

Today and the Future: Mobilization in China

Mobilization always accompanies economy development, and it is mainly presented by the higher proportion of autos especially cars in all kinds of vehicles. As economy develops, people tend to seek for better living quality. Since autos can provide convenient and comfortable transportation service, mobilization is an inevitable process in human society.

1 Analysis of Motorized Vehicles Ownership

1.1 Historical Data

1.1.1 Motorized Vehicles

The total amount of motorized vehicles in China increased to 42.09 million in 1997. Compared with 2.09 million in 1980, the average annual growth rate reached 19.91%. During the same period, the amount of autos reached about 12 million and the annual growth rate was 12.48%, which was much higher than 3.07%, the same index of the world. As a characteristic of China, motorcycles developed as well. The total amount increased from 0.13 million in 1980 to 20.22 million in 1997, with an average annual growth rate as high as 36.76%. This is shown in Figure 1.

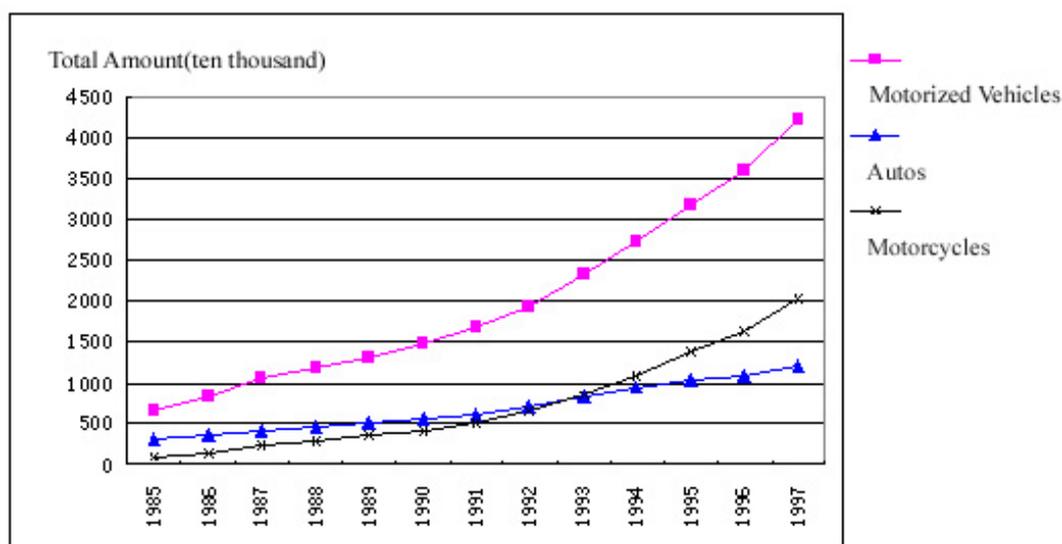


Fig 1 Development of Motorized Vehicles, Autos and Motorcycles in China

Although motorized vehicles develop quickly in China, the amount of motorized vehicles per thousand people is only 8, and that of passenger vehicles is only 1. These indexes are not only much lower than those of developed countries, but also relatively

lower than those of countries with the same economy level. Due to this low jumping-off point, motorization in China will have great potential in the future.

Especially, the increase of motorized vehicles in large cities is eye-catching during recent years. The growth rate of motorized vehicles in Beijing, Guangzhou, Chengdu and Shantou is by far higher than the averaged level of the country. Even in Shanghai, a city with high population density that can hinder the development of motorized vehicles, the annual growth rate still reached 10%. Moreover, the amount of motorized vehicles per person in these cities is much higher than the averaged level in China.

1.1.2 Private Autos

The demand for private autos grows as economy develops. In Figure 2 and Table 1 show the total amount of private autos and the proportion of private autos to all the commercial autos in the 1990s.

Table 1 Development of Private Autos in China

Year	Private Autos			Private Wagons			Private Passenger Vehicles		
	Total Amount (10 ⁴)	Growth Rate (%)	Proportion to All Autos (%)	Total Amount (10 ⁴)	Growth Rate (%)	Proportion to All Wagons (%)	Total Amount (10 ⁴)	Growth Rate (%)	Proportion to All Passenger Vehicles (%)
1990	81.62	-	14.8	57.3	-	16.02	24.07	-	14.84
1991	96.04	17.67	15.85	65.42	14.17	16.92	30.36	26.13	16.39
1992	118.2	23.07	17.09	75.82	15.90	17.72	41.87	37.91	18.51
1993	155.77	31.79	19.05	93.18	22.90	19.28	59.85	42.94	20.93
1994	205.42	31.87	21.81	122.62	31.59	22.55	78.62	31.36	22.48
1995	249.96	21.68	24.03	131.01	6.84	23.04	114.15	45.19	27.32
1996	289.67	15.89	26.33	142.07	8.44	25.45	143.04	25.31	29.31
1997	358.36	23.71	29.39	161.94	13.99	26.93	191.27	33.72	32.95

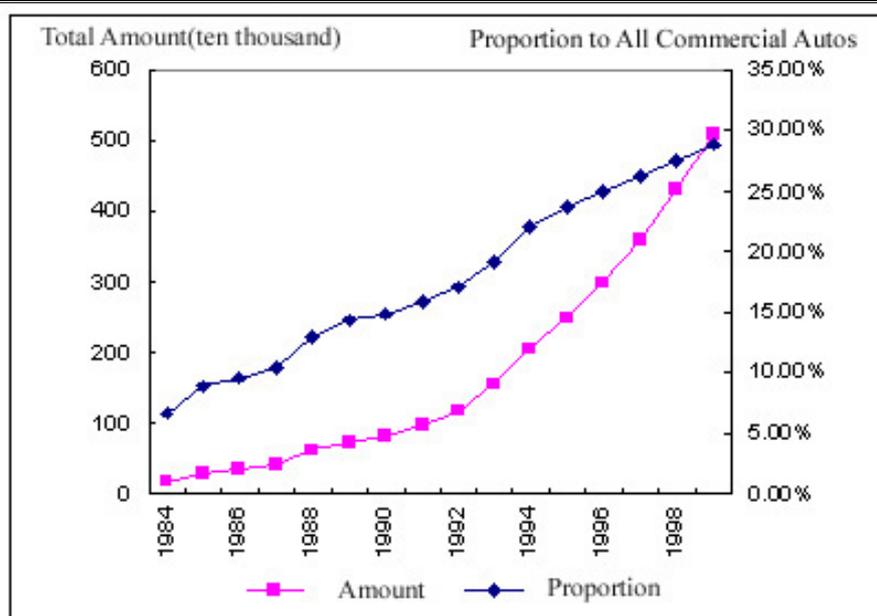


Fig 2 Development of Private Autos in China

As shown in Figure 2, the total amount of private autos has increased rapidly since 1990 and the average growth rate is 23.5%, among which the growth rates of wagons and passenger vehicles are 16.0% and 34.5% respectively.

It should also be pointed out that since the market share of middle and large passenger vehicles is limited, the increase of small passenger vehicles, cars and mini-autos take the largest proportion in the increase of private passenger vehicles.

In Table 2 is the amount of commercial autos in Beijing, Tianjin, Shanghai and Chongqing in 1997. Figures show that the proportions of private passenger vehicles to all the passenger vehicles in these four cities are all less than 50%.

Table 2 Commercial Autos in Four Important Chinese Cities in 1997

City	Total Amount of Commercial Autos_10 ⁴ _	Total Amount of Passenger Vehicles_10 ⁴ _	Total Amount of Private Passenger Vehicles_10 ⁴ _	Proportion of Passenger Vehicles to Commercial Vehicles	Proportion of Private Passenger Vehicles to all the Passenger Vehicles
Beijing	78.4	57.45	25.61	73%	45%
Tianjin	36.5	15.57	7.33	43%	47%
Shanghai	38.3	22.66	0.68	59%	3%
Chongqing	17.4	8.14	1.83	47%	22%

1.1.3 Cars

When national economy and people's income grow to a certain level, a desire for using cars will inevitably form. Therefore, the development of cars is the certain result of economy development. Generally speaking, cars are developed only on a small scale before national income per person exceeds 300 dollar. When national income per person is between 300 and 800 dollar, cars will grow steadily. When national income per person exceeds 800 dollar, car ownership will increase more rapidly. When national income per person exceeds 1600_2000 dollar, this increase will level off.

As to the market demand for autos in China, the proportion of cars and mini-autos to all the autos has kept increasing ever since 1990, especially after 1995. This tendency is shown in Table 3 and Figure 3.

Table 3 Proportion of homemade cars and mini-autos to the demand of all autos

Year	1991	1992	1993	1994	1995	1996	1997
Proportion of mini-auto demand_%_	1.24	2.67	1.16	4.52	10.34	12.06	13.84

Proportion of car demand_%_	12.71	16.62	21.9	20.07	23.29	26.58	30.43
Sum_%_	13.95	19.29	23.06	24.59	33.63	38.64	44.27

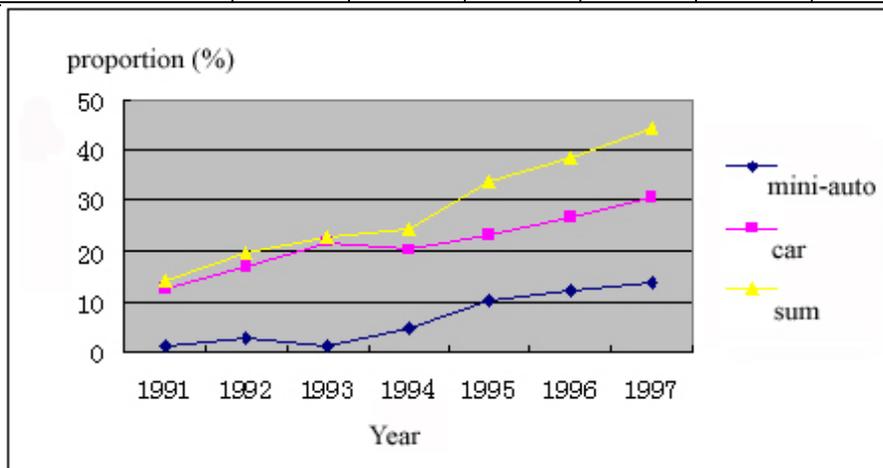


Fig 3 Proportion of homemade cars and mini-autos to the demand of all autos

The development of cars is similar to that of autos, which is shown in Figure 4. The total amount of cars reached 6.54million in 1997 and the index per thousand people is about 5.5.

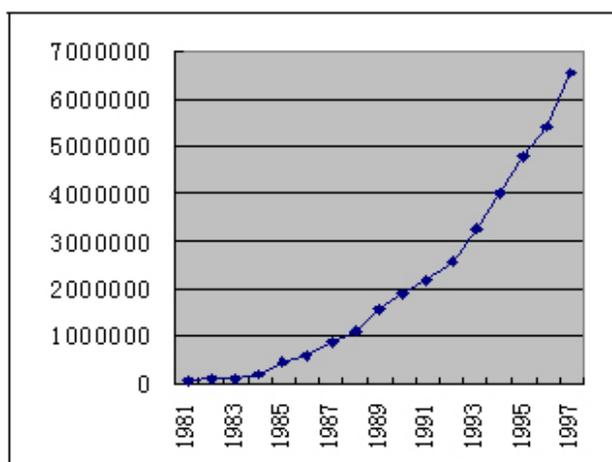


Fig 4 the Development of cars in China

Moreover, the proportion of cars to all the autos can reflect the maturity of automobile industry. This proportion is usually about 70% in developed countries and in China, this proportion has reached 55% after years of development and tends to keep increasing in the future. This is shown in Figure 5.

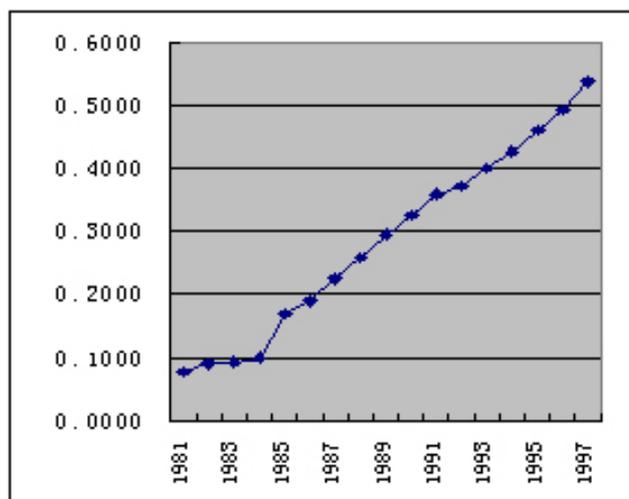


Fig 5 the Proportion of Cars to All the Autos in China

1.2 Tendency of Development

After analyzing the mobilization of many countries, we find the increase of income is the most important factor to expedite mobilization. As economy develops, people's living condition will be improved. Therefore more demand for private autos will be inevitably formed. Since the mobility of China is still low compared with developed countries, automobiles will keep increasing rapidly in the future no matter what police is adapted.

Here we apply Income Elasticity Parameter Method to forecast the amount of cars, wagons and motorized vehicles from 2000 to 2020 in China. We find 80% of the change in the total amount of cars is due to the change in GNP per capita and population density. The influence of GNP per capita on urban mobility embodies the influence of income, while population density reflect the level of city development. The resultant elasticity parameters of car ownership relative to GNP per capita and population density are 1.02 and -0.21 respectively. This means that when income increases 1% the total amount of cars will increase 1.02% and when urban population density decrease 1%, the total amount of cars will increase 0.21%. This result proves the incessant increase of cars while the economy keeps increasing. On the other hand, the decrease of urban population density will expedite the development of cars to some extent, but its influence is relatively low compared with that of income.

If the economy of China keeps developing in the following 25 years, the total amount of cars in cities will increase by 13 to 22 times and the annual growth rate will be 11% to 13%. According to the forecast in *Research on Developing Strategies of*

Private Cars in China, there will be 4.7 to 5.5 cars per thousand people in 2000 and 15.7 to 19.3 in 2010.

As to the proportion of private cars to all the autos, we integrate the characteristics of China and the mode splits in Japanese cities of different scale. The occupancy of different traffic modes is shown in Table 4.

Table 4 Occupancy of Different Traffic Modes

Traffic Modes	Car	Public Transportation		
		Metropolis	Medium City	Small City
Occupancy	2.5	40	30	18

The approximate proportion of private cars to all the autos in metropolis and medium cities is 60%~65% and that in small cities can be as high as 70%.

Take Beijing as a specific example. The total amount of motorized vehicles in 2010 is about 2.2 to 2.5 million, among which passenger vehicles take 75% to 80%. According to the reasonable proportion of private cars obtained above, the city can hold 1 to 1.3 million of private cars. As to other large cities such as Shanghai, there will be even larger space for development because of their low proportion of cars nowadays.

2 Analysis of Mode Split

2.1 Historical Data

Generally speaking, present urban transportation in China is assumed by bicycle. This is mainly because of the unpopular car ownership and undeveloped public transportation system in cities. The mode splits of 20 large cities in China are shown in Table 5.

Table 5 Mode Splits of 20 Large Cities in China

City	Year	PT	Bicycle	Walk	Company bus	Motorcycle	Taxi	Other
Wuhan	1998	48.5	45.6	N/A	2.4	N/A	1.6	1.9
Dalian	1994	40.9	12.8	33.6	10.5	N/A	N/A	2.2
Shanghai	1986	36.1	24.2	36.3	2.3	0.1	0.2	0.7
Beijing	1994	34.7	49.5	N/A	N/A	N/A	N/A	15.4
Chongqing	1985	26.1	0.6	69.1	2.4	0.2	0.6	1.0
Changsha	1983	25.2	31.4	39.2	N/A	N/A	N/A	4.2
Changchun	1997	23.3	32.1	27.0	6.8	2.1	7.8	0.9
Lanzhou	1984	22.6	29.3	45.0	N/A	N/A	N/A	3.1
Fushun	1987	22.1	24.5	40.4	N/A	N/A	N/A	13.0
Nanjing	1986	19.2	44.1	33.1	2.5	0.3	0.1	0.7
Haerbin	1985	17.7	28.5	39.4	N/A	N/A	N/A	14.4

Anshan	1994	13.1	57.2	22.1	5.2	1.3	1.0	0.2
Hangzhou	1986	13.0	56.3	27.7	N/A	N/A	N/A	3.1
Guiyang	1987	11.6	13.0	69.7	N/A	N/A	N/A	5.7
Guangzhou	1984	11.2	37.2	45.6	4.3	0.4	0.3	0.9
Shenyang	1985	10.1	58.7	29.0	N/A	N/A	N/A	2.3
Chengdu	1995	9.5	51.5	36.0	N/A	N/A	N/A	3.0
Tianjin	1990	8.3	74.6	10.6	4.0	N/A	N/A	2.5
Zhengzhou	1987	3.2	63.1	33.0	N/A	N/A	N/A	0.8
Shijiazhuang	1998	2.9	54.4	33.6	2.5	4.5	1.5	0.6

As shown in the above table, bicycles play an leading role in most of the cities in China and the usage of private vehicles is relatively little. Moreover, large cities in China can be divided into 4 groups according to the share of public transportation.

In cities of the 1st group such as Beijing, Shanghai, Lanzhou, Dalian, Fushun, Chongqing, Wuhan, Changsha and Changchun, the share of public transportation is over 20%. Beijing, Shanghai and Wuhan are large cities with a population more than 4 million. Relatively long trip distance urges more residents to use public transportation. At the same time, the level of public transportation facilities and service is better in these three cities. As to other cities except Changchun, the low share of bicycles is due to geographical conditions and city structure.

The share of public transportation is 15%~20% in cities of the 2nd group such as Nanjing and Haerbin. Each of these two cities has a population about 3 million and single city center that is on plains with few hills. The network and share of public transportation are in a middle level and can reflect the normal conditions of present public transportation system in China.

The 3rd group has Guangzhou, Guiyang, Shenyang, Hangzhou, Anshan and other cities with a share of public transportation between 10% and 15%. The low share of public transportation doesn't fit the transportation demand in these cities, which reflect their undeveloped facilities and service level of public transportation.

In cities of the 4th group such as Tianjin, Shijiazhuang, Zhengzhou and Chengdu, share of public transportation is less than 10%. In fact, the scale of these cities is not small and they all lie on plains. Therefore the low share of public transportation reflects the little recognition of public transportation system construction and management in these cities.

To sum up, the share of public transportation is generally too low to satisfy transportation demand in cities with a population over one million, while the share of

bicycles is rather high. The share of private motorized vehicles is still small but has begun to increase.

2.2 Tendency of Development

Taking the popular personal use of company cars in China into consideration, the concept of private cars we use here includes this possibility. Since one of the city developing objectives in the future is to build an integrated modern transportation system with public transportation as the main traffic mode, we think the reasonable share of private cars in large cities in China should be 20%~25%, while this share could be as high as 35% in cities of middle or small scale because it is not economic to build large capacity rail transit system in these cities and the normal public transportation will have relatively weaker attraction. Moreover, this increase of car share is not the result of decreasing the share of public transportation, but by reducing the high share of bicycles to a reasonable low level.