GDP Assignment

Submitted by: Janarthanan Balasubramanian

(jnvdasa@gmail.com)

Project Brief

The CEO of NITI Aayog has initiated a project to provide top-level recommendations to the Chief Ministers (CMs) of various states of India, to help them prioritize areas of development for their respective states. Since different states are in different phases of development, the recommendations should be specific to the states. The overall goal of this project is to help the CMs focus on areas that will foster economic development for their respective states.

As a chief data scientist at NITI Aayog, the assignment for us is to analyze the most common measure of economic development - GDP (Gross Domestic Product) of the various states of India and suggest ways to improve it.

What is GDP?

Gross domestic product (GDP) at current prices is the GDP at the market value of goods and services produced in a country during a year. In other words, GDP measures the **monetary value of final goods & services produced by a country/state in a given period.** GDP can be broadly divided into goods and services produced by three sectors: the primary sector (agriculture), the secondary sector (industry), and the tertiary sector (services). It is also known as nominal GDP. More technically, real GDP takes into account the price change that may have occurred due to inflation. This means that the real GDP is nominal GDP adjusted for inflation. In this assignment, we will use the nominal GDP. And we will consider the financial year 2015-16 as the base year.

Data Sourcing

The data for this assignment is sourced from

Open Government Data (OGD) Platform, India

Data 1A: State-wise GDP at current price on yearly basis
https://data.gov.in/resources/state-wise-gross-domestic-product-gdp-current-price-yearly-basis

Data 1B: GSVA by Economic Activity at Current Prices for All States

Data 1C: Dropout rates data: https://data.gov.in/resources/state-ut-wise-average-annual-drop-out-rate-2012-13-2014-15-ministry-human-resource

GDP Assignment

Part 1 A

Understanding the Data

Data 1A: State-wise GDP at current price on yearly basis

Contains 11 rows: (6 + 5)

GSDP - CURRENT PRICES (` in Crore) for all states in the years 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017.

(% Growth over previous year) for all states in the years 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017.

Data Quality Issues

Column Name Standardization: Column name Items Description has additional space between the two words. Renamed the column into Items. Andhra Pradesh had a additional trailing space which is removed. West Bengal1 is renamed to West Bengal and All_India GDP is renamed to India.

Handling Missing Values in Columns: For West Bengal values are missing in all the rows. So we dropped the West Bengal column. The Union Territories are not in the scope of the analysis. We can drop the columns for Andaman & Nicobar Islands, Chandigarh, Delhi, Puducherry, Jammu & Kashmir (Note: J & K has been established as a Union Territory on Oct 31, 2019).

Data Quality Issues

Handling Missing Values in the row for 2016-2017: Data is not available for most of the states and Union Territories in the year 2016-2017 (row number 6 and 11 - index 5 and 10). There are 23 missing values in these rows. Since we are considering 2015-2016 as the base year for our analysis, we can remove these 2 rows for 2016-2017 i.e. row number 6 and 11. We will have 9 rows in the dataset.

Handling Missing Values in the row for 2015-2016: For the year 2015-2016, the values are missing for Himachal Pradesh, Maharashtra, Manipur, Mizoram, Nagaland, Punjab, Rajasthan, Tripura, Uttar Pradesh, Uttarakhand, Andaman & Nicobar Islands and Chandigarh. We need to impute it with some value. How?

Data Imputation

Missing values in 2015-2016 can be imputed in various ways:

- take the **average** of the previous financial years; however mean can be drastically different due to outliers and it is not recommended.
- assume the **same percentage growth** as in the previous financial year; while charting with growth rates, this will result in a flat line.
- **compute the % growth** based on GSDP of previous years: this is a better alternative. The formula is explained in next slide.

Data Imputation

For each state we compute the average growth rate as follows:

$$Average\ Growth\ Rate = \left[\frac{GSDP\ in\ last\ period}{GSDP\ in\ first\ period}\right]^{\frac{1}{n}} - 1$$

Last Period: 2014-2015 and first period = 2011-2012; n is the number of periods and is equal to 4.

The average growth rate is a decimal value. To express it in percentage we need to multiply it by 100.

With this average growth rate, we can compute the GSDP for the period 2015-2016 as follows:

$$GSDP\ for\ 2015-16 = GSDP\ for\ 2014-15 + GSDP\ for\ 2014-15\ (Average\ Growth\ Rate)$$

Data Imputation

For each state we compute the average growth rate as follows:

$$Average\ Growth\ Rate = \left[\frac{GSDP\ in\ last\ period}{GSDP\ in\ first\ period}\right]^{\frac{1}{n}} - 1$$

Last Period: 2014-2015 and first period = 2011-2012; n is the number of periods and is equal to 4.

The average growth rate is a decimal value. To express it in percentage we need to multiply it by 100.

With this average growth rate, we can compute the GSDP for the period 2015-2016 as follows:

$$GSDP\ for\ 2015-16 = GSDP\ for\ 2014-15 + GSDP\ for\ 2014-15\ (Average\ Growth\ Rate)$$

Data Imputation

Missing values (NaN) of 2015-2016 for the following states are imputed with the logic explained in previous slide.

	Items	Duration	Himachal Pradesh	Maharashtra	Manipur	Mizoram	Nagaland	Punjab	Rajasthan	Tripura
0	GSDP - CURRENT PRICES (` in Crore)	2011-12	72720.00	1272967.00	12915.00	7259.00	11839.00	266628.00	436465.00	19208.00
1	GSDP - CURRENT PRICES (` in Crore)	2012-13	82820.00	1448466.00	13748.00	8362.00	13619.00	297734.00	494004.00	21663.00
2	GSDP - CURRENT PRICES (` in Crore)	2013-14	94764.00	1647506.00	16198.00	10293.00	16612.00	334714.00	549701.00	25593.00
3	GSDP - CURRENT PRICES (` in Crore)	2014-15	104369.00	1792122.00	18043.00	11559.00	18414.00	368011.00	612194.00	29667.00
4	GSDP - CURRENT PRICES (` in Crore)	2015-16	114232.00	1952158.00	19616.00	12984.00	20565.00	398887.00	666251.00	33073.00
6	(% Growth over previous year)	2012-13	13.89	13.79	6.45	15.20	15.03	11.67	13.18	12.78
7	(% Growth over previous year)	2013-14	14.42	13.74	17.83	23.10	21.98	12.42	11.27	18.14
8	(% Growth over previous year)	2014-15	10.14	8.78	11.39	12.30	10.85	9.95	11.37	15.92
9	(% Growth over previous year)	2015-16	9.45	8.93	8.72	12.33	11.68	8.39	8.83	11.48

Data Imputation - Computed Values

	(% Growth over previous year)	GSDP - CURRENT PRICES (` in Crore)	Actuals from Wiki	Prediction Error %
Himachal Pradesh	9.45	114232	114239	-0.01%
Maharashtra	8.93	1952158	1966147	-0.71%
Manipur	8.72	19616	19531	0.44%
Mizoram	12.33	12984	15139	-14.23%
Nagaland	11.68	20565	19524	5.33%
Punjab	8.39	398887	390087	2.26%
Rajasthan	8.83	666251	681485	-2.24%
Tripura	11.48	33073	35938	-7.97%

Split into two datasets

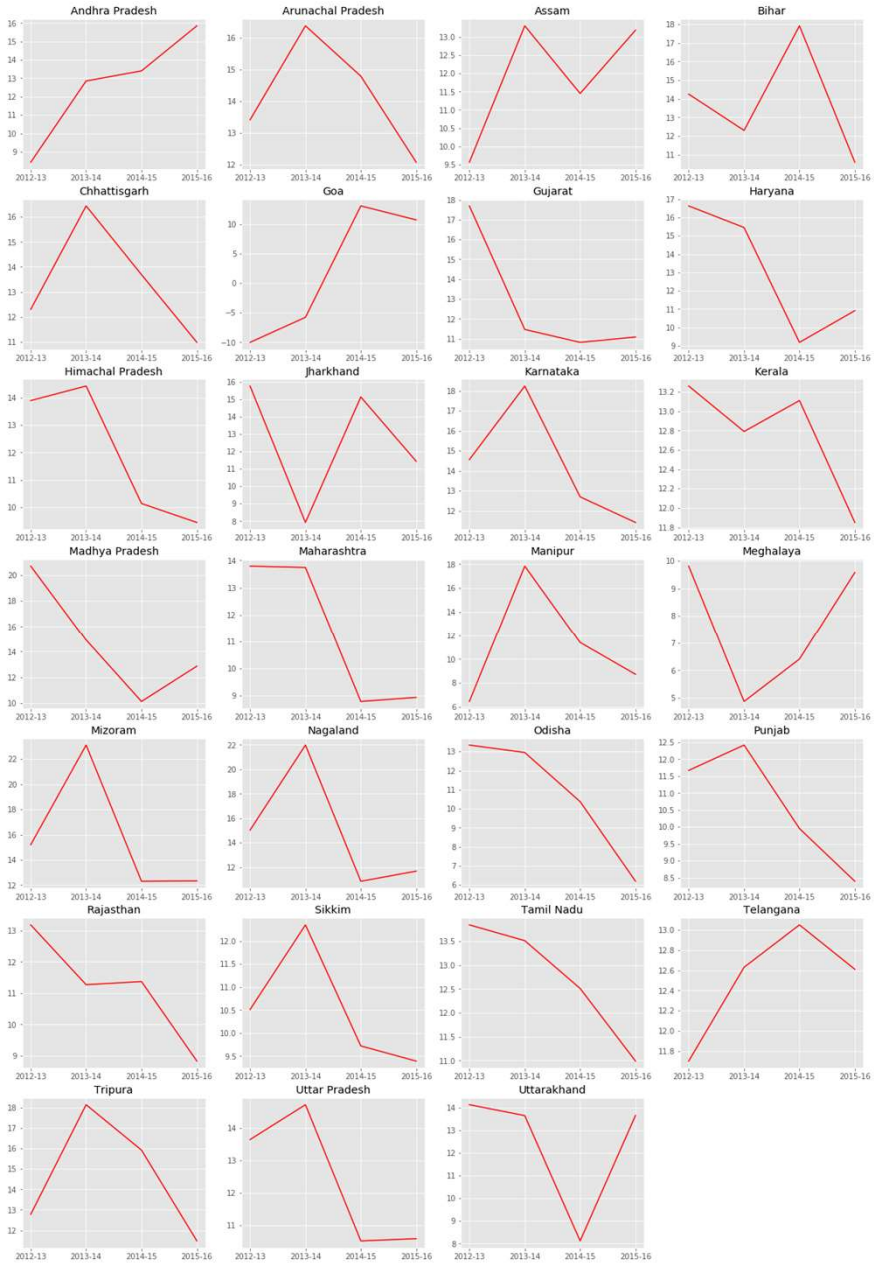
We split the data set into two data frames as follows.

GSDP - CURRENT PRICES (` in Crore) for all states in the years 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016. **5 rows**

(% Growth over previous year) for all states in the years 2012-2013, 2013-2014, 2014-2015, 2015-2016. **4 rows**

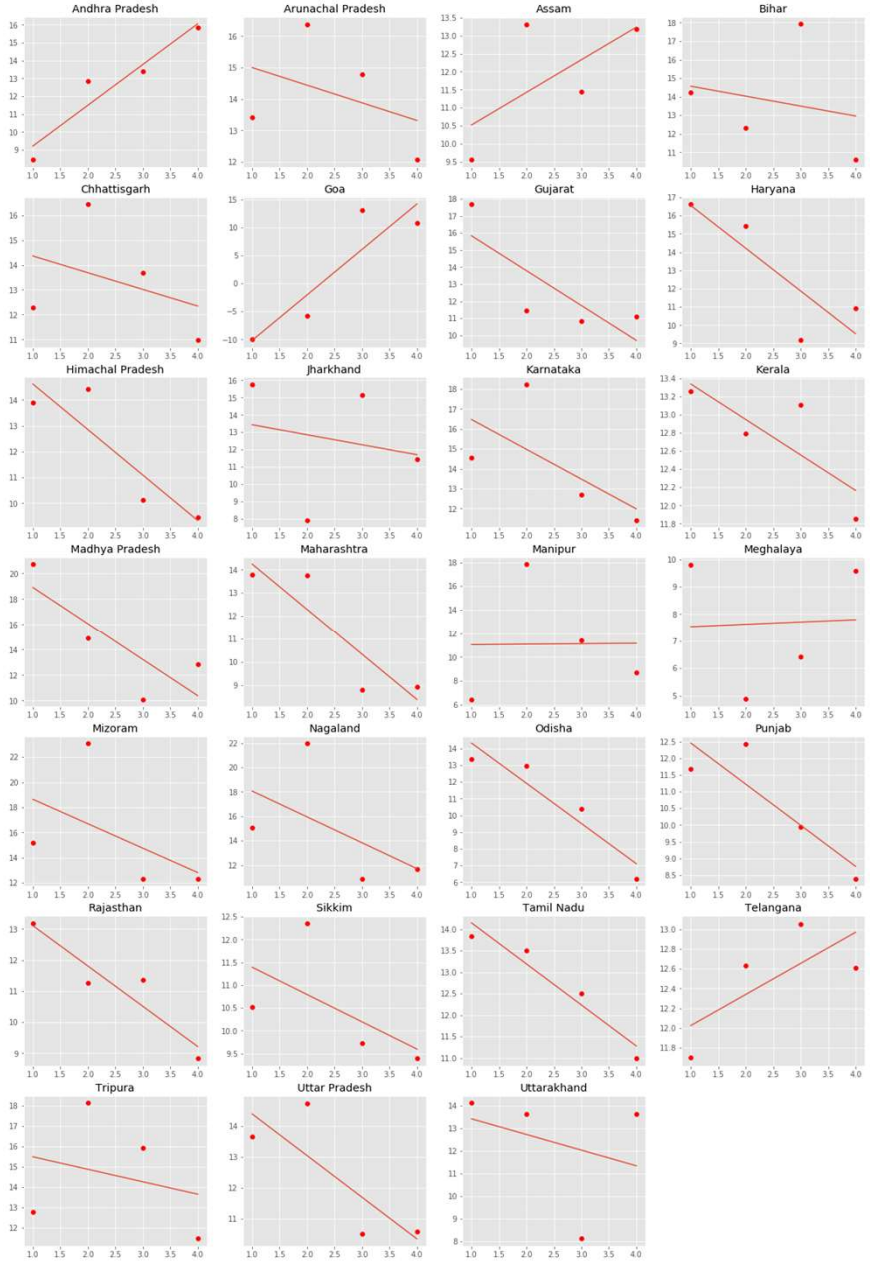
Visualizing Growth Rate

As per the graph, state which has consistent increase in growth rate are Andhra Pradesh. The growth rate is continuously decreasing in Odisha, Tamil Nadu and so on. **However this is not enough to conclude on the growth of the State.** Hence we need to plot the best fit line to see the trend.



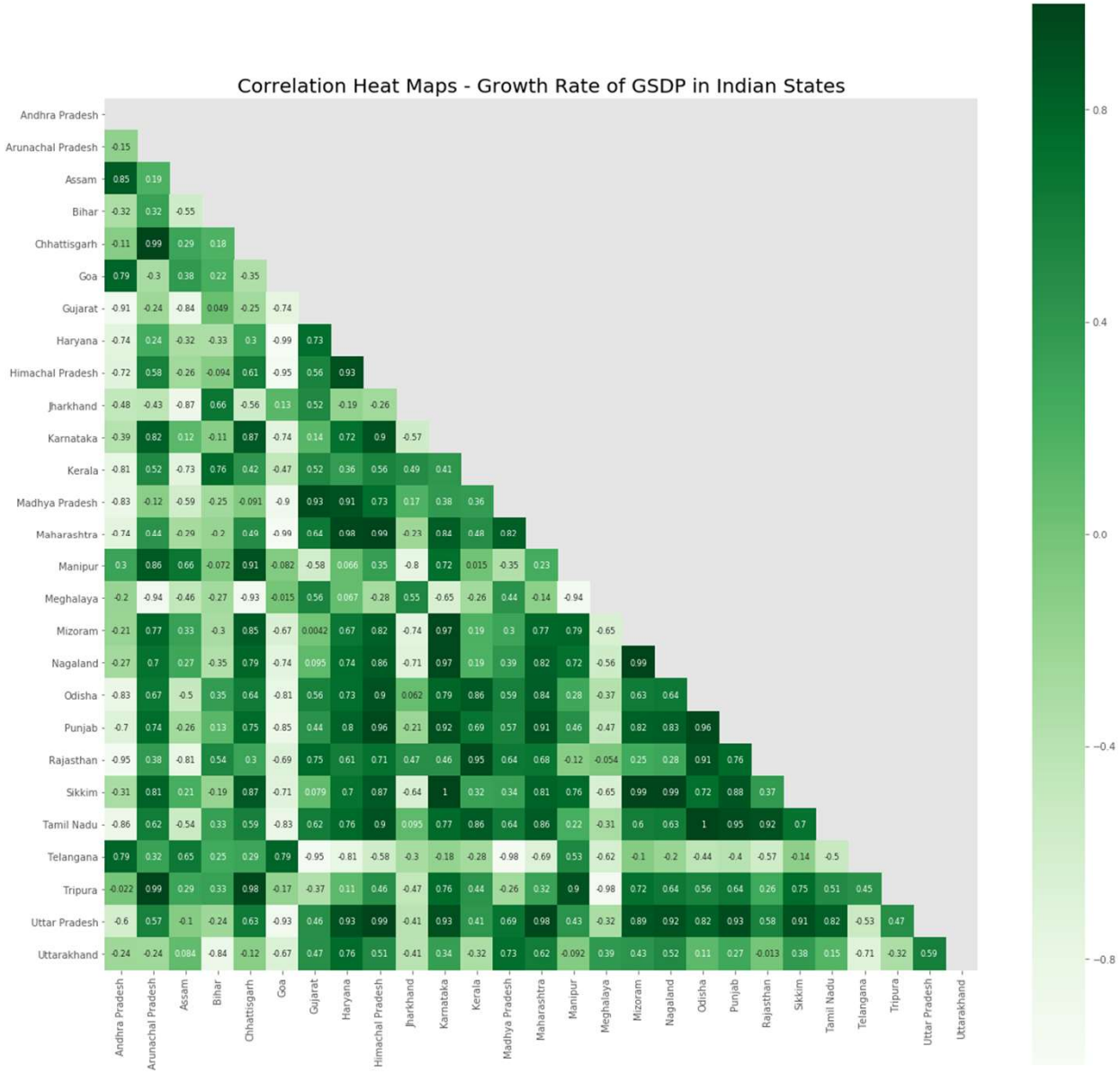
Visualizing Growth Rate

The best fit line shows the actual trend - whether there is increase or decrease. Andhra Pradesh, Assam, Goa and Telangana shows a trend of positive growth.



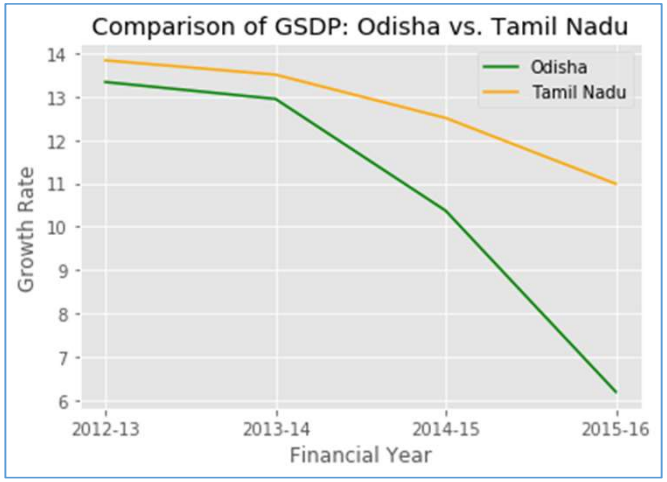
Growth Rates

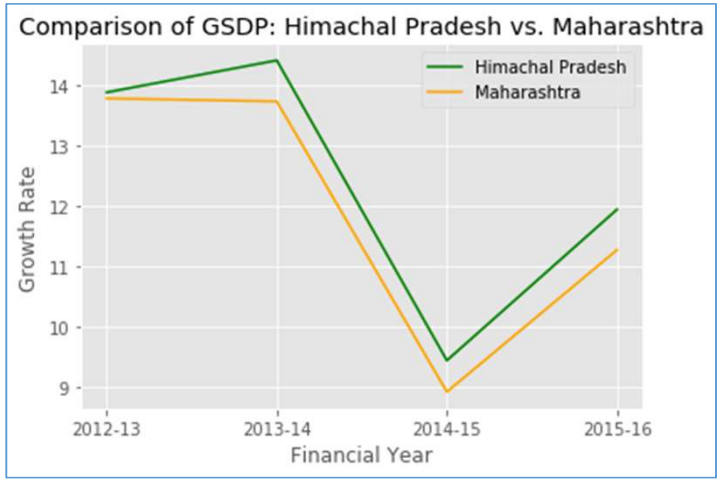
A positive correlation between the growth rates of the state is indicated with darker green and as it gets lighter the correlation tends to reduce and become negative.

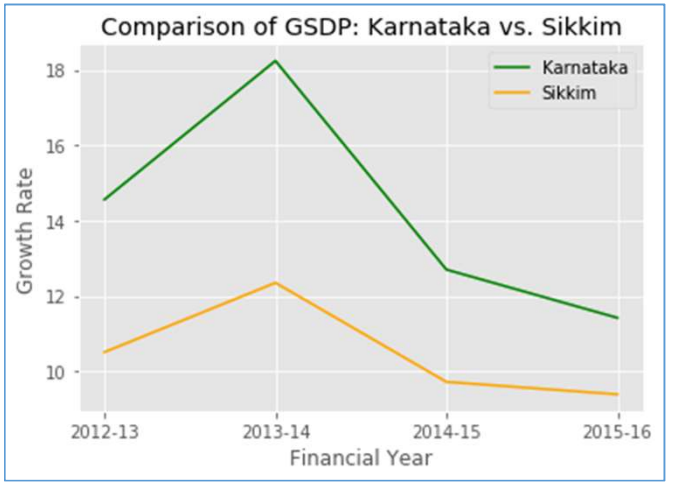


Correlation between States - An Interesting Study

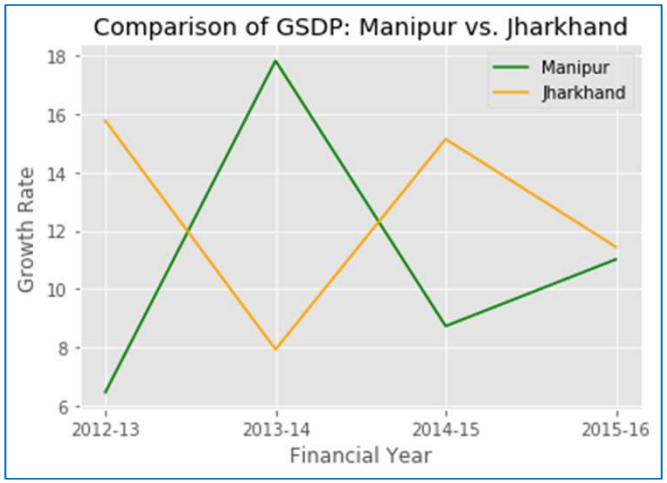
Positive Correlation

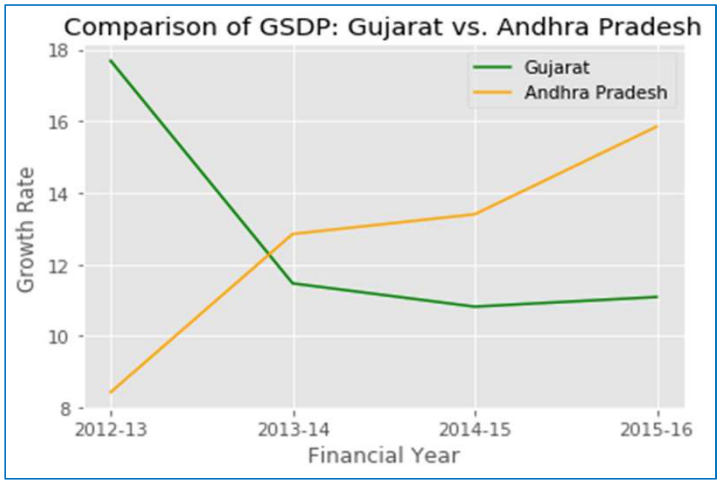


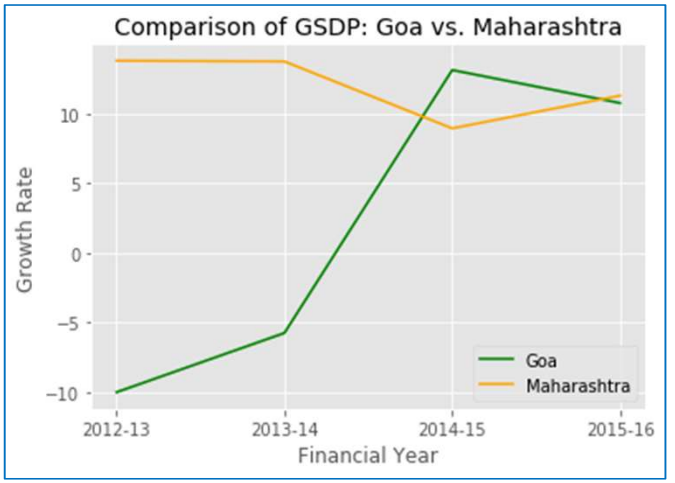




Negative Correlation





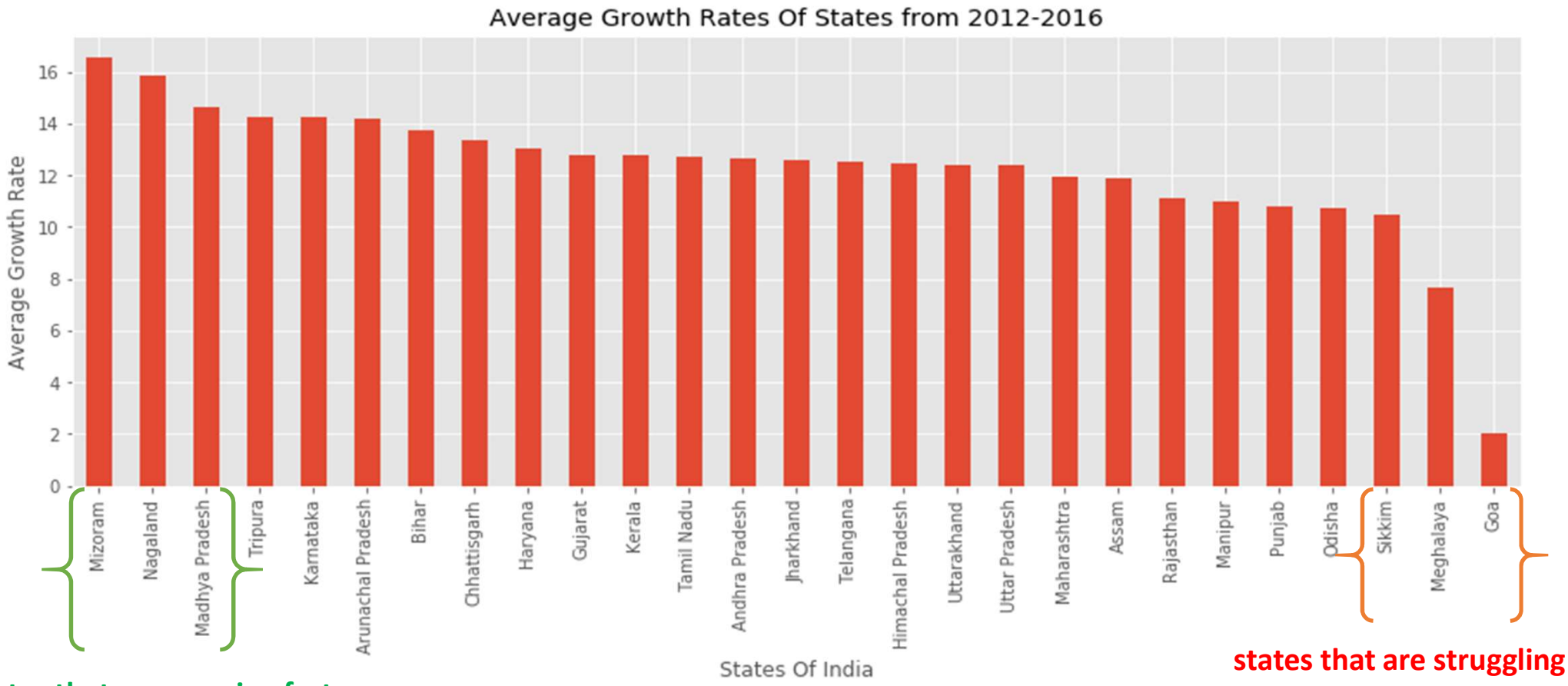


Studying the Correlation

Code included to study the trend in two different states and see how they are related. It will be interesting to study why these correlation exists? However, correlation does not imply causation. We need to see whether there are any third variable that is causing the correlation.

Growth Rate Comparison

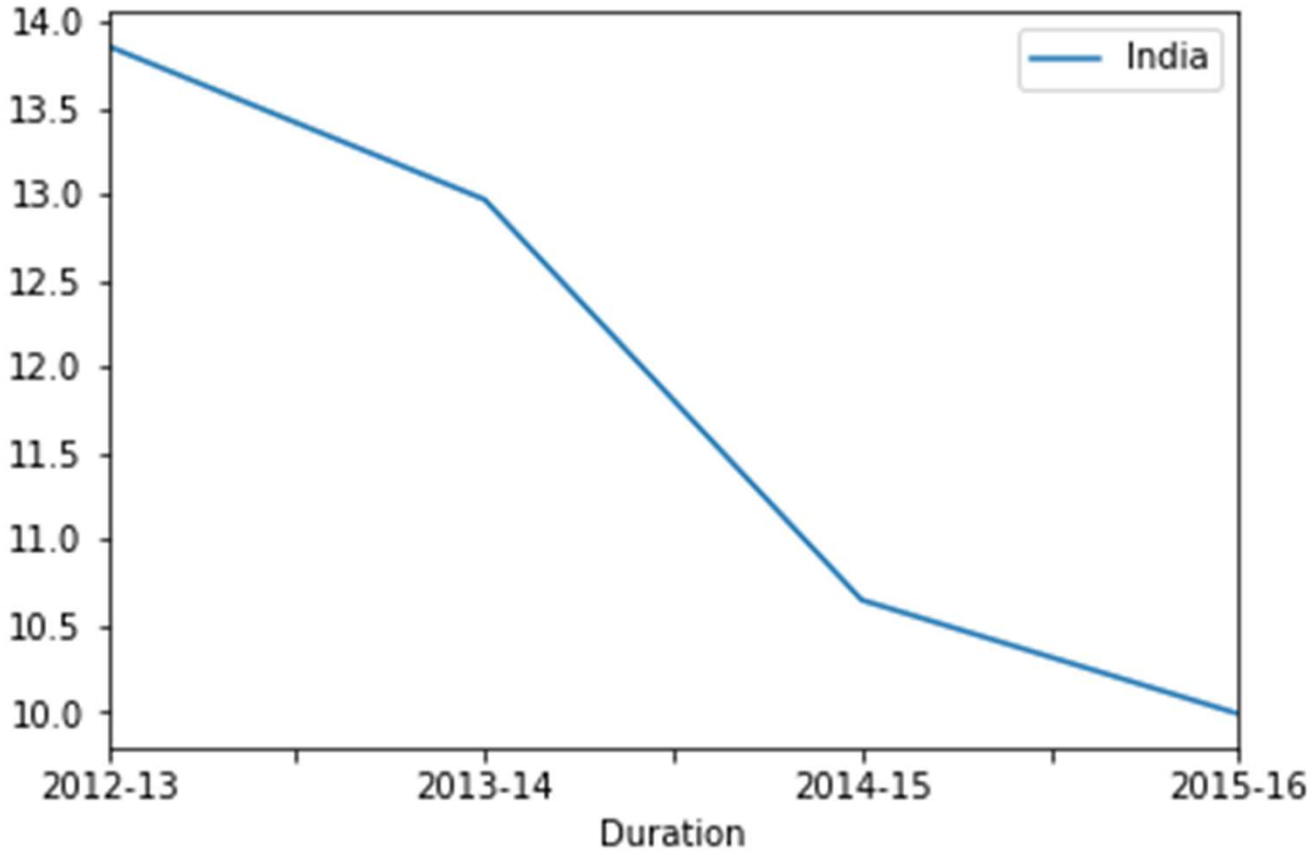
Caution: This result may differ from one person to another due to the way the missing values for year 2015-16 are treated. Further this is based on the growth rate, not on the exact value of GDP.



states that are growing fast

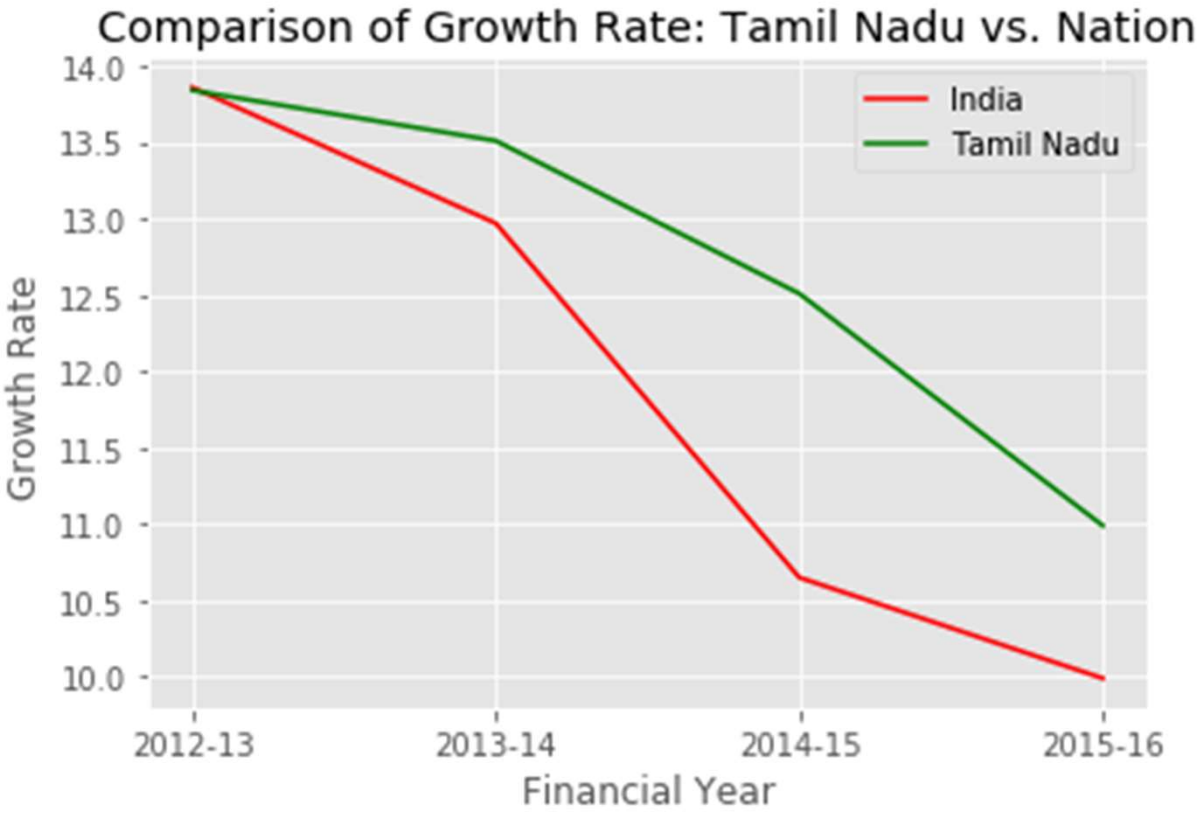
states that are struggling with their growth

Nation’s Growth Rate



We see that the growth rate is consistently declining across the country. So it is recommended to take up further studies to boost the overall performance of all States to improve the GDP of the country.

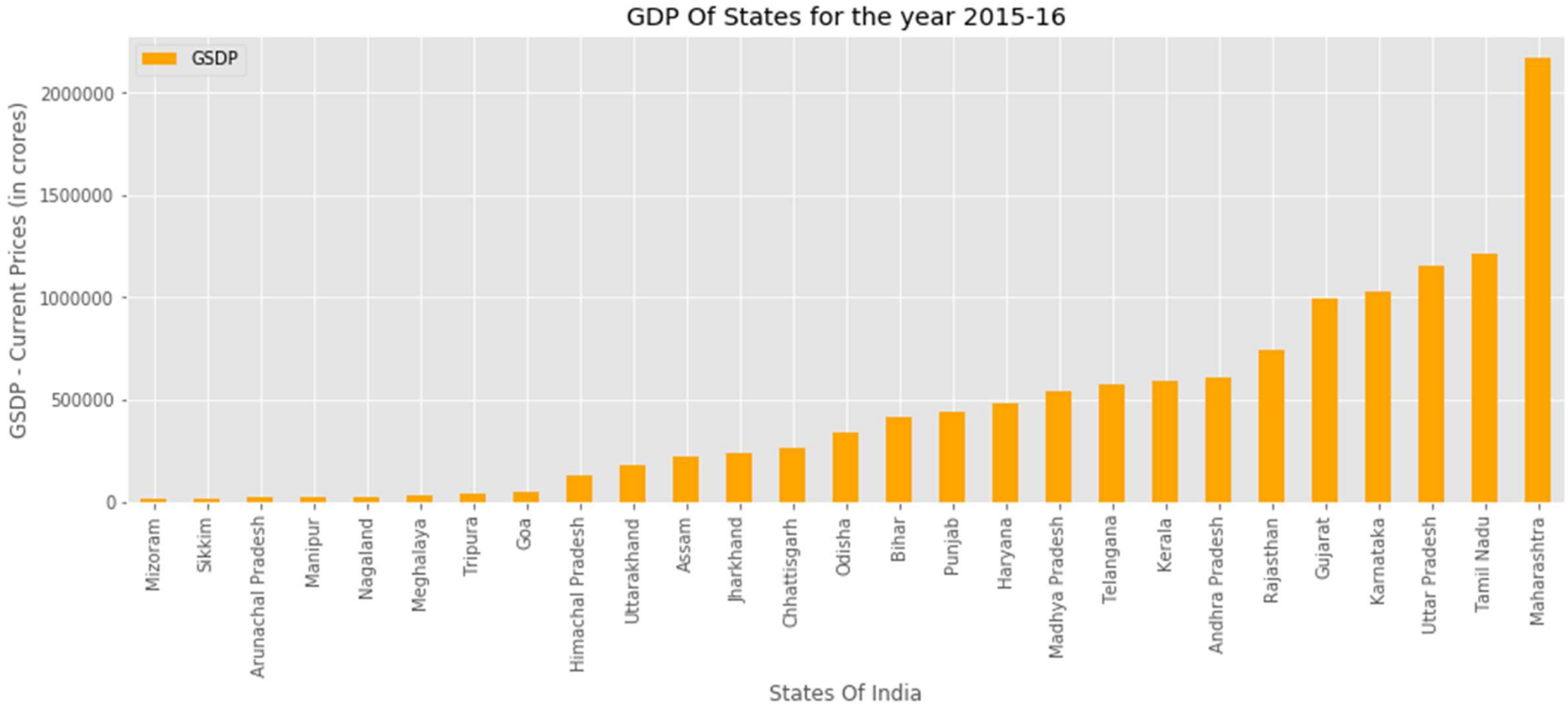
Nation vs. Home State (Tamil Nadu)



As we see in the case of my home state, many states in the country are lagging in growth rate, thus contributing to the overall reduction in growth rate. This is a matter of concern and need to be addressed.

Gross State Domestic Product

We have just seen the trends in the growth rate. To get more insights, we need to study this along with the GSDP.

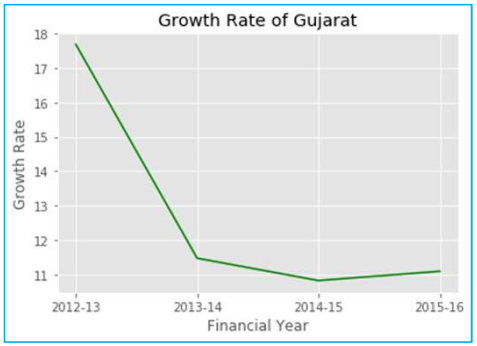


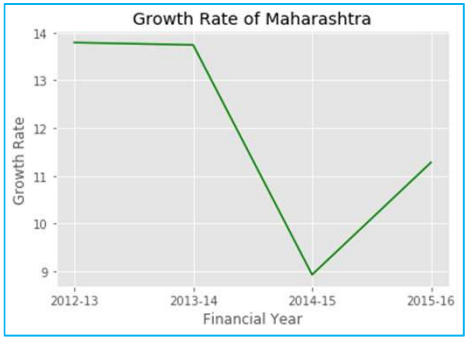
What does the Chart Reveal?

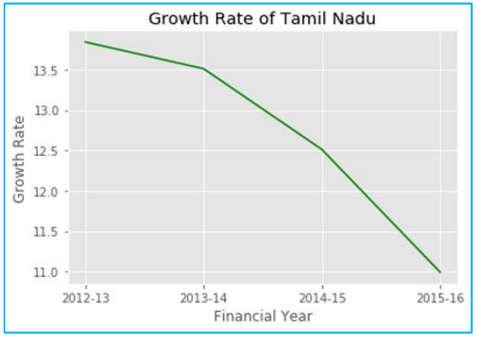
Top 5 states based on GDP :

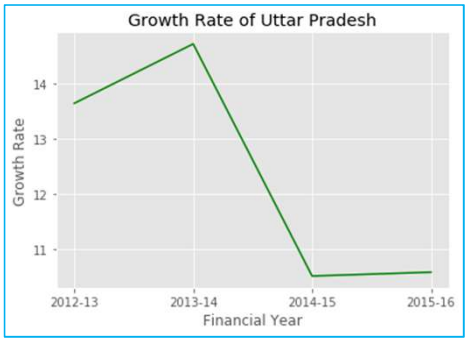
- Maharashtra
- Tamil Nadu
- Uttar Pradesh
- Karnataka
- Gujarat

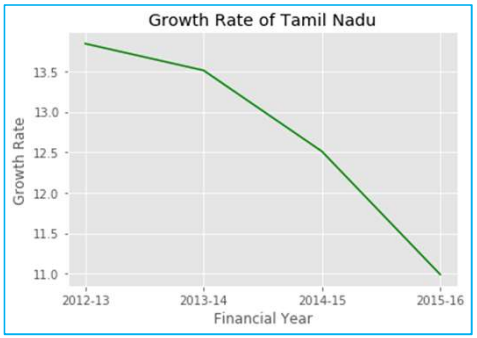
The growth rates of these major contributors is declining.









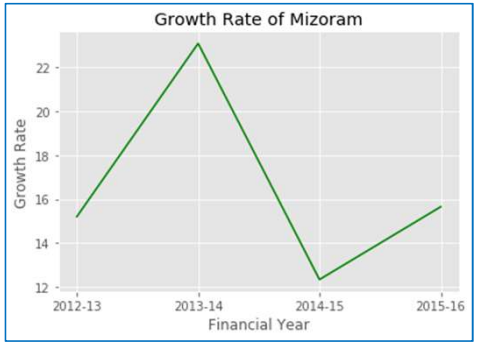


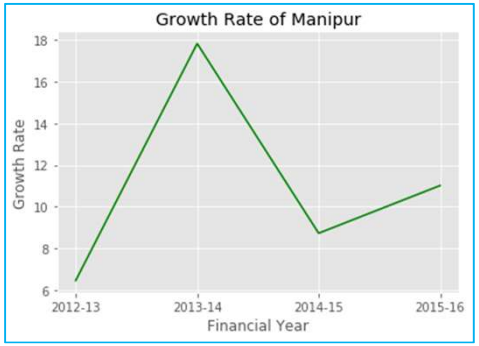
What does the Chart Reveal?

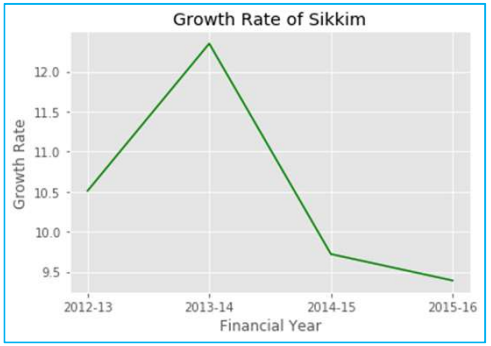
Bottom 5 states based on GDP:

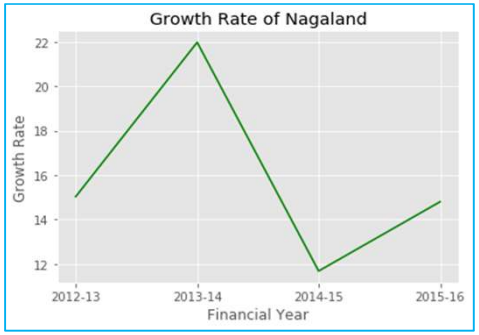
- Mizoram
- Sikkim
- Arunachal Pradesh
- Manipur
- Nagaland

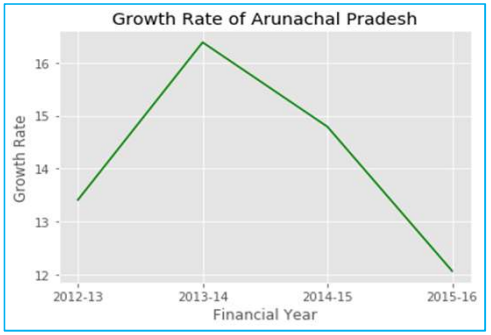
The growth rates except for Sikkim and Arunachal Pradesh has increased in 2015-16. We have to wait and observe in subsequent years.











A note on the Visualizations used in this section

- **Heat Map:** When dealing with large volumes of data, the colours in heat map are easy to distinguish than the numbers. Thus we get a more generalized view of the numeric values. We used heat map in this assignment to visualize the correlation between the two states.
- **Line Plots:** Suitable for any time series data to study the trend.
- **Regression Line:** Best fit line is used to plot the trend with the help of a number of independent variables. This also helps to predict the future.
- **Bar Graphs:** Can be used to visually compare a measure between different categories. Here we used it to depict the numeric variables GSDP and Growth rate across different states.

GDP Assignment

Part 1 B

Data Sourcing

We studied the GSDP and Growth Rate of the States and the Country. To deep dive into this, we sourced the GDP data for the individual states with contribution from different sectors and sub sectors. Since the Union Territories are governed directly by Central Government, we consider only the data for the different states in the country.

Understanding the Data

The contributions from Primary (Agriculture), Secondary (Industry) and Tertiary (Services) together gives the GSVA. These sectors are further divided into sub sectors.

GSDP = GSVA + Taxes on Products - Subsidies on Products

Per Capita GDP = GSDP / Population of the State

The files contain the data for multiple years for a specific state. But, we will focus on 2014-15 data for our analysis.

Sectors & Sub-sectors

Sectors	Sub Sectors
Primary (Agriculture)	Agriculture, forestry and fishing
	Mining and quarrying
Secondary (Industry)	Manufacturing
	Electricity, gas, water supply & other utility services
	Construction
Tertiary (Services)	Trade, repair, hotels and restaurants
	Transport, storage, communication & services related to broadcasting
	Financial services
	Real estate, ownership of dwelling & professional services
	Public administration
	Other services

Data Quality Issues

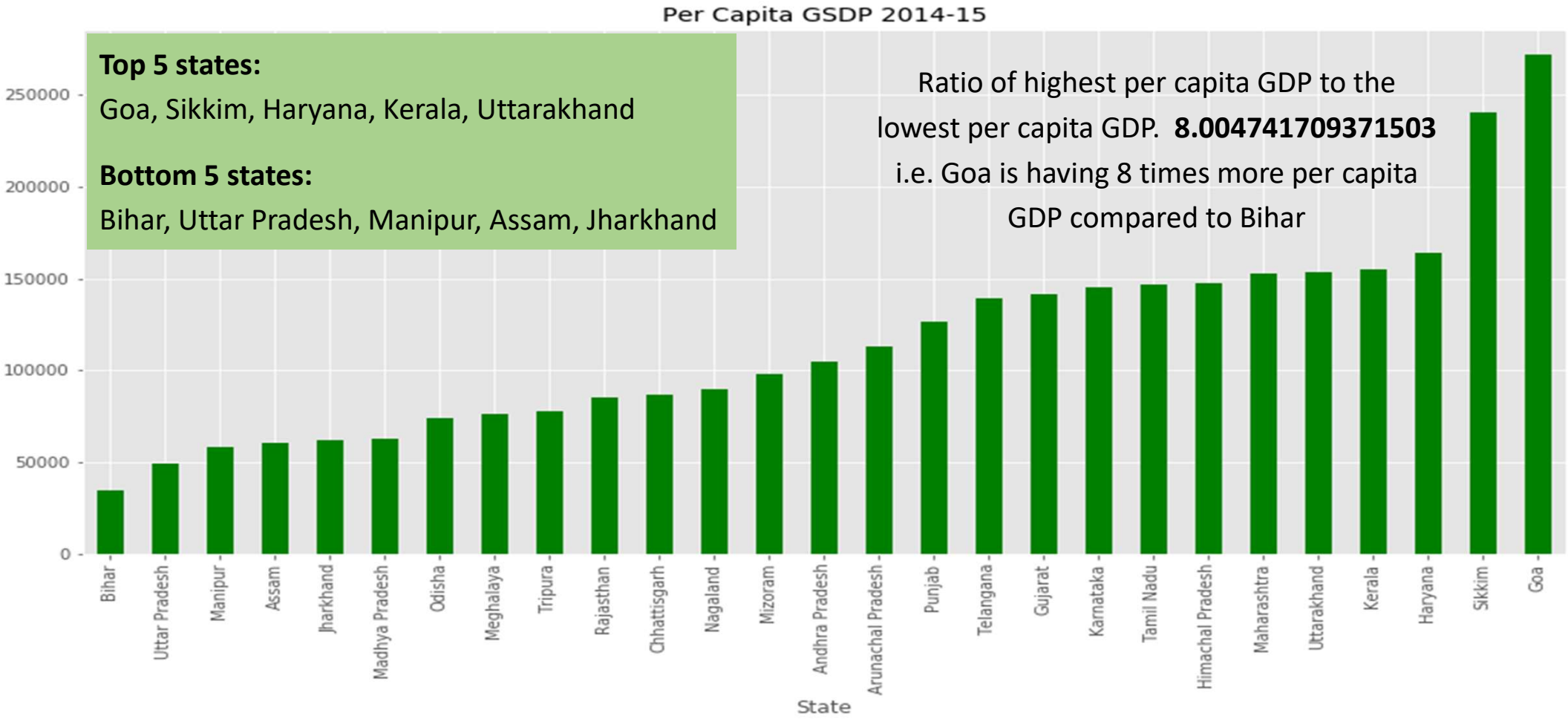
We have to filter out the Union Territories.

We have to load only the data for 2014-15 for our analysis.

Data from the individual files are consolidated in a single data frame.

In some of the cases the Item field is having trailing spaces or unwanted characters like asterisk (*) or dot (.) which need to be stripped out before further analysis.

GDP Per Capita for all States (2014-15)



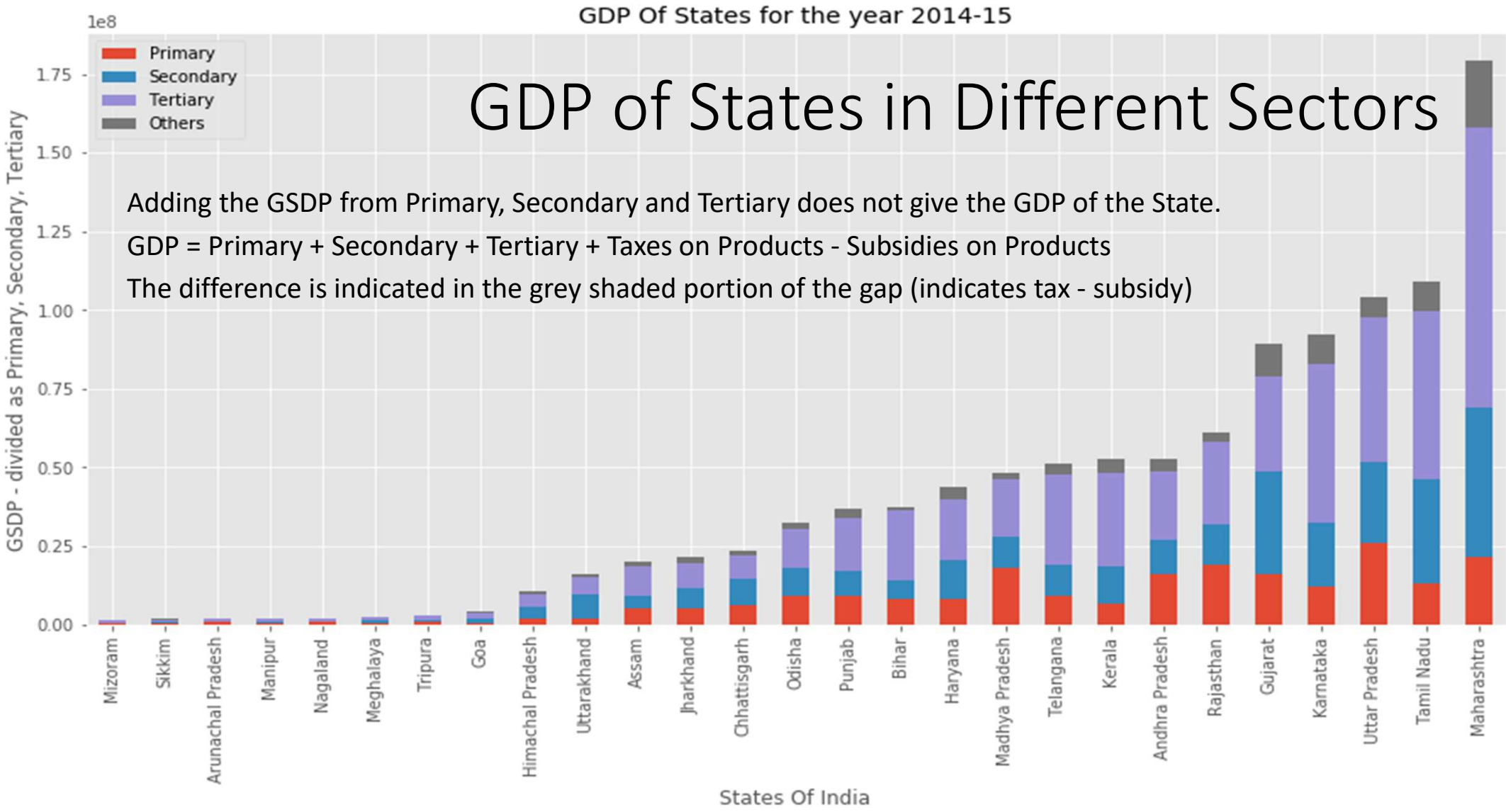
Top 5 states:
Goa, Sikkim, Haryana, Kerala, Uttarakhand

Bottom 5 states:
Bihar, Uttar Pradesh, Manipur, Assam, Jharkhand

Ratio of highest per capita GDP to the lowest per capita GDP. **8.004741709371503**
i.e. Goa is having 8 times more per capita GDP compared to Bihar

We need to filter only rows containing GDP per capita (computed as total GSDP / Population of the state) from our dataset.

GDP of States in Different Sectors

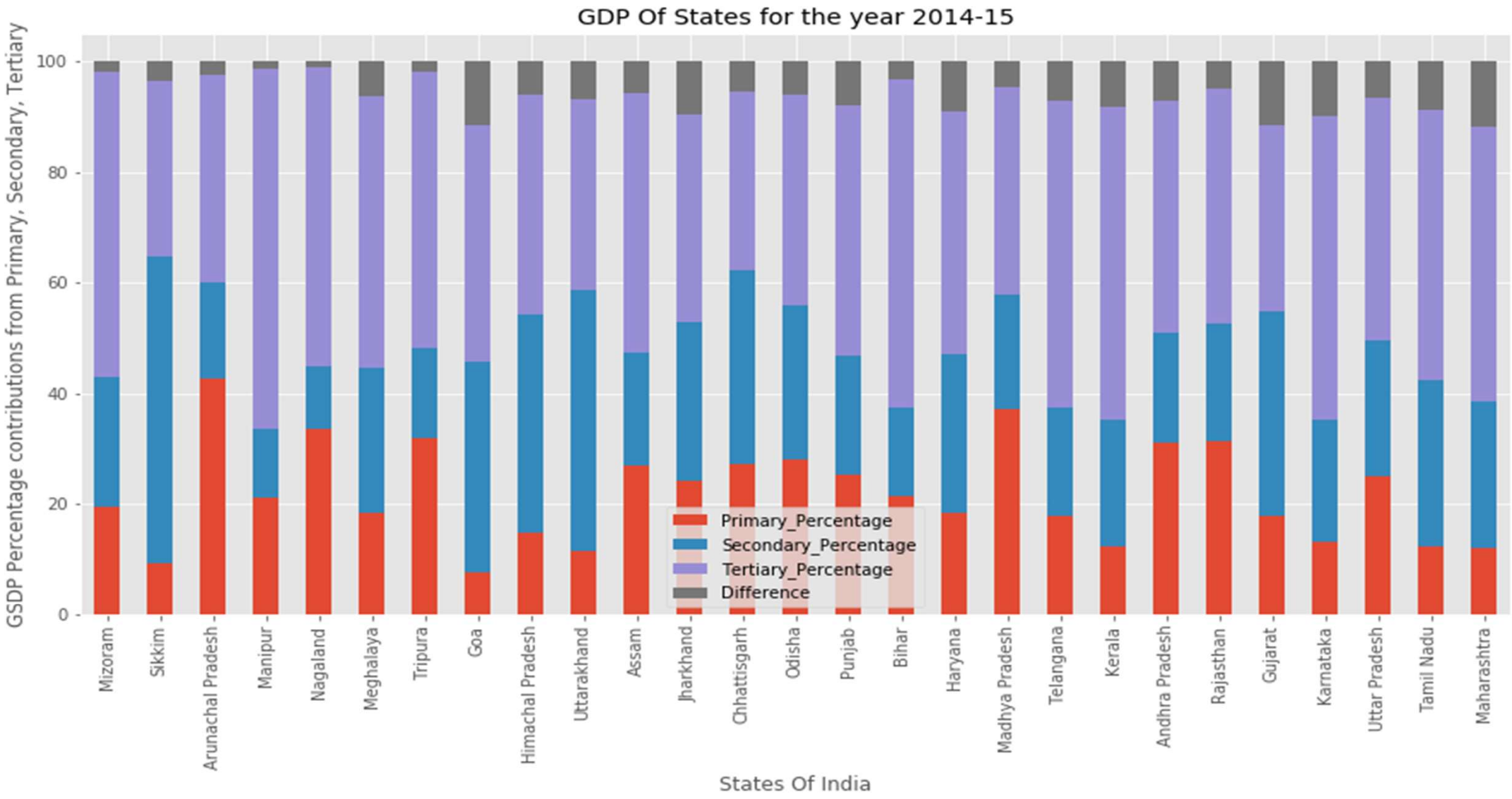


Adding the GSDP from Primary, Secondary and Tertiary does not give the GDP of the State.

GDP = Primary + Secondary + Tertiary + Taxes on Products - Subsidies on Products

The difference is indicated in the grey shaded portion of the gap (indicates tax - subsidy)

Visuals depiction of contribution from different sectors to the GSDP of the State using a stacked bar.



Visuals depiction of % contribution from different sectors to the GSDP of the State using a stacked bar.

Categorizing the States

For further analysis we categorise the states into four groups based on the GDP per capita. This will simplify the subsequent analysis, as otherwise, comparing the data of all the states would become quite exhaustive. We have to **prepare the data frame for further analysis on categories and sub-sectors**.

	Quantile	GDP Per Capita
C4	0-20	> 0 and <= 65187
C3	20-50	> 65187 and <= 104977
C2	50-85	> 104978 and <= 153246
C1	85-100	> 153247 and <= 271793

Categorizing the States

C1	C2	C3	C4
Goa	Uttarakhand	Andhra Pradesh	Madhya Pradesh
Sikkim	Maharashtra	Mizoram	Jharkhand
Haryana	Himachal Pradesh	Nagaland	Assam
Kerala	Tamil Nadu	Chhattisgarh	Manipur
	Karnataka	Rajasthan	Uttar Pradesh
	Gujarat	Tripura	Bihar
	Telangana	Meghalaya	
	Punjab	Odisha	
	Arunachal Pradesh		

Comparing the GSDP

	Sub Sector	GSDPC1	GSDPC2	GSDPC3	GSDPC4
0	Real estate, ownership of dwelling & professio...	14740245.0	92121446.0	16224118.0	24177534.0
1	Agriculture, forestry and fishing	14391809.0	75209022.0	42226888.0	56735044.0
2	Trade, repair, hotels and restaurants	13995159.0	61238862.0	17245309.0	27484595.0
3	Manufacturing	13758793.0	109196530.0	22038331.0	24987032.0
4	Construction	11264451.0	40653562.0	15707921.0	22775948.0
5	Other services	8059922.0	36253657.0	12815417.0	15859015.0
6	Transport, storage, communication & services r...	6818560.0	33749808.0	12231484.0	16191800.0
7	Financial services	3936489.0	36296642.0	5766226.0	7684498.0
8	Public administration	3571292.0	18567815.0	7927173.0	13486630.0
9	Electricity, gas, water supply & other utility...	2000998.0	13823378.0	4604774.0	4310264.0
10	Mining and quarrying	588961.0	10373346.0	10835771.0	6096419.0

Comparing the GSDP Percentage

	Sub Sector	PercentageC1	PercentageC2	PercentageC3	PercentageC4
0	Real estate, ownership of dwelling & professio...	15.83	17.46	9.68	11.00
1	Agriculture, forestry and fishing	15.45	14.26	25.19	25.81
2	Trade, repair, hotels and restaurants	15.03	11.61	10.29	12.51
3	Manufacturing	14.77	20.70	13.15	11.37
4	Construction	12.10	7.71	9.37	10.36
5	Other services	8.65	6.87	7.65	7.22
6	Transport, storage, communication & services r...	7.32	6.40	7.30	7.37
7	Financial services	4.23	6.88	3.44	3.50
8	Public administration	3.83	3.52	4.73	6.14
9	Electricity, gas, water supply & other utility...	2.15	2.62	2.75	1.96
10	Mining and quarrying	0.63	1.97	6.46	2.77

Category - Subsector-wise GSDP

Category	Sub Sector	GSDP
C1	Real estate, ownership of dwelling & professional services	14740245
	Agriculture, forestry and fishing	14391809
	Trade, repair, hotels and restaurants	13995159
	Manufacturing	13758793
	Construction	11264451
	Other services	8059922
	Transport, storage, communication & services related to broadcasting	6818560
	Financial services	3936489
	Public administration	3571292
	Electricity, gas, water supply & other utility services	2000998
	Mining and quarrying	588961

Category	Sub Sector	GSDP
C2	Manufacturing	109196530
	Real estate, ownership of dwelling & professional services	92121446
	Agriculture, forestry and fishing	75209022
	Trade, repair, hotels and restaurants	61238862
	Construction	40653562
	Financial services	36296642
	Other services	36253657
	Transport, storage, communication & services related to broadcasting	33749808
	Public administration	18567815
	Electricity, gas, water supply & other utility services	13823378
	Mining and quarrying	10373346

Category	Sub Sector	GSDP
C3	Agriculture, forestry and fishing	42226888
	Manufacturing	22038331
	Trade, repair, hotels and restaurants	17245309
	Real estate, ownership of dwelling & professional services	16224118
	Construction	15707921
	Other services	12815417
	Transport, storage, communication & services related to broadcasting	12231484
	Mining and quarrying	10835771
	Public administration	7927173
	Financial services	5766226
	Electricity, gas, water supply & other utility services	4604774

Category	Sub Sector	GSDP
C4	Agriculture, forestry and fishing	56735044
	Trade, repair, hotels and restaurants	27484595
	Manufacturing	24987032
	Real estate, ownership of dwelling & professional services	24177534
	Construction	22775948
	Transport, storage, communication & services related to broadcasting	16191800
	Other services	15859015
	Public administration	13486630
	Financial services	7684498
	Mining and quarrying	6096419
	Electricity, gas, water supply & other utility services	4310264

C1

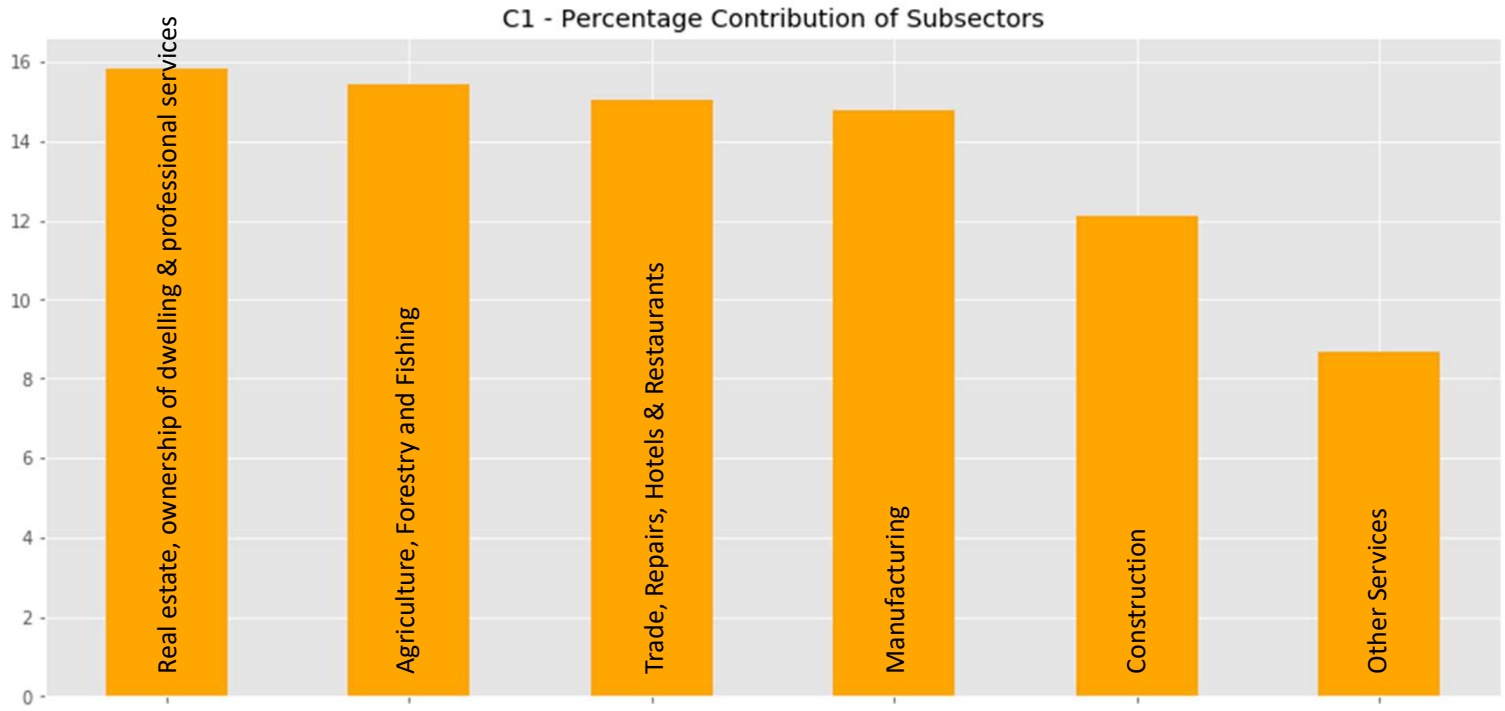
States: **Goa, Sikkim, Haryana, Kerala**

Observations & Insights

Almost the top 4 sub sectors are contributing somewhat equal percentage. Not dependent on single sub-sector for GSDP.

Recommendations

Service sector is booming here. Industries are also equally contributing. Mining & Quarrying and Financial services can be focused on to improve the GDP. Public Administration is another area to improve.



Sub Sector	GSDP	Cumulative%	Percentage
Real estate, ownership of dwelling & professional services	14740245.0	15.83	15.83
Agriculture, forestry and fishing	14391809.0	31.28	15.45
Trade, repair, hotels and restaurants	13995159.0	46.31	15.03
Manufacturing	13758793.0	61.08	14.77
Construction	11264451.0	73.18	12.10
Other services	8059922.0	81.84	8.65

C2

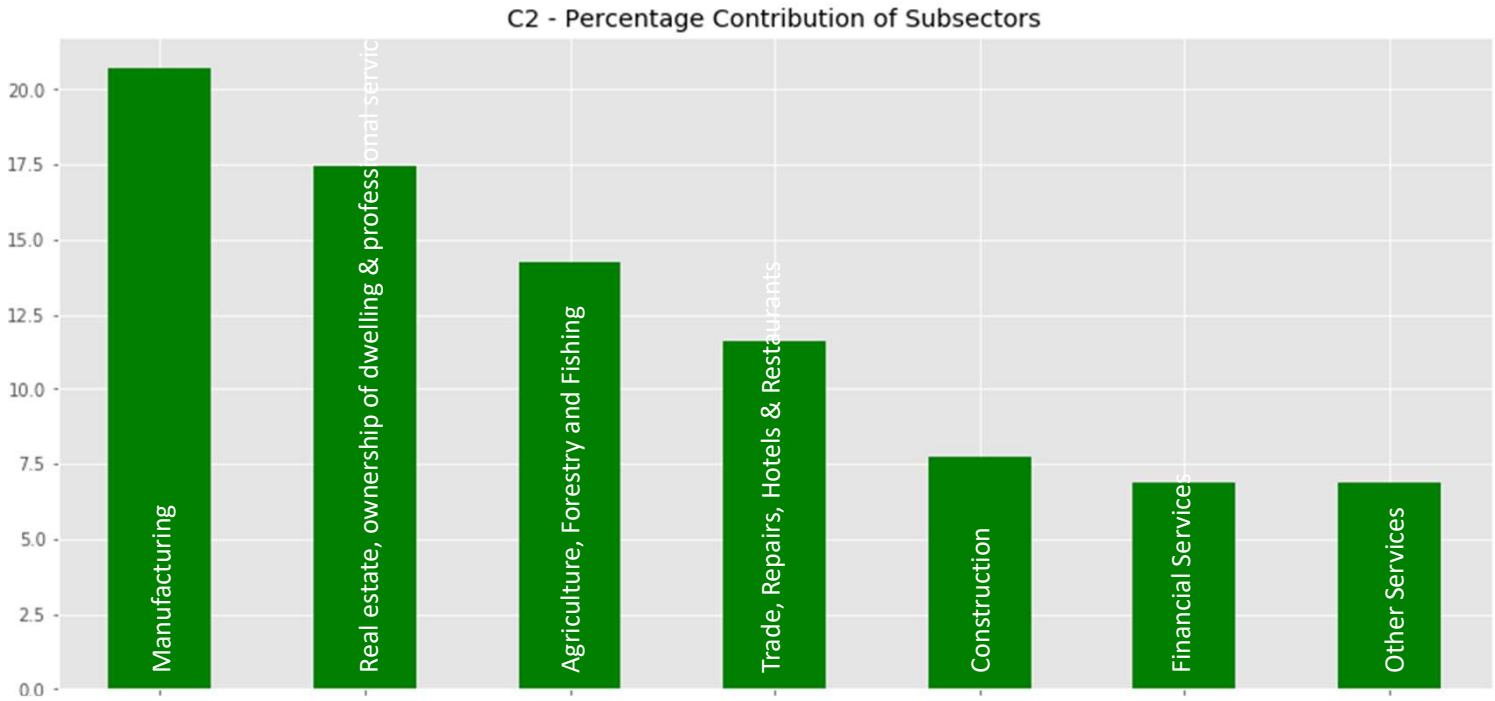
States: Uttarakhand, Maharashtra, Himachal Pradesh, Tamil Nadu, Karnataka, Gujarat, Telangana, Punjab, Arunachal Pradesh

Observations & Insights

Manufacturing is the top contributor in C2. All 3 sectors (primary, secondary, tertiary) are contributing to growth.

Recommendations

Construction and Other Services can be the focus for further improvement.



Sub Sector	GSDP	Cumulative%
Manufacturing	109196530.0	20.70
Real estate, ownership of dwelling & professional services	92121446.0	38.17
Agriculture, forestry and fishing	75209022.0	52.42
Trade, repair, hotels and restaurants	61238862.0	64.03
Construction	40653562.0	71.74
Financial services	36296642.0	78.62
Other services	36253657.0	85.49

C3

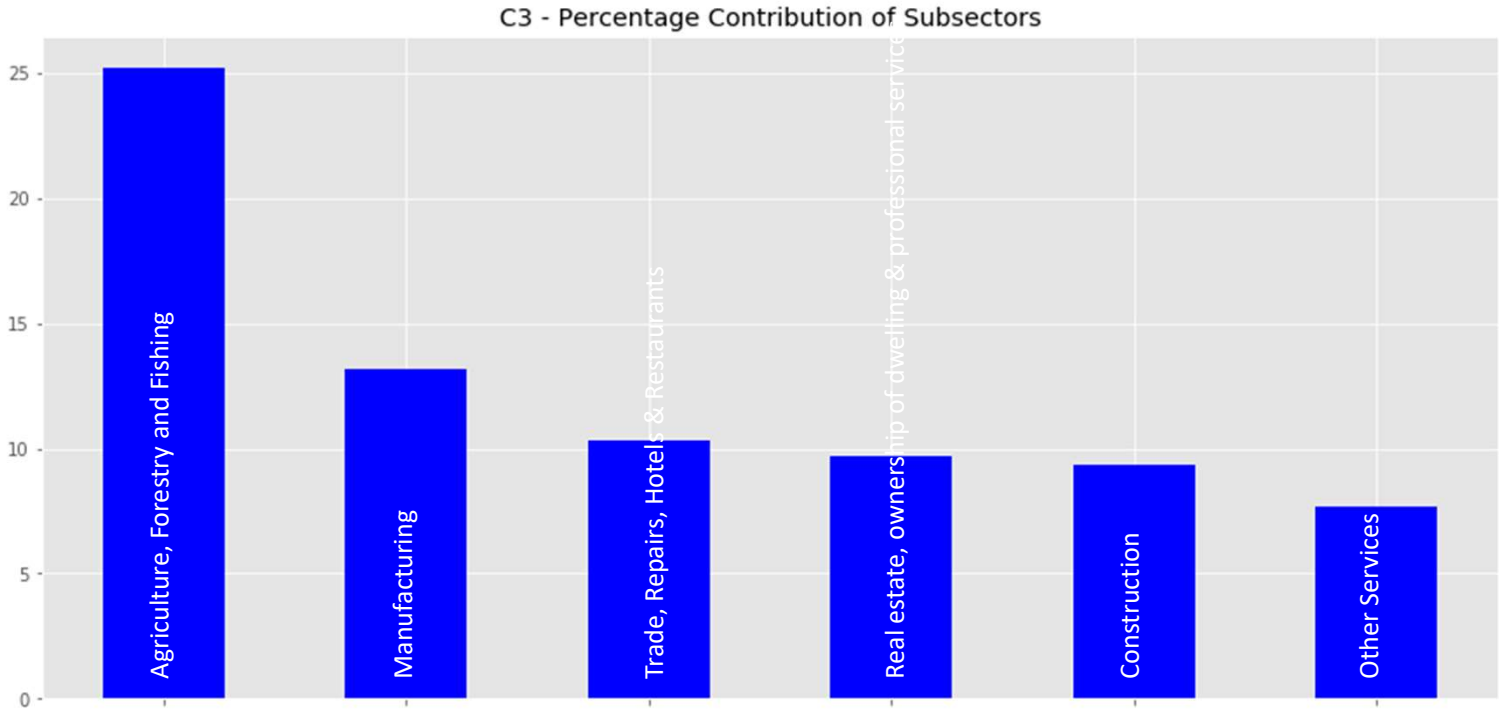
States: Andhra Pradesh, Mizoram, Nagaland, Chhattisgarh, Rajasthan, Tripura, Meghalaya, Odisha

Observations & Insights

Dependency is on Agriculture in C3 states. 25% of GSDP is from Agriculture. Not much growth in industry and services.

Recommendations

The focus should be on industrial sectors and services. There is also good potential in manufacturing and construction. Real Estate also can grow to improve the GDP.



Sub Sector	GSDP	Cumulative%
Agriculture, forestry and fishing	42226888.0	25.19
Manufacturing	22038331.0	38.34
Trade, repair, hotels and restaurants	17245309.0	48.63
Real estate, ownership of dwelling & professional services	16224118.0	58.31
Construction	15707921.0	67.68
Other services	12815417.0	75.32
Transport, storage, communication & services related to broadcasting	12231484.0	82.62

C4

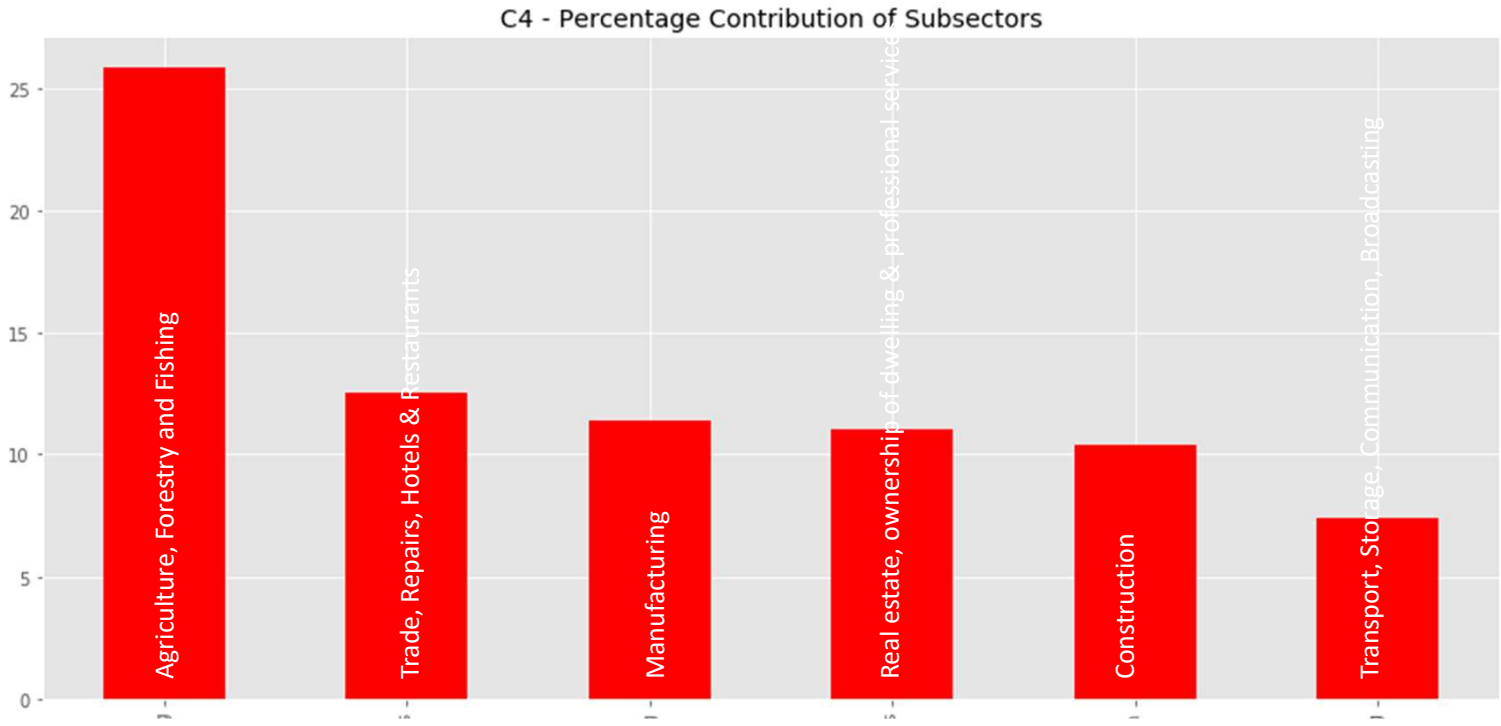
States: Madhya Pradesh, Jharkhand, Assam, Manipur, Uttar Pradesh, Bihar

Observations & Insights

Dependency is on Agriculture in C4 states. 25% of GSDP is from Agriculture. Not much growth in industry and services.

Recommendations

The focus should be on industrial sectors and services. There is also good potential in manufacturing and construction. Real Estate also can grow to improve the GDP. Unlike other categories, Transport is a contribution in top 6.



Sub Sector	GSDP	Cumulative%
Agriculture, forestry and fishing	56735044.0	25.81
Trade, repair, hotels and restaurants	27484595.0	38.32
Manufacturing	24987032.0	49.69
Real estate, ownership of dwelling & professional services	24177534.0	60.69
Construction	22775948.0	71.05
Transport, storage, communication & services related to broadcasting	16191800.0	78.42
Other services	15859015.0	85.63

Other Insights - Top 5 Sub-sectors

- Agriculture, forestry and fishing (primary)
- Manufacturing (secondary)
- Construction (secondary)
- Real estate, ownership of dwelling & professional services (tertiary)
- Trade, repair, hotels and restaurants (tertiary)

These 5 sub-sectors contribute to 65% of the total GDP of the nation.

	C1	C2	C3	C4	Total
Agriculture, forestry and fishing	14391809	75209022	42226888	56735044	188562763
Manufacturing	13758793	109196530	22038331	24987032	169980686
Construction	11264451	40653562	15707921	22775948	90401882
Real estate, ownership of dwelling & professional services	14740245	92121446	16224118	24177534	147263343
Trade, repair, hotels and restaurants	13995159	61238862	17245309	27484595	119963925
Total	68150457	378419422	113442567	156160153	**716172599**
All India Total GDP for 2014-15					**1099529582**

Other Insights

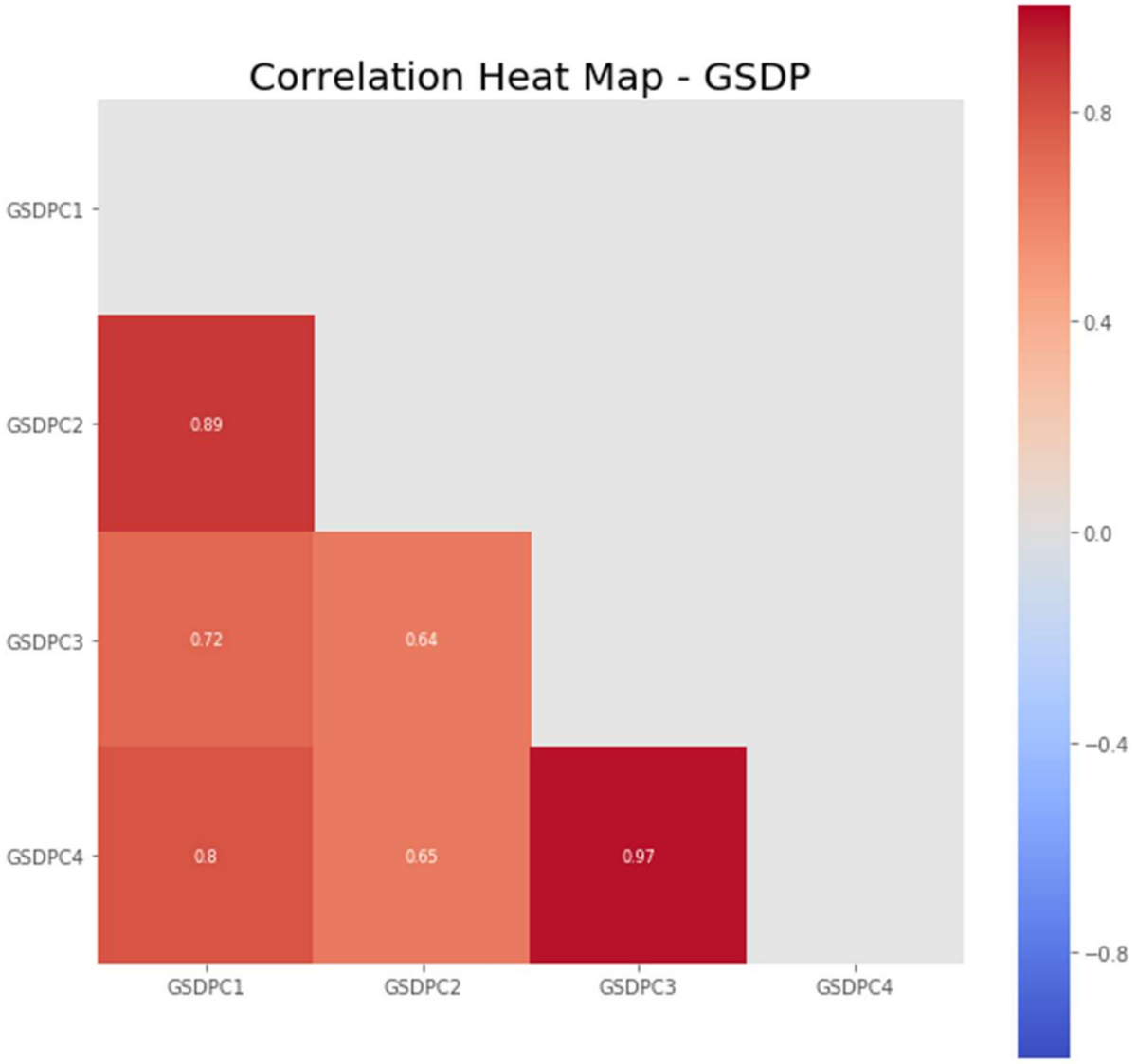
- In C1 the subsector contributions are balanced very well.
- Agriculture is still the primary contributor to GDP of the nation.
- States in C3 and C4 contribute through Agriculture.
- Manufacturing is the top contributor in C2, and Real Estate in C1.
- We can improve GDP by focusing on Services and Industry sectors, but this will require educated and skilled labour.

Correlation

GSDP-C3 & GSDP-C4 are strongly correlated.

GSDP-C1 & GSDP-C2 are strongly correlated.

The other correlations are not that strong.



Recommendations

- C1: Focus can be on Mining and Financial Services.
- C2: Mining and Construction need to be focused upon for growth. Other C2 states are doing well in all the sub sectors.
- C3: By focusing on Manufacturing and Real Estate the states in C3 can contribute much more towards the GDP. Financial Services is another potential domain.
- C4: Industrial sectors and Services to be focused on, esp. manufacturing and real estate can help growth of these states.
- C2, C3, C4 can try to balance their contribution in different sub sectors.

A note on the Visualization

- **Bar Chart:** Can be used to visually compare a measure between different categories. Here we used it to depict the numeric variables GDP Per Capita across different states.
- **Stacked Bar Chart:** Helpful in showing the relative sizes between different categories, especially a stacked percentage bar.

GDP Assignment

Part 2 - GDP and Education Drop Out Rates

Understanding the Dataset

- The dataset provides the drop out rate in different states at different levels of education viz. Primary, Upper Primary, Secondary, Senior Secondary. Data is available for 2012-13, 2013-14 and 2014-15.

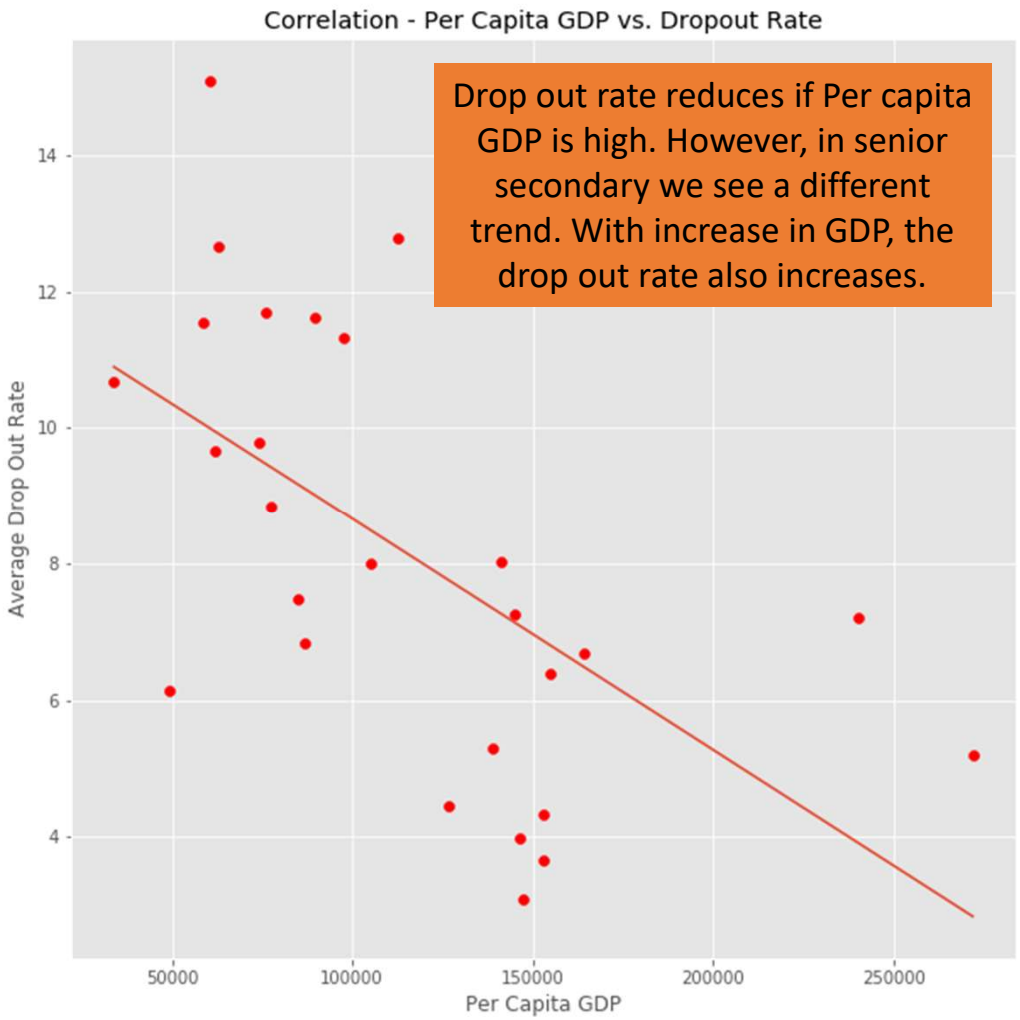
Data Quality Issues

- Spelling mistakes in state names (Chhatisgarh, Uttarakhand)
- Created data frame with only the state required for analysis
- Many values were null (taken average drop out rate for 2014-15)
- Column names: Primary - 2014-2015 and Primary - 2014-2015.1
- Column Primary - 2013-2014 is missing. So we assume that Primary - 2014-2015 is the data for Primary - 2013-2014 and Primary - 2014-2015.1 is Primary - 2014-2015.

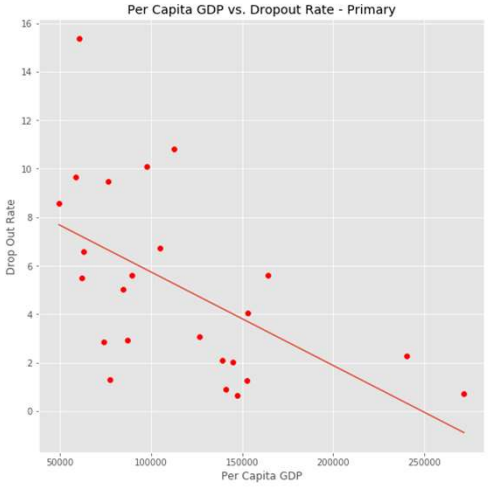
Data Exploration

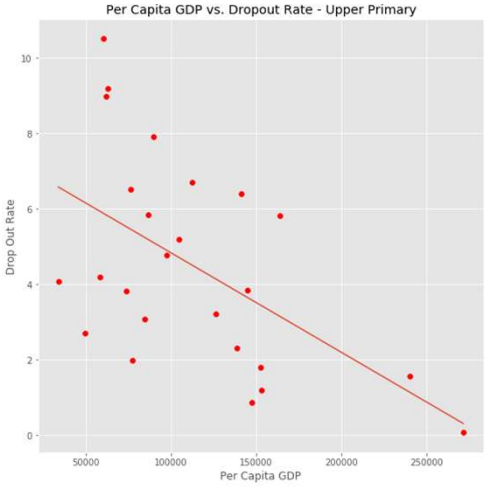
- We used this data to explore:
  - Is there any correlation between GSDP and Drop Out Rates
  - Is there any correlation between Sector-wise contribution and Drop Out Rates
  - Is there any correlation between population and Drop Out Rates

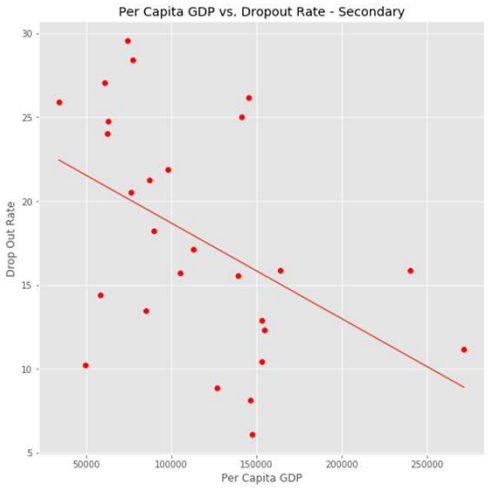
Per Capita GDP vs. Drop Out Rates

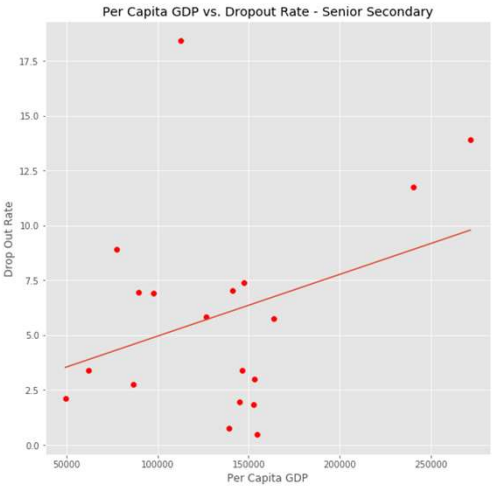


Drop out rate reduces if Per capita GDP is high. However, in senior secondary we see a different trend. With increase in GDP, the drop out rate also increases.

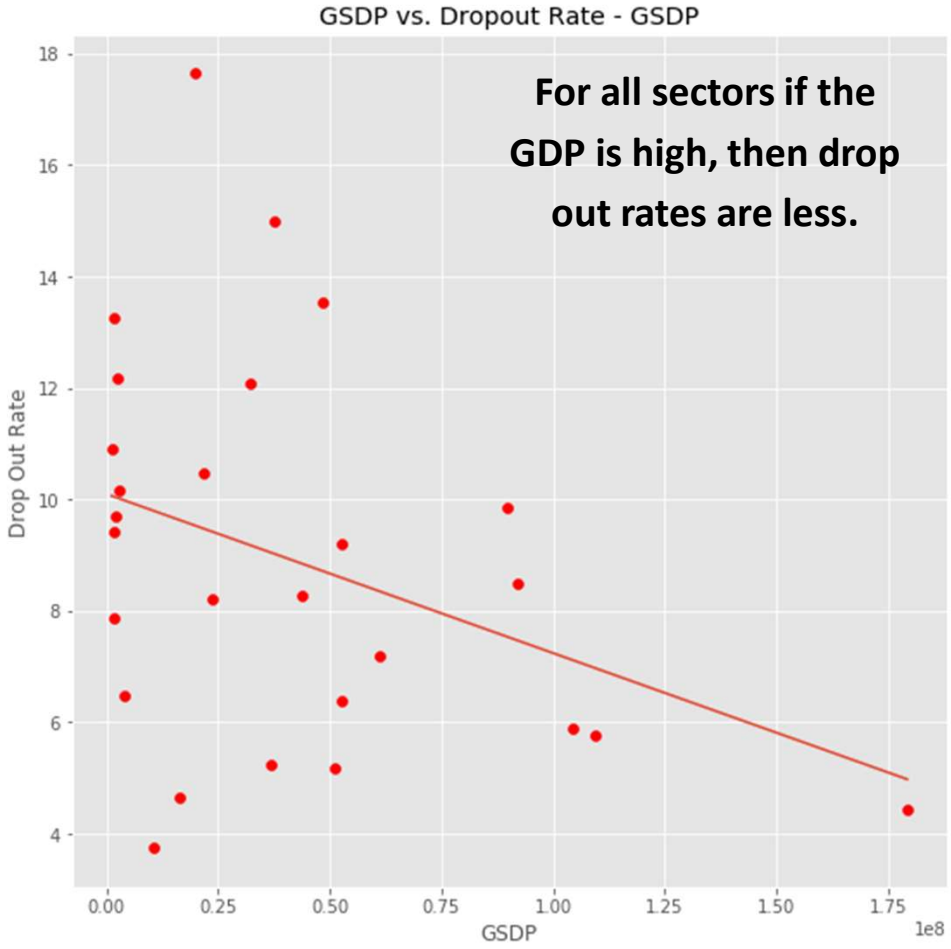


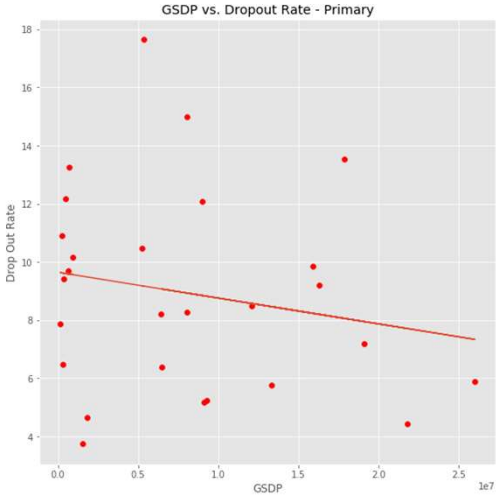


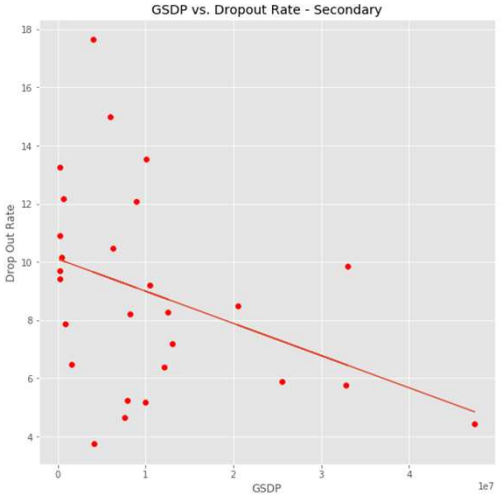


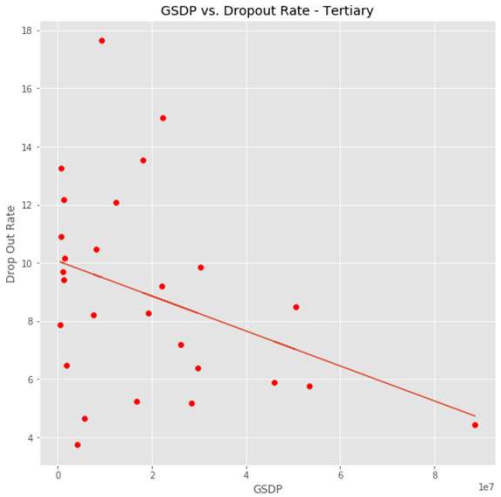


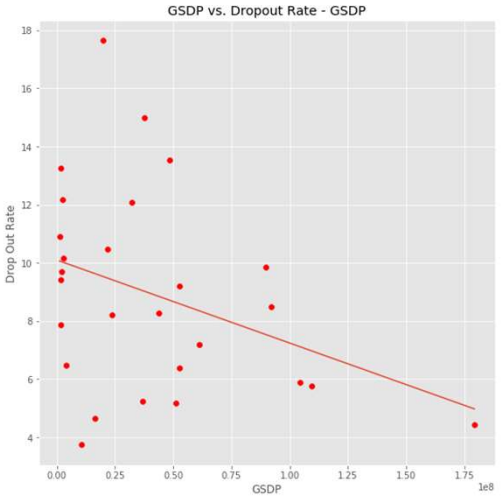
Sector GDP vs. Drop Out Rates





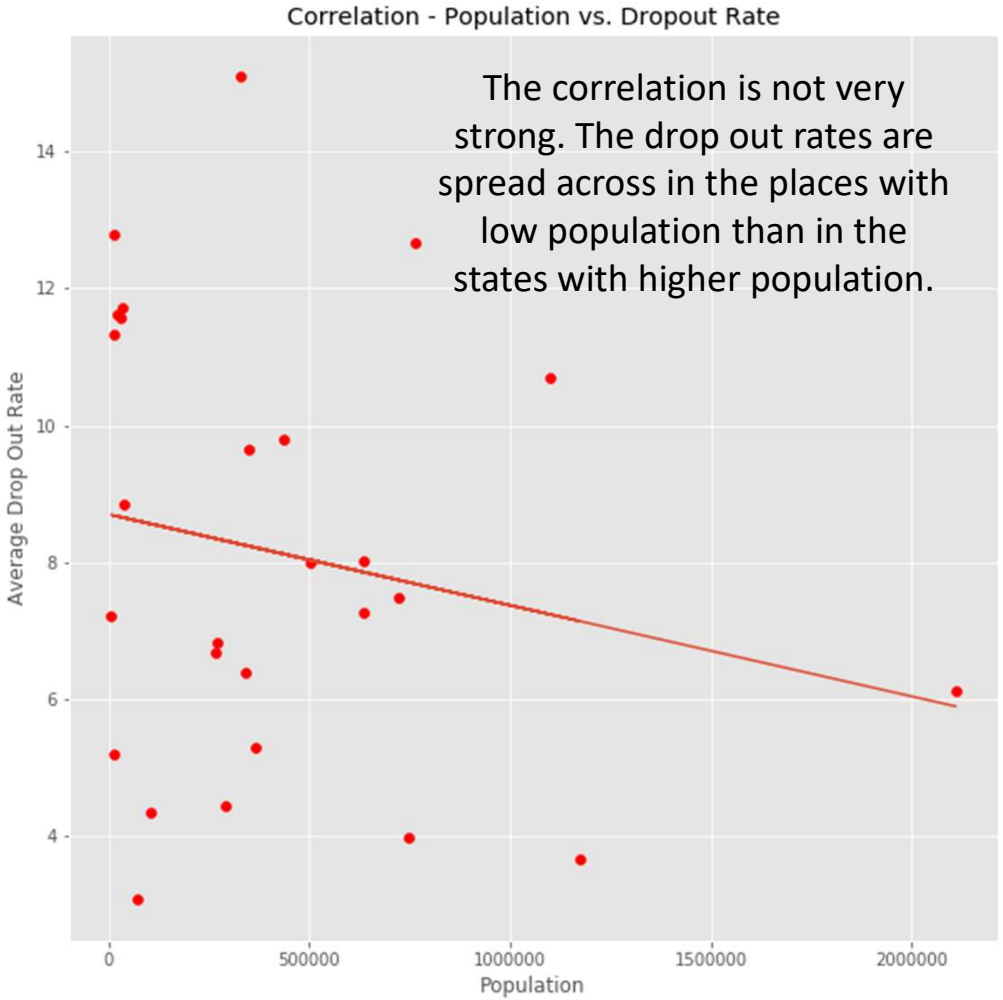


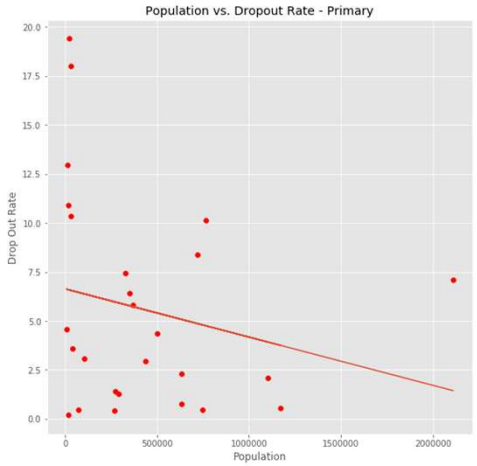


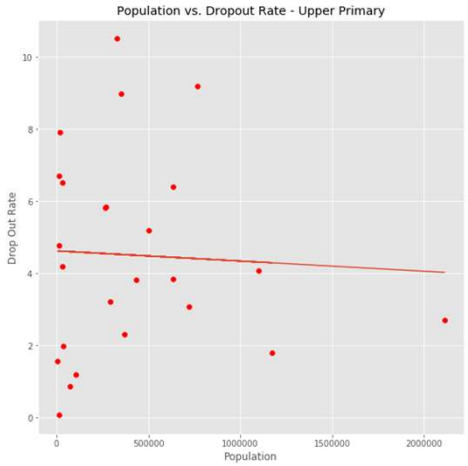


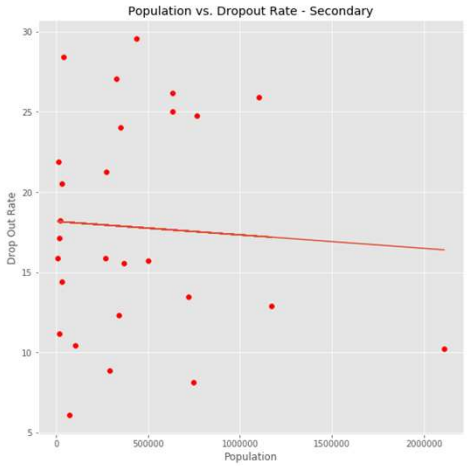
Population vs. Drop-out Rate

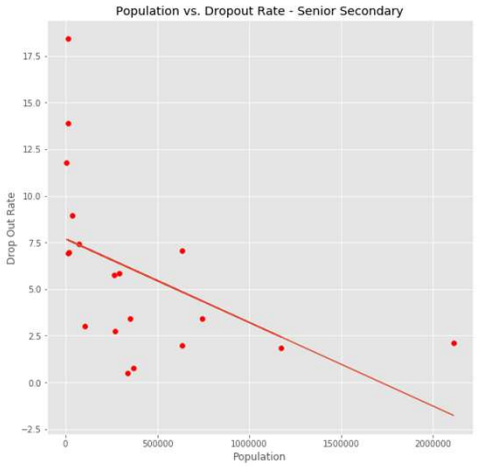
Higher the population, lower is the drop out rate.











Hypothesis

- In states where the GDP is high, the senior secondary students drop out from educational institutions.