

# Research on the Welfare Loss Caused by Administrative Monopoly in Airline Industry in China

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## Abstract

There is still too much administrative monopoly behavior in China's airline industry. By developing a standard economic model, this paper uses the data of China's airline industry to estimate the net loss of social welfare, the increase of total cost and the transfer effect of welfare. These studies will help us to understand the harm of administrative monopoly to China's airline industry so that measures will be taken to promote the reform of administrative monopoly.

**Key words:** *net loss of social welfare; increase of total cost; transfer of welfare; administrative monopoly; airline industry*

## 1 Introduction

Usually, air transport industry is considered a natural monopoly industry, but actually it is an integrated industrial chain with a series of vertical business units. These businesses units formed a series of corresponding sub industries. It is generally agreed that airline sub industry which provides passenger and freight transportation services shows a characteristics of weak natural monopoly even a considerable degree of competition. However, there is still too much administrative monopoly behavior in China's airline industry. Sometimes natural monopoly may be a good thing, while administrative monopoly is almost a bad thing. This paper will further study the effects on China's airline industry caused by administrative monopoly.

## 2 The model

### 2.1 The net loss of social welfare

In Fig. 1, neither the producer nor the consumers or government can get the part of social welfare which is represented by  $\Delta ABC$ . The area of  $\Delta ABC$  is also known as the net loss of social welfare caused by monopoly ( $DWL$ ), which is often called "harberger triangle" (A.C.Harberger<sup>1</sup>) by economists. It can be calculated as follows:

$$\Delta P = P_m - P_c, \quad \Delta Q = Q_c - Q_m \quad (1)$$



Where,  $C_z$  is the increased total cost caused by administrative monopoly;  $C_s$  is the real cost of the monopoly;  $C_q$  is cost of competitive enterprises.

The potential profit rate

$$r = \frac{P_m - P_c}{P_m} = \frac{P_m - C_q}{P_m} \quad C_q = (1 - r)P_m \quad (6)$$

$$r_s = \frac{P_m - C_s}{P_m} \quad C_s = (1 - r_s)P_m \quad (7)$$

Where,  $r_s$  is the real profit rate

Combine with Eq. (5)

$$C_z = Q_m \times (C_s - C_q) = \{(1 - r_s) - (1 - r)\}P_m Q_m \quad (8)$$

### 2.3 The transfer of welfare

Because of the X-inefficiency, rent-seeking cost and so on, the excess profits of the administrative monopoly industry will come to a loss of rectangle III and IV (see Fig. 1). The value represented by rectangle I and II is not lost, but they have different meaning for the monopoly industry. Rectangular I is the actual excess profits which form the accounting profits of monopoly industry; Rectangle II is an unnecessary increase in labor costs which is caused by voluntary increase in wages & benefits of workers of the administrative monopoly industry. In fact, it is the transfer of welfare from the producer to the industry practitioners. From the perspective of society as a whole, this part of increased cost is not wasted but transferred to workers in the form of wage & benefits. So rectangle II can be deducted in the calculation of the total efficiency loss, and here it is calculated only to explain the welfare transfer of administrative monopoly.

## 3 Data and estimates

### 3.1 The net loss of social welfare caused by administrative monopoly

#### 3.1.1 Determination of potential profit rate ( $r$ )

The key problem here is that the acquisition of potential profit rate is very difficult. Because the U.S. air transport market is a very mature and highly competitive, price level of U.S. air transport may be approximately used as competitive price  $P_c$ . It is very natural to think of the U.S. air transport price level to be converted into RMB using the purchasing power parity rate. Take China's air transport price level as  $P_m$ , the potential profit rate thus can be carried out by Eq. (6).

Purchasing power parity conversion factor (*PPPCF*, RMB/USD) published by the World Bank will be quoted directly in this paper. Due to the lack of data, U.S. air

transport price level (here we use Passenger Yield in USA,  $PYU$ , USD/Revenue Passenger Miles) after 2010 is replaced by the average number of 0.1228 (2002-2009)<sup>3</sup>. China’s air transport price level includes both passenger and freight (Yield in China,  $YC$ , YUAN/Revenue Ton Kilometer). U.S. air transport price level converted by  $PPPCF$  ( $UPLPPP$ ) is calculated at 0.075 ton per passenger; meanwhile miles should be converted to kilometres, see Table 1. Here:

$$r = \frac{P_m - P_c}{P_m} = \frac{YC - UPLPPP}{YC} \tag{9}$$

Table 1 –The net loss of social welfare and the increase of total cost

Year	PYU	PPPCF	UPLPPP	YC	$r$	TRAI	NLSW	Profit	$r_s$	Cz
2005	0.1202	2.82	2.81	5.10	0.449	133.38	17.88	1.65	0.012	58.27
2006	0.1279	2.84	3.01	5.34	0.436	163.34	20.65	2.38	0.015	68.89
2007	0.1298	2.99	3.22	5.23	0.385	191.07	18.82	9.40	0.049	64.17
2008	0.1373	3.16	3.60	5.31	0.323	200.01	13.85	-32.40	-0.162	96.99
2009	0.1187	3.13	3.08	4.78	0.356	212.00	17.84	7.40	0.035	68.05
2010	-	3.31	3.37	5.30	0.364	299.90	26.46	35.10	0.117	74.21
2011	-	3.51	3.57	5.83	0.387	353.20	35.20	27.80	0.079	109.01
2012	-	3.52	3.58	5.99	0.402	388.98	41.75	21.10	0.054	135.27
2013	-	3.55	3.61	6.02	0.400	404.99	43.02	16.24	0.040	145.72
2014	-	3.52	3.58	5.17	0.307	421.56	26.42	17.45	0.041	112.04

Source: China Air Transport Development Report 2006-2008; Civil aviation industry development statistical bulletin 2008-2014.

### 3.1.2 Price elasticity of demand of china’s airline industry ( $\eta$ )

L. Chen<sup>4</sup> calculated the price elasticity of China's airline industry and found that  $\eta$  has maintained at a relatively stable level in the last 10 years. In order to avoid repeated work, the result will be quoted in this paper at an average amount of 1.32837.

Thus, the net loss of social welfare ( $NLSW$ , in billion Yuan) caused by administrative monopoly in China's airline industry can be calculated by Eq. (4). It is fluctuating between 13.85-43.02 billion Yuan during the period of 2005-2014, see Table 1. Here, the total revenue of airline industry  $TRAI = P_m Q_m$  (in billion Yuan).

### 3.2 The increase of total cost caused by administrative monopoly in airline industry

The potential profit rate has been estimated above, and the actual profit rate can be obtained by the actual profit (in billion Yuan) and the total revenue of the airline

industry. According to Eq. (7), the actual profit rate can be calculated as:

$$r_s = \frac{P_m - C_s}{P_m} = \frac{(P_m - C_s)Q_m}{P_m Q_m} = \frac{\text{Pr ofit}}{\text{TRAI}} \quad (10)$$

The increased total cost ( $C_z$ ) caused by administrative monopoly in airline industry is calculated by Eq. (8) as in Table 1. It is fluctuating between 58.27-145.72 billion Yuan during the period of 2005-2014, which shows a great harm of administrative monopoly.

### 3.3 The transfer of welfare caused by administrative monopoly in airline industry

High welfare is usually implicit so that it is difficult to get the data. However the unnecessary increase in labor costs can be reflected in high wages. The unnecessary increase in labor costs can be estimated by comparing the average wage in airline industry with the average wage in all industries. In this case, the normal wage gap between the industries must be taken into consideration. It may be related to the technical requirements, work intensity of industry and so on. That is, high wage doesn't necessarily mean that there is administrative monopoly in the industry.

There is little administrative monopoly in US airline industry. Define the ratio between average wage in U.S. airline industry and average wage in all other industries in U.S. as  $f$ , then  $f$  can be regarded as the normal level of wage gap in china without administrative monopoly. Define  $f'$  is the same ratio in China. If  $f' > f$ , the difference between  $f'$  and  $f$  can be regarded as the extra welfare transferred to the employees.

See Table2, where the average wage in airline industry is replaced by the average wage in air transport industry.  $AWAIC$  is the average wage in all industries in China (Yuan),  $AWATIC$  is the average wage in air transport industry in China (Yuan),  $AE$  is airline employees in China (million),  $TW$  is the transfer of welfare (billion Yuan),  $TW'$  is transfer of welfare when considering hidden benefits (billion Yuan). According to the data released by the U.S. Department of labor in May 2011, the average wage in air transport industry in U.S. was \$55790, and the average wage in all industries in U.S. over the same period was \$45230. That means  $f = 55790/45230 = 1.233$ . This ratio is relatively stable in each year both in U.S. and in China. In this case,  $f' = AWATIC/AWAIC$ . So  $TW$  can be reached by:

$$TW = AWAIC \times (f' - f) \times AE \quad (11)$$

It seems that  $TW$  has increased from 4.10 billion Yuan in 2005 to 23.43 billion Yuan in 2014. However, if hidden benefits is considered, the ratio  $f'$  may be much higher. Let  $f' = 4$ , then the transfer of welfare  $TW'$  can be achieved, which is much higher than  $TW$ .

Table 2– Transfer of welfare caused by administrative monopoly in airline industry

Year	AWAIC	AWATIC	$f'$	AE	TW	TW'
2005	18364	49610	2.701	0.152	4.10	7.72
2006	21001	60387	2.875	0.176	6.07	10.23
2007	24932	68775	2.759	0.198	7.53	13.66
2008	29229	75769	2.592	0.201	7.98	16.26
2009	32736	79880	2.440	0.202	7.98	18.30
2010	37147	92788	2.498	0.192	9.02	19.73
2011	41799	100649	2.408	0.215	10.56	24.87
2012	46769	-	-	0.254	15.78	32.87
2013	51483	-	-	0.278	19.01	39.60
2014	56360	-	-	0.313	23.43	48.81

Source: National Bureau of Statistics of China, <http://data.stats.gov.cn/easyquery.htm?cn=C01>

#### 4 Conclusion

Administrative monopoly does have a huge negative impact on China's airline industry. The net loss of social welfare, the increased total cost and the transfer of welfare caused by administrative monopoly reached 13.85-43.02 billion Yuan, 58.27-145.72 billion Yuan and 4.10-23.43 billion Yuan respectively in China's airline industry during the period of 2005-2014. It will be helpful for us to accurately understand the harm of administrative monopoly and to promote the reform of eliminating administrative monopoly.

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