Mini Project

December 13, 2017

In [1]:
```
import pandas as pd
import numpy as np
import random
import matplotlib.pyplot as plt
from matplotlib.ticker import FuncFormatter
```

In [2]:
```
data = pd.read_csv('~/EdX-Data-Scientist-Education/UCSanDiegoX-DSE200x-Python-for-Data-
data.shape
```

Out[2]: (5656458, 6)

In [3]:
```
data.head(10)
```

Out[3]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
0	Arab World	ARB	Adolescent fertility rate (births per 1,000 wo...	SP.ADO.TFRT	1960	1.335609e+02
1	Arab World	ARB	Age dependency ratio (% of working-age populat...	SP.POP.DPND	1960	8.779760e+01
2	Arab World	ARB	Age dependency ratio, old (% of working-age po...	SP.POP.DPND.OL	1960	6.634579e+00
3	Arab World	ARB	Age dependency ratio, young (% of working-age ...	SP.POP.DPND.YG	1960	8.102333e+01
4	Arab World	ARB	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1960	3.000000e+06
5	Arab World	ARB	Arms imports (SIPRI trend indicator values)	MS.MIL.MPRT.KD	1960	5.380000e+08
6	Arab World	ARB	Birth rate, crude (per 1,000 people)	SP.DYN.CBRT.IN	1960	4.769789e+01
7	Arab World	ARB	CO2 emissions (kt)	EN.ATM.CO2E.KT	1960	5.956399e+04
8	Arab World	ARB	CO2 emissions (metric tons per capita)	EN.ATM.CO2E.PC	1960	6.439635e-01
9	Arab World	ARB	CO2 emissions from gaseous fuel consumption (%...	EN.ATM.CO2E.GF.ZS	1960	5.041292e+00

0.1 What is the range of years?

```
In [4]: years = data['Year'].unique().tolist()
        print(min(years), '-',max(years))
```

```
1960 - 2015
```

0.2 What are the unique Country names and codes, and how many are there?

```
In [5]: # List unique countries and the count or length of list
        countries = data['CountryName'].unique().tolist()
        countryCode = data['CountryCode'].unique().tolist()


        print(countries, countryCode, len(countries), len(countryCode))
```

```
['Arab World', 'Caribbean small states', 'Central Europe and the Baltics', 'East Asia & Pacifi
```

0.3 Checking for null values

```
In [6]: data.isnull().any()
```

```
Out[6]: CountryName      False
        CountryCode      False
        IndicatorName    False
        IndicatorCode    False
        Year             False
        Value            False
        dtype: bool
```

0.4 Value Statistics - use to evaluate overall country exports from 1980 - 2015

```
In [7]: data['Value'].describe()
```

```
Out[7]: count    5.656458e+06
        mean     1.070501e+12
        std      4.842469e+13
        min     -9.824821e+15
        25%      5.566242e+00
        50%      6.357450e+01
        75%      1.346722e+07
        max      1.103367e+16
        Name: Value, dtype: float64
```

```
In [8]: data.std(axis=0)
```

```
Out[8]: Year     1.387895e+01
        Value    4.842469e+13
        dtype: float64
```

```
In [9]: data['CountryName'].count()

Out[9]: 5656458
```

0.5 Most common value in column 'Value'

```
In [10]: data['Value'].mode()

Out[10]: 0    0.0
         dtype: float64
```

0.6 Lowest value in column 'Value'

```
In [11]: data['Value'].min()

Out[11]: -9824821297572060.0
```

0.7 Highest value in column 'Value'

```
In [12]: data['Value'].max()

Out[12]: 11033666000000000.0
```

0.8 Remove Unwanted CountryCode rows

0.8.1 Find grouped countries via the country code

```
In [13]: data.columns

Out[13]: Index(['CountryName', 'CountryCode', 'IndicatorName', 'IndicatorCode', 'Year',
                'Value'],
               dtype='object')

In [14]: data.set_index('CountryCode', inplace=True, drop=False)

In [15]: data = data.drop(['HIC', 'OEC', 'OED', 'NOC', 'CEB', 'EAP', 'EMU', 'ECS', 'ECA', 'EUU
         #data.head(10)

In [16]: data = data.reset_index(drop=True)

In [17]: data.shape

Out[17]: (5059963, 6)
```

0.9 Select Arms Exports from all countries

```
In [99]: # Data selected: Arms exports
         arms_stage = data[data['IndicatorName'].str.contains('Arms exports \(SIPRI')]

In [100]: arms_stage.shape

Out[100]: (2024, 6)

In [101]: arms_stage.head()

Out[101]:                 CountryName CountryCode  \
          4664484       United States         USA
          4606252  Russian Federation         RUS
          4472579              France         FRA
          4453682      United Kingdom         GBR
          4408557             Germany         DEU

                                              IndicatorName   IndicatorCode  Year  \
          4664484  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  2014
          4606252  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  2014
          4472579  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  2014
          4453682  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  2014
          4408557  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  2014

                         Value
          4664484  1.019400e+10
          4606252  5.971000e+09
          4472579  1.978000e+09
          4453682  1.704000e+09
          4408557  1.200000e+09
```

0.10 Filter for yearly USA exports

```
In [95]: # select Arms export for the World
         hist_indicator = 'Arms exports \(SIPRI'
         hist_year = 2014
         hist_country = 'USA'

         mask1 = data['IndicatorName'].str.contains(hist_indicator)
         #mask2 = data['Year'].isin([hist_year])
         mask2 = data['Year'].between(1960, 1980)
         mask3 = data['CountryCode'].str.contains(hist_country)


         # stage is just those indicators matching the 1980 for year and Arms export over time
         usa_stage = data[mask1 & mask3]
         usa_67 = data[mask1 & mask2 & mask3]

In [96]: usa_stage.head(11)
```

Out[96]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4664484	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2014	1.019400e+10
4629943	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2013	7.384000e+09
4651699	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2012	9.018000e+09
4652810	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2011	9.111000e+09
4640880	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2010	8.169000e+09
4621048	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2009	6.822000e+09
4620931	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2008	6.814000e+09
4636237	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2007	7.834000e+09
4631888	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2006	7.521000e+09
4620019	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2005	6.758000e+09
4619906	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2004	6.752000e+09

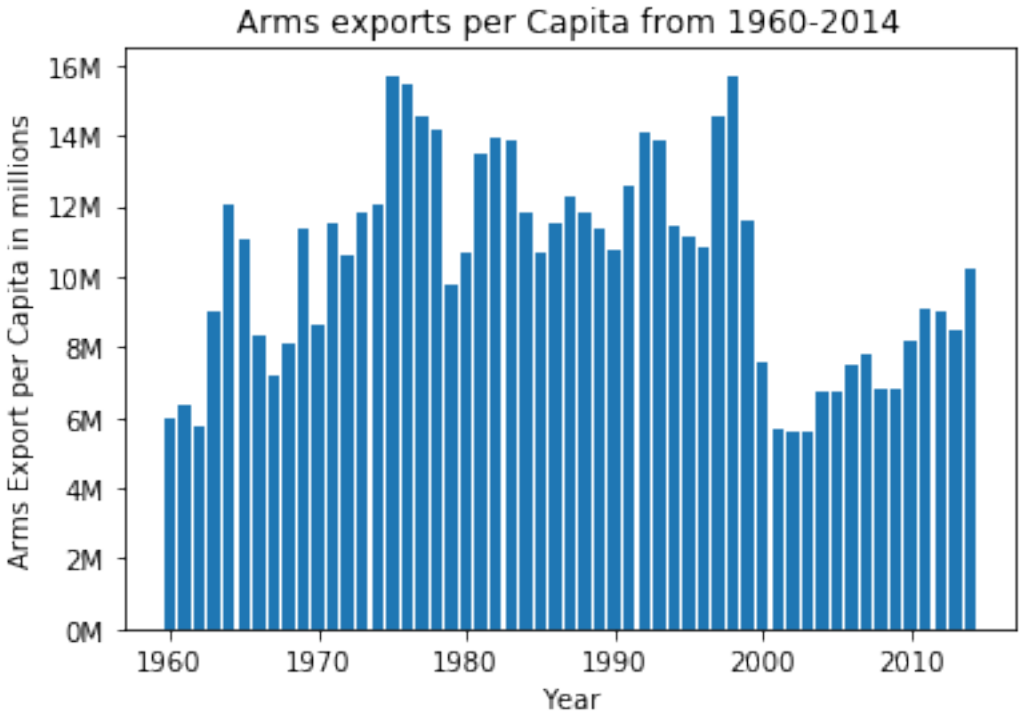
In [23]:
```
type(usa_stage)
```

Out[23]:
```
pandas.core.frame.DataFrame
```

0.11 Bar Chart Arms Export per Capita

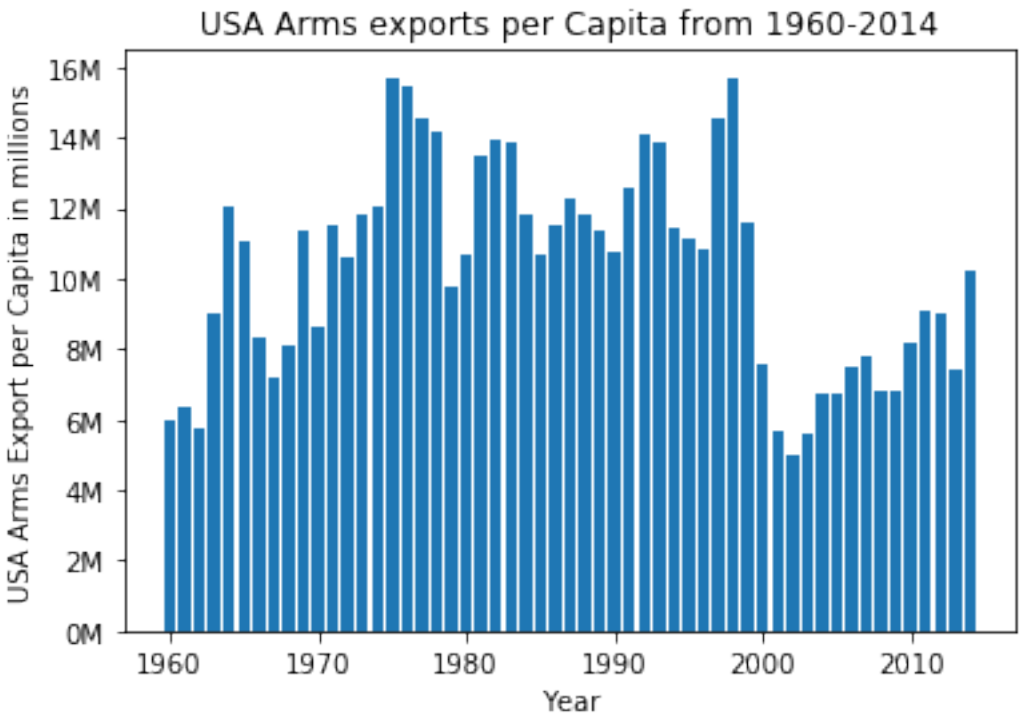
In [93]:
```
# get the years
years = arms_stage['Year'].values
# get the values
```

```
arms = arms_stage['Value'].values

# create
plt.bar(years,arms)
plt.title("Arms exports per Capita from 1960-2014")
plt.xlabel("Year")
plt.ylabel("Arms Export per Capita in millions")

# format the number output on the y-axis
ax = plt.gca()
ax.yaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.yaxis.set_major_formatter(formatter)

plt.show()
```



0.12 Bar chart of yearly USA arms exports

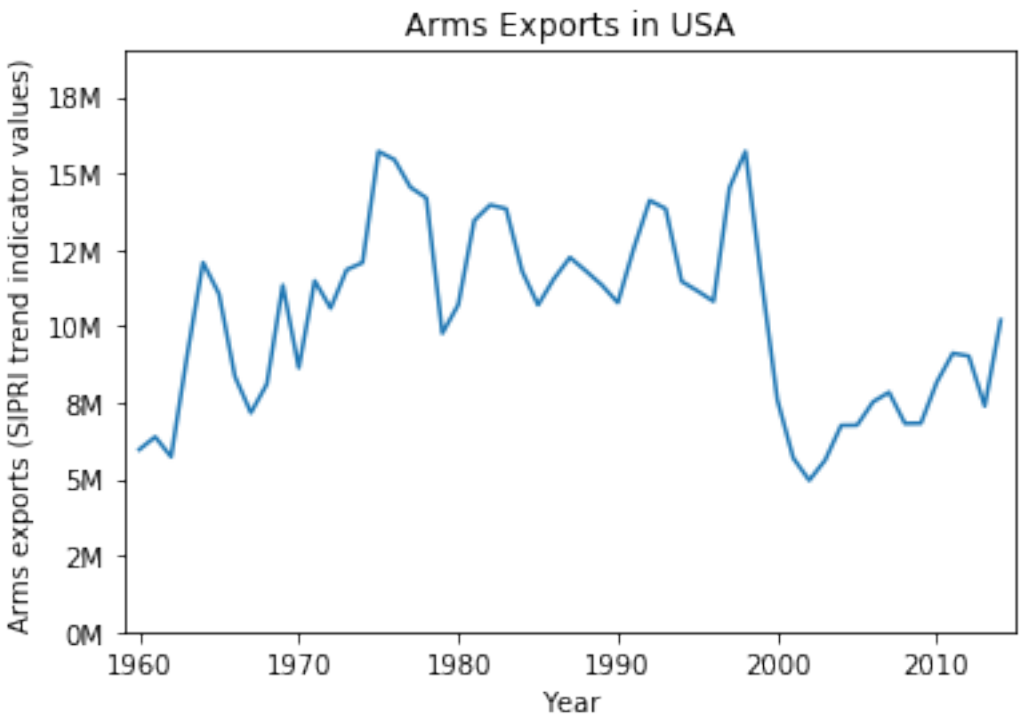
In [97]:
```
# get the years
years = usa_stage['Year'].values
# get the values
arms = usa_stage['Value'].values

# create
plt.bar(years,arms)
plt.title("USA Arms exports per Capita from 1960-2014")
plt.xlabel("Year")
plt.ylabel("USA Arms Export per Capita in millions")

# format the number output on the y-axis
ax = plt.gca()
ax.yaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.yaxis.set_major_formatter(formatter)

plt.show()
```



Notable years: 2002, 2013 There is an increase in global exports compared to USA

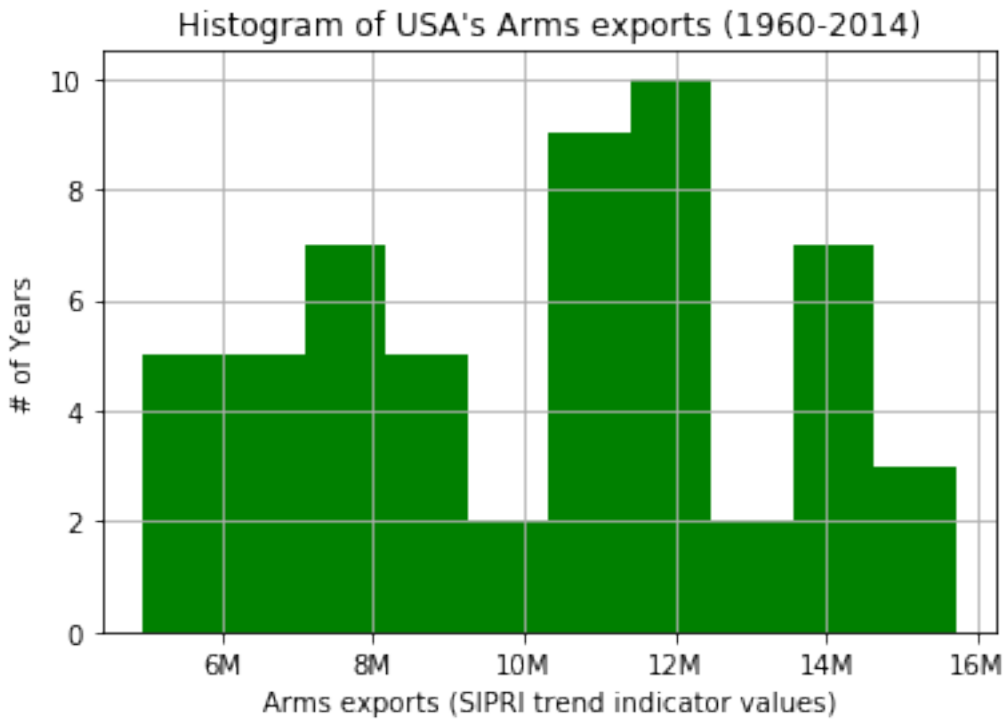
0.13 Line Graph of USA arms exports annual

In [30]:
```
# switch to a line plot
plt.plot(usa_stage['Year'].values, usa_stage['Value'].values)

# Label the axes
plt.xlabel('Year')
plt.ylabel(usa_stage['IndicatorName'].iloc[0])

#label the figure
plt.title('Arms Exports in USA')

# to make more honest, start the y axis at 0
plt.axis([1959, 2015, 0, 1.9e10])

ax = plt.gca()
ax.yaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.yaxis.set_major_formatter(formatter)

plt.show()
```



0.14 Histogram of Global and USA Arms exports annual

```
In [31]: hist_data = usa_stage['Value'].values
         plt.hist(usa_stage['Value'].values, 10, normed=False, facecolor='green')

         plt.xlabel(usa_stage['IndicatorName'].iloc[0])
         plt.ylabel('# of Years')
         plt.title("Histogram of USA's Arms exports (1960-2014)")

         ax = plt.gca()
         ax.xaxis.get_major_formatter().set_scientific(False)

         def millions(x, pos):
             'The two args are the value and tick position'
             return '{:.0f}M'.format(x*1e-9)

         formatter = FuncFormatter(millions)

         ax.xaxis.set_major_formatter(formatter)

         #plt.axis([10, 22, 0, 14])
         plt.grid(True)

         plt.show()
```



So the USA has many years where it exported between 10M-12M arms per capita with outliers on either side.

```
In [32]: print(hist_data)
```

```
[  5.96100000e+09   6.37600000e+09   5.72500000e+09   9.02900000e+09
   1.20770000e+10   1.10540000e+10   8.34900000e+09   7.16500000e+09
   8.10100000e+09   1.13340000e+10   8.63400000e+09   1.14780000e+10
   1.05850000e+10   1.18390000e+10   1.20740000e+10   1.57080000e+10
   1.54400000e+10   1.45370000e+10   1.41860000e+10   9.76400000e+09
   1.06970000e+10   1.34510000e+10   1.39600000e+10   1.38340000e+10
   1.17960000e+10   1.06890000e+10   1.15480000e+10   1.22430000e+10
   1.18010000e+10   1.13420000e+10   1.07620000e+10   1.25400000e+10
   1.41070000e+10   1.38360000e+10   1.14610000e+10   1.11460000e+10
   1.08080000e+10   1.45180000e+10   1.57080000e+10   1.15530000e+10
   7.59100000e+09   5.68200000e+09   4.95500000e+09   5.61800000e+09
   6.75200000e+09   6.75800000e+09   7.52100000e+09   7.83400000e+09
   6.81400000e+09   6.82200000e+09   8.16900000e+09   9.11100000e+09
   9.01800000e+09   7.38400000e+09   1.01940000e+10]
```

0.15 How does USA compare to other countries

```
In [120]: data = data.sort_values(by=['Year', 'Value'], ascending=False)
          data.head(10)
```

Out[120]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4918852	South Asia	SAS	Disbursements on external debt, long-term (DIS...	DT.DIS.DLXF.CD	2015	2.287139e+11
4914010	Pakistan	PAK	Disbursements on external debt, long-term (DIS...	DT.DIS.DLXF.CD	2015	2.111025e+11
4913622	South Asia	SAS	PPG, private creditors (DIS, current US$)	DT.DIS.PRVT.CD	2015	2.097367e+11
4913619	South Asia	SAS	PPG, commercial banks (DIS, current US$)	DT.DIS.PCBK.CD	2015	2.097213e+11
4913319	Pakistan	PAK	PPG, private creditors (DIS, current US$)	DT.DIS.PRVT.CD	2015	2.087984e+11
4913320	Pakistan	PAK	PPG, commercial banks (DIS, current US$)	DT.DIS.PCBK.CD	2015	2.087984e+11
4730595	Romania	ROM	Principal repayments on external debt, long-te...	DT.AMT.DLXF.CD	2015	2.014780e+10
4727366	Mexico	MEX	Principal repayments on external debt, long-te...	DT.AMT.DLXF.CD	2015	1.946834e+10
4724948	South Asia	SAS	PPG, official creditors (DIS, current US$)	DT.DIS.OFFT.CD	2015	1.897722e+10
4721109	Mexico	MEX	PPG, private creditors (AMT, current US$)	DT.AMT.PRVT.CD	2015	1.821751e+10

In [121]:
```
# select arms exports for all countries in 2011
hist_indicator = 'Arms exports \(SIPRI'
hist_year = 1990

mask1 = data['IndicatorName'].str.contains(hist_indicator)
mask2 = data['Year'].isin([hist_year])
mask3 = data['Year'].between(1973, 1981)
mask4 = data['Year'].between(1989, 1996)

# apply our mask
arms_1990 = data[mask1 & mask2]
arms_range1 = data[mask1 & mask3].head(20)
```

```
arms_range2 = data[mask1 & mask4].head(20)
arms_1990.head(5)
```

Out[121]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4670076	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.076200e+10
4465903	United Kingdom	GBR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.877000e+09
4462962	Germany	DEU	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.834000e+09
4453239	France	FRA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.698000e+09
4375760	China	CHN	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	9.410000e+08

In [122]: `arms_range1`

Out[122]:

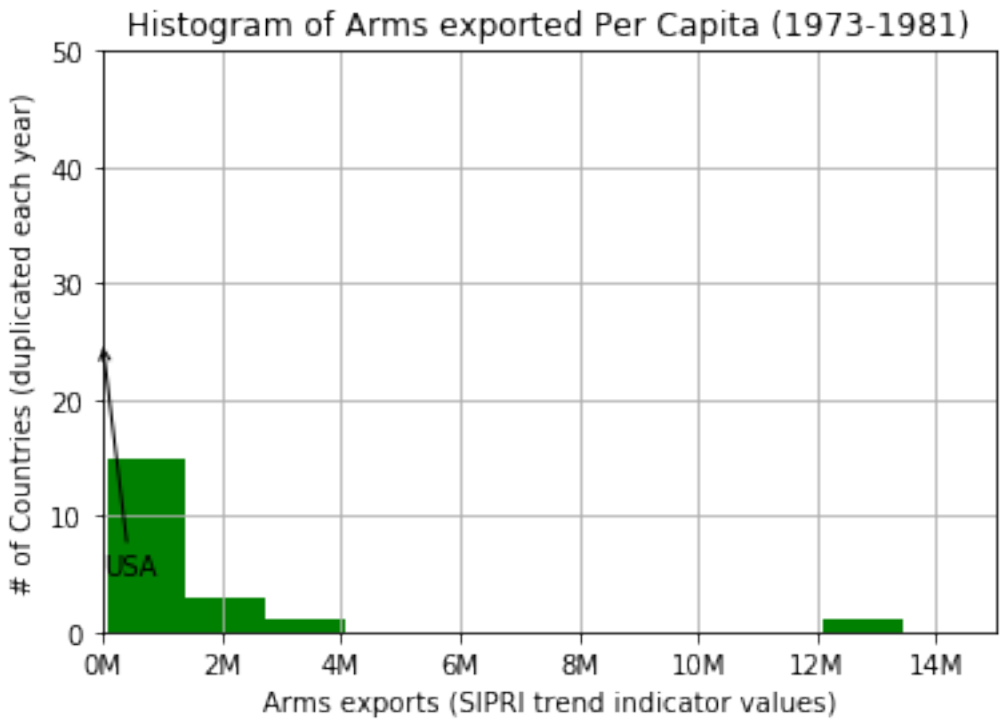
	CountryName	CountryCode
4692070	United States	USA
4553128	France	FRA
4496997	United Kingdom	GBR
4475814	Germany	DEU
4452661	Italy	ITA
4355588	Netherlands	NLD
4323869	China	CHN
4323240	Switzerland	CHE
4240877	Poland	POL
4211955	Norway	NOR
4178697	Israel	ISR
4178696	Arab World	ARB
4117226	Sweden	SWE
4109226	Korea, Rep.	KOR
4109194	Spain	ESP
4104846	Canada	CAN
4083097	Libya	LBY
4061197	Macedonia, FYR	MKD
4038655	Egypt, Arab Rep.	EGY
4031566	Austria	AUT

```
                                          IndicatorName   IndicatorCode  Year  \
4692070  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4553128  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4496997  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4475814  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4452661  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4355588  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4323869  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4323240  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4240877  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4211955  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4178697  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4178696  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4117226  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4109226  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4109194  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4104846  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4083097  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4061197  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4038655  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981
4031566  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1981

                Value
4692070  1.345100e+10
4553128  3.786000e+09
4496997  2.403000e+09
4475814  2.029000e+09
4452661  1.690000e+09
4355588  8.120000e+08
4323869  6.420000e+08
4323240  6.390000e+08
4240877  3.460000e+08
4211955  2.780000e+08
4178697  2.170000e+08
4178696  2.170000e+08
4117226  1.380000e+08
4109226  1.300000e+08
4109194  1.300000e+08
4104846  1.260000e+08
4083097  1.070000e+08
4061197  9.100000e+07
4038655  7.700000e+07
4031566  7.300000e+07
```

0.15.1 Histogram of Top 20 arms contributors from 1973-1981

In [113]:
```
# let's plot a histogram of the arms exported per capita by country
```

```
# subplots returns a touple with the figure, axis attributes.
fig, ax = plt.subplots()

ax.annotate("USA",
            xy=(20, 25), xycoords='data',
            xytext=(15, 5), textcoords='data',
            arrowprops=dict(arrowstyle="->",
                            connectionstyle="arc3"),
            )

plt.hist(arms_range1['Value'], 10, normed=False, facecolor='green')

plt.xlabel(arms_range1['IndicatorName'].iloc[0])
plt.ylabel('# of Countries (duplicated each year)')
plt.title('Histogram of Arms exported Per Capita (1973-1981)')

plt.axis([0, 1.5e10, 0, 50])
plt.grid(True)

ax = plt.gca()
ax.xaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.xaxis.set_major_formatter(formatter)


plt.show()
```




```
In [88]: arms_range2
```

Out[88]:

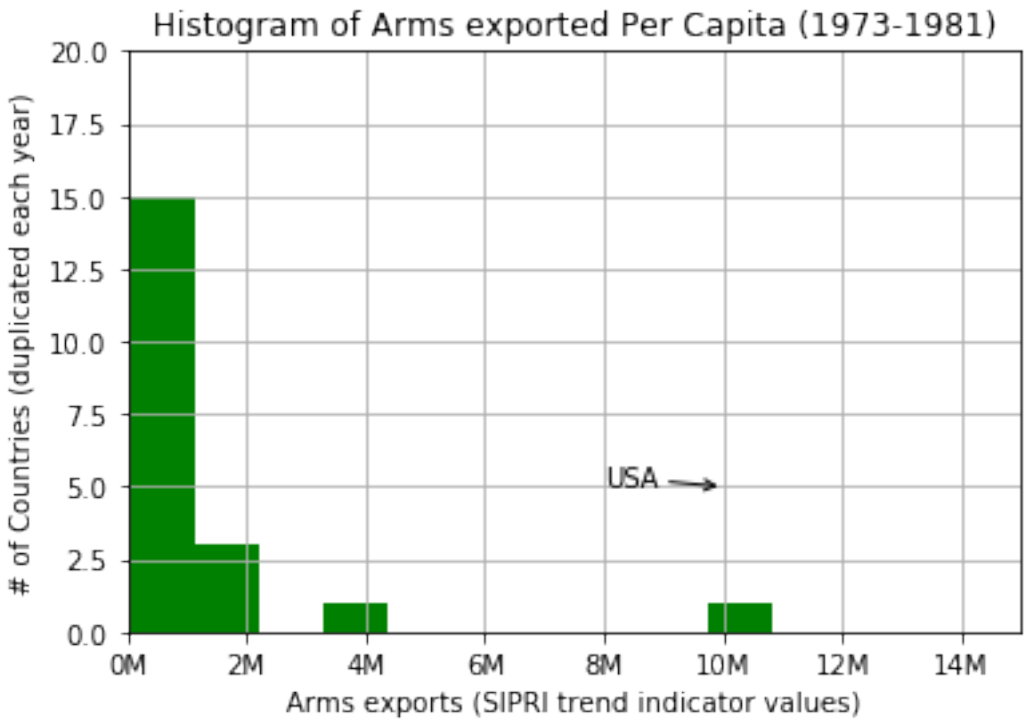
	CountryName	CountryCode
4696661	United States	USA
4694834	United States	USA
4685231	United States	USA
4676393	United States	USA
4675317	United States	USA
4673572	United States	USA
4670520	United States	USA
4670076	United States	USA
4556602	Russian Federation	RUS
4544913	Russian Federation	RUS
4544264	United Kingdom	GBR
4541527	Russian Federation	RUS
4513924	Germany	DEU
4507509	Russian Federation	RUS
4502729	Germany	DEU
4486259	France	FRA
4472323	Germany	DEU
4467214	France	FRA
4465903	United Kingdom	GBR
4462962	Germany	DEU

```
                                          IndicatorName   IndicatorCode  Year  \
4696661  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1992
4694834  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1993
4685231  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1991
4676393  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1994
4675317  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1989
4673572  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1995
4670520  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1996
4670076  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1990
4556602  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1995
4544913  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1996
4544264  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1989
4541527  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1993
4513924  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1994
4507509  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1992
4502729  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1991
4486259  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1989
4472323  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1996
4467214  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1996
4465903  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1990
4462962  Arms exports (SIPRI trend indicator values)  MS.MIL.XPRT.KD  1990

                Value
4696661  1.410700e+10
4694834  1.383600e+10
4685231  1.254000e+10
4676393  1.146100e+10
4675317  1.134200e+10
4673572  1.114600e+10
4670520  1.080800e+10
4670076  1.076200e+10
4556602  3.900000e+09
4544913  3.539000e+09
4544264  3.520000e+09
4541527  3.442000e+09
4513924  2.751000e+09
4507509  2.613000e+09
4502729  2.516000e+09
4486259  2.207000e+09
4472323  1.974000e+09
4467214  1.896000e+09
4465903  1.877000e+09
4462962  1.834000e+09
```

0.15.2 Histogram of Top 20 contributors from 1989-1996

In [119]: *# let's plot a histogram of the arms exported per capita by country*

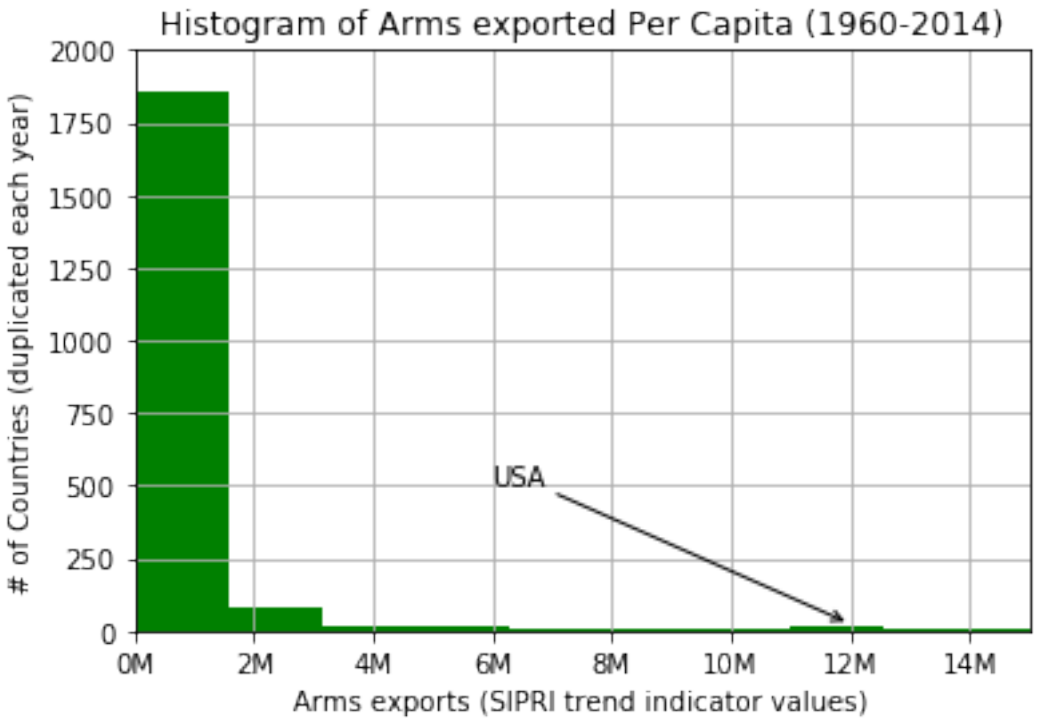
```
# subplots returns a touple with the figure, axis attributes.
fig, ax = plt.subplots()

ax.annotate("USA",
            xy=(10e9, 5), xycoords='data',
            xytext=(8e9, 5), textcoords='data',
            arrowprops=dict(arrowstyle="->",
                            connectionstyle="arc3"),
            )

plt.hist(arms_range2['Value'], 10, normed=False, facecolor='green')

plt.xlabel(arms_range2['IndicatorName'].iloc[0])
plt.ylabel('# of Countries (duplicated each year)')
plt.title('Histogram of Arms exported Per Capita (1973-1981)')

plt.axis([0, 1.5e10, 0, 20])
plt.grid(True)

ax = plt.gca()
ax.xaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.xaxis.set_major_formatter(formatter)


plt.show()
```



0.16 Histogram of arms exports per capita by country

In [52]:
```
# let's plot a histogram of the arms exported per capita by country

# subplots returns a touple with the figure, axis attributes.
fig, ax = plt.subplots()

ax.annotate("USA",
            xy=(12e9, 25), xycoords='data',
            xytext=(6e9, 500), textcoords='data',
            arrowprops=dict(arrowstyle="->",
                            connectionstyle="arc3"),
            )

plt.hist(arms_stage['Value'], 10, normed=False, facecolor='green')

plt.xlabel(arms_stage['IndicatorName'].iloc[0])
plt.ylabel('# of Countries (duplicated each year)')
plt.title('Histogram of Arms exported Per Capita (1960-2014)')

plt.axis([0, 1.5e10, 0, 2000])
plt.grid(True)
```

```
ax = plt.gca()
ax.xaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.xaxis.set_major_formatter(formatter)


plt.show()
```



In [34]: `print(len(arms_stage))`

2024

So the USA, at ~12M arms is an outlier, as most countries have 0-1M arms exported from 1960-2014

0.17 Relationship between Death rate and Arms Exports in the USA

In [50]:
```
# select GDP Per capita emissions for the United States
hist_indicator = 'Death rate, crude \(p'
hist_country = 'USA'

mask1 = data['IndicatorName'].str.contains(hist_indicator)
mask2 = data['CountryCode'].str.contains(hist_country)

# stage is just those indicators matching the USA for country code and CO2 emissions
#gdp_stage = data[mask1 & mask2]
gdp_stage = data[mask1]
usa_death = data[mask1 & mask2]

#plot gdp_stage vs stage
```

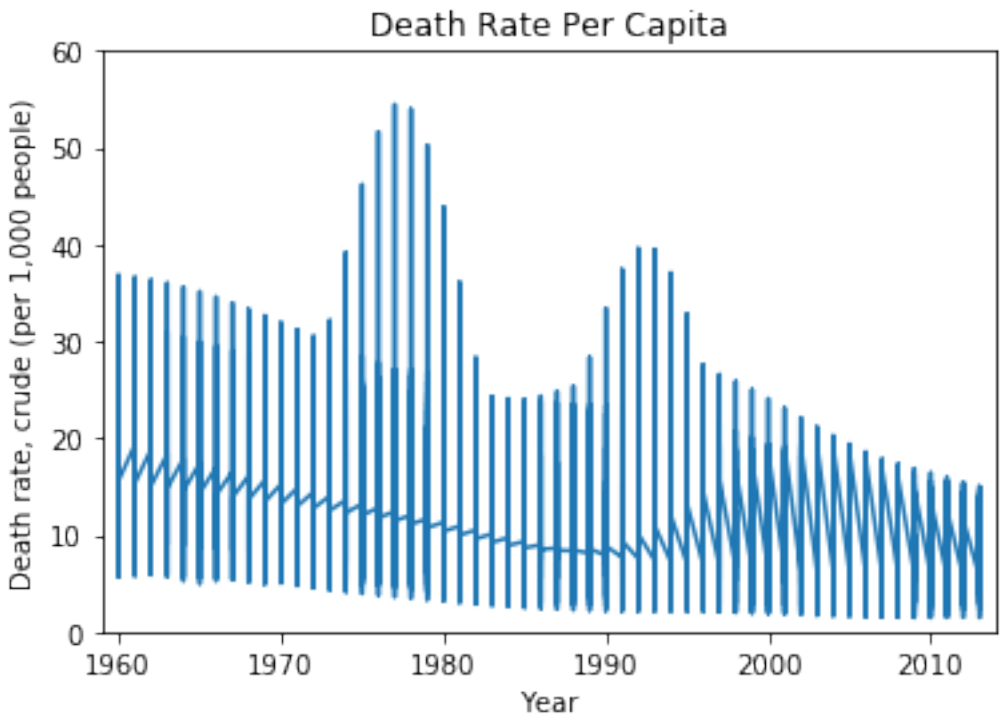
In [41]:
```
gdp_stage.head(2)
```

Out[41]:
```
               CountryName CountryCode                          IndicatorName  \
13              Arab World         ARB  Death rate, crude (per 1,000 people)
91  Caribbean small states         CSS  Death rate, crude (per 1,000 people)

     IndicatorCode  Year      Value
13  SP.DYN.CDRT.IN  1960  19.754452
91  SP.DYN.CDRT.IN  1960   9.813167
```

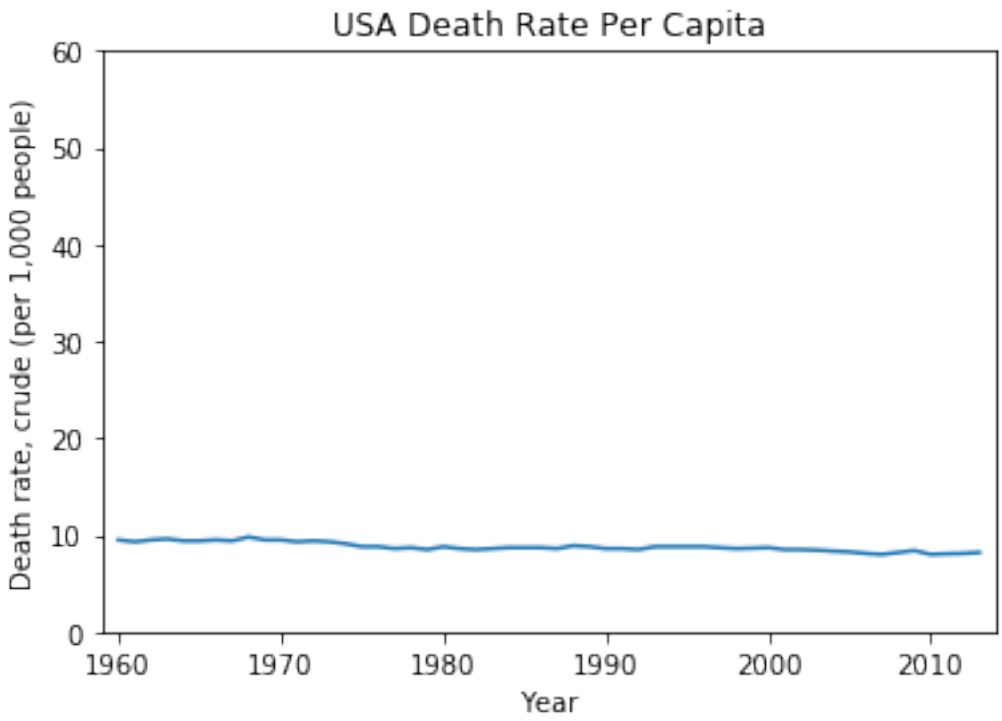
In [42]:
```
usa_stage.head(2)
```

Out[42]:
```
          CountryName CountryCode                                  IndicatorName  \
19360  United States         USA  Arms exports (SIPRI trend indicator values)
42551  United States         USA  Arms exports (SIPRI trend indicator values)

        IndicatorCode  Year         Value
19360  MS.MIL.XPRT.KD  1960  5.961000e+09
42551  MS.MIL.XPRT.KD  1961  6.376000e+09
```

In [71]:
```
# switch to a line plot
plt.plot(gdp_stage['Year'].values, gdp_stage['Value'].values)

# Label the axes
plt.xlabel('Year')
plt.ylabel(gdp_stage['IndicatorName'].iloc[0])

#label the figure
plt.title('Death Rate Per Capita')

# to make more honest, start they y axis at 0
plt.axis([1959, 2014,0,60])

plt.show()
```




```
In [72]: # switch to a line plot
         plt.plot(usa_death['Year'].values, usa_death['Value'].values)

         # Label the axes
         plt.xlabel('Year')
         plt.ylabel(usa_death['IndicatorName'].iloc[0])

         #label the figure
         plt.title('USA Death Rate Per Capita')

         # to make more honest, start they y axis at 0
         plt.axis([1959, 2014,0,60])

         plt.show()
```


USA Death Rate Per Capita
Death rate, crude (per 1,000 people)
60
50
40
30
20
10
0
1960
1970
1980
1990
2000
2010
Year

In [ ]: