In [5]:
```
import datetime as dt

import numpy as np
import pandas as pd
import seaborn as sns

import os
import re
```

In [6]:
```
file_path = "../data/budownictwo_mieszkaniowe_w_okresie_styczen-pazdziern
os.path.isfile(file_path)
```

Out[6]: True

In [7]:
```
tdf = pd.read_excel(file_path)
tdf.to_csv("../data/temp_deweloperzy.csv")
```

In [8]:
```
df = pd.read_excel(file_path, header=1)
df = df.iloc[12:]
df = df.iloc[:-1]
df.head()
```

Out[8]:

	Unnamed: 0	I	I-II	I-III	I-IV	I-V	I-VI	I-VII	I-VIII	I-IX	
12	NaN	1993	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
13	OGÓŁEM	8513	15456	22266	28231	34213	42060	49665	56195	62092	68
14	indywidualne	1906	3724	5601	7427	9341	12931	14834	17080	19501	22
15	sprzedaż lub wynajem	3	18	87	108	113	199	229	265	310	
16	spółdzielcze	5634	10041	14169	17849	21327	24796	29403	33037	35895	39

Możemy użyć metody `stepwise_selection` z pakietu *dmba*.

In [9]:
```
df.head()
```

Out[9]:

	Unnamed: 0	I	I-II	I-III	I-IV	I-V	I-VI	I-VII	I-VIII	I-IX	
12	NaN	1993	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
13	OGÓŁEM	8513	15456	22266	28231	34213	42060	49665	56195	62092	68
14	indywidualne	1906	3724	5601	7427	9341	12931	14834	17080	19501	22
15	sprzedaż lub wynajem	3	18	87	108	113	199	229	265	310	
16	spółdzielcze	5634	10041	14169	17849	21327	24796	29403	33037	35895	39

In [10]:
```
df['year'] = None
df
```

Out[10]:

	Unnamed: 0	I	I-II	I-III	I-IV	I-V	I-VI	I-VII	I-VIII	I-I
12	NaN	1993	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Na
13	OGÓŁEM	8513	15456	22266	28231	34213	42060	49665	56195	620
14	indywidualne	1906	3724	5601	7427	9341	12931	14834	17080	195(
15	sprzedaż lub wynajem	3	18	87	108	113	199	229	265	31
16	spółdzielcze	5634	10041	14169	17849	21327	24796	29403	33037	358
...	...	...	...	...	...	...	...	...	...	
199	OGÓŁEM	14909	31011	48286	64243	79164	95615	114244	128830	14541
200	indywidualne	6165	12027	18087	24016	29257	34660	40870	46332	516
201	sprzedaż lub wynajem	8312	18232	29106	38768	48053	58662	70067	78514	896(
202	spółdzielcze	36	36	56	119	180	300	840	840	8
203	pozostałe	396	716	1037	1340	1674	1993	2467	3144	33

192 rows × 14 columns

In [11]:
```
df.columns
```

Out[11]:
```
Index(['Unnamed: 0', 'I', 'I-II', 'I-III', 'I-IV', 'I-V', 'I-VI', 'I-VI
I',
       'I-VIII', 'I-IX', 'I-X', 'I-XI', 'I-XII', 'year'],
      dtype='object')
```

In [ ]:
```
current_year = None
for index, row in df.iterrows():
    if np.isnan(row["I-II"]):
        current_year = row["I"]
    df.at[index, "year"] = current_year

df['year']
```

Out[ ]:
```
12      1993
13      1993
14      1993
15      1993
16      1993
        ...
199     2024
200     2024
201     2024
202     2024
203     2024
Name: year, Length: 192, dtype: object
```

In [13]:
```
df["year"].unique()
```

Out[13]:
```
array([1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003,
       2004, '2005 a', '2006a', '2007a', '2008a', '2009a', '2010a',
       '2011a', '2012a', '2013a', '2014a', '2015a', '2016a', '2017a',
       '2018a', 2019, 2020, 2021, 2022, 2023, 2024], dtype=object)
```

In [14]:
```
df['year'] = df['year'].apply(lambda r: int(re.findall(r"\d+", r)[0]) if
df["year"].unique()
```

Out[14]:
```
array([1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003,
       2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014,
       2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024])
```

In [15]:
```
df = df[df["year"] >= 2014]
df = df[~df["Unnamed: 0"].isna()]
df.head(10)
```

Out[15]:

	Unnamed: 0	I	I-II	I-III	I-IV	I-V	I-VI	I-VII	I-VIII	I-IX
139	OGÓŁEM	12511	24973	35562	47208	56101	66418	79677	88821	100142
140	indywidualne	7155	13869	20399	26501	32017	37819	44347	49365	55417
141	sprzedaż lub wynajem	4449	9517	13204	18299	21484	25601	31480	34515	39247
142	spółdzielcze	415	773	1012	1205	1251	1392	1873	2146	2544
143	pozostałe	492	814	947	1203	1349	1606	1977	2795	2934
145	OGÓŁEM	11748	21241	31703	42138	52548	63966	76852	88067	101331
146	indywidualne	6627	12930	19698	26470	32231	38542	45855	51751	57798
147	sprzedaż lub wynajem	4868	7818	11182	14493	19099	23896	28839	33606	40365
148	spółdzielcze	50	81	244	494	495	511	735	1075	1195
149	pozostałe	203	412	579	681	723	1017	1423	1635	1973

In [16]:
```
df.columns
```

Out[16]:
```
Index(['Unnamed: 0', 'I', 'I-II', 'I-III', 'I-IV', 'I-V', 'I-VI', 'I-VI
I',
       'I-VIII', 'I-IX', 'I-X', 'I-XI', 'I-XII', 'year'],
      dtype='object')
```

In [17]:
```
df2014 = df[df["year"] == 2014].copy()
df2014
```

Out[17]:

	Unnamed: 0	I	I-II	I-III	I-IV	I-V	I-VI	I-VII	I-VIII	I-IX
139	OGÓŁEM	12511	24973	35562	47208	56101	66418	79677	88821	100142
140	indywidualne	7155	13869	20399	26501	32017	37819	44347	49365	55417
141	sprzedaż lub wynajem	4449	9517	13204	18299	21484	25601	31480	34515	39247
142	spółdzielcze	415	773	1012	1205	1251	1392	1873	2146	2544
143	pozostałe	492	814	947	1203	1349	1606	1977	2795	2934

In [18]:
```
def from_roman(num):
    roman_numerals = {'I':1, 'V':5, 'X':10, 'L':50, 'C':100, 'D':500, 'M'
    result = 0
    for i,c in enumerate(num):
        if (i+1) == len(num) or roman_numerals[c] >= roman_numerals[num[i
```

```
            result += roman_numerals[c]
        else:
            result -= roman_numerals[c]
    return result

def rename_columns(col_name: str) -> str:
    if col_name == "Unnamed: 0":
        return "title"
    elif col_name == "I":
        return "1"
    elif col_name[:2] == "I-":
        return str(from_roman(col_name[2:]))
    else:
        return col_name


df.rename(columns=rename_columns, inplace=True)
df.head()
```

Out[18]:

	title	1	2	3	4	5	6	7	8	9
139	OGÓŁEM	12511	24973	35562	47208	56101	66418	79677	88821	100142
140	indywidualne	7155	13869	20399	26501	32017	37819	44347	49365	55417
141	sprzedaż lub wynajem	4449	9517	13204	18299	21484	25601	31480	34515	39247
142	spółdzielcze	415	773	1012	1205	1251	1392	1873	2146	2544
143	pozostałe	492	814	947	1203	1349	1606	1977	2795	2934

In [19]:

```
def proceed_subdf(df: pd.DataFrame, year: int) -> pd.DataFrame:
    ndf = df.T
    ndf.columns = ndf.iloc[0]
    ndf.drop(index="title", inplace=True)
    ndf.drop(index="year", inplace=True)
    for index in range(12, 1, -1):
        ndf.loc[str(index)] -= ndf.loc[str(index-1)]
    ndf.index = [dt.datetime(year=year, month=int(ind), day=1) for ind in
    return ndf

proceed_subdf(df=df2014, year=2014)
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
Cell In[19], line 11
      8     ndf.index = [dt.datetime(year=year, month=int(ind), day=1) for ind in ndf.index]
      9     return ndf
---> 11 proceed_subdf(df=df2014, year=2014)

Cell In[19], line 4, in proceed_subdf(df, year)
      2 ndf = df.T
      3 ndf.columns = ndf.iloc[0]
----> 4 ndf.drop(index="title", inplace=True)
      5 ndf.drop(index="year", inplace=True)
      6 for index in range(12, 1, -1):

File ~/code/ds/pkobp/.venv/lib/python3.12/site-packages/pandas/core/frame.py:5581, in DataFrame.drop(self, labels, axis, index, columns, level, inplace, errors)
   5433 def drop(
   5434     self,
   5435     labels: IndexLabel | None = None,
   (...)
   5442     errors: IgnoreRaise = "raise",
   5443 ) -> DataFrame | None:
   5444     """
   5445     Drop specified labels from rows or columns.
   5446
   (...)
   5579             weight  1.0     0.8
   5580     """
-> 5581     return super().drop(
   5582         labels=labels,
   5583         axis=axis,
   5584         index=index,
   5585         columns=columns,
   5586         level=level,
   5587         inplace=inplace,
   5588         errors=errors,
   5589     )

File ~/code/ds/pkobp/.venv/lib/python3.12/site-packages/pandas/core/generic.py:4788, in NDFrame.drop(self, labels, axis, index, columns, level, inplace, errors)
   4786 for axis, labels in axes.items():
   4787     if labels is not None:
-> 4788         obj = obj._drop_axis(labels, axis, level=level, errors=errors)
   4790 if inplace:
   4791     self._update_inplace(obj)

File ~/code/ds/pkobp/.venv/lib/python3.12/site-packages/pandas/core/generic.py:4830, in NDFrame._drop_axis(self, labels, axis, level, errors, only_slice)
   4828         new_axis = axis.drop(labels, level=level, errors=errors)
   4829     else:
-> 4830         new_axis = axis.drop(labels, errors=errors)
   4831     indexer = axis.get_indexer(new_axis)
   4833 # Case for non-unique axis
```

```
   4834 else:

File ~/code/ds/pkobp/.venv/lib/python3.12/site-packages/pandas/core/indexes/base.py:7070, in Index.drop(self, labels, errors)
   7068 if mask.any():
   7069     if errors != "ignore":
-> 7070         raise KeyError(f"{labels[mask].tolist()} not found in axis")
   7071     indexer = indexer[~mask]
   7072 return self.delete(indexer)

KeyError: "['title'] not found in axis"
```

In [91]:
```
dfs = []
for year, _df in df.groupby(by="year"):
    dfs.append(proceed_subdf(df=_df, year=year))
len(dfs)
```

Out[91]: 11

In [96]:
```
tdf = pd.concat(objs=dfs, axis=0)
tdf.head()
```

Out[96]:

title	OGÓŁEM	indywidualne	sprzedaż lub wynajem	spółdzielcze	pozostałe
2014-01-01	12511	7155	4449	415	492
2014-02-01	12462	6714	5068	358	322
2014-03-01	10589	6530	3687	239	133
2014-04-01	11646	6102	5095	193	256
2014-05-01	8893	5516	3185	46	146

In [100…
```
tdf.columns
```

Out[100…
```
Index(['ogolem', 'indywidualne', 'sprzedaz_lub_wynajem', 'spoldzielcze',
       'pozostale'],
      dtype='object', name='title')
```

In [101…
```
tdf.rename(columns={
    'OGÓŁEM':"ogolem",
    'indywidualne':"indywidualne",
    'sprzedaż lub wynajem': "sprzedaz_lub_wynajem",
    'spółdzielcze': "spoldzielcze",
      'pozostałe': "pozostale"},
      inplace=True)
tdf.index.name = "data"
tdf.head()
```

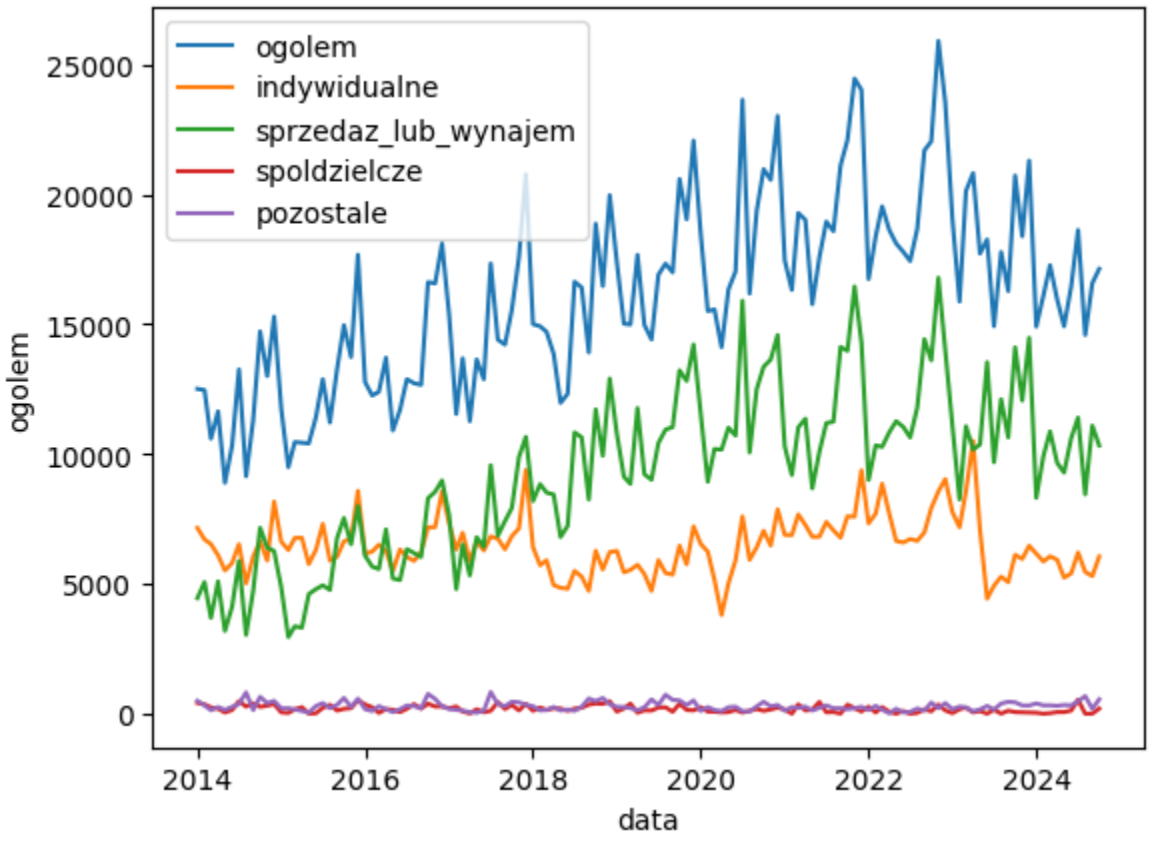
Out[101…

title data	ogolem	indywidualne	sprzedaz_lub_wynajem	spoldzielcze	pozostale
2014-01-01	12511	7155	4449	415	492
2014-02-01	12462	6714	5068	358	322
2014-03-01	10589	6530	3687	239	133
2014-04-01	11646	6102	5095	193	256
2014-05-01	8893	5516	3185	46	146

In [105…
```
tdf.index
```

Out[105…
```
DatetimeIndex(['2014-01-01', '2014-02-01', '2014-03-01', '2014-04-01',
               '2014-05-01', '2014-06-01', '2014-07-01', '2014-08-01',
               '2014-09-01', '2014-10-01',
               ...
               '2024-03-01', '2024-04-01', '2024-05-01', '2024-06-01',
               '2024-07-01', '2024-08-01', '2024-09-01', '2024-10-01',
               '2024-11-01', '2024-12-01'],
              dtype='datetime64[ns]', name='data', length=132, freq=Non
e)
```

In [111…
```
for col in tdf.columns:
    sns.lineplot(x='data', y=col, data=tdf, label=col)
```



In [112…
```
tdf.to_csv("../data/gus_budowa.csv")
```

In [62]:
```
df2014
```

Out[62]:

	title	1	2	3	4	5	6	7	8	9
139	OGÓŁEM	12511	24973	35562	47208	56101	66418	79677	88821	100142
140	indywidualne	7155	13869	20399	26501	32017	37819	44347	49365	55417
141	sprzedaż lub wynajem	4449	9517	13204	18299	21484	25601	31480	34515	39247
142	spółdzielcze	415	773	1012	1205	1251	1392	1873	2146	2544
143	pozostałe	492	814	947	1203	1349	1606	1977	2795	2934

In [ ]:

```
Unnamed: 0 Un named: 0
I I
I-II I- II
I-III I- III
I-IV I- IV
I-V I- V
I-VI I- VI
I-VII I- VII
I-VIII I- VIII
I-IX I- IX
I-X I- X
I-XI I- XI
I-XII I- XII
year ye ar
```

Out[ ]:

	title	1	2	3	4	5	6	7	8	9
139	OGÓŁEM	12511	24973	35562	47208	56101	66418	79677	88821	100142
140	indywidualne	7155	13869	20399	26501	32017	37819	44347	49365	55417
141	sprzedaż lub wynajem	4449	9517	13204	18299	21484	25601	31480	34515	39247
142	spółdzielcze	415	773	1012	1205	1251	1392	1873	2146	2544
143	pozostałe	492	814	947	1203	1349	1606	1977	2795	2934

In [87]:

```
def proceed_subdf(df: pd.DataFrame, year: int) -> pd.DataFrame:
    ndf = df.T
    ndf.columns = ndf.iloc[0]
    ndf.drop(index="title", inplace=True)
    ndf.drop(index="year", inplace=True)
    for index in range(12, 1, -1):
        ndf.loc[str(index)] -= ndf.loc[str(index-1)]
    ndf.index = [dt.datetime(year=year, month=int(ind), day=1) for ind in
    return ndf

proceed_subdf(df=df2014, year=2014)
```

Out[87]:

title	OGÓŁEM	indywidualne	sprzedaż lub wynajem	spółdzielcze	pozostałe
2014-01-01	12511	7155	4449	415	492
2014-02-01	12462	6714	5068	358	322
2014-03-01	10589	6530	3687	239	133
2014-04-01	11646	6102	5095	193	256
2014-05-01	8893	5516	3185	46	146
2014-06-01	10317	5802	4117	141	257
2014-07-01	13259	6528	5879	481	371
2014-08-01	9144	5018	3035	273	818
2014-09-01	11321	6052	4732	398	139
2014-10-01	14724	6647	7161	265	651
2014-11-01	13005	5897	6395	308	405
2014-12-01	15295	8168	6262	373	492

In [ ]:

In [80]:
```
ndf2014 = df2014.T
ndf2014.columns = ndf2014.iloc[0]
ndf2014.drop(index="title", inplace=True)
ndf2014.drop(index="year", inplace=True)
ndf2014
```

Out[80]:

title	OGÓŁEM	indywidualne	sprzedaż lub wynajem	spółdzielcze	pozostałe
1	12511	7155	4449	415	492
2	24973	13869	9517	773	814
3	35562	20399	13204	1012	947
4	47208	26501	18299	1205	1203
5	56101	32017	21484	1251	1349
6	66418	37819	25601	1392	1606
7	79677	44347	31480	1873	1977
8	88821	49365	34515	2146	2795
9	100142	55417	39247	2544	2934
10	114866	62064	46408	2809	3585
11	127871	67961	52803	3117	3990
12	143166	76129	59065	3490	4482

In [81]:
```
ndf2014.index
```

Out[81]:
```
Index(['1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12'], d
type='object')
```

In [82]:
```
for index in range(12, 1, -1):
    ndf2014.loc[str(index)] -= ndf2014.loc[str(index-1)]
ndf2014
```

Out[82]:

title	OGÓŁEM	indywidualne	sprzedaż lub wynajem	spółdzielcze	pozostałe
1	12511	7155	4449	415	492
2	12462	6714	5068	358	322
3	10589	6530	3687	239	133
4	11646	6102	5095	193	256
5	8893	5516	3185	46	146
6	10317	5802	4117	141	257
7	13259	6528	5879	481	371
8	9144	5018	3035	273	818
9	11321	6052	4732	398	139
10	14724	6647	7161	265	651
11	13005	5897	6395	308	405
12	15295	8168	6262	373	492

In [85]:
```
ndf2014.index = [dt.datetime(year=2014, month=int(ind), day=1) for ind in
ndf2014
```

Out[85]:

title	OGÓŁEM	indywidualne	sprzedaż lub wynajem	spółdzielcze	pozostałe
2014-01-01	12511	7155	4449	415	492
2014-02-01	12462	6714	5068	358	322
2014-03-01	10589	6530	3687	239	133
2014-04-01	11646	6102	5095	193	256
2014-05-01	8893	5516	3185	46	146
2014-06-01	10317	5802	4117	141	257
2014-07-01	13259	6528	5879	481	371
2014-08-01	9144	5018	3035	273	818
2014-09-01	11321	6052	4732	398	139
2014-10-01	14724	6647	7161	265	651
2014-11-01	13005	5897	6395	308	405
2014-12-01	15295	8168	6262	373	492