The Development Status of China's Transportation Industry Since China's Reform and Opening Up Period

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Introduction

Program theme and background

This program is designed to explore the development status of China’s transportation industry since China’s Reform and Opening Up Period.

China's overall economy and various industries have developed at an astonishing speed since the implementation of the Reform and Opening Up Policy (1978). I am interested in exploring the development status of China’s transportation industry over the 40 years of Reform and Opening Up, which is a perspective to understand China’s macroeconomy. In this report, I will further explore this theme through four relevant questions.

Program tasks /research questions

This program includes five sub-tasks: one dataset-construction sub-task and four question-answering sub-tasks.

In the dataset-construction sub-task, I will access an API to obtain the required variables and construct a separate dataset for each question. Therefore, this sub-task will be listed with each question rather than being especially listed in the code cells.

The four data-driving questions expected to explore in this report include:

1. Changes in the added value index of the tertiary sector in China’s transportation industry since the Reform and Opening Up period.
2. Changes in China’s passenger and freight turnover since the Reform and Opening Up period.

3. Changes in the passenger and freight transport volume with different transportation modes in China’s Yangtze River delta area since the Reform and Opening Up period.
4. International comparison: the passenger volume and freight turnover of air transportation in the top ten countries in GDP.

In terms of the first question, the added value index of the tertiary sector can represent the change in the added value of an industry in the tertiary sector compared with last year. If this index is greater than 100, it means that this industry’s output value has increased compared to the previous year. In the first question, we will not only analyze the changes in the added value index of the tertiary sector in China’s transportation industry, but also compare the changes in the added value index of the tertiary sector in China’s other industries in the tertiary sector. This question will provide us with an overview of the development status of the transportation industry's output value.

Since freight and passenger transportation are two primary transportation purposes in the transportation industry, the rest three questions will discuss content related to them from different perspectives. The second question will analyze changes in China’s passenger and freight turnover since the Reform and Opening Up period. The passenger turnover is the product of the distance transported and the number of passengers transported; the freight turnover is the product of the distance transported and the tonnage of goods transported. These two indicators can measure transportation capabilities more comprehensively than the passenger or freight transportation volume. Next, the third question will analyze changes in the passenger and freight transport volume in China’s Yangtze River delta area, an economically

developed area containing 41 cities. This question will focus on different transportation modes and their proportion in the passenger and freight transport volume.

Lastly, since air transportation is an advanced and significant component in a nation's transportation industry, I would like to compare the transportation industry in the top ten countries in GDP by comparing their passenger volume and freight turnover of air transportation.

Dataset

The data used in this program is from the Wind terminal through an API.

Wind (https://www.wind.com.cn/ , English page https://www.wind.com.cn/en/edb.html) is a universal private platform in China which provides China macro and industry data. Wind collects or purchases different types of data from various sources and sorts them into multiple variables. Therefore, it is a comprehensive and credible data source.

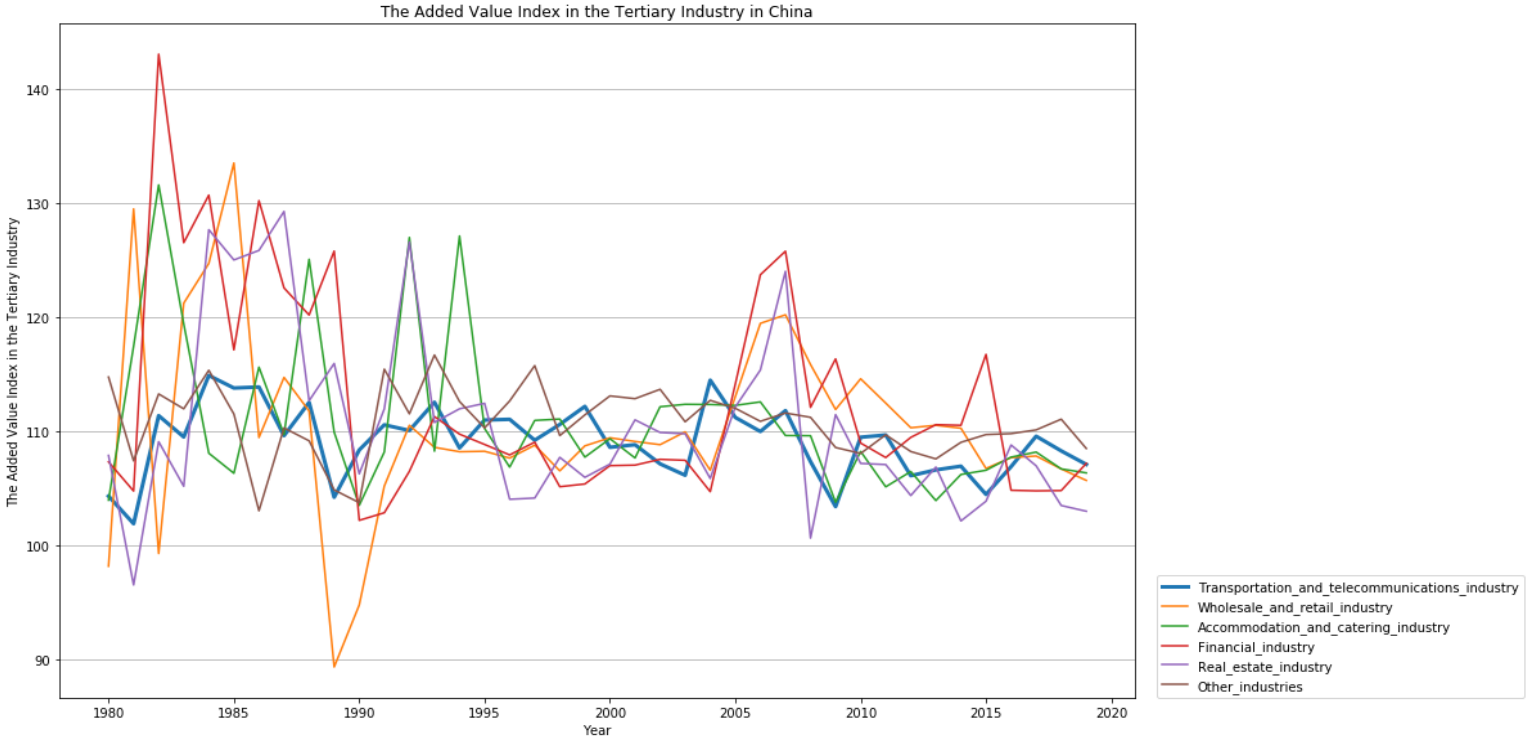
For each of my research questions, I selected appropriate variables from different datasets in Wind. Especially, the variables used in research question one come from the macroeconomic dataset in Wind; the variables used in research question two and three come from the industry dataset in Wind; the variables used in research question four come from the international dataset in Wind, which are adapted from the World Bank.

Analysis

Question 1: changes in the added value index of the tertiary sector in China's transportation industry since the Reform and Opening Up period.

As shown in the figure, the added value index of the tertiary sector in the transportation industry has been greater than 100 since 1980, Which means that the transportation industry's output value has continuously increased over the 40 years of Reform and Opening Up.

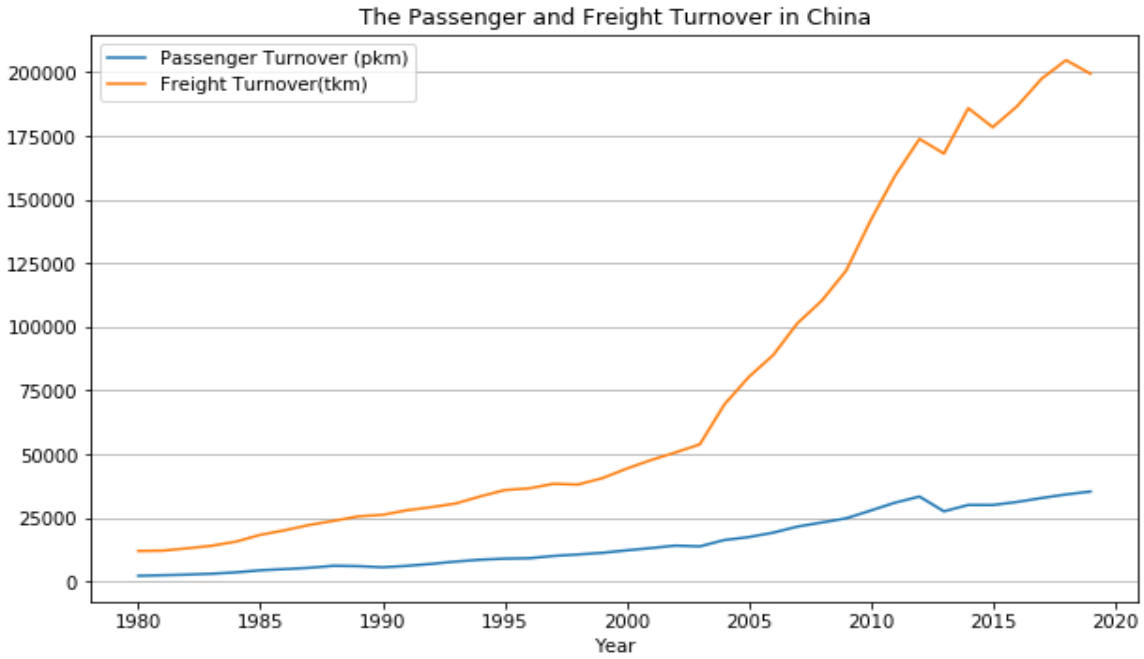
Additionally, compared with other industries in the tertiary sector, the added value index of the tertiary sector in the transportation industry is not the highest, however, this index has always remained relatively stable (in the range of 102 to 115).



Question 2: changes in China's passenger and freight turnover since the Reform and Opening Up period.

As the figure is shown, when the Reform and Opening up period began (1980), civil freight and passenger transportation in China was still in its infancy. However, both passenger and freight turnover has been rapidly increasing over the past 40 years.

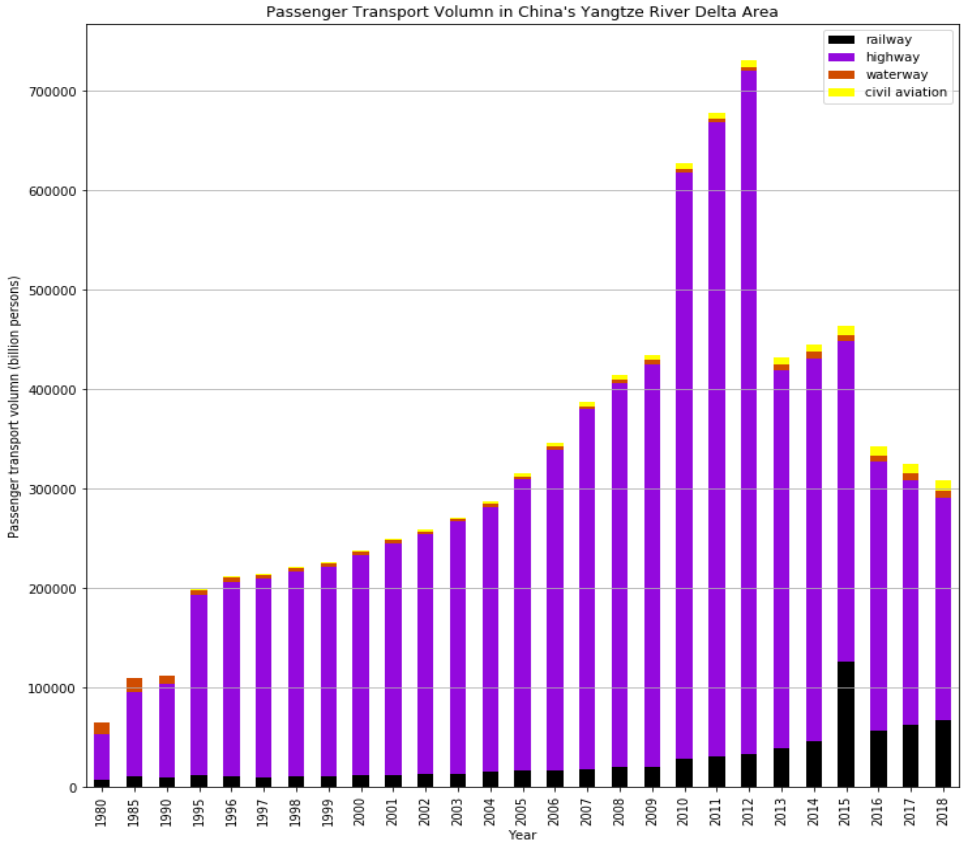
Overall, the growth rate of freight turnover is much higher than that of passenger turnover: the freight turnover in China has increased from nearly 1.3 ton-km (tkm) to 20 trillion tkm during the period; the passenger turnover in China has increased from 0.2 trillion passenger-km (pkm) to 3.5 trillion pkm during the period.



Question 3: changes in the passenger and freight transport volume with different transportation modes in China's Yangtze River delta area since the Reform and Opening Up period.

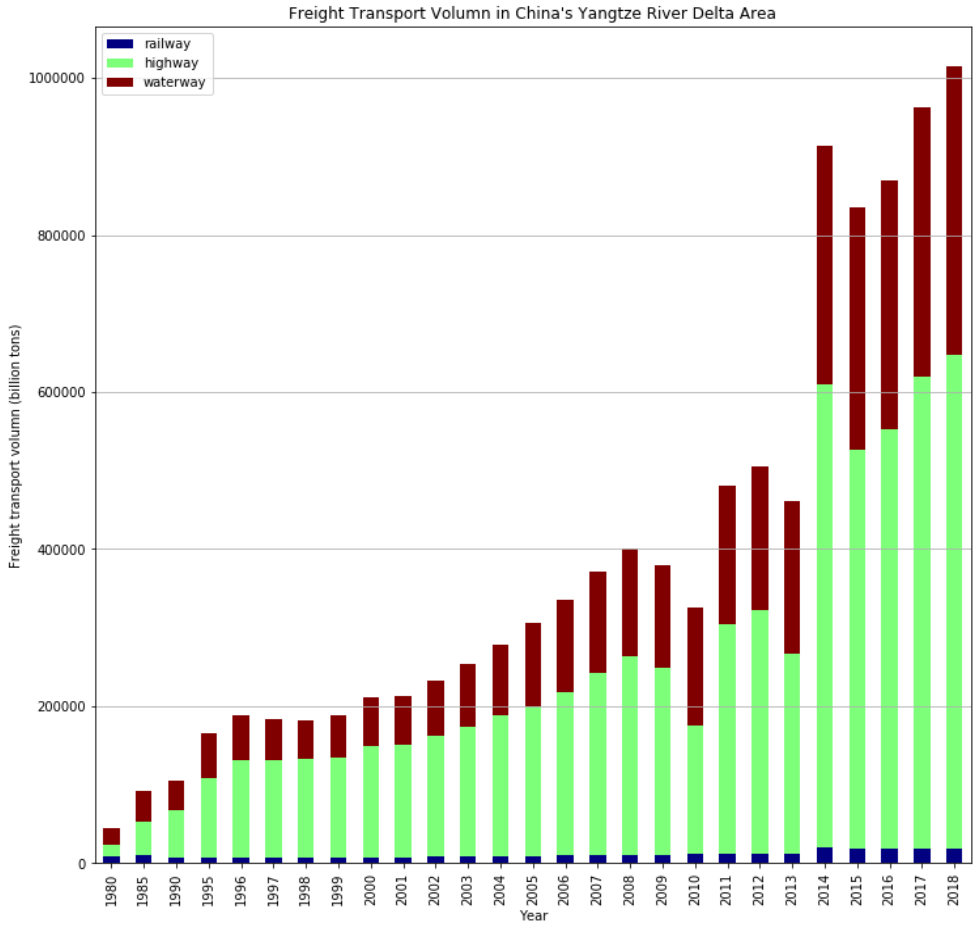
The bar figure below shows the changes in the passenger transport volume in China's Yangtze River delta area during the Reform and Opening Up period. Since 1980, the passenger transport volume in this area has continuously increased. After reaching its peak in 2012 (720 trillion persons), this volume has shown a downward trend as a whole and fell to about 301 trillion persons in 2018.

Railway, highway, waterway, and civil aviation are the four primary transportation modes in this area's passenger transportation. In detail, the highway is the most common transportation mode, which accounts for the largest proportion of passenger transport volume in this area. Since 2000, the railway has also become more and more popular among passengers.



Next, the following figure presents the changes in the freight transport volume with different transportation modes in China's Yangtze River delta area since the Reform and Opening Up period. Even with fluctuations between 2010 and 2015, the freight transport volume in China's Yangtze River delta area has presented an overall growing trend. Though the freight transport volume in this area is only 40 trillion tons at the beginning of the Reform and Opening Up period, it increased to more than 1,000 trillion tons in 2018.

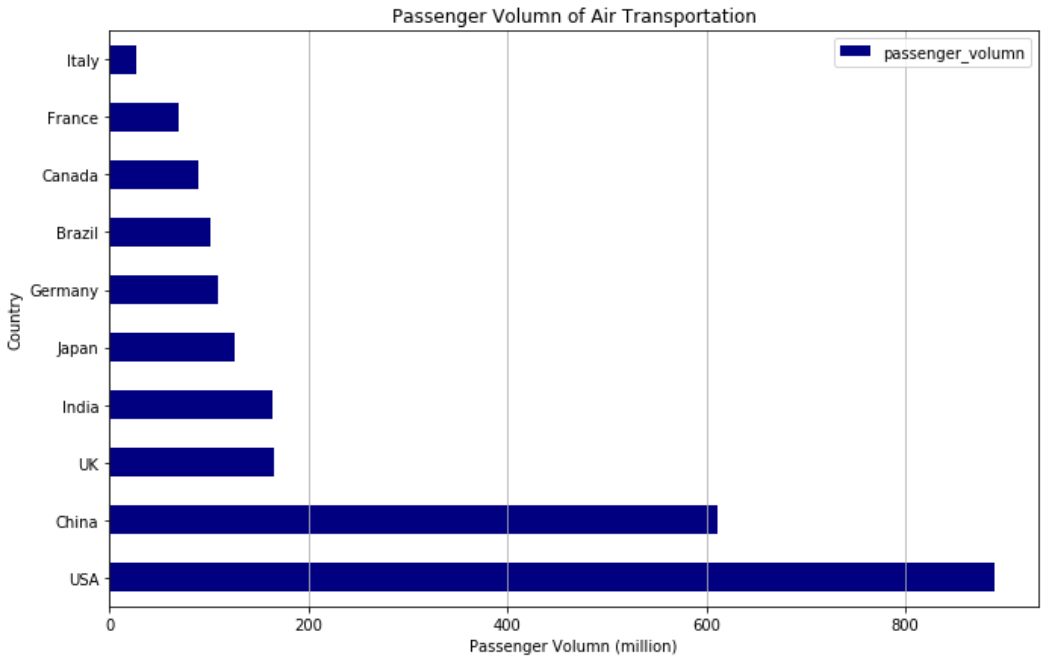
Since air aviation is too expensive for freight transportation, only railway, highway, and waterway are commonly used as freight transportation modes here. For freight transportation, the highway is still the most common transportation mode; the waterway accounts for more proportion of freight transport volume in this area rather than that of passenger transport volume.



Question 4: International comparison: the passenger volume and freight turnover of air transportation in the top ten countries in GDP.

The figure and table below show the passenger volume of air transportation in the top ten countries in GDP in 2019.

As two countries with the first and second highest GDP in the world, the United States and China have the first- and second-largest passenger volume of air transportation respectively (920 million and 605 million). The passenger volume of air transportation of the remaining eight countries did not exceed 200 million persons in 2019, which is far from that of the United States and China.

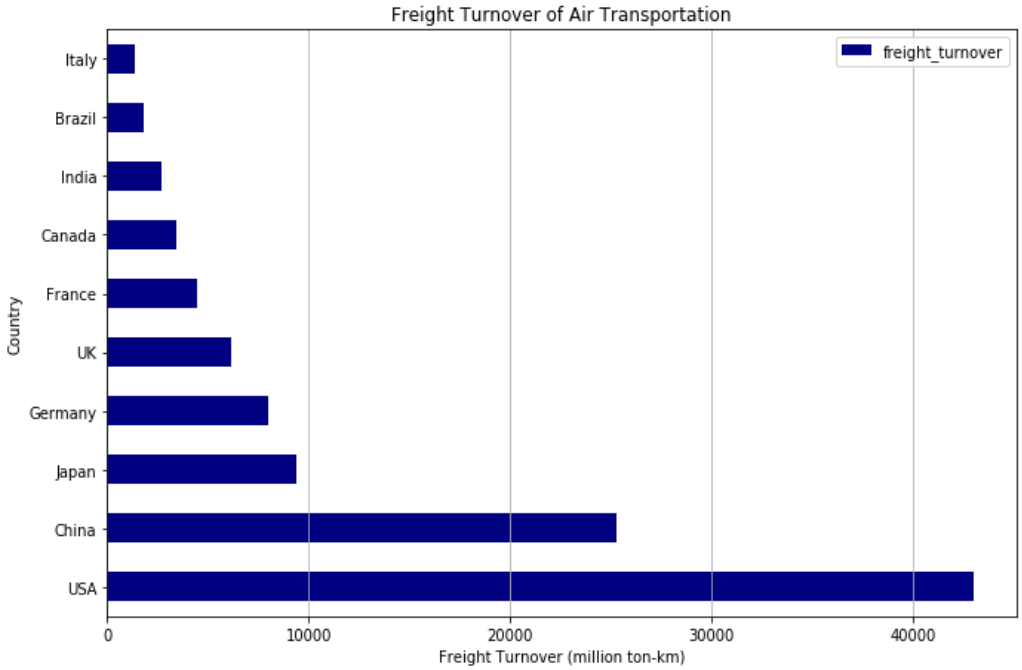


Country	Passenger Volumn of Air Transportation (million)
USA	889.02
China	611.44
UK	165.39
India	164.04
Japan	126.39
Germany	109.80
Brazil	102.11
Canada	89.38
France	70.19
Italy	27.63

Next, the following figure and table display the freight turnover of air transportation in the top ten countries in GDP in 2019.

Like the ranking in the passenger volume, the United States and China still have the first- and second-largest freight turnover of air transportation individually (45,000 million ton-km and 25,000 million ton-km). However, compared to the gap of passenger volume, the gap of freight turnover of air transportation between the United States and China is relatively large

(17,729 million ton-km). Besides, the gap between China and the rest eight countries is also large, since the freight turnover of these eight countries is no more than 10,000 million ton-km.



Country	Freight Turnover of Air Transportation (million ton-km)
USA	42985.30
China	25256.21
Japan	9420.66
Germany	7969.86
UK	6198.37
France	4443.79
Canada	3434.07
India	2703.96
Brazil	1845.65
Brazil	1418.00

Conclusion and Policy Recommendations

Conclusion/final discussion

Overall, China's transportation industry has developed rapidly and continuously over the past 40 years of Reform and Opening Up. Not only China's transportation industry's output value has stably increased, but the civil freight and passenger transportation in China developed from infancy to maturity during the Reform and Opening Up period. Also, highway is the most common transportation mode used in freight and passenger transportation in one typical economically developed area, the Yangtze River delta area. Lastly, in terms of international comparison, China has the second-largest passenger volume and freight turnover of air transportation in the world.

This report can provide people with a brief overview of the development status of China's transportation industry. Based on this report's results, some policy recommendations can also be given.

Policy recommendations

In this report, we have found that the growth rate of freight turnover is significantly higher than that of passenger turnover in recent years. This is largely due to the rise of e-commerce in China since 2010. Since 2010, a large amount of offline consumption in China has shifted to online, which has led to a surge in demand in the express logistics industry and a further rise in freight turnover. Therefore, the government should provide more support to e-commerce businesses and the express logistics industry, such as cutting taxes and increasing

financial aid. The multiplier effect of such supports can promote the development of e-commerce businesses, express logistics industry, transportation industry, and so forth.

According to international comparison, there is a noticable gap in freight turnover and passenger volume of air transportation between the United States and China. This gap is partly because China's aviation infrastructure is deficient. At present, the fixed asset investment in China's air transportation is only about 20 billion yuan; the number of airports and navigable cities in China is also much lower than that of the United States. It is high time for the government to increase aviation infrastructure investment, especially investing in airport construction and expansion projects in some densely populated cities.