A STUDY OF THE MOVEMENT OF THE GROWTH OF CIVIL AVIATION IN CHINA WITH ITS ECONOMIC DEVELOPMENT INDICATORS

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DECLARATION

We hereby declare that the project entitled is **"A STUDY OF THE MOVEMENT OF THE GROWTH OF CIVIL AVIATION IN CHINA WITH ITS ECONOMIC DEVELOPMENT INDICATORS"** a bonafide piece of research work done under the supervision and guidance of **Mr.BOBY THOMAS,** Department of Commerce, Pavanatma College, Murickassery and is submitted to the Mahatma Gandhi University for the partial fulfilment of degree of Bachelor Commerce and that it has not been submitted earlier for the award of any degree, Diploma , Fellowship or any other similar title.

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CERTIFICATE

This is certify that the project entitled **"A STUDY OF THE MOVEMENT OF THE GROWTH OF CIVIL AVIATION IN CHINA WITH ITS ECONOMIC DEVELOPMENT INDICATORS"** is the bonafide piece of work done by **MINCHU SIBICHAN (PRN:200021073325), NEETHUMOL THOMAS (200021073326), OLGA VARGHESE (PRN:200021073327)** in partial fulfilment for the award of the degree **"BACHELOR OF COMMERCE"** in Mahatma Gandhi University under my supervision and guidance.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The air transportation subsector is part of the transportation and warehousing sector. Industries in the Air Transportation subsector provide air transportation of passengers and/or cargo using aircraft, such as aeroplanes and helicopters. The subsector distinguishes scheduled from non-scheduled air transportation. It generates economic growth, creates jobs, and facilitates international trade and tourism.

Aviation provides the only rapid worldwide transportation network, which makes it essential for global business. It generates economic growth, creates jobs, and facilitates international trade and tourism. Airline Industry facilitates tourism, trade, connectivity, generates economic growth, provides jobs, improves living standards, alleviates poverty, provides a lifeline for remote communities and enables a rapid response when disasters occur. Aviation helps drive the development of the modern world.

Of the 5 million direct jobs generated by the air transport industry worldwide, 4.3 million people are employed by the airlines and airports (aviation sector) globally, contributing around US$ 275 billion of GDP to the global economy(Gittens et al. 2019).

Civil aviation includes three major categories: Commercial air transport, including scheduled and non-scheduled passenger and cargo flights. Aerial work, in which an aircraft is used for specialized services such as agriculture, photography, surveying, search and rescue, etc.

Aviation provides the only rapid worldwide transportation network, which makes it essential for global business. It generates economic growth, creates jobs, and facilitates international trade and tourism.

Commercial aviation drives 5% of U.S. GDP—the equivalent of $1.25 trillion in 2022. Every day, U.S. airlines operate 25,000 flights carrying 2.3 million

passengers to/from nearly 80 countries and 66,000 tons of cargo to/from more than 220 countries (Airlines.org, 2018).

With the air passenger traffic projected to increase, the Indian aviation industry is on a high-growth path. To satisfy the current and projected rise in demand for commercial air travel, Indian airlines have placed large orders for aircraft. The aviation market is expected to grow significantly in the coming decades. By 2038, global air transport is forecast to support 143 million jobs and contribute $6.3 trillion to the global economy (Anon, 2023).

Airline companies carry passengers and cargo at the same time. That's because having both aircraft is cheaper than having one airline for cargo and one for passengers. The cost-saving resulting from carrying cargo and passengers at the same time is due to economies of scope.

1.2 Statement of the problem

Airline industries plays an important role in economic development of a country. The coronavirus pandemic of 2019 brought with it an avalanche of disasters, not just affecting human lives but negatively impacting the economic development of a country. Due coronavirus pandemic airline industries face many challenges like; lesser available airlines, labour shortage, low international air travel, change in airport traffic, issues in processing times, and impact on airport revenues all these are adversely affects the GDP of a nation. Hence the study of the growth of civil aviation is integrated with the economic development of any nation. Therefore, the present study is titled **"A STUDY OF THE MOVEMENT OF THE GROWTH OF CIVIL AVIATION IN CHINA WITH ITS ECONOMIC DEVELOPMENT INDICATORS".**

1.3 Objectives of the study

1. To examine whether growth of civil aviation industry of China is correlated with the GDP growth of that nation.
2. To examine whether growth of civil aviation industry of China is correlated with the GNI growth of that nation.

1.4 Data collection

The researcher used secondary data collected from the published record of world bank. We use data for 62 years from 1960 to 2021.

1.5 Tools of analysis

Correlation analysis, Time series trend projection, Co integration analysis, ADF test are used for analysis.

1.6 Period of study

We use the data from 1960 to 2021.

1.7 Hypothesis

$H_0$1 The development of Airline industry does not show a co integrated movement with GDP of China.

$H_1$1 The development of Airline industry shows a co integrated movement with GDP of China.

$H_0$2 The development of Airline industry does not show a co integrated movement with per capita GDP of China.

$H_1$2 The development of Airline industry shows a co integrated movement with per capita GDP of China.

$H_0$3 The development of Airline industry does not show a correlation movement with GDP of China.

$H_1 3$ The development of Airline industry shows a correlation movement with GDP of China.

1.8 Chapter scheme

The presentation of the report is divided into four chapter. Airline industry of China with the growth of its GDP, GNI, Air passengers carried.

Chapter -1 Introduction

This introduction chapter deals with the topic like Introduction of the airline industry, Statement of the problem, Objective of study, Data collection, Tools of analysis, Period of study, Hypothesis and Chapter Scheme.

Chapter -2 Civil Aviation Industry of China – Literature Review

Airline industry of China Literature Review; The current situation in the China aviation industry. This study Looks at the world airline industry, from 1960 to 2021, from a strategy perspective.

Chapter 3- Data Analysis

Introduction of data analysis, Objectives of the study, Summary Statistics. Data Analysis has mainly two parts: Trend Analysis, Correlation Analysis. Trend analysis and correlation analysis are carried out in the following

dimensions:

1. Growth Trend of GDP and Air Passenger Traffic
2. Growth Trend of GNP and Air Passenger Traffic
3. Growth Trend of GDP and Air Cargo
4. Growth Trend of GNP and Air Cargo

5. Growth Trend of Air Passenger Traffic and Air Cargo

The trend analysis showing graphs and correlation analysis showing tables.

Chapter 4- Findings, Conclusion, Suggestions

The Chapter deals with Introduction, Findings, Suggestions and Conclusion about the relationship between the economic indicators of a country and the industrial growth of that country.

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CHAPTER 2

Civil Aviation Industry of China – Literature Review

2.1 Introduction

The airline industry encompasses a wide range of businesses, called airlines, which offer air transport services for paying customers or business partners. These air transport services are provided for both human travellers and cargo, and are most commonly offered via jets, although some airlines also use helicopters. It generates economic growth, creates jobs, and facilitates international trade and tourism. An airline is a company that provides air transport services for traveling passengers and freight. Airlines use aircraft to supply these services and may form partnerships or alliances with other airlines for codeshare agreements, in which they both offer and operate the same flight. International airline industry provides service to virtually every corner of the globe, and has been an integral part of the creation of a global economy. The airline industry itself is a major economic force, both in terms of its own operations and its impacts on related industries such as aircraft manufacturing and tourism, to name but two. Few other industries generate the amount and intensity of attention given to airlines, not only among its participants but from government policy makers, the media, and almost anyone who has an anecdote about a particular air travel experience.

During much of its development, the global airline industry dealt with major technological innovations such as the introduction of jet airplanes for commercial use in the 1950s, followed by the development of wide-body “jumbo jets” in the 1970s. At the same time, airlines were heavily regulated throughout the world, creating an environment in which technological advances and government policy took precedence over profitability and competition. It has only been in the period since the economic deregulation of airlines in the United States in 1978 that questions of cost efficiency, operating profitability and competitive behaviour have become the dominant issues facing airline management.

2.2 Types of airlines

Types of civil aviation airline include mainly two types: Scheduled and Non-scheduled. Based on travel boundaries they are classified as International and Domestic.

1.Scheduled

The airline company schedules regular flights in and out of an airport, which is usually a busy commercial airport. Scheduled air transportation is accomplished by the scheduling of flights at regular times and days of the year on a consistent basis. The airline responsible for the transportation often has a commercial or operational license and is governed by rules in the Federal Aviation Regulations manual (FAR) and is subject to the capacity.

2.Non scheduled

Non scheduled airline is a company that offers un scheduled air transport services of passengers or goods at an hourly or per mile/kilometre charge for chartering the entire aircraft along with crew. A non-scheduled airline may hold domestic or international licences, or both, and operates under the regulations prescribed by its national civil aviation authority.

3.International

International airlines are a group of the largest, most high-profile and most successful airlines. They make billions in revenue each year and operate large passenger jets. These airlines also tend to focus their efforts on offering global services, carrying passengers and cargo over large distances.

4.Domestic

Domestic flights are generally cheaper and shorter than most international flights. Some international flights may be cheaper than domestic ones due to the short distance between the pair of cities in different countries, and also because

domestic flights might, in smaller countries, mainly be used by high paying business travellers, while leisure travellers use road or rail domestically.

2.3 Airline industry and economic development

According to the empirical results, national income per capita and industrial production index have positive impact on aviation demand, while ticket prices, inflation and exchange rate have a negative impact on it. Income per capita, ticket prices, industrial production index, inflation and exchange rate have been accepted as the factors affecting aviation demand. Reduced ticket prices has led to significant increase in demand for air transport, as a result the increased demand expanded the airline network globally, and it has facilitated contacts with foreign markets these factors give distinguishing data about economic performance of countries, their level of industrial development and their volume of international trade.it generate economic growth, creates jobs and facilitates international trade and tourism

2.4 Airline industry V.S Tourism industry

The tourism and Airline industry complement each other. Tourism depends on transportation to bring visitors, while the airline industry depends on tourism to generate demand for its services. The growth in the tourism industry directly reflects on airlines. Over the last 25 years, the number of international tourists has more than doubled. The expansion of international tourism has a large impact on the discipline of transport geography.

2.5 Civil Aviation Industry Development of china in 2020

In 2020, the entire industry fully implemented the guiding principles of the Party's 19th National Congress and the Second, Third, Fourth and Fifth Plenary Sessions of the19th Central Committee, as well as the Central Economic Work Conference. Guided by the new development philosophy and the underlying

principle of pursuing progress while ensuring stability, the industry ensured stability on six key fronts and maintained support in six key areas.

The industry coordinated COVID-19 response and safe development by adjusting response measures in view of the evolving COVID-19 dynamics. As a result, China's civil aviation took the lead in the world to return back with the fastest-recovering and best-performing air service market (CAAC, 2021).

2.6 Structure of China's Commercial Aviation Manufacturing Industry

In the past, China's aircraft manufacturing industry produced aircraft almost exclusively for the Chinese military, especially the People's Liberation Army Air Force (PLAAF). Aside from the production of smaller (often propeller-driven) planes based on modified Soviet designs, China's role in the global commercial aviation manufacturing industry consisted of providing parts for foreign aircraft manufacturers (Crane et al., 2023).

2.7 Theoretical Framework

The study of Nur and Dorin discussed the relationship between Growth Domestic Products (GDP), Human Development Index (HDI) and poverty rate in china from 1960 to 2020. The results in this study shows HDI and poverty rate have a relationship with GDP. The HDI and poverty rate have relationship with GDP in the long term. HDI and GDP have a negative relationship in the long term while poverty rate and GDP has a positive relationship with the GDP. Meanwhile in the short term, HDI and GDP have no relationship but poverty rate and GDP has a relationship with GDP but it is a negative relationship (Nur & Selvaratnam, 2015) Kuruvila finds that import substitution industrialization was associated with IR/HR policy goals of pluralism and stability, while a low-cost export-oriented industrialization strategy was associated with IR/HR policy goals of cost containment and union suppression (Kuruvilla, 1996).

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CHAPTER 3
DATA ANALYSIS

3.1 Introduction

A statistics summary gives information about the data in a sample. It can help understand the values better. It may include the total number of values, minimum value, and maximum value, along with the mean value and the standard deviation corresponding to a data collection. With this, you can understand the trends, outliers, and distribution of values in a data set. This is especially useful when dealing with large amounts of data as it can help in analysing the data better. This information can be utilized to steer the rest of the analysis and derive more information about a data set. These are values that are calculated based on the sample data and do not go beyond the data on hand statistics summary gives information about the data in a sample. It can help understand the values better. It may include the total number of values, minimum value, and maximum value, along with the mean value and the standard deviation corresponding to a data collection. With this, you can understand the trends, outliers, and distribution of values in a data set. This is especially useful when dealing with large amounts of data as it can help in analysing the data better. This information can be utilized to steer the rest of the analysis and derive more information about a data set. These are values that are calculated based on the sample data and do not go beyond the data on hand.

The study was conducted with the following objectives:

1. To examine whether growth of civil aviation industry of China is correlated with the GDP growth of that nation.
2. To examine whether growth of civil aviation industry of China is correlated with the GNI growth of that nation.

3.3 Summary Statistics

Summary statistics is a part of descriptive statistics that summarizes and provides the gist of information about the sample data. Statisticians commonly try to

describe and characterize the observations by finding: a measure of location, or central tendency, such as the arithmetic mean.

Summary statistics provide a quick summary of data and are particularly useful for comparing one project to another, or before and after. There are two main types of summary statistics used in evaluation: measures of central tendency and measures of dispersion. Summary statistics *summarize and provide information about your sample data*. It tells you something about the values in your data set.

Table 3.1

Summary statistics

	GDP*	GNI*	APC**
Mean	28206	71578	1400.9
Median	3721.2	62791	522.77
Min	472.09	18084	7.1
Max	177340	156590	6596.3
SD	46044	44618	1835.8
C.V	1.6324	0.62335	1.3104
Skewness	1.7402	0.45296	1.3852

Kurtosis	1.7568	-1.1503	0.78326

Source: Secondary Data

* Figures in Crores

** Figures in Lakhs

The table 3.1 shows a summary of GDP, APC and GNI.GDP stands for Gross Domestic Product and APC stands for Airline Passenger Carried, GNI stands for Gross National Income.

Mean

In statistics, the mean is one of the measures of central tendency. Mean is nothing but the average of the given set of values. It denotes the equal distribution of values for a given data set. Mean statistics show that GDP values show crore figures. Mean GDP is 28206 crores, Air Passenger Carried is 1400.9 lakhs, and GNI is 71578 crores.

Median

Median is defined as the middle value in a given set of numbers or data. In Mathematics, there are three different measures, which are used to find the average value for a given set of numbers. Median of GDP is 3721.2 crores, Air Passenger Carried are is522.77lakhs, and GNI is 62791 crores.

Minimum

The minimum is the lowest or smallest amount possible or acceptable. Minimum statistics shows that the values of GDP show crore figures. The minimum GDP is 472.09 crores, Air Passenger Carried is 7.1, and GNI is 18084 crores.

Maximum

The maximum value in a set of values, excluding any outliers. Both are computed using either the interquartile rule or a user-defined statistical limit. Maximum of GDP is 177340 crores, Air Passenger Carried is 6596.3 lakhs, and GNI is 156590 Crores.

Standard Deviation (SD)

Standard Deviation is a measure which shows how much variation from the mean exists. The standard deviation indicates a “typical” deviation from the mean. It is a popular measure of variability because it returns to the original units of measure of the data set. SD of GDP is 46044 crores, Air Passenger Carrier is 1835.8 lakhs and GNI is 44618 crores.

Coefficient of Variation (CV)

The coefficient of variation (CV) is the ratio of the standard deviation to the mean. The higher the coefficient of variation, the greater the level of dispersion around the mean. It is generally expressed as a percentage. CV of GDP is 1.6324 crores, Air Passenger Carried is 1.3104 lakhs, GNI is 0.62335 crores.

Skewness

Skewness is a measurement of the distortion of symmetrical distribution or asymmetry in a data set. SK of GDP is 1.7402 crores, Air Passenger Carried is 1.3852 lakhs, GNI is 0.45296 crores.

Kurtosis

Kurtosis is a statistical measure used to describe the degree to which scores cluster in the tails or the peak of a frequency distribution. Kurtosis of GDP is 1.7568 crores, Air Passenger Carried is 0.78326 lakhs and GNI is -1.1503 crores.

3.4 Trend Analysis

Trend analysis is a technique used to examine and predict movements of an item based on current and historical data. You can use trend analysis to improve your business using trend data to inform your decision-making. By comparing data over a specific period, you can spot patterns and project future events.

A trend is a general direction the market is taking during a specified period of time. Trends can be both upward and downward, relating to bullish and bearish markets, respectively. While there is no specified minimum amount of time required for a direction to be considered a trend, the longer the direction is maintained, the more notable the trend.

Trend analysis is the process of looking at current trends in order to predict future ones and is considered as a form of comparative analysis. This can include attempting to determine whether a current market trend, such as gains in a particular market sector, is likely to continue, as well as whether a trend in one market area could result in a trend in another. Though a trend analysis may involve a large amount of data, there is no guarantee that the results will be correct.

Trend Analysis is carried out in the following dimensions;

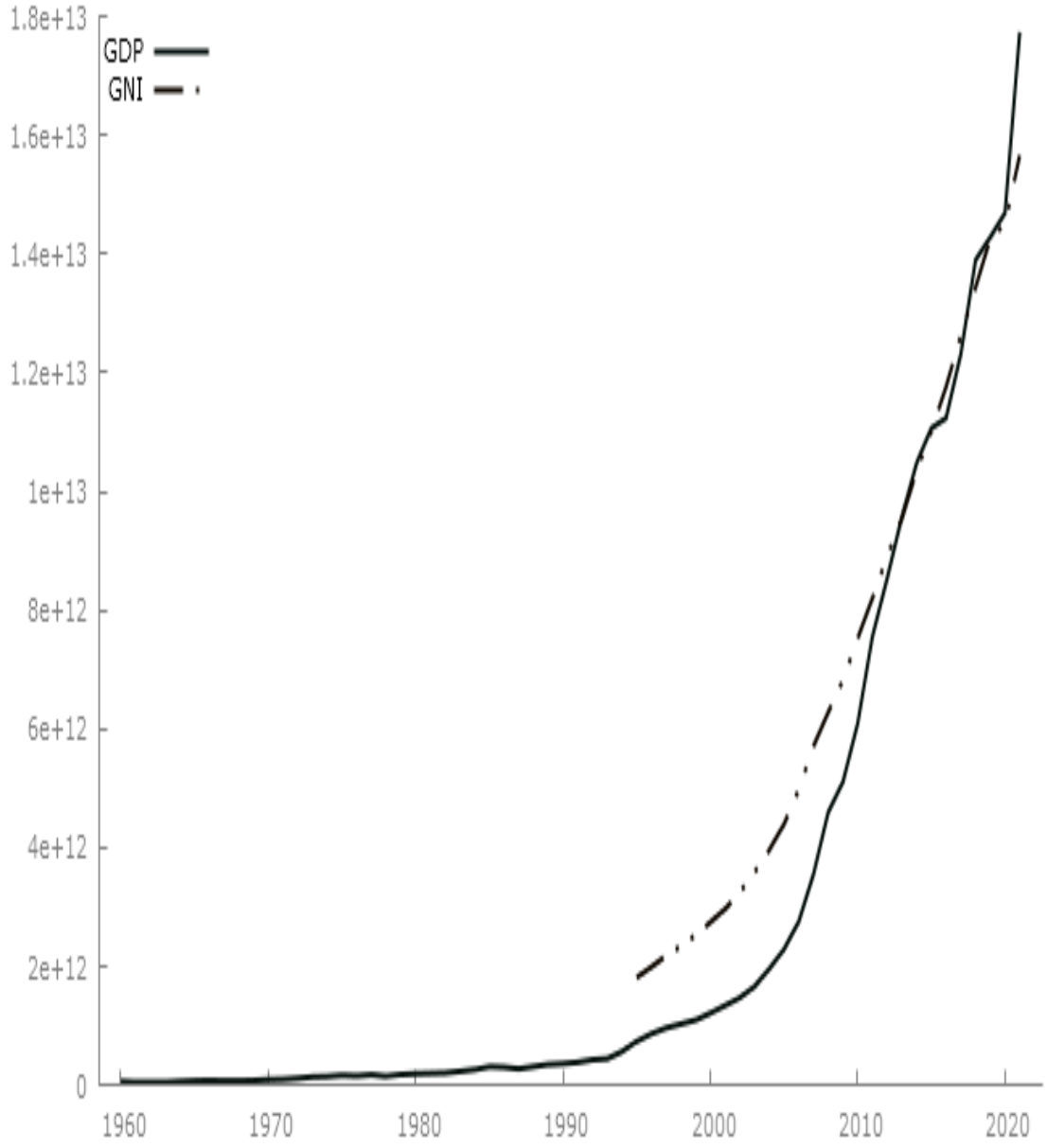
1. Trend of GDP and GNI.
2. Trend of GNI and Air Passengers Carried.
3. Trend of GDP, GNI and Air Passengers Carried.

3.4.1 Trend of GDP and GNI

Time series plot is used to evaluate the growth trend of GDP of China and GNI of China.The data of GDP and GNI of China are given below. The data of GDP is available for the years 1960 to 2020. The data of GNI is available for the years 1995 to 2020.

Figure 3.1

GDP and GNI Time Plot



Source: Secondary data, Created with Gretl

The above figure shows the comparison of movement of GDP (Gross Domestic Product) of China from 1960 to 2020 and the data of GNI (Gross National Income) is available for the years 1995 to 2020. X axis shows the years from 1960 to 2020 and Y axis shows the data related to GDP and GNI. In 1960 to 1970 the GDP rate was constant, there is no variations. From 1970 to 1993 there is a slight increase in GDP. A marked increase is seen from 1994 to 2020 in GDP. From

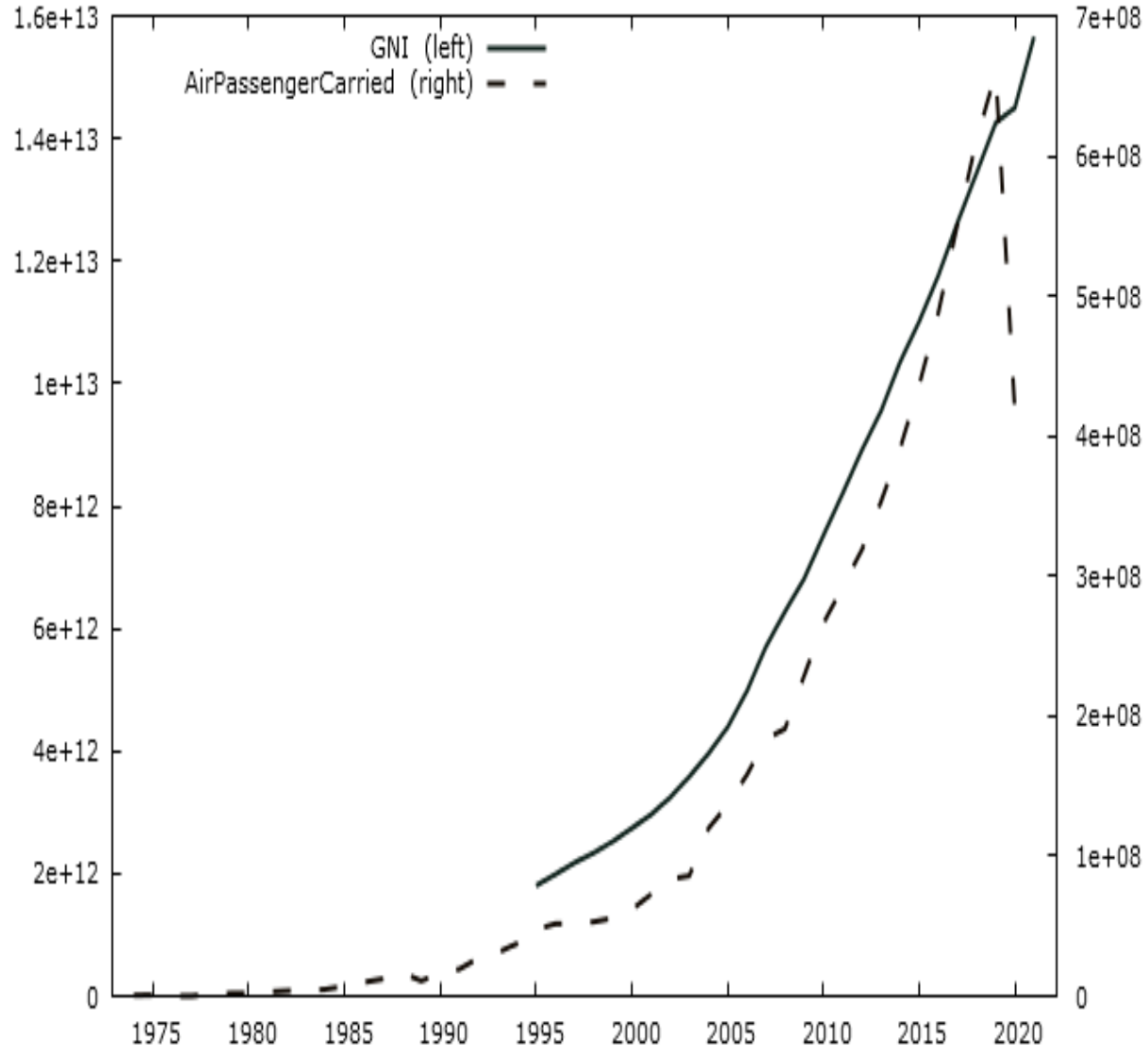
1995 to 2020, there is a marked increase in GNI. The trend of GDP and GNI is going in the same direction.

3.4.2 Trend of GNI and Air Passenger carried

Time series plot is used to evaluate the growth trend of GNI of China and Air Passenger carried of China. The data of GNI is available for the years 1995 to 2020. The data of Air Passenger carried is available for the years 1975 to 2020.

Figure 3.2

GNI and Air Passengers carried Time Plot



Source: Secondary data, Created with Gretl

The above figure shows the comparison of movement of GNI (Gross National Income) is available for the years 1995 to 2020 and APC (Air Passenger Carried) of China from 1975 to 2020. X axis shows the years from 1975 to 2020 and Y axis shows the data related to Gross National Income and Air Passenger Carried. A marked increase is seen from 1995 to 2020 in Gross National Income. From 1975 to 1985 the Air Passenger Carried was constant, there is no variation. From 1985 to 1990 there was a slight decrease in Air Passenger Carried. From 1990 to 2000 there was a slight increase in Air Passenger Carried. From 2000 to 2019, there is a marked increase in Air Passenger Carried. From 2020 sees a huge decrease in Air Passenger Carried. In 2020 the Air Passenger Carried decrease due to the transport control. Because of the COVID 19 pandemic situation the rate of passenger carried has decreased. It negatively affects the airline industry of China.

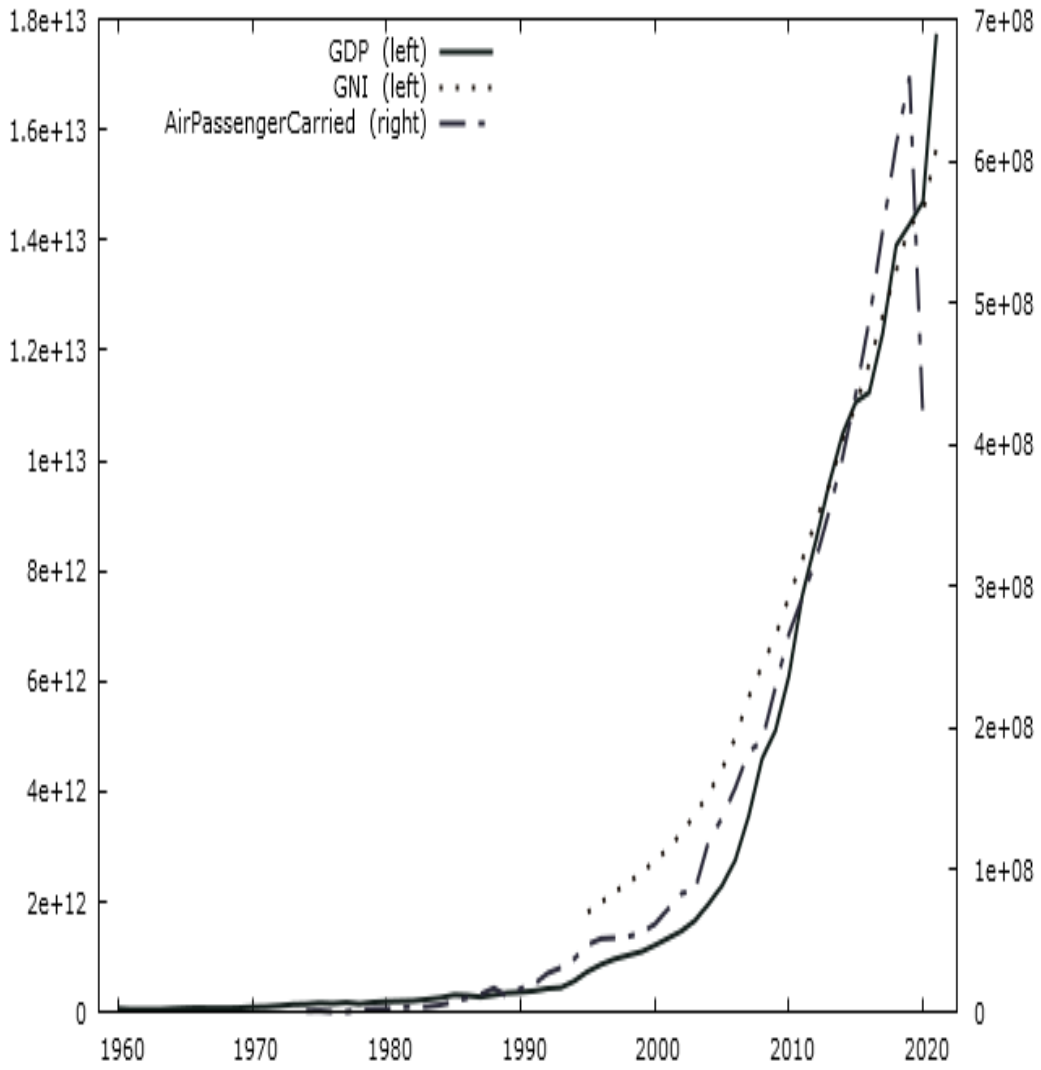
3.4.3 Trend of GDP, GNI and Air Passenger carried

Time series plot is used to evaluate the growth trend of Gross Domestic Product (GDP)of China, Gross National Income of China (GNI) and Air Passenger carried of China. The data of Gross Domestic Product (GDP) is available for the years 1960 to 2020.The data of Gross National Income is available for the years 1995 to 2020. The data of Air Passenger carried is available for the years 1975 to 2020.

The figure 3.3 shows the relation between GDP (Gross Domestic Product) of China from 1960 to 2020, GNI (Gross National Income) of China is available for the years 1995 to 2020 and APC (Air Passenger Carried) of China from 1960 to 2020.

Figure 3.3

GDP, GNI and Air Passengers carried Time Plot



Source: Secondary data, Created with Gretl

The figure 3.3 shows the relation between GDP (Gross Domestic Product) of China from 1960 to 2020, GNI (Gross National Income) of China is available for the years 1995 to 2020 and APC (Air Passenger Carried) of China from 1960 to 2020. X axis shows the years from 1960 to 2020 and Y axis shows the data related to GDP, GNI and Air Passenger Carried. In 1960 to 1970 the GDP rate was constant, there is no variations. From 1970 to 1993 there was a slight increase in the GDP rate. A marked increase is seen from 1993 to 2020 in GDP. From 1995 to 2020, there is a marked increase in GNI. From 1975 to 1985 the Air Passenger

Carried was constant, there is no variations. From 1985 to 2000 there was a slight increase in Air Passenger Carried. From 2000 to 2019, there is a marked increase in Air Passenger Carried. From 2020 sees a huge decrease in Air Passenger Carried. In 2020 the Air Passenger Carried decrease due to the transport control. Because of the COVID 19 pandemic situation the rate of passenger carried has decreased. The trend of GDP and GNI is going in the same direction.

3.5 Correlation Analysis

Correlation analysis, also known as bivariate, is primarily concerned with finding out whether a relationship exists between variables and then determining the magnitude and action of that relationship. A correlation close to 0 indicates no linear relationship between the variables. The sign of the coefficient indicates the direction of the relationship. If both variables tend to increase or decrease together, the coefficient is positive, and the line that represents the correlation slopes upward.

Correlation analysis was carried out in the following dimensions

1. Growth trend of Air Passenger carried and GDP
2. Growth trend of Air Passenger carried and GNI
3. Growth trend of GDP and GNI

3.5.1 Correlation Analysis – Air Passenger carried and GDP

Spearman's rank correlation analysis is carried out to examine the relationship between Airline passengers carried and GDP of the nation China. To test the statistical significance of the correlation the following null hypothesis is formulated.

$H_0$1 There is no correlation between Airline passengers carried and the GDP Spearman's rank correlation coefficient(rho), is used to analyse the correlation between the two variables. The following table 3.2 show the calculation of rank for the correlation analysis.

Table 3.2

Calculation of rank: APT -GDP

Year	APT (in thousand)	Rank	GDP (in Crore)	Rank
1974	710	47	144182	47
1975	1000	46	163432	44
1976	1050	45	153940	45
1977	1110	44	174938	43
1978	1540	43	149541	46
1979	2519	42	178281	42
1980	2568	41	191149	41
1981	3236	40	195866	40
1982	3942	38	205090	39
1983	3836	39	230687	38
1984	5000	37	259947	37
1985	7300	36	309488	34
1986	10000	35	300758	35
1987	12500	33	272973	36
1988	17000	31	312354	33

1989	11080	34	347768	32
1990	16596	32	360858	31
1991	19520	30	383373	30
1992	27345	29	426916	29
1993	31313	28	444731	28
1994	37601	27	564325	27
1995	47565	26	734548	26
1996	51770	25	863747	25
1997	52277	24	961604	24
1998	53234	23	1029040	23
1999	55853	22	1094000	22
2000	61892	21	1211350	21
2001	72661	20	1339400	20
2002	83672	19	1470550	19
2003	86041	18	1660290	18
2004	119789	17	1955350	17
2005	136722	16	2285970	16
2006	158013	15	2752130	15
2007	183613	14	3550340	14
2008	191001	13	4594310	13
2009	229062	12	5101700	12

2010	266293	11	6087160	11
2011	292160	10	7551500	10
2012	318476	9	8532230	9
2013	352795	8	9570410	8
2014	390879	7	10475700	7
2015	436184	5	11061600	6
2016	487960	4	11233300	5
2017	551235	3	12310400	4
2018	611440	2	13894800	3
2019	659629	1	14279900	2
2020	417256	6	14687700	1

Source: Secondary Data, Gretl Procedure

This table shows the rank correlation analysis between Air Passenger Carried and GDP. The first rank of APC is in 2019 and the last rank is in 1974. The first rank of GDP is in 2020 and the last rank is in 1974. The rank of APC and GDP is going at a high rate.

Table 3.3 show the test results:

Table 3.3

Correlation Analysis – Airline Industry & GDP

correlation coefficient (rho)	t-value	P value	Criterion	Decision
0.99606846	75.4269	0.000	<0.05	Reject $H_0$1

Source: Secondary Data, Gretl Procedure

Spearman's rank correlation coefficient (rho), two-tailed p-value.

The P value of test result is less than 0.05, the null hypothesis H_o1 is rejected and it is concluded that GDP of China is significantly correlated with the Growth of its airline industry represented by Air Passenger carried (APC).

3.5.2 Correlation Analysis – Air Passenger Carried and GNI

Kendall's tau correlation analysis carried out to examine the relationship between airline passenger carried and GNI of the nation of China. To test the statistical significance of the correlation the following null hypothesis is formulated.

H_02 There is no correlation between Air Passenger carried and GNI

Kendall's tau correlation analysis is used to analyse the correlation between the two variables. The following table 3.3 show the calculation of rank for the correlation analysis

Table 3.4

Calculation of Rank: GNI-APC

Year	GNI (in Crores)	Rank	APT (in 1000)	Rank
1974	100111	46	12159	47
1975	100012	47	13113	46
1976	104175	45	14302	45
1977	107295	44	15431	44
1978	112572	43	16821	43
1979	116363	42	17967	42

1980	116837	40	19521	41
1981	116491	41	21591	40
1982	118987	39	22372	39
1983	120294	38	23278	38
1984	121422	37	23694	37
1985	124163	36	24492	36
1986	130333	35	25211	34
1987	134156	34	27950	33
1988	140994	33	30667	32
1989	146222	32	33976	29
1990	150601	31	35964	27
1991	151740	30	33128	31
1992	154528	28	33964	30
1993	154059	29	35626	28
1994	157207	27	38170	25
1995	160116	26	36020	26
1996	162815	25	41253	24
1997	167207	24	43401	22
1998	173807	23	42232	23
1999	181010	22	49536	18
2000	186005	21	52581	15

2001	190198	20	50477	17
2002	191680	19	49306	19
2003	193688	18	47259	21
2004	198787	17	48544	20
2005	202010	16	52477	16
2006	206662	15	59538	13
2007	212348	12	61551	10
2008	212869	11	61215	11
2009	208511	14	58318	14
2010	211772	13	60864	12
2011	215548	9	64185	7
2012	215019	10	64684	6
2013	217155	8	63925	8
2014	219948	7	63434	9
2015	224591	5	65040	5
2016	227676	4	65363	4
2017	232262	3	68317	3
2018	235854	2	70188	2
2019	240469	1	71289	1
2020	221172	6	24956	35

Source: Secondary Data, Gretl Procedure

This table shows the rank correlation analysis between Air Passenger Carried and GNI. The first rank of APC is in 2019 and the last rank is in 1974. The first rank of GNI is in 2019 and the last rank is in 1975. The rank of APC and GDP is going at a high rate.

The Table 3.5Show the test result:

Table 3.5

Correlation Analysis – Airline Industry & GNI

correlation coefficient (rho)	Z-score	P value	Criterion	Decision
0.96923077	6.92105	0.0001	<0.05	Reject $H_0$2

Source: Secondary Data, Gretl Output

Kendall's tau correlation, two-tailed p-value

The p-value of test result is less than 0.05, the null hypothesis $H_0$2 is rejected and it is concluded that GNI (Gross National Income) of China is significantly correlated with the growth of its airline industry by Air Passenger Carried (APC).

3.5.3 Correlation Analysis – GDP and GNI

Kendall's tau correlation analysis carried out to examine the relationship between GDP (Gross Domestic Product) and GNI (Gross National Income) of the nation of China. To test the statistical significance of the correlation the following null hypothesis is formulated.

$H_0$3 There is no correlation between GDP and GNI.

Kendall's tau correlation analysis is used to analyse the correlation between the two variables. The following table 3.6 show the calculation of rank for the correlation analysis.

Table 3.6

Calculation of Rank: GDP-GNI

Year	GNI (in Crores)	Rank	GDP (in Crores)	Rank
1974	100111	46	144182	47
1975	100012	47	163432	44
1976	104175	45	153940	45
1977	107295	44	174938	43
1978	112572	43	149541	46
1979	116363	42	178281	42
1980	116837	40	191149	41
1981	116491	41	195866	40
1982	118987	39	205090	39
1983	120294	38	230687	38
1984	121422	37	259947	37
1985	124163	36	309488	34
1986	130333	35	300758	35
1987	134156	34	272973	36

1988	140994	33	312354	33
1989	146222	32	347768	32
1990	150601	31	360858	31
1991	151740	30	383373	30
1992	154528	28	426916	29
1993	154059	29	444731	28
1994	157207	27	564325	27
1995	160116	26	734548	26
1996	162815	25	863747	25
1997	167207	24	961604	24
1998	173807	23	1029040	23
1999	181010	22	1094000	22
2000	186005	21	1211350	21
2001	190198	20	1339400	20
2002	191680	19	1470550	19
2003	193688	18	1660290	18
2004	198787	17	1955350	17
2005	202010	16	2285970	16
2006	206662	15	2752130	15
2007	212348	12	3550340	14
2008	212869	11	4594310	13

2009	208511	14	5101700	12
2010	211772	13	6087160	11
2011	215548	9	7551500	10
2012	215019	10	8532230	9
2013	217155	8	9570410	8
2014	219948	7	10475700	7
2015	224591	5	11061600	6
2016	227676	4	11233300	5
2017	232262	3	12310400	4
2018	235854	2	13894800	3
2019	240469	1	14279900	2
2020	221172	6	14687700	1

Source: Secondary Data, Gretl Procedure

This table shows the rank correlation analysis between GNI and GDP. The first rank of GNI is in 2019 and the last rank is in 1975. The first rank of GDP is in 2020 and the last rank is in 1974. The rank of GNI and GDP is going at a high rate.

The Table 3.7 show the test result:

Table 3.7

Correlation Analysis – GDP & GNI

correlation coefficient (rho)	Z-score	P value	Criterion	Decision

1.0000000	7.29642	0.001	<0.05	**Reject $H_0$3**

Source: Secondary Data, Gretl Output

Kendall's tau correlation, two-tailed p-value

The p-value of test result is less than 0.05, the null hypothesis $H_0$3 is rejected and it is concluded that GNI (Gross National Income) of China is significantly correlated with the growth of its airline industry by, GDP (Gross Domestic Product).

3.6 Conclusion

The conclusion of this analysis is that China's civil aviation industry is correlated with that nation's GDP growth and GNI growth. Trend analysis is the process of looking at the current trend to predict the future and is considered as a form of comparative analysis. Time series plot is used to evaluate the growth trend of China with its growth of GDP, GNI and Air Passengers Carried. The conclusion from this analysis is that there is mostly an increasing trend in GDP, GNI and Air Passenger Carried of China. The conclusion is that GDP growth of China is significantly correlated with the growth of its airline industry represented by Air Passenger Carried. GNI growth of China is significantly correlated with the growth of its airline industry by Air Passenger Carried.

CHAPTER - 4
FINDINGS AND CONCLUSION

4.1 Introduction

It is possible that there is a relationship between the economic indicators of a country and the industrial growth of that country. Because the economic indicators indicate the overall progress of the country's various industries. If any industry is moving differently from the economic indicators, it is likely to be a distressed industry and an industry that is not getting enough attention. To understand this phenomenon, we studied the relationship between the growth of the China airline industry and economic indicators in that country. The following objectives were formulated for this purpose;

1. To examine whether the growth of civil aviation industry of China is correlated with the GDP of that nation.
2. To examine whether the growth of civil aviation industry of China is correlated with the GNI of that nation.

For the purpose of analysing data summary statistics, Trend analysis and correlation analysis are used. Summary statistics are a part of descriptive statistics that summarises and provide the gist of information about the sample data. Mean, Median, Minimum, Maximum, standard deviation, coefficient of variation, skewness and kurtosis are the tools used for comparing variables. Time series plot is used to evaluate the growth trend of China with its growth of GNI and Air Passengers Carried.

4.2 Findings

The relationship between the economic indicators of a country and the industrial growth of that country. The economic indicators are GDP and GNI. Following are the judgements of civil aviation industry;

1. Movement of civil aviation industry and GDP
2. Movement of aviation industry and GNI

4.2.1 Movement of civil aviation industry and GDP

1. From 1960 to1970, the GDP rate was constant.
2. From 1970 to 1993, there is a slight increase in GDP.
3. A marked increase is seen from1994 to 2020 in GDP.
4. From 1975 to 1985, the Air Passenger Carried was constant.
5. From 1985 to 1990, there was a slight decrease in Air Passenger Carried.
6. From 1990 to 2000, there was a slight increase in Air Passenger Carried.
7. From 2000 to 2019, there is a marked increase in Air Passengers Carried.
8. In 2020, there was a huge decrease in Air Passengers Carried due to the transport control. Because of the covid19 pandemic.
9. The GDP growth of China significantly correlated with the growth of its airline industry represented by Air Passenger Carried.

4.2.1 Movement of civil aviation industry and GNI

1. From 1995 to 2020, there is a marked increase in GNI.
2. From 1975 to 1985, the Air Passenger Carried was constant.
3. From 1985 to 1990, there was a slight decrease in Air Passenger Carried.
4. From 1990 to 2000, there was a slight increase in Air Passenger Carried.
5. From 2000 to 2019, there is a marked increase in Air Passengers Carried.
6. In 2020, there was a huge decrease in Air Passengers Carried.
7. The GNI growth of China significantly correlated with the growth of its airline industry represented by Air Passenger Carried.

4.3 Suggestions

1. China belongs to the high income group. Macro analysis shows that there is a relationship between the GDP and GNI of china and the growth of Airline Industry. Therefore the comparison of the growth of an industry with the economic indicators would help the industry’s strength.

2. Further research is also sugguested for the comparsion of industrial growth with economic indicators.

4.4 Conclusion

According to correlation and trend analysis, there is a correlation between China's civil aviation industry and the growth of Gross Domestic Product (GDP). Growth of Gross National Income (GNI) and civil aviation industry has been correlated by correlation and trend analysis. There is a relationship between the economic indicators of a country and the industrial growth of that country. Because the economic indicators indicate the overall progress of the country.

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APPENDIX

Data Collected from The World Bank

Year	GDP	GNI	Air Passenger Carried
1960	46834000000		
1961	50775000000		
1962	56906000000		
1963	63794000000		
1964	70755000000		
1965	76422000000		
1966	82826000000		
1967	89545000000		
1968	97683000000		
1969	112366000000		
1970	125698000000		
1971	140192000000		
1972	156487000000		
1973	179495000000		
1974	209367000000		
1975	235876000000		13112800
1976	272612000000		14301900

1977	306807000000		15431300
1978	348615000000		16821200
1979	398210000000		17967000
1980	451770000000		19521000
1981	509985000000		21591200
1982	585989000000		22372400
1983	650512000000		23278100
1984	707030000000		23694300
1985	757689000000		24491900
1986	814596000000		25211400
1987	855983000000		27950200
1988	925215000000		30667300
1989	997121000000		33975500
1990	1053546000000		35963900
1991	1091705000000		33127800
1992	1130983000000		33963900
1993	1142119000000		35625600
1994	1179867000000		38170400
1995	1218273000000	1601159461000	36020400

1996	1252266000000	1628153079000	41252600
1997	1292777000000	1672069823000	43400700
1998	1351896000000	1738065147000	42232400
1999	1400999000000	1810104257000	49536300
2000	1478585000000	1860050404000	52581312
2001	1538200000000	1901984919000	50476541
2002	1587829000000	1916804165000	49305864
2003	1630666000000	1936875558000	47258820
2004	1704019000000	1987869792000	48543473
2005	1765905000000	2020096790000	52477178
2006	1848151000000	2066622661000	59537872
2007	1941360000000	2123477191000	61551258
2008	1992380000000	2128694892000	61214656
2009	1936422000000	2085114524000	58318312
2010	1995289000000	2117722892000	60864422.11
2011	2058369000000	2155480570000	64185339.34
2012	2088804000000	2150189988000	64683769.02
2013	2117189000000	2171546724000	63925151
2014	2149765000000	2199475832000	63434263

2015	2198432000000	2245909000000	65039503
2016	2234129000000	2276759530000	65362743
2017	2297242000000	2322617142000	68316473
2018	2363306000000	2358535903000	70188028
2019	2437635000000	2404693165000	71289277
2020	2310469000000	2211720843000	24956343