='kde', plot_kws={'alpha': 0.2})
sns.pairplot(data, diag_kind='kde', plot_kws={'alpha': 0.2})

plt.savefig(os.path.join(folder, 'wykres19.png'), dpi=400, bbox_inches='tight')
```



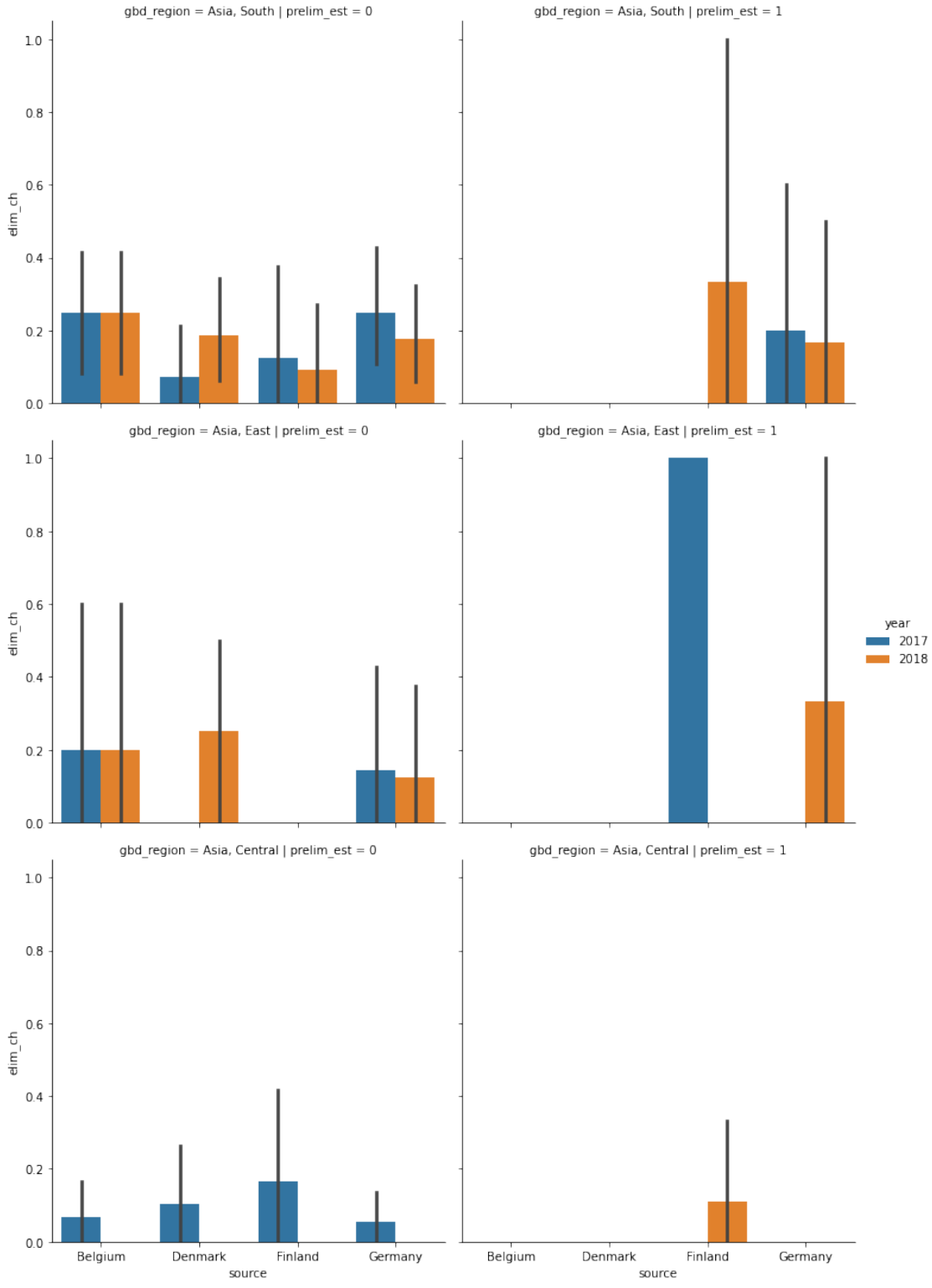
[30]:
```
# kilka wykresów słupkowych obok siebie (tzw. faset)

path = r"C:
 ↪\Users\piotr\Downloads\EiWD_lab_zadanie02\IHME_DAH_DATABASE_1990_2020_Y2021M09D22.
 ↪CSV"

data = pd.read_csv(path, low_memory=False)

#print(data.source.drop_duplicates())
#print(data[data['prelim_est'] == 1].source.drop_duplicates()) # Australia,␣
 ↪Austra, Belgium, Canada, Denmark, Finland, Germany, Greece...
```

```
#print(data[data['prelim_est'] == 1].year.drop_duplicates()) # 1990, 1991,␣
↪2017, 2018, 2019, 2020

#print(data.year.drop_duplicates())
#print(data[data['prelim_est'] == 0].source.drop_duplicates()) # Australia,␣
↪Austria, Belgium, Canada, China, Denmark, Finland, France, Germany, Greece...
#print(data[data['prelim_est'] == 0].year.drop_duplicates()) # 1990-2020
```

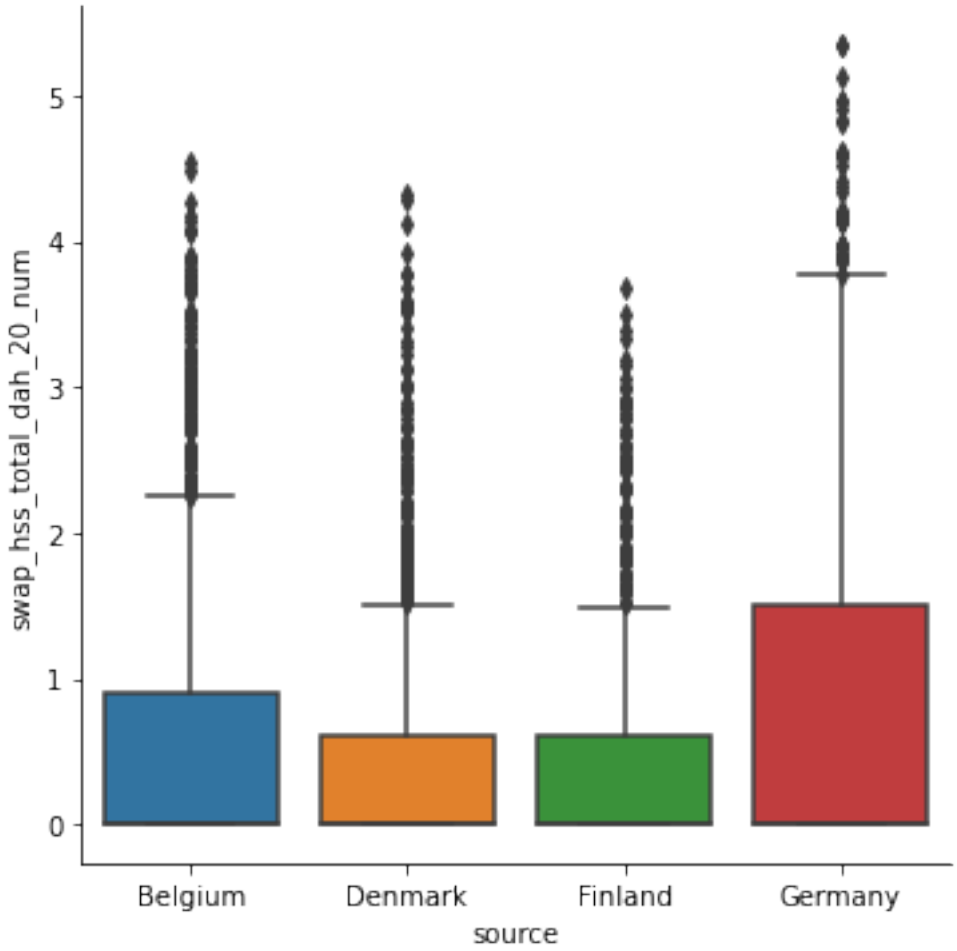
[76]:
```
#sns.catplot(x='day', y='tip_pct', hue='sex', col='smoke', kind='bar',␣
↪data=tips[tips.tip_pct < 1])

data = data[(data.year.isin([2017, 2018, 2019, 2020]) & data.source.
↪isin(['Austrialia', 'Belgium', 'Denmark', 'Finland', 'Germany']))]

sns.catplot(x='source', y='elim_ch', hue='year', col='prelim_est', kind='bar',␣
↪data=data)

plt.savefig(os.path.join(folder, 'wykres20.png'), dpi=400, bbox_inches='tight')
```



[46]:
```
# łączenie warunków wyświetlania faset

#sns.catplot(x='day', y='tip_pct', row='sex', col='smoke', kind='bar',␣
↪data=tips[tips.tip_pct < 1])
sns.catplot(x='source', y='elim_ch', hue='year', row='gbd_region',␣
↪col='prelim_est', kind='bar', data=data[data.gbd_region.isin(['Asia, South',␣
↪'Asia, East', 'Asia, Central'])])

plt.savefig(os.path.join(folder, 'wykres21.png'), dpi=400, bbox_inches='tight')
```


gbd_region = Asia, South | prelim_est = 0
gbd_region = Asia, South | prelim_est = 1
gbd_region = Asia, East | prelim_est = 0
gbd_region = Asia, East | prelim_est = 1
gbd_region = Asia, Central | prelim_est = 0
gbd_region = Asia, Central | prelim_est = 1
elim_ch
0.0
0.2
0.4
0.6
0.8
1.0
Belgium
Denmark
Finland
Germany
source
year
2017
2018

[125]:
```
# wykresy pudełkowe

#sns.catplot(x='tip_pct', y='day', kind='box', data=tips[tips.tip_pct < 0.5])

import math

data['swap_hss_total_dah_20_num'] = data.swap_hss_total_dah_20.apply(lambda x:␣
 ↪0 if x=='-' else math.log(abs(int(x)+1),10))
#sns.catplot(x='source', y='swap_hss_total_dah_20_num', kind='box',␣
 ↪data=data[data.gbd_region.isin(['Asia, South', 'Asia, East', 'Asia,␣
 ↪Central'])])
sns.catplot(x='source', y='swap_hss_total_dah_20_num', kind='box', data=data)

plt.savefig(os.path.join(folder, 'wykres22.png'), dpi=400, bbox_inches='tight')
```



[ ]: