In [1]:

```
from __future__ import print_function
import time
import openapi_client
from openapi_client.rest import ApiException
from openapi_client.api.default_api import DefaultApi
from pprint import pprint
import requests
import plotly.express as px
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import seaborn as sns
```

In [2]:

```
def get_data(url):

    category = str(url)
    response = requests.get(category)
    data = response.json()
    data_dict = data["items"]

    data = pd.DataFrame.from_records(data_dict)

    return data
```

In [4]:

```
asylum_decisions = get_data('https://api.unhcr.org/population/v1/asylum-decision
asylum_applications = get_data('https://api.unhcr.org/population/v1/asylum-appli
demographics = get_data('https://api.unhcr.org/population/v1/demographics/?&year
population = get_data('https://api.unhcr.org/population/v1/population/?&yearFrom
```

In [5]:

```
asylum_decisions = asylum_decisions.dropna()
asylum_decisions[['year', 'dec_recognized', 'dec_other', 'dec_rejected', 'dec_cl
asylum_decisions = asylum_decisions.drop(['dec_pc', 'coo_iso', 'coa', 'coa_iso',
asylum_decisions = asylum_decisions[asylum_decisions.coo != 'UKN']
asylum_decisions
```

Out[5]:

| | year | coo_id | coo_name | coo | coa_id | coa_name | dec_recognized | dec_other | dec_rejec |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 2010 | 2 | Afghanistan | AFG | 11 | Australia | 11 | 0 | |
| **1** | 2010 | 3 | Albania | ALB | 11 | Australia | 0 | 0 | |
| **2** | 2010 | 8 | Egypt | ARE | 11 | Australia | 22 | 0 | |
| **3** | 2010 | 14 | Bahrain | BAH | 11 | Australia | 0 | 0 | |
| **4** | 2010 | 20 | Bangladesh | BGD | 11 | Australia | 10 | 0 | |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | |
| **65811** | 2023 | 91 | Iran (Islamic Rep. of) | IRN | 89 | Indonesia | 5 | 0 | |
| **65812** | 2023 | 177 | Sudan | SUD | 96 | Jordan | 0 | 0 | |
| **65813** | 2023 | 211 | Yemen | YEM | 185 | Syrian Arab Rep. | 5 | 0 | |

| | year | coo_id | coo_name | coo | coa_id | coa_name | dec_recognized | dec_other | dec_rejec |
|---|---|---|---|---|---|---|---|---|---|
| **65814** | 2023 | 147 | Pakistan | PAK | 188 | Thailand | 0 | 0 | |
| **65815** | 2023 | 174 | Viet Nam | SRV | 188 | Thailand | 0 | 0 | |

65208 rows × 11 columns

In [6]:

```
asylum_applications['year'] = asylum_applications ['year'].astype(int)
asylum_applications = asylum_applications.drop(['coo_iso', 'coa', 'coa_iso', 'pr
asylum_applications = asylum_applications[asylum_applications.coo != 'UKN']
asylum_applications = asylum_applications.dropna()
asylum_applications
```

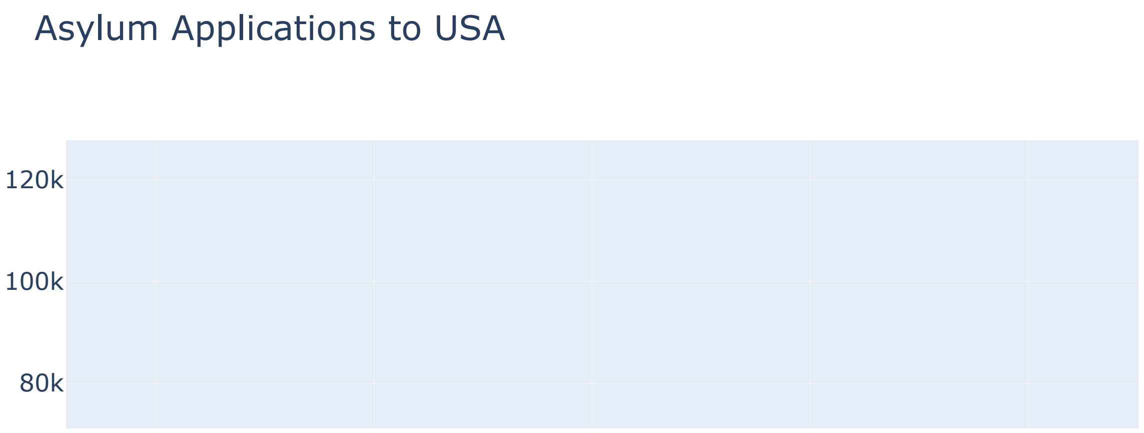
Out[6]:

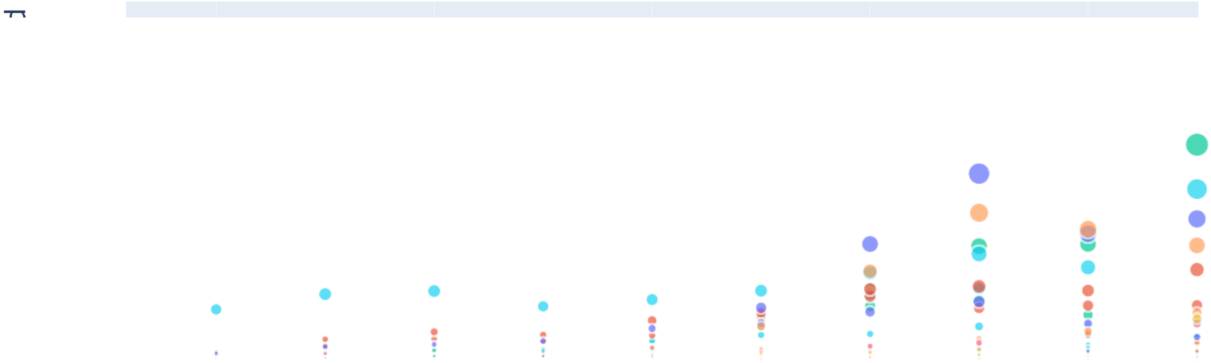
| | year | coo_id | coo_name | coo | coa_id | coa_name | app_type | applied |
|---|---|---|---|---|---|---|---|---|
| **0** | 2010 | 2 | Afghanistan | AFG | 11 | Australia | A | 14 |
| **1** | 2010 | 3 | Albania | ALB | 11 | Australia | A | 9 |
| **2** | 2010 | 8 | Egypt | ARE | 11 | Australia | A | 86 |
| **3** | 2010 | 14 | Bahrain | BAH | 11 | Australia | A | 5 |
| **4** | 2010 | 20 | Bangladesh | BGD | 11 | Australia | A | 42 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **72517** | 2023 | 172 | Somalia | SOM | 8 | Egypt | R | 23 |
| **72518** | 2023 | 179 | South Sudan | SSD | 8 | Egypt | R | 68 |
| **72519** | 2023 | 199 | Uganda | UGA | 8 | Egypt | R | 5 |
| **72520** | 2023 | 34 | Central African Rep. | CAR | 39 | Cameroon | R | 16 |
| **72521** | 2023 | 161 | Rwanda | RWA | 39 | Cameroon | R | 5 |

71871 rows × 8 columns

In [7]:

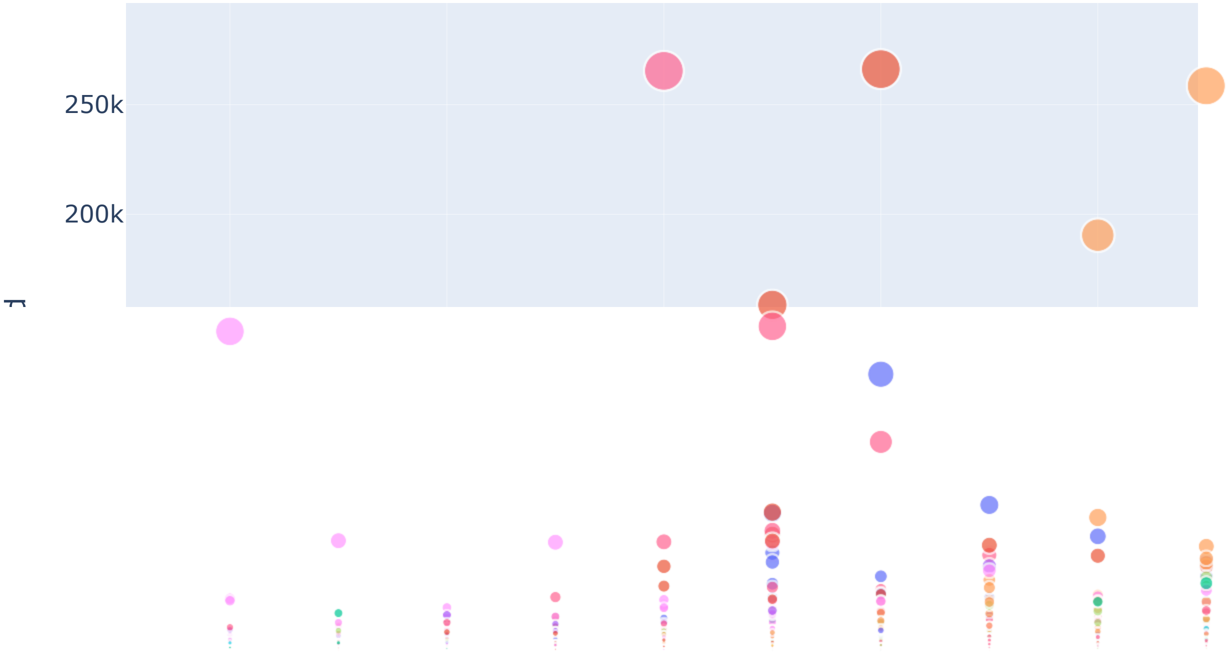
```
usa_app = asylum_applications.loc[asylum_applications['coa_name'] == 'United Sta
px.scatter(data_frame=usa_app, x='year', y='applied', color='coo_name', hover_da
```


Asylum Applications to USA



```
In [8]:  px.scatter(data_frame= asylum_applications, x='year', y='applied', color='coo_na
```

## Asylum Applications



In [9]:

```
demographics[['year','f_0_4', 'f_5_11', 'f_12_17', 'f_18_59', 'f_60', 'f_other',
demographics = demographics.drop(['coo', 'coo_iso', 'coa', 'coa_iso'], axis = 1)
demographics = demographics.dropna()
demographics
```

Out[9]:

| | year | coo_id | coo_name | coa_id | coa_name | f_0_4 | f_5_11 | f_12_17 | f_18_59 | f_60 | f |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 2010 | 2 | Afghanistan | 2 | Afghanistan | 70435 | 180578 | 103913 | 272816 | 14923 | |
| **1** | 2010 | 91 | Iran (Islamic Rep. of) | 2 | Afghanistan | 0 | 0 | 0 | 16 | 0 | |
| **2** | 2010 | 92 | Iraq | 2 | Afghanistan | 0 | 0 | 0 | 0 | 0 | |
| **3** | 2010 | 147 | Pakistan | 2 | Afghanistan | 0 | 0 | 0 | 7 | 0 | |
| **4** | 2010 | 8 | Egypt | 3 | Albania | 5 | 0 | 0 | 0 | 0 | |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| **64455** | 2022 | 207 | Venezuela (Bolivarian Republic of) | 224 | Aruba | 0 | 0 | 0 | 0 | 0 | |
| **64456** | 2022 | 224 | Aruba | 224 | Aruba | 0 | 0 | 0 | 0 | 0 | |
| **64457** | 2022 | 207 | Venezuela (Bolivarian Republic of) | 254 | Curacao | 0 | 0 | 0 | 0 | 0 | |
| **64458** | 2022 | 254 | Curacao | 254 | Curacao | 0 | 0 | 0 | 0 | 0 | |
| **64459** | 2022 | 207 | Venezuela (Bolivarian Republic of) | 255 | Sint Maarten (Dutch part) | 0 | 0 | 0 | 0 | 0 | |

64460 rows × 20 columns

In [10]:

```
ax = demographics.groupby('year', as_index=False).sum()
ax
```

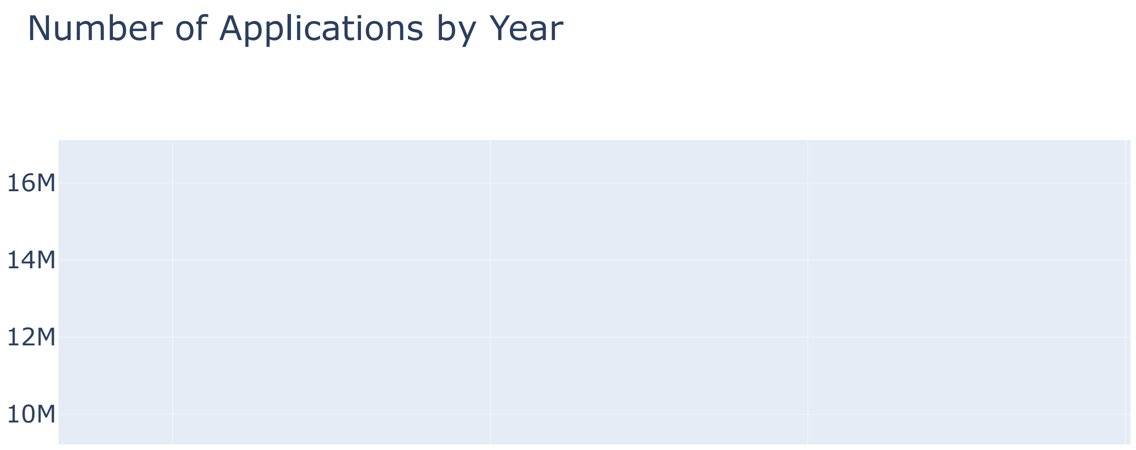
Out[10]:

| | year | coo_id | coa_id | f_0_4 | f_5_11 | f_12_17 | f_18_59 | f_60 | f_other | f_tota |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 2010 | 435423 | 430467 | 825988 | 1233425 | 905704 | 3088782 | 335609 | 3353415 | 974292 |
| **1** | 2011 | 436098 | 427416 | 965743 | 1389627 | 1033612 | 3469224 | 371045 | 3706594 | 1093584 |
| **2** | 2012 | 454168 | 445254 | 875040 | 1454786 | 1062724 | 3017112 | 310150 | 3501253 | 1022106 |
| **3** | 2013 | 477788 | 464086 | 1205398 | 1632987 | 1058049 | 3321821 | 291143 | 4095684 | 1160508 |
| **4** | 2014 | 501199 | 483106 | 1250374 | 1805103 | 1184284 | 3671946 | 329846 | 6177087 | 1441864 |
| **5** | 2015 | 529098 | 498818 | 1535707 | 2268862 | 1472882 | 4620148 | 403974 | 1665330 | 1196690 |
| **6** | 2016 | 530226 | 499136 | 1785662 | 2586197 | 1621779 | 4946759 | 475506 | 5624292 | 1704019 |

| | year | coo_id | coa_id | f_0_4 | f_5_11 | f_12_17 | f_18_59 | f_60 | f_other | f_tota |
|---|---|---|---|---|---|---|---|---|---|---|
| **7** | 2017 | 553337 | 510243 | 2073913 | 2968050 | 1859113 | 5510242 | 631625 | 7295969 | 2033891 |
| **8** | 2018 | 567870 | 531699 | 2609643 | 3292382 | 2139690 | 6778462 | 650736 | 8590885 | 2406179 |
| **9** | 2019 | 592301 | 551524 | 3232464 | 4176209 | 2748655 | 8436568 | 667947 | 9395730 | 2865757 |
| **10** | 2020 | 600819 | 557862 | 3156037 | 4002046 | 3035940 | 10897461 | 983130 | 7679638 | 2975425 |
| **11** | 2021 | 607965 | 567703 | 3218508 | 4504514 | 3388485 | 12637836 | 1297246 | 4954297 | 3000088 |
| **12** | 2022 | 653378 | 608391 | 3539943 | 5052005 | 3896957 | 16019860 | 2256670 | 11350271 | 4211570 |

In [11]:

```
px.scatter(ax, x ='year', y=['f_0_4', 'f_5_11','f_12_17','f_18_59','f_60','m_0_4
```



In [12]:

```
population[['year', 'refugees', 'asylum_seekers', 'returned_refugees', 'idps', '
population = population.drop(['coo', 'coo_iso', 'coa', 'coa_iso', 'oip', 'hst'],
population = population.dropna()
population
```

Out[12]:

| | year | coo_id | coo_name | coa_id | coa_name | refugees | asylum_seekers | returned_refuge |
|---|---|---|---|---|---|---|---|---|
| **0** | 2010 | 2 | Afghanistan | 2 | Afghanistan | 0 | 0 | |

| | year | coo_id | coo_name | coa_id | coa_name | refugees | asylum_seekers | returned_refuge |
|---|---|---|---|---|---|---|---|---|
| **1** | 2010 | 91 | Iran (Islamic Rep. of) | 2 | Afghanistan | 30 | 21 | |
| **2** | 2010 | 92 | Iraq | 2 | Afghanistan | 6 | 0 | |
| **3** | 2010 | 147 | Pakistan | 2 | Afghanistan | 6398 | 9 | |
| **4** | 2010 | 8 | Egypt | 3 | Albania | 5 | 0 | |
| **...** | ... | ... | ... | ... | ... | ... | ... | |
| **70745** | 2023 | 207 | Venezuela (Bolivarian Republic of) | 254 | Curacao | 0 | 0 | |
| **70746** | 2023 | 254 | Curacao | 254 | Curacao | 0 | 0 | |
| **70747** | 2023 | 207 | Venezuela (Bolivarian Republic of) | 255 | Sint Maarten (Dutch part) | 0 | 131 | |
| **70748** | 2023 | 92 | Iraq | 262 | Unknown | 0 | 0 | 1 |
| **70749** | 2023 | 200 | Ukraine | 262 | Unknown | 0 | 0 | 170 |

70750 rows × 12 columns

In [ ]:

```
```

In [13]:

```
asylum_grouped = asylum_decisions.groupby('coa_name').sum().reset_index()
pop_grouped = population.groupby('coa_name').sum().reset_index()

asylum_grouped = asylum_grouped.drop(['year', 'coo_id', 'coa_id'], axis = 1)
```

In [14]:

```
pop_grouped = pop_grouped.drop(['year', 'coo_id', 'coa_id'], axis = 1)
```

In [15]:

```
merged_df = pd.merge(asylum_grouped, pop_grouped, on='coa_name')
merged_df.corr()
```

Out[15]:

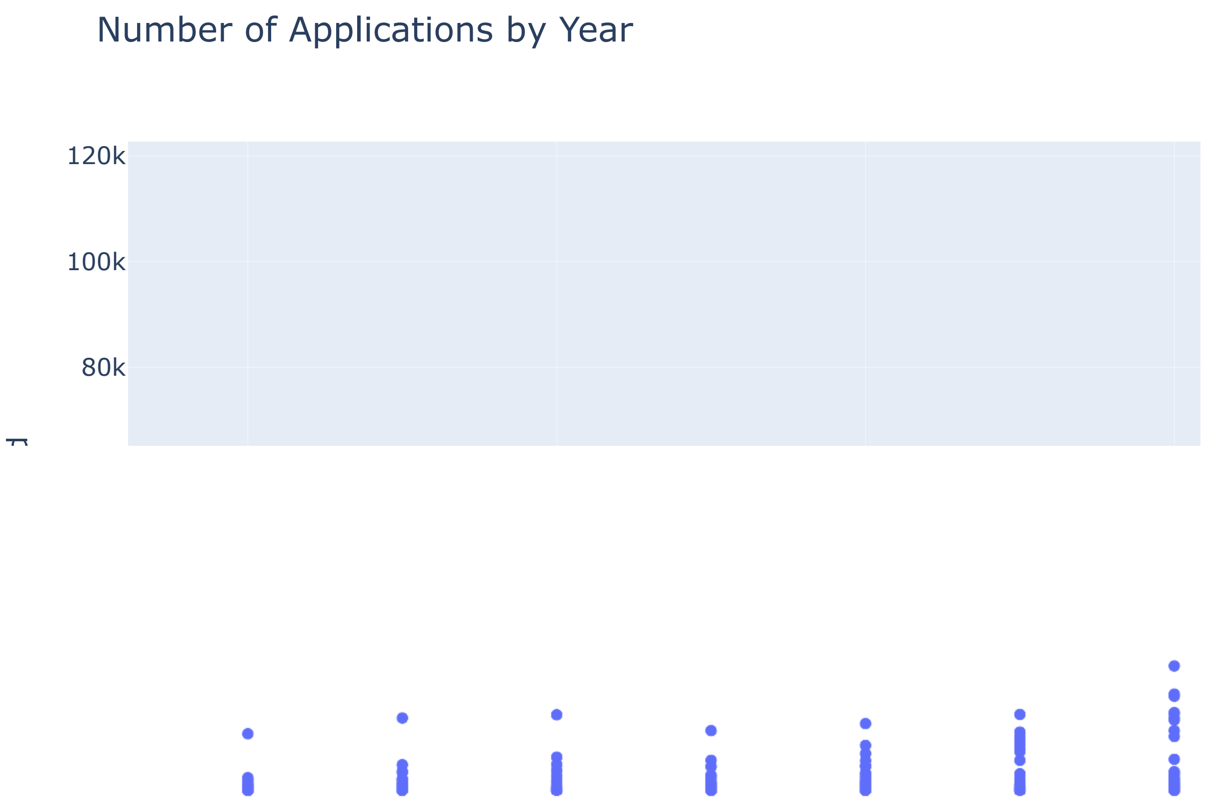
| | dec_recognized | dec_other | dec_rejected | dec_closed | dec_total | refugees | a |
|---|---|---|---|---|---|---|---|
| **dec_recognized** | 1.000000 | 0.699957 | 0.782173 | 0.870113 | 0.935127 | 0.407414 | |
| **dec_other** | 0.699957 | 1.000000 | 0.657895 | 0.626796 | 0.794029 | 0.217782 | |
| **dec_rejected** | 0.782173 | 0.657895 | 1.000000 | 0.702324 | 0.915963 | 0.228852 | |
| **dec_closed** | 0.870113 | 0.626796 | 0.702324 | 1.000000 | 0.898985 | 0.369765 | |
| **dec_total** | 0.935127 | 0.794029 | 0.915963 | 0.898985 | 1.000000 | 0.337073 | |
| **refugees** | 0.407414 | 0.217782 | 0.228852 | 0.369765 | 0.337073 | 1.000000 | |

| | dec_recognized | dec_other | dec_rejected | dec_closed | dec_total | refugees | as |
|---|---|---|---|---|---|---|---|
| **asylum_seekers** | 0.628568 | 0.264677 | 0.543942 | 0.767214 | 0.645064 | 0.288089 | |
| **returned_refugees** | 0.189878 | 0.022466 | 0.032057 | 0.133828 | 0.101144 | 0.737635 | |
| **idps** | -0.033496 | -0.047448 | -0.062319 | -0.031046 | -0.050854 | 0.092930 | |
| **returned_idps** | -0.014911 | -0.045612 | -0.059511 | -0.045679 | -0.049529 | 0.230440 | |
| **stateless** | -0.017439 | 0.033228 | -0.030907 | -0.026995 | -0.019015 | 0.042172 | |
| **ooc** | -0.008709 | -0.033147 | -0.034559 | -0.024710 | -0.029386 | 0.009638 | |

In [16]:

```
fig = px.scatter(usa_app, x='year', y='applied', title='Number of Applications b

fig.show()
```



Number of Applications by Year

In [17]:

```
#usa_app['applied'] = ((usa_app['applied'] - usa_app['applied'].mean()) / usa_ap
#usa_app
```

In [18]:

```
usa_app
```

Out[18]:

| | year | coo_id | coo_name | coo | coa_id | coa_name | app_type | applied |
|---|---|---|---|---|---|---|---|---|
| **4959** | 2017 | 3 | Albania | ALB | 202 | United States of America | A | 5 |
| **4960** | 2017 | 8 | Egypt | ARE | 202 | United States of America | A | 29 |
| **4961** | 2017 | 9 | Argentina | ARG | 202 | United States of America | A | 5 |
| **4962** | 2017 | 20 | Bangladesh | BGD | 202 | United States of America | A | 5 |
| **4963** | 2017 | 27 | Brazil | BRA | 202 | United States of America | A | 52 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **52935** | 2023 | 203 | Uzbekistan | UZB | 202 | United States of America | N | 1566 |
| **52936** | 2023 | 207 | Venezuela (Bolivarian Republic of) | VEN | 202 | United States of America | N | 61995 |
| **52937** | 2023 | 211 | Yemen | YEM | 202 | United States of America | N | 119 |
| **52938** | 2023 | 213 | Zambia | ZAM | 202 | United States of America | N | 56 |
| **52939** | 2023 | 214 | Zimbabwe | ZIM | 202 | United States of America | N | 315 |

4557 rows × 8 columns

In [19]:

```
x = usa_app.year
X = np.array([[1] * len(usa_app),
              x]).T
y = np.array(usa_app.applied)
X[0:4508,]
```

Out[19]:

```
array([[   1, 2017],
       [   1, 2017],
       [   1, 2017],
       ...,
       [   1, 2023],
       [   1, 2023],
       [   1, 2023]])
```

In [23]:

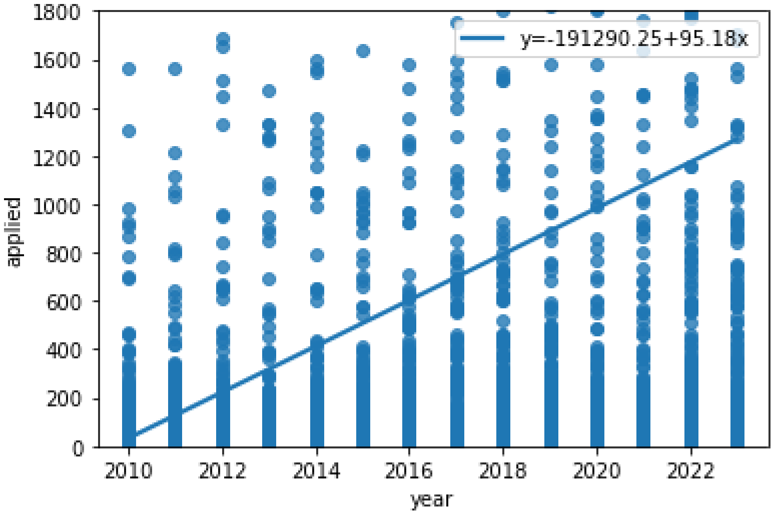
```
b = np.matmul(np.linalg.inv(np.matmul(X.T, X)), np.matmul(X.T, y))
np.set_printoptions(suppress=True)
b
```

Out[23]:

```
array([-191290.24548709,      95.18494156])
```

In [24]:

```
plot = sns.regplot(data= usa_app, x='year', y='applied', fit_reg=True, ci=None,
                   line_kws={'label':"y={1:.2f}+{0:.2f}x".format(b[1],b[0])});
plot.set_ylim(0,1800)
plot.legend();
sns.move_legend(plot, "upper right")
```



In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]: