RS Budget Analysis

December 5, 2019

1 Budget Analysis Plotting

[1]:
```
import numpy
import pandas as pd
import matplotlib.pyplot as plt
from tabula import read_pdf
```

[ ]:
```
# WANT: Two dataframes for actual and adopted columns.

# NOTE:
# - Each dataframe will have the year as the index [first column]
# and the name of the department as the identifier [top row].

# INDEX: Year
# IDENTIFIER: Name of Department (Actual/Adopted)
```

[ ]:
```
# TWO WAYS TO EXTRACT DATA:

# 1) Extract from pdf using some sort of combination of code.
# This will be helpful, if we want to repeatedly do so.

# LINK1: https://blog.chezo.uno/
 ↪tabula-py-extract-table-from-pdf-into-python-dataframe-6c7acfa5f302
# LINK2: https://github.com/chezou/tabula-py#get-tabula-py-working-windows-10

# 2) Manually input numbers into dataframe.
```

[ ]:
```
# FIRST WAY:
# Problem with using pdf file because of Java.

# MAYBE, let us see if we can copy info from pdf file into another pdf file.
# We only want that page.
# Here, we can copy information and create an excel spreadsheet that contains␣
 ↪our information.
```

[61]:
```
#"/home/james/Desktop/RS_Budget_Analysis.pdf"
```

[41]:
```
# OPTION 1:

#df_budget_analysis = read_pdf(
#    "/home/james/RAVATA SOLUTIONS/RS Budget Analysis/RS_Budget_Analysis.pdf")
#df_budget_analysis
```

[ ]:
```
# ValueError:
# /home/james/RAVATA SOLUTIONS/RS Budget Analysis/
 ↪03-Budget-Summary-Adopted-19-20 (1).pdf is empty.
# Check the file, or download it manually.
```

[5]:
```
# Create a vector for x-axis.

year =␣
 ↪["2010-2011","2011-2012","2012-2013","2013-2014","2014-2015","2015-2016","2016-2017","2017-

year
```

[5]:
```
['2010-2011',
 '2011-2012',
 '2012-2013',
 '2013-2014',
 '2014-2015',
 '2015-2016',
 '2016-2017',
 '2017-2018',
 '2018-2019',
 '2019-2020']
```

[2]:
```
# Create the two essential dataframes:

df_rs_budget_actual_xlsx = pd.read_excel("/home/james/RAVATA SOLUTIONS/RS␣
 ↪Budget Analysis/RS_Budget_Analysis_Actual.xlsx")
df_rs_budget_actual_xlsx = df_rs_budget_actual_xlsx.set_index("FY Year Actual")
df_rs_budget_actual_xlsx
```

[2]:

FY Year Actual	City Attorney	City Council	City Manager's Office	\
2010-2011	374959.0	161531.0	11554579.0	
2011-2012	479555.0	146932.0	11154418.0	
2012-2013	334547.0	150439.0	4173096.0	
2013-2014	581203.0	124507.0	4346174.0	
2014-2015	538458.0	168389.0	3935800.0	
2015-2016	439639.0	162094.0	4172989.0	
2016-2017	718999.0	187422.0	4753745.0	
2017-2018	682633.0	188777.0	5954378.0	
2018-2019	NaN	NaN	NaN	
2019-2020	NaN	NaN	NaN	

FY Year Actual	Administrative Services	Community Development & Sustainability	Parks & Community Services	Fire	Police	Public Works	Capital Improvements	Debt Service
2010-2011	25272689.0	3344607.0	NaN	8985464.0	14846094.0	40119804.0	10026651.0	10057775.0
2011-2012	24300874.0	3398020.0	NaN	9457327.0	15273212.0	40654384.0	11993613.0	12267671.0
2012-2013	16859315.0	3572266.0	15870729.0	10239420.0	15847268.0	35970661.0	16711266.0	5157737.0
2013-2014	18861312.0	3829249.0	14669687.0	10095292.0	16754297.0	46470044.0	29164596.0	3710709.0
2014-2015	18985420.0	5673144.0	16452077.0	11103303.0	17501908.0	39054636.0	52809377.0	5982705.0
2015-2016	19295876.0	6003727.0	12644833.0	10891261.0	18493702.0	38724852.0	44882322.0	17194043.0
2016-2017	22721507.0	6228146.0	12287180.0	11298141.0	19423228.0			
2017-2018	22133658.0	6973143.0	14407831.0	12129791.0	21322087.0			
2018-2019	NaN	NaN	NaN	NaN	NaN			
2019-2020	NaN	NaN	NaN	NaN	NaN			

```
2016-2017         50064556.0            50265141.0    19681218.0
2017-2018         47505612.0            37516985.0    19781672.0
2018-2019                NaN                   NaN           NaN
2019-2020                NaN                   NaN           NaN

                Davis Redev. Agency/RDA Successor Agency  Non Departmental
FY Year Actual
2010-2011                                      8706217.0               NaN
2011-2012                                      1030318.0               NaN
2012-2013                                      6116702.0               NaN
2013-2014                                     20218833.0               NaN
2014-2015                                      3681329.0         2902811.0
2015-2016                                      9195055.0               NaN
2016-2017                                      3572437.0         3044202.0
2017-2018                                      6899893.0          109548.0
2018-2019                                            NaN               NaN
2019-2020                                            NaN               NaN
```

[3]:
```
df_rs_budget_adopted_xlsx = pd.read_excel("/home/james/RAVATA SOLUTIONS/RS␣
 ↪Budget Analysis/RS_Budget_Analysis_Adopted.xlsx")
df_rs_budget_adopted_xlsx = df_rs_budget_adopted_xlsx.set_index("FY Year␣
 ↪Adopted (Budget/Proposed)")
df_rs_budget_adopted_xlsx
```

[3]:
```
                                   City Attorney  City Council  \
FY Year Adopted (Budget/Proposed)
2010-2011                                 512967        137229
2011-2012                                 504558        168446
2012-2013                                 512967        172559
2013-2014                                 512967        137290
2014-2015                                 512967        167135
2015-2016                                 512967        170299
2016-2017                                 512967        167275
2017-2018                                 512967        213838
2018-2019                                 512967        248585
2019-2020                                 320217        239105

                                   City Manager's Office  \
FY Year Adopted (Budget/Proposed)
2010-2011                                      11426412
2011-2012                                      16272551
2012-2013                                       3605661
2013-2014                                       4209654
2014-2015                                       4522280
2015-2016                                       5173744
2016-2017                                       5115574
2017-2018                                       5586929
2018-2019                                       5896894
```

2019-2020	6724988

FY Year Adopted (Budget/Proposed)	Administrative Services
2010-2011	NaN
2011-2012	NaN
2012-2013	28601609.0
2013-2014	30209684.0
2014-2015	19781209.0
2015-2016	20270540.0
2016-2017	22512847.0
2017-2018	23126805.0
2018-2019	23351074.0
2019-2020	24040809.0

FY Year Adopted (Budget/Proposed)	Community Development & Sustainability
2010-2011	3201097
2011-2012	3339362
2012-2013	3419888
2013-2014	3822230
2014-2015	4394172
2015-2016	4386667
2016-2017	4992622
2017-2018	6268460
2018-2019	6122439
2019-2020	7311694

FY Year Adopted (Budget/Proposed)	Parks & Community Services	Fire
2010-2011	25451333.0	9562413
2011-2012	30609941.0	9365237
2012-2013	NaN	9464285
2013-2014	NaN	10147788
2014-2015	17787308.0	10116694
2015-2016	13194266.0	10689904
2016-2017	13520361.0	10643954
2017-2018	14798021.0	10939556
2018-2019	14366636.0	12311501
2019-2020	14765258.0	13075582

FY Year Adopted (Budget/Proposed)	Police	Public Works
2010-2011	14686200	34142910
2011-2012	15018857	36534426
2012-2013	15429193	46801345
2013-2014	16357725	47150169

```
2014-2015                          17308881      41440615
2015-2016                          17921131      42974079
2016-2017                          19018081      49745316
2017-2018                          20578192      52827759
2018-2019                          21187378      53789648
2019-2020                          21777592      55513036

                                   Capital Improvements  Debt Service  \
FY Year Adopted (Budget/Proposed)
2010-2011                                       8870632       8086418
2011-2012                                      40073897       9829286
2012-2013                                      27433891       8615203
2013-2014                                     127562239       8413452
2014-2015                                     134559503       6442588
2015-2016                                     179874278       6152714
2016-2017                                      59384543       7310674
2017-2018                                      45227220       7236698
2018-2019                                      31021491      10541777
2019-2020                                      66004791      23223340

                                   Davis Redev. Agency/RDA Successor Agency  \
FY Year Adopted (Budget/Proposed)
2010-2011                                                           4977392
2011-2012                                                           8706217
2012-2013                                                           2172787
2013-2014                                                            897780
2014-2015                                                           3721076
2015-2016                                                           3757689
2016-2017                                                           3686196
2017-2018                                                           3672100
2018-2019                                                           3672246
2019-2020                                                           3667231

                                   Non Departmental
FY Year Adopted (Budget/Proposed)
2010-2011                                       NaN
2011-2012                                       NaN
2012-2013                                       NaN
2013-2014                                       NaN
2014-2015                                   30000.0
2015-2016                                 3315979.0
2016-2017                                 3140000.0
2017-2018                                       NaN
2018-2019                                 2402761.0
2019-2020                                 2202761.0
```

[40]:
```
df_rs_budget_actual_xlsx["Capital Improvements"]
```

[40]:
```
FY Year Actual
2010-2011    10026651.0
2011-2012    11993613.0
2012-2013    16711266.0
2013-2014    29164596.0
2014-2015    52809377.0
2015-2016    44882322.0
2016-2017    50265141.0
2017-2018    37516985.0
2018-2019           NaN
2019-2020           NaN
Name: Capital Improvements, dtype: float64
```

[41]:
```
# Take only the "Capital Improv." column of each.

df_rs_budget_actual_xlsx["Capital Improvements"]

df_capt_actual = df_rs_budget_actual_xlsx["Capital Improvements"].
 ↪reset_index(drop=True)

df_capt_actual = df_capt_actual.to_frame()

df_capt_actual["Year"] = year

df_capt_actual = df_capt_actual.set_index("Year")

df_capt_actual
```

[41]:
```
           Capital Improvements
Year
2010-2011            10026651.0
2011-2012            11993613.0
2012-2013            16711266.0
2013-2014            29164596.0
2014-2015            52809377.0
2015-2016            44882322.0
2016-2017            50265141.0
2017-2018            37516985.0
2018-2019                   NaN
2019-2020                   NaN
```

[7]:
```
df_rs_budget_adopted_xlsx["Capital Improvements"]

df_capt_adopted = df_rs_budget_adopted_xlsx["Capital Improvements"].
 ↪reset_index(drop=True)

df_capt_adopted = df_capt_adopted.to_frame()
```

```
df_capt_adopted["Year"] = year

df_capt_adopted = df_capt_adopted.set_index("Year")

df_capt_adopted
```

[7]:

Year	Capital Improvements
2010-2011	8870632
2011-2012	40073897
2012-2013	27433891
2013-2014	127562239
2014-2015	134559503
2015-2016	179874278
2016-2017	59384543
2017-2018	45227220
2018-2019	31021491
2019-2020	66004791

2 Merge and rename columns:

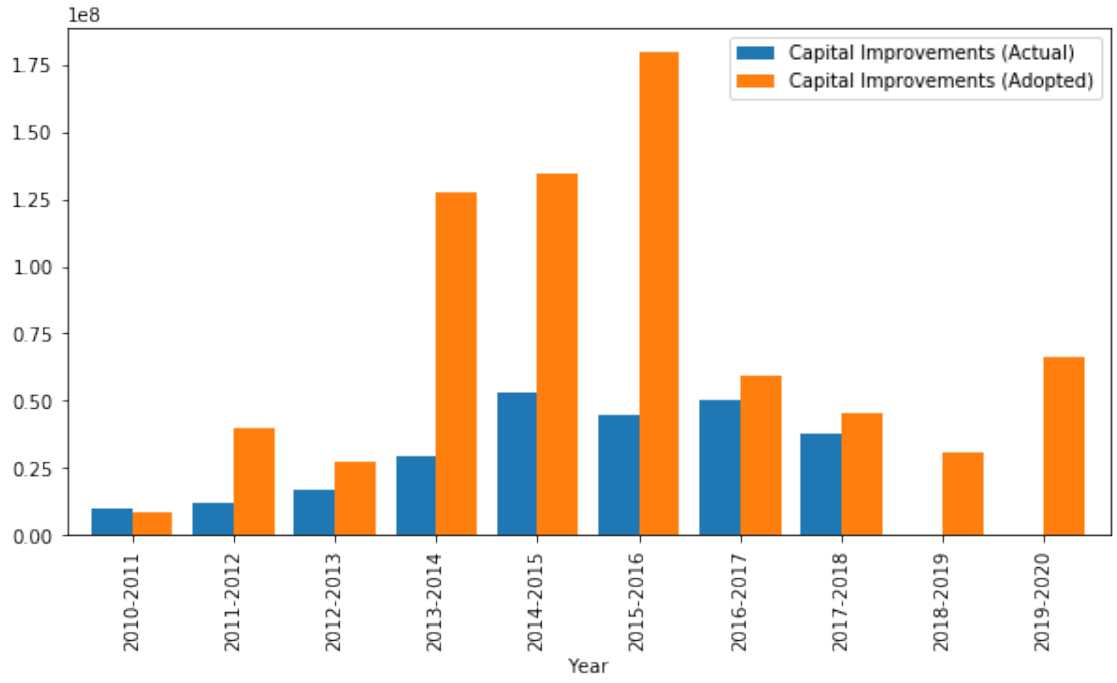
[8]:
```
df_capt_actual_adopted = pd.merge(df_capt_actual, df_capt_adopted, on = "Year",␣
↪how = "right")

df_capt_actual_adopted = df_capt_actual_adopted.rename(columns={"Capital␣
↪Improvements_x": "Capital Improvements (Actual)",
                                    "Capital Improvements_y": "Capital␣
↪Improvements (Adopted)"})

df_capt_actual_adopted
```

[8]:

Year	Capital Improvements (Actual)	Capital Improvements (Adopted)
2010-2011	10026651.0	8870632
2011-2012	11993613.0	40073897
2012-2013	16711266.0	27433891
2013-2014	29164596.0	127562239
2014-2015	52809377.0	134559503
2015-2016	44882322.0	179874278
2016-2017	50265141.0	59384543
2017-2018	37516985.0	45227220
2018-2019	NaN	31021491
2019-2020	NaN	66004791

[9]:
```
capt_barplot = df_capt_actual_adopted.plot.bar(width = 0.8, figsize=(10,5))
capt_barplot
```

[9]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8589a56f98>
```

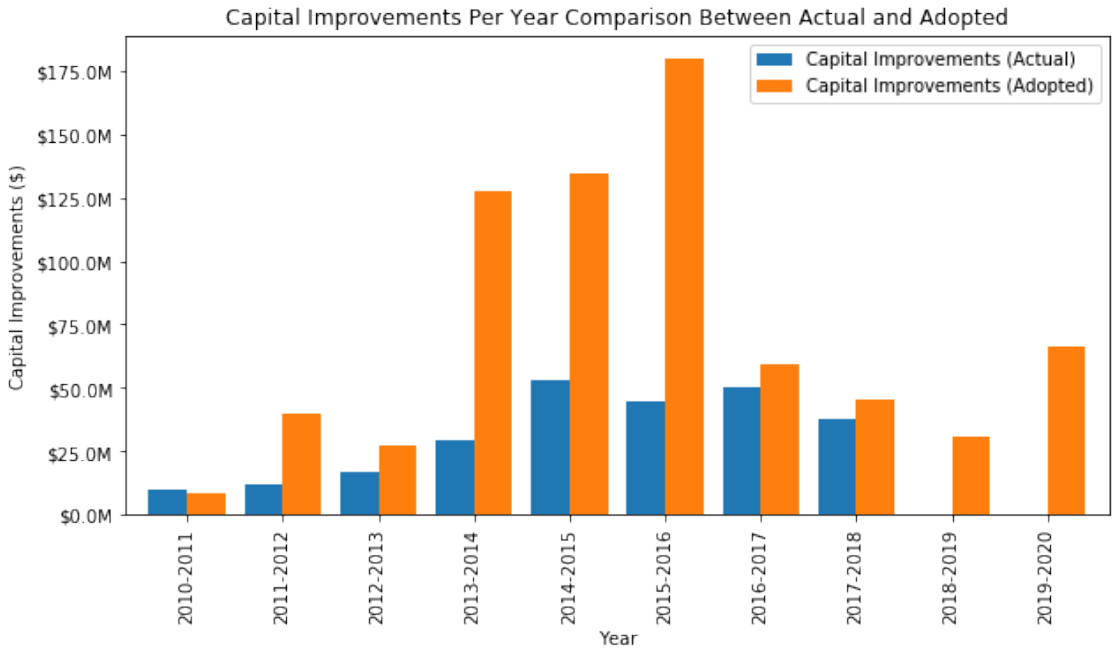


[26]:
```
# Change y-axis tickers:

from matplotlib.ticker import FuncFormatter

def millions(x, pos):
    'The two args are the value and tick position'
    return '$%1.1fM' % (x * 1e-6)

formatter = FuncFormatter(millions)

# Alter for object:
ax.yaxis.set_major_formatter(formatter)
```

[ ]:
```

```

[29]:
```
# Create plot figure:
plot = df_capt_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
                            width = 0.8,
                            y = ['Capital Improvements (Actual)','Capital␣
 ↪Improvements (Adopted)'])

# Y-label, Title and Scale change:
plt.ylabel("Capital Improvements ($)")
```

```
plt.title("Capital Improvements Per Year Comparison Between Actual and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



3 Repeat steps from columns inside dataframe

[49]:
```
# Maybe, let's try to create a function to repeat the steps for all columns:
```

[55]:
```
def df_year_before_merge(df):
    """
    FUNCTION CAN BE USED FOR ACTUAL/ADOPTED Dataframes.
    INSERT INSIDE df:
    df_rs_budget_actual_xlsx["Capital Improvements"],
    df_rs_budget_adopted_xlsx["Capital Improvements"], etc.
    """
    df_year_before_merge = df.reset_index(drop=True)
    df_year_before_merge = df_year_before_merge.to_frame()
    df_year_before_merge["Year"] = year
    df_year_before_merge = df_year_before_merge.set_index("Year")
    return df_year_before_merge
```

[56]:
```
# Function applied to actual:
df_year_before_merge(df_rs_budget_actual_xlsx["Capital Improvements"])
```

[56]:

Year	Capital Improvements
2010-2011	10026651.0
2011-2012	11993613.0
2012-2013	16711266.0
2013-2014	29164596.0
2014-2015	52809377.0
2015-2016	44882322.0
2016-2017	50265141.0
2017-2018	37516985.0
2018-2019	NaN
2019-2020	NaN

[57]:
```
# Function applied to adopted:
df_year_before_merge(df_rs_budget_adopted_xlsx["Capital Improvements"])
```

[57]:

Year	Capital Improvements
2010-2011	8870632
2011-2012	40073897
2012-2013	27433891
2013-2014	127562239
2014-2015	134559503
2015-2016	179874278
2016-2017	59384543
2017-2018	45227220
2018-2019	31021491
2019-2020	66004791

4 MANUALLY, Change column names as needed.

5 Now, start creating plots, beginning from City Attorney.

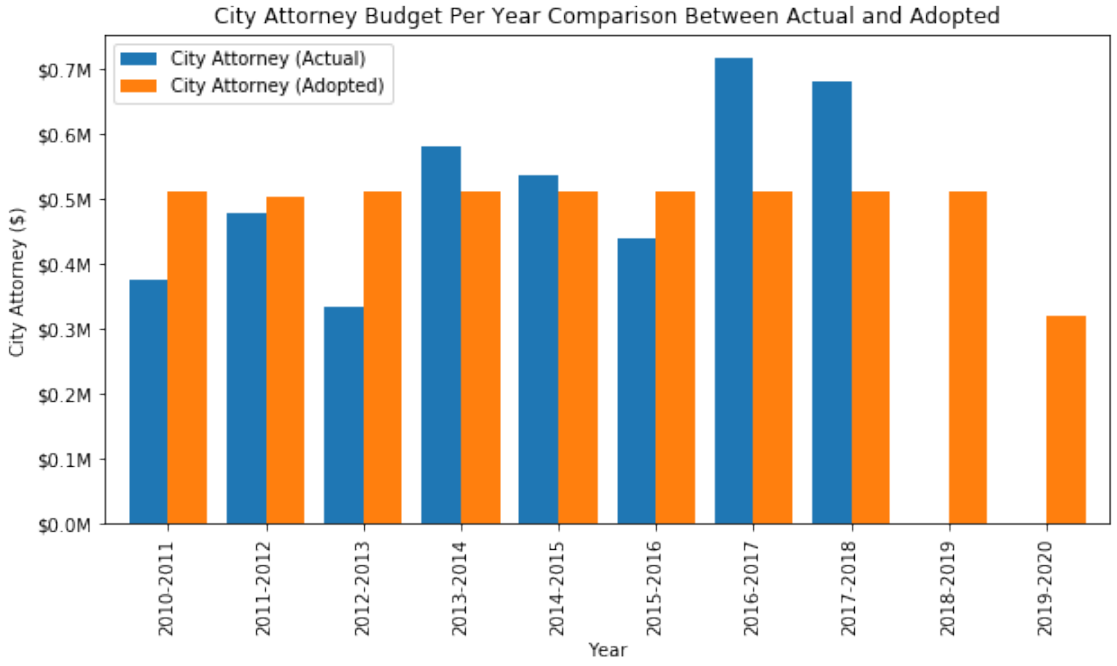
[59]:
```
# City Attorney:
df_cityAtt_actual = df_year_before_merge(df_rs_budget_actual_xlsx["City␣
 ↪Attorney"])
df_cityAtt_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["City␣
 ↪Attorney"])

df_cityAtt_actual_adopted = pd.merge(df_cityAtt_actual, df_cityAtt_adopted, on␣
 ↪= "Year", how = "right")
df_cityAtt_actual_adopted
```

[59]:
```
           City Attorney_x  City Attorney_y
Year
2010-2011         374959.0           512967
2011-2012         479555.0           504558
2012-2013         334547.0           512967
2013-2014         581203.0           512967
2014-2015         538458.0           512967
2015-2016         439639.0           512967
2016-2017         718999.0           512967
2017-2018         682633.0           512967
2018-2019              NaN           512967
2019-2020              NaN           320217
```

[61]:
```
df_cityAtt_actual_adopted = df_cityAtt_actual_adopted.rename(columns={"City␣
 ↪Attorney_x": "City Attorney (Actual)",
                                        "City Attorney_y": "City Attorney␣
 ↪(Adopted)"})
df_cityAtt_actual_adopted
```

[61]:
```
           City Attorney (Actual)  City Attorney (Adopted)
Year
2010-2011                374959.0                   512967
2011-2012                479555.0                   504558
2012-2013                334547.0                   512967
2013-2014                581203.0                   512967
2014-2015                538458.0                   512967
2015-2016                439639.0                   512967
2016-2017                718999.0                   512967
2017-2018                682633.0                   512967
2018-2019                     NaN                   512967
2019-2020                     NaN                   320217
```

[62]:
```
# Create plot figure:
plot = df_cityAtt_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
                            width = 0.8,
                            y = ['City Attorney (Actual)','City Attorney␣
 ↪(Adopted)'])

# Y-label, Title and Scale change:
plt.ylabel("City Attorney ($)")
plt.title("City Attorney Budget Per Year Comparison Between Actual and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[67]:
```
# City Council:

df_cityCouncil_actual = df_year_before_merge(df_rs_budget_actual_xlsx["City␣
 ↪Council"])
df_cityCouncil_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["City␣
 ↪Council"])

df_cityCouncil_actual_adopted = pd.merge(df_cityCouncil_actual,␣
 ↪df_cityCouncil_adopted, on = "Year", how = "right")
df_cityCouncil_actual_adopted
```

[67]:

Year	City Council_x	City Council_y
2010-2011	161531.0	137229
2011-2012	146932.0	168446
2012-2013	150439.0	172559
2013-2014	124507.0	137290
2014-2015	168389.0	167135
2015-2016	162094.0	170299
2016-2017	187422.0	167275
2017-2018	188777.0	213838
2018-2019	NaN	248585
2019-2020	NaN	239105

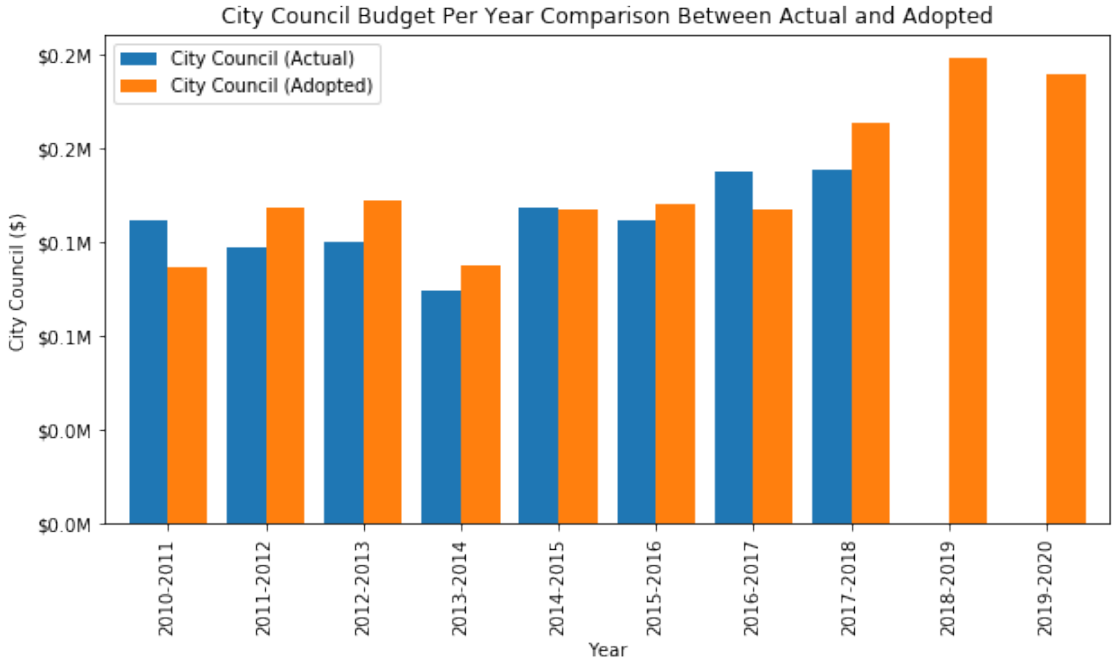
[68]:
```
df_cityCouncil_actual_adopted = df_cityCouncil_actual_adopted.
 ↪rename(columns={"City Council_x": "City Council (Actual)",
```

```
                                        "City Council_y": "City Council␣
 ↪(Adopted)"})
df_cityCouncil_actual_adopted
```

[68]:

Year	City Council (Actual)	City Council (Adopted)
2010-2011	161531.0	137229
2011-2012	146932.0	168446
2012-2013	150439.0	172559
2013-2014	124507.0	137290
2014-2015	168389.0	167135
2015-2016	162094.0	170299
2016-2017	187422.0	167275
2017-2018	188777.0	213838
2018-2019	NaN	248585
2019-2020	NaN	239105

[69]:
```
# Create plot figure:
plot = df_cityCouncil_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
                            width = 0.8,
                            y = ['City Council (Actual)','City Council␣
 ↪(Adopted)'])

# Y-label, Title and Scale change:
plt.ylabel("City Council ($)")
plt.title("City Council Budget Per Year Comparison Between Actual and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[72]:
```
# City Manager's Office:
df_cityManOffice_actual = df_year_before_merge(df_rs_budget_actual_xlsx["City␣
 ↪Manager's Office"])
df_cityManOffice_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["City␣
 ↪Manager's Office"])

df_cityManOffice_actual_adopted = pd.merge(df_cityManOffice_actual,␣
 ↪df_cityManOffice_adopted, on = "Year", how = "right")
df_cityManOffice_actual_adopted
```

[72]:

Year	City Manager's Office_x	City Manager's Office_y
2010-2011	11554579.0	11426412
2011-2012	11154418.0	16272551
2012-2013	4173096.0	3605661
2013-2014	4346174.0	4209654
2014-2015	3935800.0	4522280
2015-2016	4172989.0	5173744
2016-2017	4753745.0	5115574
2017-2018	5954378.0	5586929
2018-2019	NaN	5896894
2019-2020	NaN	6724988

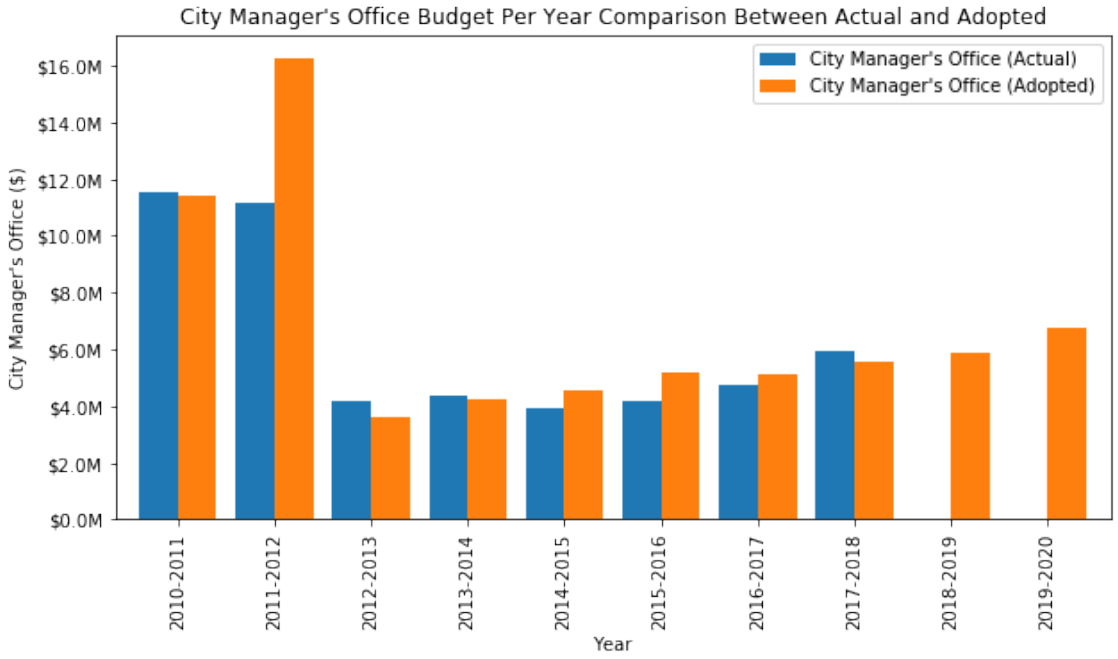
[73]:
```
df_cityManOffice_actual_adopted = df_cityManOffice_actual_adopted.rename(
    columns={"City Manager's Office_x": "City Manager's Office (Actual)",
    "City Manager's Office_y": "City Manager's Office (Adopted)"})
```

```
df_cityManOffice_actual_adopted
```

[73]:

Year	City Manager's Office (Actual)	City Manager's Office (Adopted)
2010-2011	11554579.0	11426412
2011-2012	11154418.0	16272551
2012-2013	4173096.0	3605661
2013-2014	4346174.0	4209654
2014-2015	3935800.0	4522280
2015-2016	4172989.0	5173744
2016-2017	4753745.0	5115574
2017-2018	5954378.0	5586929
2018-2019	NaN	5896894
2019-2020	NaN	6724988

[75]:
```
# Create plot figure:
plot = df_cityManOffice_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
                            width = 0.8,
                            y = ["City Manager's Office (Actual)","City␣
 ↪Manager's Office (Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("City Manager's Office ($)")
plt.title("City Manager's Office Budget Per Year Comparison Between Actual and␣
 ↪Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[78]:
```
# Administrative Services:
df_adminService_actual =␣
 ↪df_year_before_merge(df_rs_budget_actual_xlsx["Administrative Services"])
df_adminService_adopted =␣
 ↪df_year_before_merge(df_rs_budget_adopted_xlsx["Administrative Services"])

df_adminService_actual_adopted = pd.merge(df_adminService_actual,␣
 ↪df_adminService_adopted,
                                          on = "Year", how = "right")
df_adminService_actual_adopted
```

[78]:

Year	Administrative Services_x	Administrative Services_y
2010-2011	25272689.0	NaN
2011-2012	24300874.0	NaN
2012-2013	16859315.0	28601609.0
2013-2014	18861312.0	30209684.0
2014-2015	18985420.0	19781209.0
2015-2016	19295876.0	20270540.0
2016-2017	22721507.0	22512847.0
2017-2018	22133658.0	23126805.0
2018-2019	NaN	23351074.0
2019-2020	NaN	24040809.0

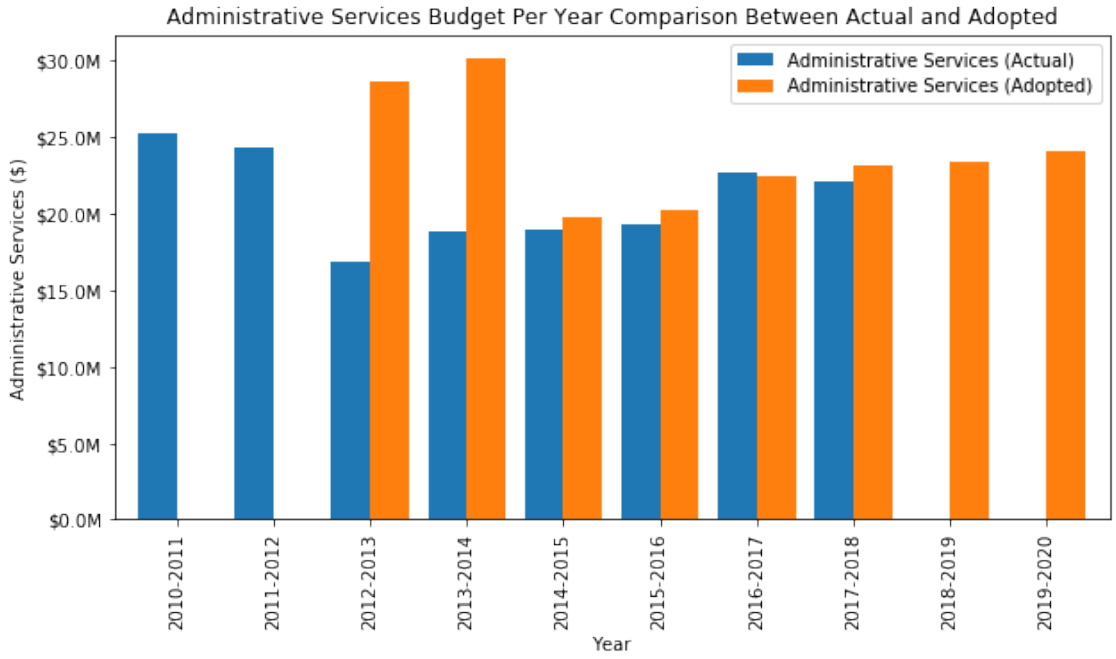
[79]:
```
df_adminService_actual_adopted = df_adminService_actual_adopted.rename(
    columns={"Administrative Services_x": "Administrative Services (Actual)",
    "Administrative Services_y": "Administrative Services (Adopted)"})
```

```
df_adminService_actual_adopted
```

[79]:

Year	Administrative Services (Actual)	Administrative Services (Adopted)
2010-2011	25272689.0	NaN
2011-2012	24300874.0	NaN
2012-2013	16859315.0	28601609.0
2013-2014	18861312.0	30209684.0
2014-2015	18985420.0	19781209.0
2015-2016	19295876.0	20270540.0
2016-2017	22721507.0	22512847.0
2017-2018	22133658.0	23126805.0
2018-2019	NaN	23351074.0
2019-2020	NaN	24040809.0

[80]:
```
# Create plot figure:
plot = df_adminService_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
                            width = 0.8,
                            y = ["Administrative Services␣
 ↪(Actual)","Administrative Services (Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Administrative Services ($)")
plt.title("Administrative Services Budget Per Year Comparison Between Actual␣
 ↪and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[81]:
```
# Community Development & Sustainability
df_commDevSust_actual =␣
 ↪df_year_before_merge(df_rs_budget_actual_xlsx["Community Development &␣
 ↪Sustainability"])
df_commDevSust_adopted =␣
 ↪df_year_before_merge(df_rs_budget_adopted_xlsx["Community Development &␣
 ↪Sustainability"])

df_commDevSust_actual_adopted = pd.merge(df_commDevSust_actual,␣
 ↪df_commDevSust_adopted,
                                         on = "Year", how = "right")
df_commDevSust_actual_adopted
```

[81]:

Year	Community Development & Sustainability_x
2010-2011	3344607.0
2011-2012	3398020.0
2012-2013	3572266.0
2013-2014	3829249.0
2014-2015	5673144.0
2015-2016	6003727.0
2016-2017	6228146.0
2017-2018	6973143.0
2018-2019	NaN
2019-2020	NaN

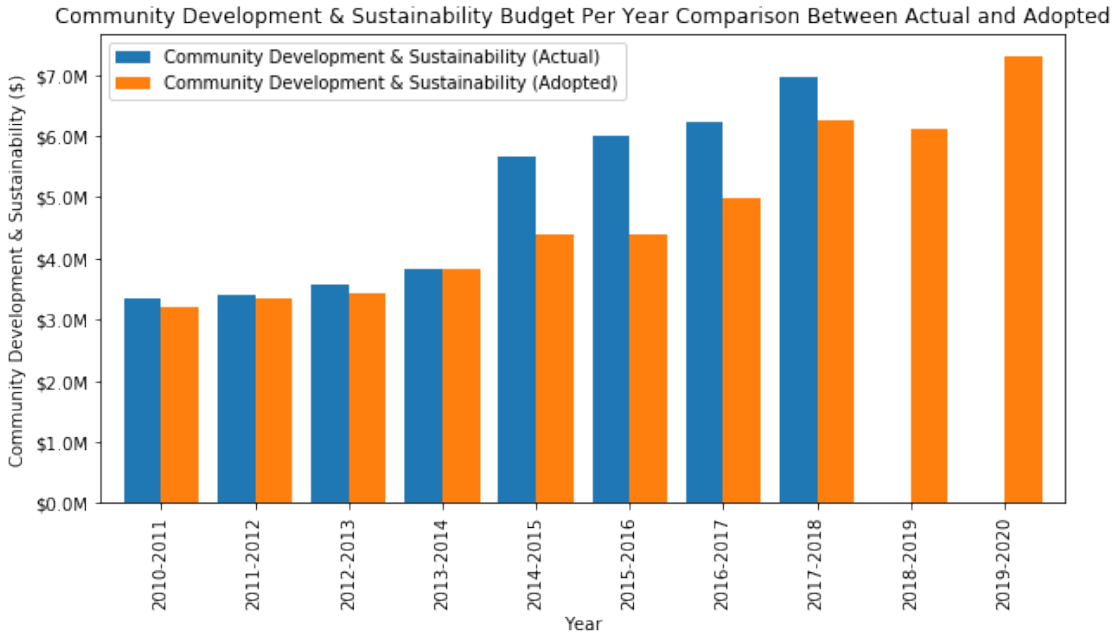
```
            Community Development & Sustainability_y
Year
2010-2011                                   3201097
2011-2012                                   3339362
2012-2013                                   3419888
2013-2014                                   3822230
2014-2015                                   4394172
2015-2016                                   4386667
2016-2017                                   4992622
2017-2018                                   6268460
2018-2019                                   6122439
2019-2020                                   7311694
```

[82]:
```
df_commDevSust_actual_adopted = df_commDevSust_actual_adopted.rename(
    columns={"Community Development & Sustainability_x": "Community Development␣
 ↪& Sustainability (Actual)",
    "Community Development & Sustainability_y": "Community Development &␣
 ↪Sustainability (Adopted)"})
df_commDevSust_actual_adopted
```

[82]:
```
            Community Development & Sustainability (Actual)  \
Year
2010-2011                                        3344607.0
2011-2012                                        3398020.0
2012-2013                                        3572266.0
2013-2014                                        3829249.0
2014-2015                                        5673144.0
2015-2016                                        6003727.0
2016-2017                                        6228146.0
2017-2018                                        6973143.0
2018-2019                                              NaN
2019-2020                                              NaN

            Community Development & Sustainability (Adopted)
Year
2010-2011                                          3201097
2011-2012                                          3339362
2012-2013                                          3419888
2013-2014                                          3822230
2014-2015                                          4394172
2015-2016                                          4386667
2016-2017                                          4992622
2017-2018                                          6268460
2018-2019                                          6122439
2019-2020                                          7311694
```

[83]:
```
# Create plot figure:
plot = df_commDevSust_actual_adopted.plot(kind='bar',
```

```
                              figsize=(10,5),
                              width = 0.8,
                              y = ["Community Development & Sustainability␣
 ↪(Actual)","Community Development & Sustainability (Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Community Development & Sustainability ($)")
plt.title("Community Development & Sustainability Budget Per Year Comparison␣
 ↪Between Actual and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[87]:
```
# Parks & Community Services
df_parks_CS_actual = df_year_before_merge(df_rs_budget_actual_xlsx["Parks &␣
 ↪Community Services"])
df_parks_CS_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["Parks &␣
 ↪Community Services"])

df_parks_CS_actual_adopted = pd.merge(df_parks_CS_actual, df_parks_CS_adopted,
                                      on = "Year", how = "right")
df_parks_CS_actual_adopted
```

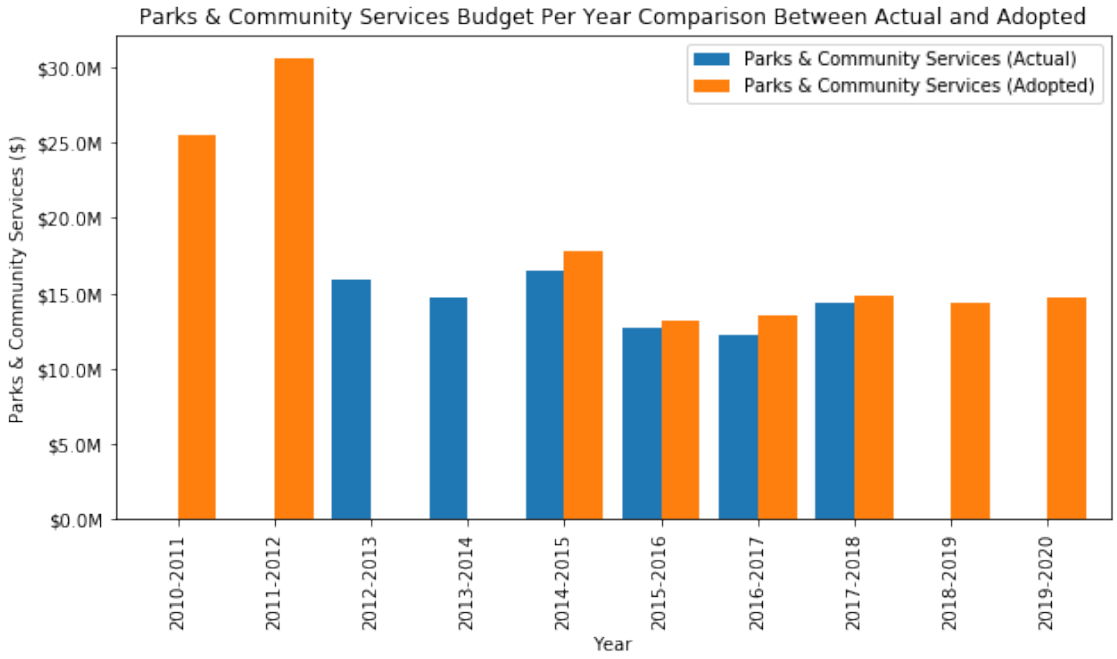
[87]:
```
           Parks & Community Services_x  Parks & Community Services_y
Year
2010-2011                           NaN                    25451333.0
2011-2012                           NaN                    30609941.0
2012-2013                   15870729.0                           NaN
2013-2014                   14669687.0                           NaN
2014-2015                   16452077.0                    17787308.0
2015-2016                   12644833.0                    13194266.0
2016-2017                   12287180.0                    13520361.0
2017-2018                   14407831.0                    14798021.0
2018-2019                           NaN                    14366636.0
2019-2020                           NaN                    14765258.0
```

[88]:
```
df_parks_CS_actual_adopted = df_parks_CS_actual_adopted.rename(
    columns={"Parks & Community Services_x": "Parks & Community Services␣
 ↪(Actual)",
    "Parks & Community Services_y": "Parks & Community Services (Adopted)"})
df_parks_CS_actual_adopted
```

[88]:
```
           Parks & Community Services (Actual)  \
Year
2010-2011                                  NaN
2011-2012                                  NaN
2012-2013                          15870729.0
2013-2014                          14669687.0
2014-2015                          16452077.0
2015-2016                          12644833.0
2016-2017                          12287180.0
2017-2018                          14407831.0
2018-2019                                 NaN
2019-2020                                 NaN

           Parks & Community Services (Adopted)
Year
2010-2011                           25451333.0
2011-2012                           30609941.0
2012-2013                                  NaN
2013-2014                                  NaN
2014-2015                           17787308.0
2015-2016                           13194266.0
2016-2017                           13520361.0
2017-2018                           14798021.0
2018-2019                           14366636.0
2019-2020                           14765258.0
```

[89]:
```
# Create plot figure:
plot = df_parks_CS_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
```

```
                              width = 0.8,
                              y = ["Parks & Community Services (Actual)","Parks &␣
 ↪Community Services (Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Parks & Community Services ($)")
plt.title("Parks & Community Services Budget Per Year Comparison Between Actual␣
 ↪and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[90]:
```
# Fire
df_fire_actual = df_year_before_merge(df_rs_budget_actual_xlsx["Fire"])
df_fire_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["Fire"])

df_fire_actual_adopted = pd.merge(df_fire_actual, df_fire_adopted,
                                  on = "Year", how = "right")
df_fire_actual_adopted
```

[90]:

Year	Fire_x	Fire_y
2010-2011	8985464.0	9562413

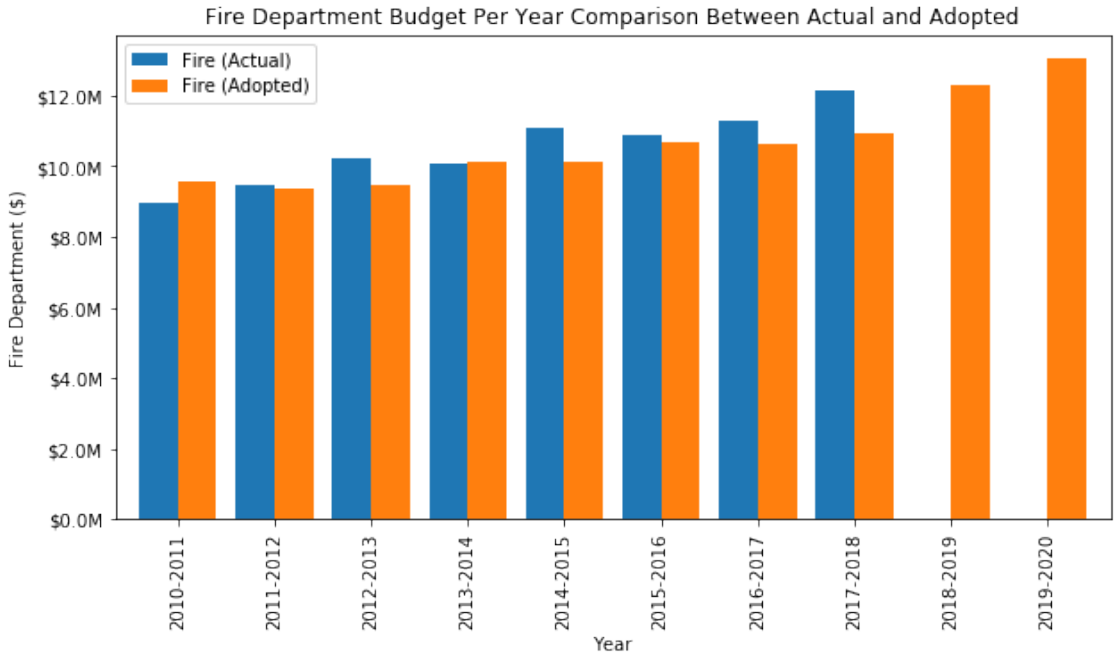
```
2011-2012   9457327.0   9365237
2012-2013  10239420.0   9464285
2013-2014  10095292.0  10147788
2014-2015  11103303.0  10116694
2015-2016  10891261.0  10689904
2016-2017  11298141.0  10643954
2017-2018  12129791.0  10939556
2018-2019         NaN  12311501
2019-2020         NaN  13075582
```

[91]:
```
df_fire_actual_adopted = df_fire_actual_adopted.rename(
    columns={"Fire_x": "Fire (Actual)",
    "Fire_y": "Fire (Adopted)"})
df_fire_actual_adopted
```

[91]:

Year	Fire (Actual)	Fire (Adopted)
2010-2011	8985464.0	9562413
2011-2012	9457327.0	9365237
2012-2013	10239420.0	9464285
2013-2014	10095292.0	10147788
2014-2015	11103303.0	10116694
2015-2016	10891261.0	10689904
2016-2017	11298141.0	10643954
2017-2018	12129791.0	10939556
2018-2019	NaN	12311501
2019-2020	NaN	13075582

[95]:
```
# Create plot figure:
plot = df_fire_actual_adopted.plot(kind='bar',
                           figsize=(10,5),
                           width = 0.8,
                           y = ["Fire (Actual)","Fire (Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Fire Department ($)")
plt.title("Fire Department Budget Per Year Comparison Between Actual and␣
 ↪Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[96]:
```
# Police
df_police_actual = df_year_before_merge(df_rs_budget_actual_xlsx["Police"])
df_police_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["Police"])

df_police_actual_adopted = pd.merge(df_police_actual, df_police_adopted,
                                    on = "Year", how = "right")
df_police_actual_adopted
```

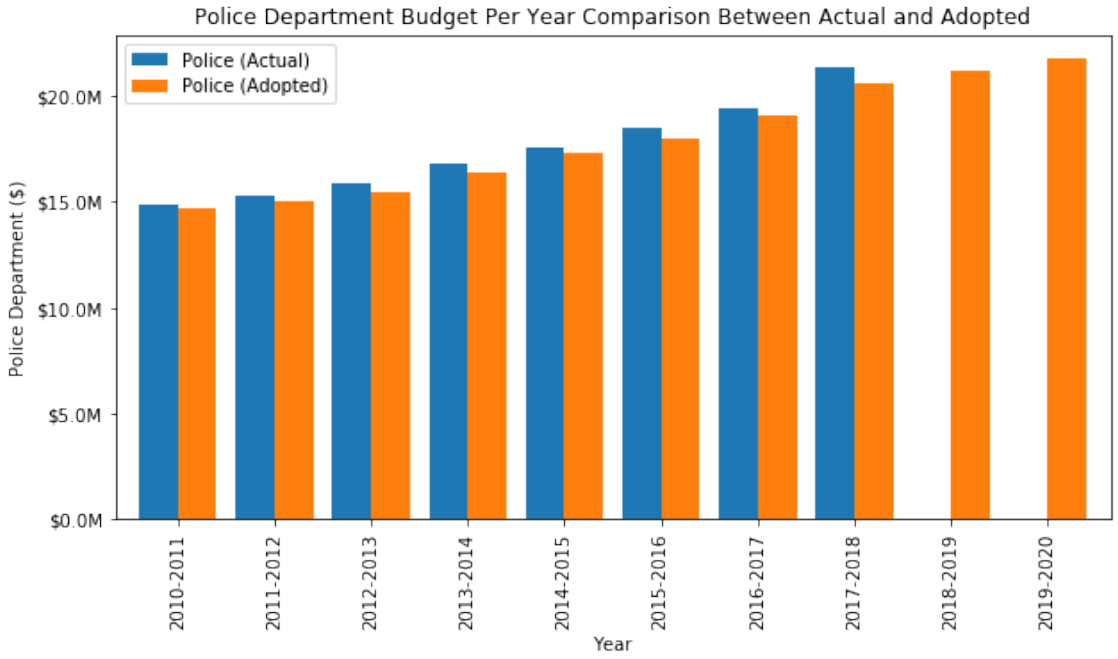
[96]:

Year	Police_x	Police_y
2010-2011	14846094.0	14686200
2011-2012	15273212.0	15018857
2012-2013	15847268.0	15429193
2013-2014	16754297.0	16357725
2014-2015	17501908.0	17308881
2015-2016	18493702.0	17921131
2016-2017	19423228.0	19018081
2017-2018	21322087.0	20578192
2018-2019	NaN	21187378
2019-2020	NaN	21777592

[97]:
```
df_police_actual_adopted = df_police_actual_adopted.rename(
    columns={"Police_x": "Police (Actual)",
    "Police_y": "Police (Adopted)"})
df_police_actual_adopted
```

[97]:
```
           Police (Actual)  Police (Adopted)
Year
2010-2011       14846094.0          14686200
2011-2012       15273212.0          15018857
2012-2013       15847268.0          15429193
2013-2014       16754297.0          16357725
2014-2015       17501908.0          17308881
2015-2016       18493702.0          17921131
2016-2017       19423228.0          19018081
2017-2018       21322087.0          20578192
2018-2019              NaN          21187378
2019-2020              NaN          21777592
```

[98]:
```
# Create plot figure:
plot = df_police_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
                            width = 0.8,
                            y = ["Police (Actual)","Police (Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Police Department ($)")
plt.title("Police Department Budget Per Year Comparison Between Actual and␣
 ↪Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[99]:
```
# Public Works
df_pWorks_actual = df_year_before_merge(df_rs_budget_actual_xlsx["Public␣
 ↪Works"])
df_pWorks_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["Public␣
 ↪Works"])

df_pWorks_actual_adopted = pd.merge(df_pWorks_actual, df_pWorks_adopted,
                                    on = "Year", how = "right")
df_pWorks_actual_adopted
```

[99]:

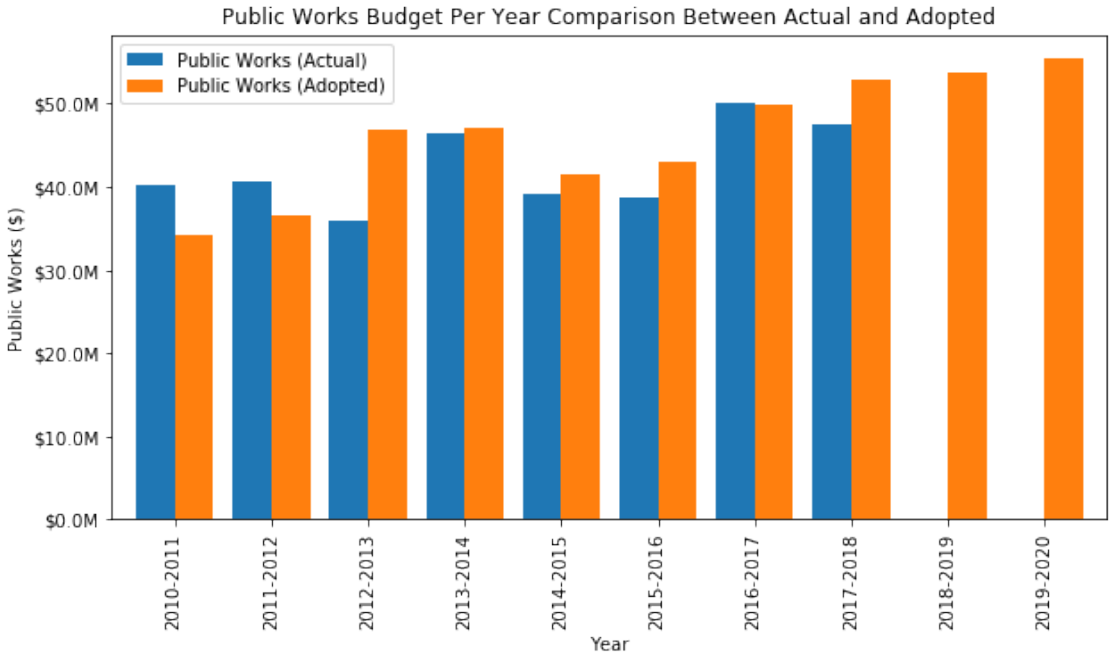
Year	Public Works_x	Public Works_y
2010-2011	40119804.0	34142910
2011-2012	40654384.0	36534426
2012-2013	35970661.0	46801345
2013-2014	46470044.0	47150169
2014-2015	39054636.0	41440615
2015-2016	38724852.0	42974079
2016-2017	50064556.0	49745316
2017-2018	47505612.0	52827759
2018-2019	NaN	53789648
2019-2020	NaN	55513036

[100]:
```
df_pWorks_actual_adopted = df_pWorks_actual_adopted.rename(
    columns={"Public Works_x": "Public Works (Actual)",
    "Public Works_y": "Public Works (Adopted)"})
df_pWorks_actual_adopted
```

[100]:

Year	Public Works (Actual)	Public Works (Adopted)
2010-2011	40119804.0	34142910
2011-2012	40654384.0	36534426
2012-2013	35970661.0	46801345
2013-2014	46470044.0	47150169
2014-2015	39054636.0	41440615
2015-2016	38724852.0	42974079
2016-2017	50064556.0	49745316
2017-2018	47505612.0	52827759
2018-2019	NaN	53789648
2019-2020	NaN	55513036

[101]:
```
# Create plot figure:
plot = df_pWorks_actual_adopted.plot(kind='bar',
                             figsize=(10,5),
                             width = 0.8,
                             y = ["Public Works (Actual)","Public Works␣
 ↪(Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Public Works ($)")
plt.title("Public Works Budget Per Year Comparison Between Actual and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[103]:
```
# Debt Service
df_debtService_actual = df_year_before_merge(df_rs_budget_actual_xlsx["Debt␣
 ↪Service"])
df_debtService_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["Debt␣
 ↪Service"])

df_debtService_actual_adopted = pd.merge(df_debtService_actual,␣
 ↪df_debtService_adopted,
                                         on = "Year", how = "right")
df_debtService_actual_adopted
```

[103]:

Year	Debt Service_x	Debt Service_y
2010-2011	10057775.0	8086418
2011-2012	12267671.0	9829286
2012-2013	5157737.0	8615203
2013-2014	3710709.0	8413452
2014-2015	5982705.0	6442588
2015-2016	17194043.0	6152714
2016-2017	19681218.0	7310674
2017-2018	19781672.0	7236698
2018-2019	NaN	10541777
2019-2020	NaN	23223340

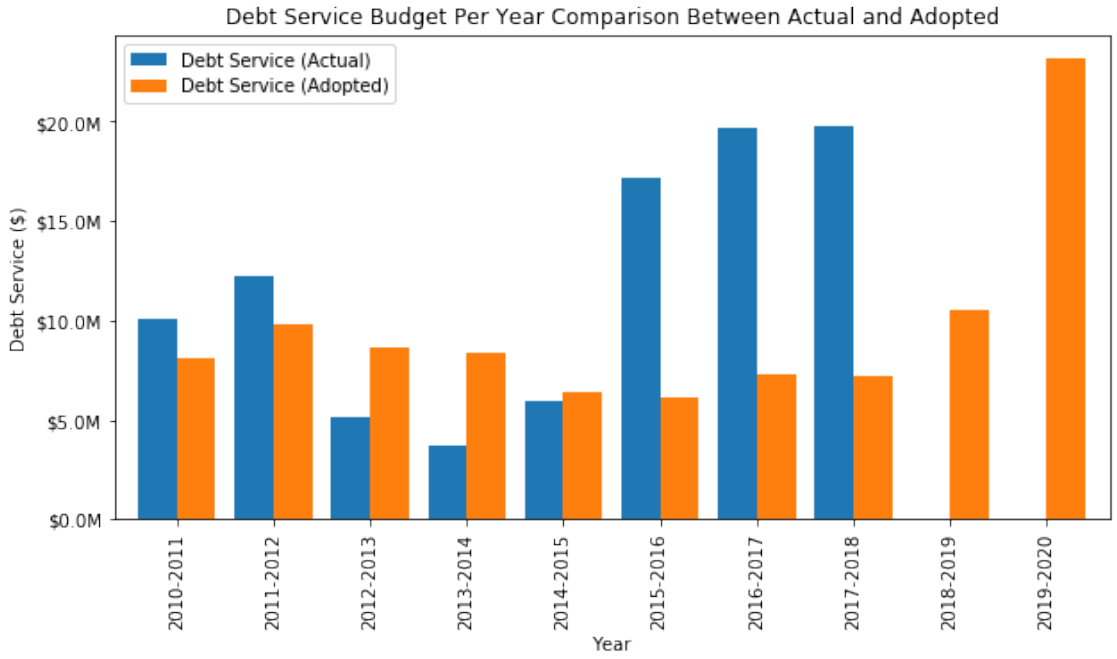
[104]:
```
df_debtService_actual_adopted = df_debtService_actual_adopted.rename(
    columns={"Debt Service_x": "Debt Service (Actual)",
    "Debt Service_y": "Debt Service (Adopted)"})
```

```
df_debtService_actual_adopted
```

[104]:

Year	Debt Service (Actual)	Debt Service (Adopted)
2010-2011	10057775.0	8086418
2011-2012	12267671.0	9829286
2012-2013	5157737.0	8615203
2013-2014	3710709.0	8413452
2014-2015	5982705.0	6442588
2015-2016	17194043.0	6152714
2016-2017	19681218.0	7310674
2017-2018	19781672.0	7236698
2018-2019	NaN	10541777
2019-2020	NaN	23223340

[105]:
```
# Create plot figure:
plot = df_debtService_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
                            width = 0.8,
                            y = ["Debt Service (Actual)","Debt Service␣
 ↪(Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Debt Service ($)")
plt.title("Debt Service Budget Per Year Comparison Between Actual and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[106]:
```
# Davis Redev. Agency/RDA Successor Agency
df_rda_actual = df_year_before_merge(df_rs_budget_actual_xlsx["Davis Redev.␣
 ↪Agency/RDA Successor Agency"])
df_rda_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["Davis Redev.␣
 ↪Agency/RDA Successor Agency"])

df_rda_actual_adopted = pd.merge(df_rda_actual, df_rda_adopted,
                                          on = "Year", how = "right")
df_rda_actual_adopted
```

[106]:

Year	Davis Redev. Agency/RDA Successor Agency_x	Davis Redev. Agency/RDA Successor Agency_y
2010-2011	8706217.0	4977392
2011-2012	1030318.0	
2012-2013	6116702.0	
2013-2014	20218833.0	
2014-2015	3681329.0	
2015-2016	9195055.0	
2016-2017	3572437.0	
2017-2018	6899893.0	
2018-2019	NaN	
2019-2020	NaN	

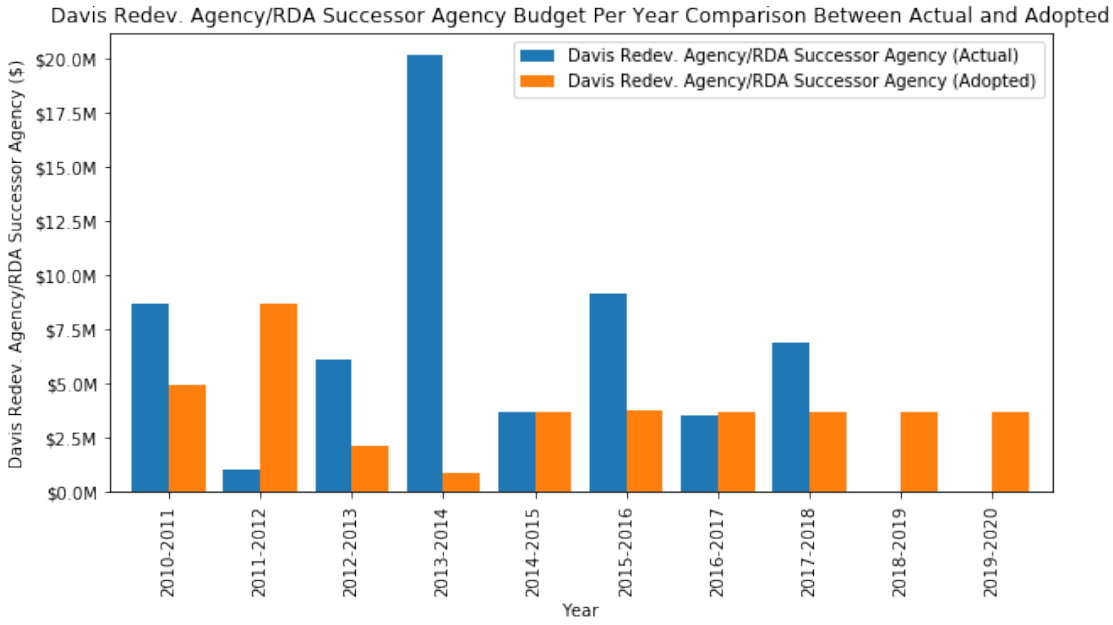
```
2011-2012                                    8706217
2012-2013                                    2172787
2013-2014                                     897780
2014-2015                                    3721076
2015-2016                                    3757689
2016-2017                                    3686196
2017-2018                                    3672100
2018-2019                                    3672246
2019-2020                                    3667231
```

[107]:
```
df_rda_actual_adopted = df_rda_actual_adopted.rename(
    columns={"Davis Redev. Agency/RDA Successor Agency_x": "Davis Redev. Agency/
↪RDA Successor Agency (Actual)",
    "Davis Redev. Agency/RDA Successor Agency_y": "Davis Redev. Agency/RDA␣
↪Successor Agency (Adopted)"})
df_rda_actual_adopted
```

[107]:
```
           Davis Redev. Agency/RDA Successor Agency (Actual)  \
Year
2010-2011                                          8706217.0
2011-2012                                          1030318.0
2012-2013                                          6116702.0
2013-2014                                         20218833.0
2014-2015                                          3681329.0
2015-2016                                          9195055.0
2016-2017                                          3572437.0
2017-2018                                          6899893.0
2018-2019                                                NaN
2019-2020                                                NaN

           Davis Redev. Agency/RDA Successor Agency (Adopted)
Year
2010-2011                                            4977392
2011-2012                                            8706217
2012-2013                                            2172787
2013-2014                                             897780
2014-2015                                            3721076
2015-2016                                            3757689
2016-2017                                            3686196
2017-2018                                            3672100
2018-2019                                            3672246
2019-2020                                            3667231
```

[108]:
```
# Create plot figure:
plot = df_rda_actual_adopted.plot(kind='bar',
                            figsize=(10,5),
                            width = 0.8,
```

```
                                y = ["Davis Redev. Agency/RDA Successor Agency␣
 ↪(Actual)","Davis Redev. Agency/RDA Successor Agency (Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Davis Redev. Agency/RDA Successor Agency ($)")
plt.title("Davis Redev. Agency/RDA Successor Agency Budget Per Year Comparison␣
 ↪Between Actual and Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```



[111]:
```
# Non Departmental
df_noDept_actual = df_year_before_merge(df_rs_budget_actual_xlsx["Non␣
 ↪Departmental"])
df_noDept_adopted = df_year_before_merge(df_rs_budget_adopted_xlsx["Non␣
 ↪Departmental"])

df_noDept_actual_adopted = pd.merge(df_noDept_actual, df_noDept_adopted,
                                    on = "Year", how = "right")
df_noDept_actual_adopted
```

[111]:

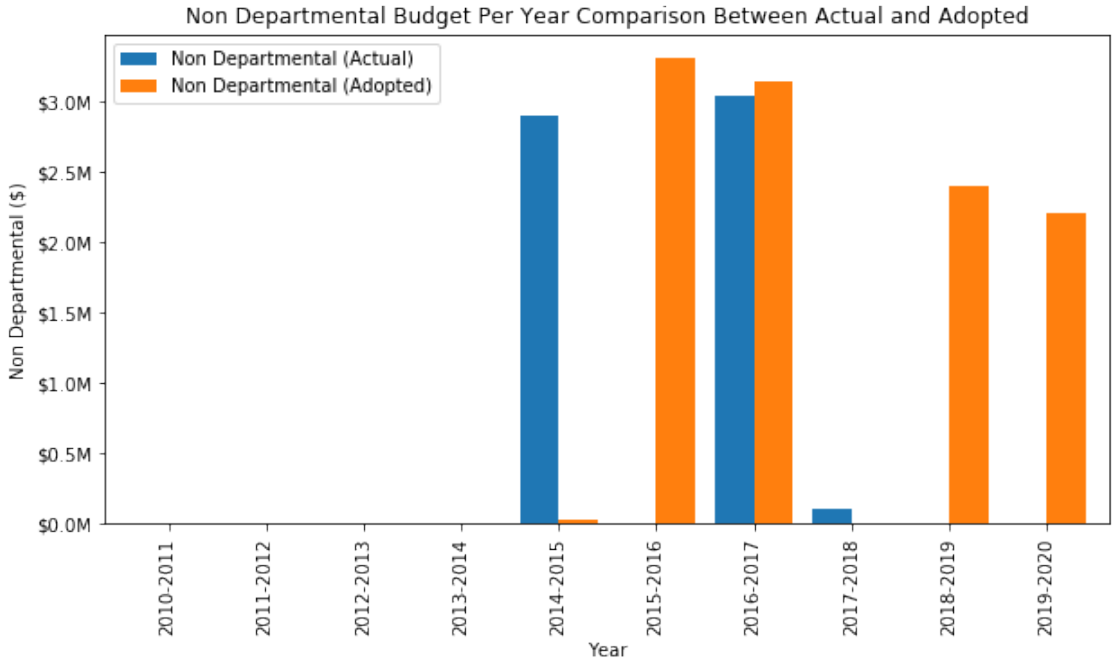
Year	Non Departmental_x	Non Departmental_y
2010-2011	NaN	NaN

```
2011-2012                NaN                NaN
2012-2013                NaN                NaN
2013-2014                NaN                NaN
2014-2015          2902811.0            30000.0
2015-2016                NaN          3315979.0
2016-2017          3044202.0          3140000.0
2017-2018           109548.0                NaN
2018-2019                NaN          2402761.0
2019-2020                NaN          2202761.0
```

[112]:
```
df_noDept_actual_adopted = df_noDept_actual_adopted.rename(
    columns={"Non Departmental_x": "Non Departmental (Actual)",
    "Non Departmental_y": "Non Departmental (Adopted)"})
df_noDept_actual_adopted
```

[112]:
```
           Non Departmental (Actual)  Non Departmental (Adopted)
Year
2010-2011                        NaN                         NaN
2011-2012                        NaN                         NaN
2012-2013                        NaN                         NaN
2013-2014                        NaN                         NaN
2014-2015                  2902811.0                     30000.0
2015-2016                        NaN                   3315979.0
2016-2017                  3044202.0                   3140000.0
2017-2018                   109548.0                         NaN
2018-2019                        NaN                   2402761.0
2019-2020                        NaN                   2202761.0
```

[113]:
```
# Create plot figure:
plot = df_noDept_actual_adopted.plot(kind='bar',
                             figsize=(10,5),
                             width = 0.8,
                             y = ["Non Departmental (Actual)","Non Departmental␣
 ↪(Adopted)"])

# Y-label, Title and Scale change:
plt.ylabel("Non Departmental ($)")
plt.title("Non Departmental Budget Per Year Comparison Between Actual and␣
 ↪Adopted")

# Change ax --> plot:
plot.yaxis.set_major_formatter(formatter)

# Use matplotlib,pyplot as plt to show:
plt.show()
```


Non Departmental Budget Per Year Comparison Between Actual and Adopted
Non Departmental (Actual)
Non Departmental (Adopted)
Non Departmental ($)
$3.0M
$2.5M
$2.0M
$1.5M
$1.0M
$0.5M
$0.0M
2010-2011
2011-2012
2012-2013
2013-2014
2014-2015
2015-2016
2016-2017
2017-2018
2018-2019
2019-2020
Year