

Wealth Analysis Task

1. Please summarize key trends in median wealth over the last 30 years by race and education using plots and in writing

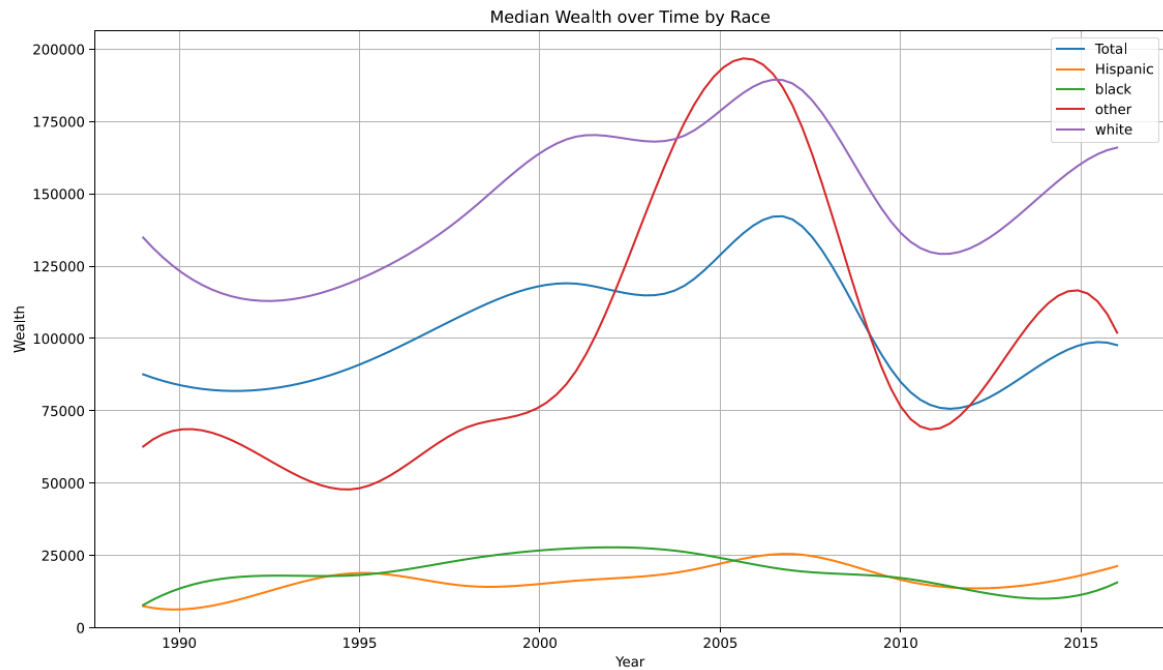


Fig. 1

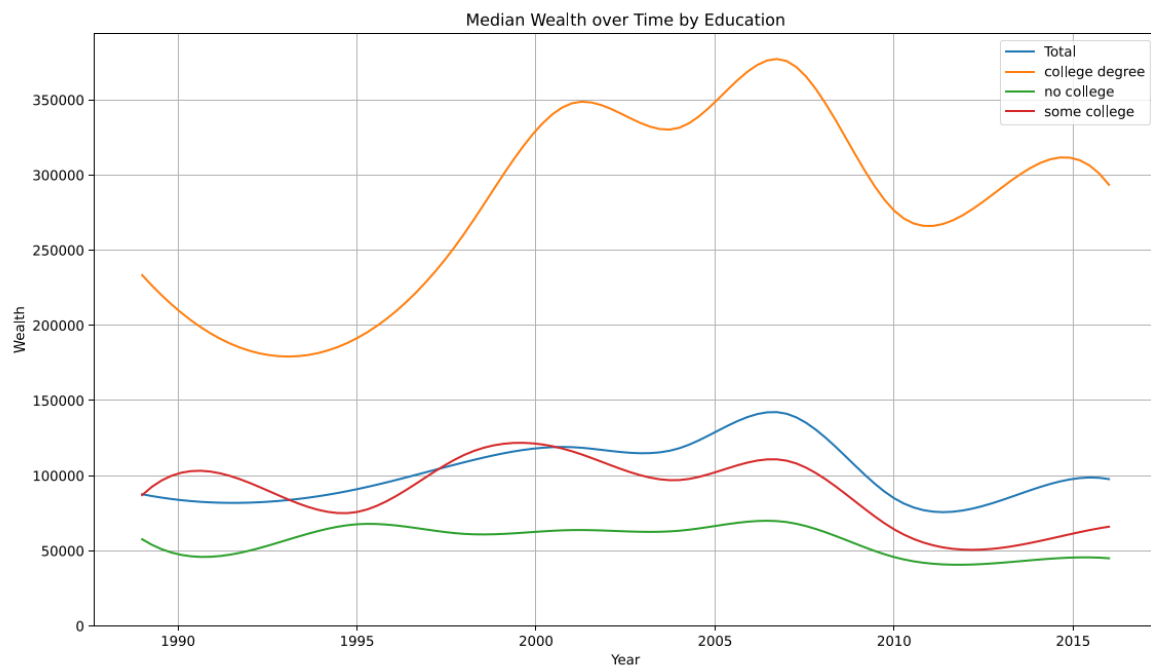


Fig. 2

Fig. 1 shows us that overall median wealth of the US population had an upward trend from early 1990s up to 2007 after which it declined sharply. As the data is already scaled to 2016 \$, the upward trend indicates real increase in wealth and should not be attributed to inflation. The sharp decline after 2007 can likely be attributed to the Great Recession and though wealth started recovering around 2011, as of 2016, it has still not recovered to the pre-crisis level. The graph makes the racial wealth disparity conspicuous with the median wealth for white households being 5 to 8 times that of black or Hispanic households at any point of time. Starting from 1995, median wealth for people belonging to the 'other' racial group rose sharply till 2007, growing at a higher rate than the overall population. Increasing number of other race skilled immigrant workers with high paying jobs acquiring US citizenship during this period might be a reason for this sharp growth. From 2008 to 2011, a typical black or Hispanic household lost half of its wealth while typical other households lost more than half. What is notable is that white households did not lose as much.

From Fig. 2 we see that people with no college education tend to have the lowest wealth while people who have been to some college tend to be somewhat wealthier. People with a college degree tend to be the wealthiest. This is expected as higher education tends to open the doors to higher paying job opportunities and in turn a chance to create greater wealth. Most important evidence from this graph is that median wealth for people with college degrees increased substantially in the span of 30 years while that for the other two groups actually decreased. This indicates that having a college degree greatly improves one's odds of not only creating greater wealth but also growing it sustainably.

2. Repeat your analysis for just housing wealth for black and white households.

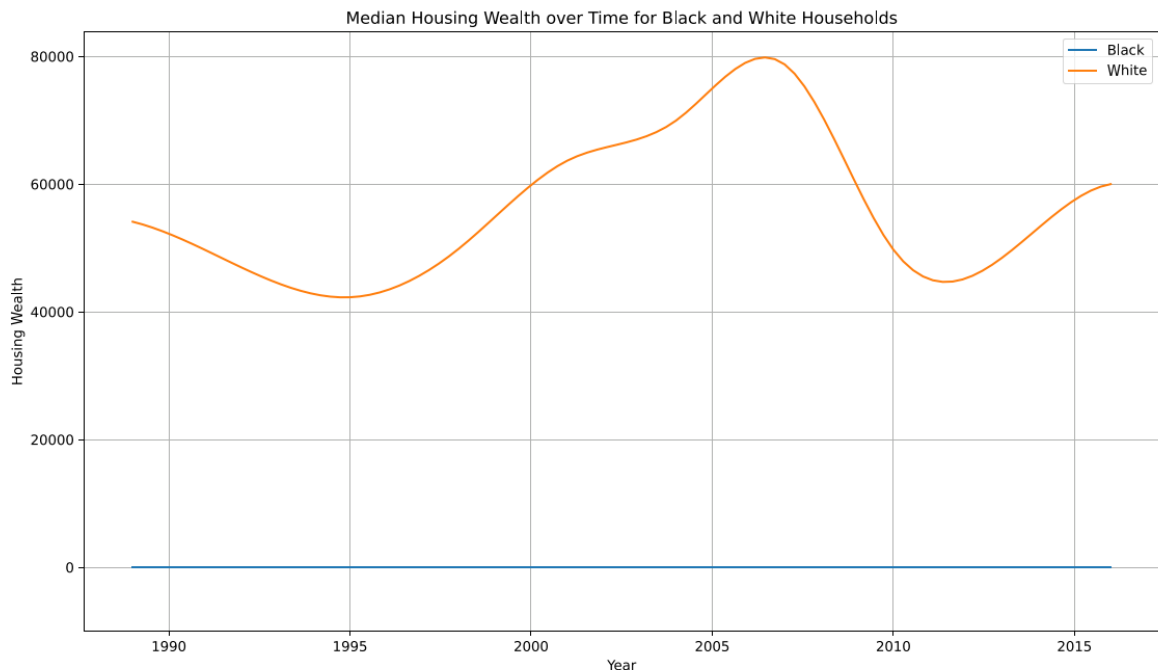


Fig. 3

The most interesting observation from this graph is that the median housing wealth of the African-American community has remained at 0 throughout the span of 30 years. This implies that half of more of black households still don't own housing assets and many of them have housing debt. In comparison the white households have managed to increase their median housing wealth over the same span of time despite suffering some setback during the financial crisis.

3. Many households are not homeowners and so your analysis for the prior question includes many zeroes for housing wealth. Let's dig deeper by focusing just on homeowners age 25 or older. Please summarize trends in for black and white households for both housing and non-housing wealth. Which group had the largest loss in housing wealth, where 2007 is defined as the base period? Please answer this question both in dollar terms and in proportional terms.

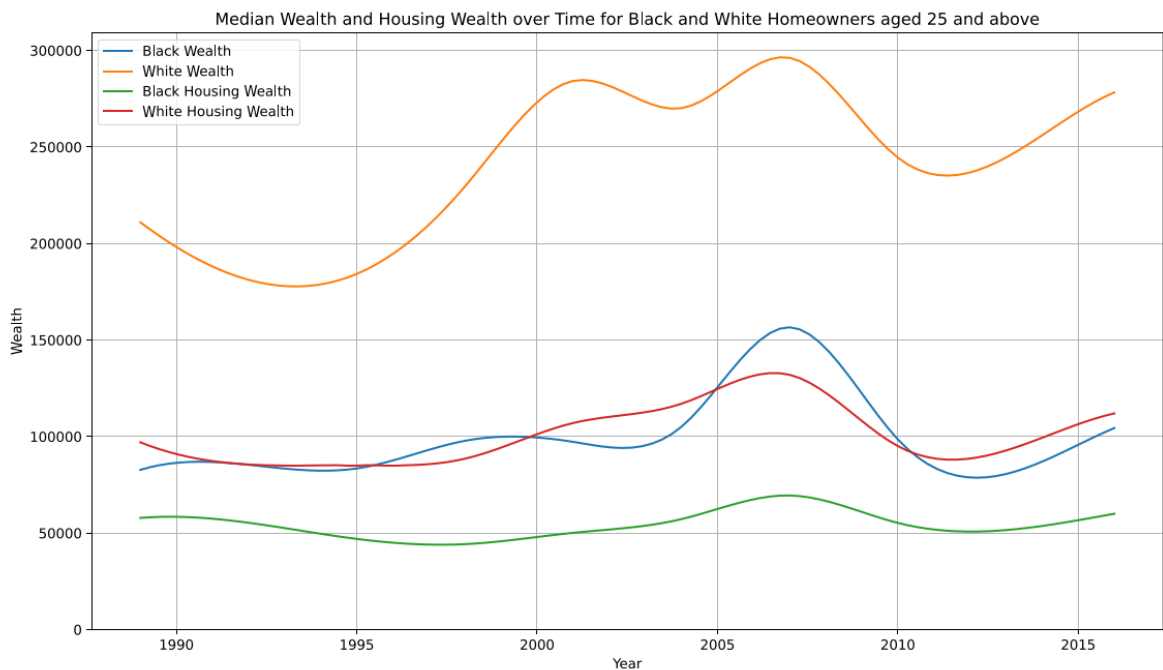


Fig. 4

After considering only homeowners age 25 or older for our analysis, we see that the general pattern we observed earlier of white wealth variables faring better than corresponding variables for black community holds true here as well. We also observe here that the proportion of housing wealth to total wealth for white households is lower than that for black households in general. For some reason, starting from 2003 median wealth for black homeowner households started increasing sharply (with a gradient higher than corresponding white wealth) while also declining sharply during the recession.

Considering 2007 as our base point and 2016 as evaluation point, median black housing wealth decreased by roughly \$10,000 or 15% and white housing wealth decreased by roughly \$20,000 or 15%. Concluding, in proportional terms, both communities lost housing wealth equally while in absolute dollar terms, white community had the larger loss. This might be due to the fact that white households tend to own larger housing assets that had greater depreciation in dollar terms during the recession.

4. Many potential channels have been identified for explaining the wealth gaps by race documented in question 1. These include differences in access to financial markets, segregation, discrimination, family networks, neighborhood characteristics, and barriers to human capital accumulation. Please pick at least two hypotheses (they do not need to be included in the list above) and explain what evidence you might want to assemble to test the importance of these channels.

Response – In Fig.2 we saw how level of highest education can affect one's wealth level. In my opinion, hindrance to education might be an important channel to explain the low levels of wealth in the African American community. An evidence proving that the youth of the community face more challenges or harder challenges to access institutions of higher education as compared to white students will greatly bolster this hypothesis. Some of these challenges might include financial barriers to afford higher education, high dropout rates from schools and colleges, need to support one's family, mental health and access to help, drug use, difficulties in securing scholarships etc. Digging through data of students in the United States by race with their highest level of education, enrollment levels in colleges and universities and some of the above variables might throw light on the evidence for my hypothesis.

Another hypothesis would be the barriers to sustainable capital accumulation. "Wealth creates wealth". Therefore, it would be interesting to investigate the barriers that the African American households face to build the initial capital and assets that can sustain their wealth similar to the white households.

Python code

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#!/usr/bin/env python
# coding: utf-8

# In[8]:

# Imports
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from scipy.interpolate import make_interp_spline

raw_data = pd.read_csv('RA_21_22.csv')          # Reading the data from csv file

raw_data.shape

# In[9]:

raw_data['wealth'] = raw_data['asset_total'] - raw_data['debt_total']          #Adding a cloumn for wealth
in the data
raw_data['wealth_housing'] = raw_data['asset_housing'] - raw_data['debt_housing'] #Adding a cloumn for housing
wealth
raw_data['wealth_non_housing'] = raw_data['wealth'] - raw_data['wealth_housing'] #Adding a cloumn for non-
housing wealth

# Writing our custom function to calculate weighted median
def weighted_median(dataframe, value, weight):
    dataframe_sorted = dataframe.sort_values(value)
    cumsum = dataframe_sorted[weight].cumsum()
    cutoff = dataframe_sorted[weight].sum() / 2.
    return dataframe_sorted[cumsum >= cutoff][value].iloc[0]

# Function to group a dataframe by year and then plot the weighted medians for a variable value
def group_by_year_and_plot(dataframe, value, weight, label):
    dictionary = {}
    grouped_by_year = dataframe.groupby('year')

    for year, year_group in grouped_by_year:
        dictionary[year] = weighted_median(year_group, value, weight)

    # Smoothen the graph as we have limited points for years on x-axis
    x = np.array(list(dictionary.keys()))
    y = np.array(list(dictionary.values()))
    x_smooth = np.linspace(x.min(), x.max(), 100)
    spline = make_interp_spline(list(dictionary.keys()), list(dictionary.values()), k = 3) # Fitting to cubic
    spline
    y_smooth = spline(x_smooth)

    # Plot
    plt.plot(x_smooth, y_smooth, label = label)

# Function to plot a trend for a "value" when given grouping and/or filtering information
def plot_trend(dataframe, value, weight, groupby = None, filtration = None, label = None):
    filtered_dataframe = dataframe

    if filtration is not None:
        filtered_dataframe = dataframe.loc[dataframe[filtration['column']] == filtration['value']]

    if groupby is None:
        group_by_year_and_plot(filtered_dataframe, value, weight, label)

    else:
        grouped_dataframe = filtered_dataframe.groupby(groupby)

        for group_name, group in grouped_dataframe:
            group_by_year_and_plot(group, value, weight, label = group_name)

# Median Wealth over Time by Race

plt.figure(figsize = (14, 8), dpi = 80)
plot_trend(raw_data, "wealth", "weight", label = 'Total')
plot_trend(raw_data, "wealth", "weight", groupby = 'race')

plt.ylim(ymin = 0)
plt.grid(True)
plt.title('Median Wealth over Time by Race')
plt.xlabel('Year')
plt.ylabel('Wealth')
plt.legend()
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plt.savefig("graph1.pdf", format="pdf")

plt.show()

# In[10]:

# Median Wealth over Time by Education

plt.figure(figsize = (14, 8), dpi = 80)
plot_trend(raw_data, "wealth", "weight", label = 'Total')
plot_trend(raw_data, "wealth", "weight", groupby = 'education')

plt.ylim(ymin = 0)
plt.grid(True)
plt.title('Median Wealth over Time by Education')
plt.xlabel('Year')
plt.ylabel('Wealth')
plt.legend()
plt.savefig("graph2.pdf", format="pdf")

plt.show()

# In[16]:

# Median Housing Wealth over Time for Black and White Households

plt.figure(figsize = (14, 8), dpi = 80)
plot_trend(raw_data, "wealth_housing", "weight", label = 'Black', filtration = {'column':'race',
'value':'black'})
plot_trend(raw_data, "wealth_housing", "weight", label = 'White', filtration = {'column':'race',
'value':'white'})

plt.ylim(ymin = -10000)
plt.grid(True)
plt.title('Median Housing Wealth over Time for Black and White Households')
plt.xlabel('Year')
plt.ylabel('Housing Wealth')
plt.legend()
plt.savefig("graph3.pdf", format="pdf")

plt.show()

# In[22]:

# Median Wealth and Housing Wealth over Time for Black and White Homeowners aged 25 and above

aged_data = raw_data.loc[raw_data['age'] >= 25] # Filtering for age 25 and above
aged_homeowners_data = aged_data.loc[aged_data['asset_housing'] > 0] # Filtering for homeowners

plt.figure(figsize = (14, 8), dpi = 80)
plot_trend(aged_homeowners_data, "wealth", "weight", label = 'Black Wealth', filtration = {'column':'race',
'value':'black'})
plot_trend(aged_homeowners_data, "wealth", "weight", label = 'White Wealth', filtration = {'column':'race',
'value':'white'})

plot_trend(aged_homeowners_data, "wealth_housing", "weight", label = 'Black Housing Wealth',
filtration = {'column':'race', 'value':'black'})
plot_trend(aged_homeowners_data, "wealth_housing", "weight", label = 'White Housing Wealth',
filtration = {'column':'race', 'value':'white'})

plt.ylim(ymin = 0)
plt.grid(True)
plt.title('Median Wealth and Housing Wealth over Time for Black and White Homeowners aged 25 and above')
plt.xlabel('Year')
plt.ylabel('Wealth')
plt.legend()
plt.savefig("graph4.pdf", format="pdf")

plt.show()

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