

**INDUSTRIAL REFORM AND AIR  
TRANSPORT DEVELOPMENT IN CHINA**

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## **Abstract**

This article describes regulatory and enterprise reform in the Chinese airline industry and its impact on the industry's development. China's transport sector is one of the largest sectors of the Chinese economy while aviation has been the fastest growing mode. Chinese civil air transport has grown by an average of 20% a year since 1980 - 4.3 times the world average. The article starts with a description of China's general economic and industrial reforms, followed by a description of reforms in the air transport sector. It then examines the impact of reforms on the growth and development of China's airline industry. In particular, the following aspects of the industry are discussed: air traffic growth and route development, market structure, and airline operation and competition.

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# **INDUSTRIAL REFORM AND AIRPORT TRANSPORT DEVELOPMENT IN CHINA**

## **I. INTRODUCTION**

As China moves from a centrally planned economy to a market economy, many sectors have witnessed, for the last 18 years, either policy liberalization or a shift in decision-making power from central to local governments. By 1993, China's economy had become essentially a market economy in the sense that some two-thirds or more of national output was produced by profit-seeking economic units. Although rural reforms turned out to be very successful, industrial reforms have proved to be much more difficult. Industry is the largest sector of the Chinese economy, accounting for 50% of total output and 80% of exports, and employing more than 100 million workers in 1992.

At the core of China's process of industrial reform has been the reform of thousands of large- and medium-size state-owned enterprises (SOEs). Most of the existing literature on the SOE reform is based on cross-section studies of many industries. However, Jefferson and Rawski (1994, p. 50) pointed out in a comprehensive survey of Chinese enterprise reform: "The problem is complex: the population of state-owned enterprises is large and diverse; the reforms are partial and uneven; they consist of measures that permit (rather than mandate) new courses of action; and outcomes are ambiguous. A full analysis must penetrate to the enterprise level and transcend the evidence available from anecdotes, small samples, and fragile statistical aggregates." This suggests an industry-case-study approach.

This article describes regulatory and enterprise reform in the Chinese airline industry and its impact on the industry's development. China's transport sector is one of the largest sectors of the Chinese economy while aviation has been the fastest growing mode since the early 1980s. Table 1 shows the composition of non-urban transport activities (passenger-kilometres) in recent years. The average annual growth rate of civil aviation in China was 20.7% during the 1980-94 period — 4.3 times the world average, while the average annual growth rate of all modes of transportation was 9.9% in the same period. Air transport has also become more important in intercity transport: its proportion of passenger-kilometres of all modes has increased from 1.7% in 1980 to 6.4% in 1994. In 1994, China ranked 8th in the world in terms of total air passenger-kilometres performed, compared with its 33th place in 1980, while its domestic passenger-kilometres ranked 4th, just behind the U.S., Russia and Japan.

Such a high growth rate appears beyond the expectation of Chinese transport planners. For example, the Development Research Centre of the State Council, an economic think tank of the central government, made the following forecast in 1985: the total tonne-kilometres performed by Chinese airlines would reach 5.0-5.5 billion at year 2000, with an average annual growth rate of 13% (DRCSC, 1988). However, the industry performed 5.8 billion total tonne-kilometres in 1994,

exceeding the estimate for year 2000.

**TABLE 1: Model Split in Non-Urban Transport in China  
(Billion passenger-km)**

	1980	1985	1990	1994	Annual Growth 1980-94
Rail	138.32	241.61	261.26	363.61	7.1%
Road	72.95	172.49	262.03	422.03	13.4%
Water	12.91	17.86	16.49	18.35	2.5%
Air	3.96	11.67	23.05	55.16	20.7%
Total	228.10	433.70	562.80	859.10	9.9%

Source: Yearbook (1995)

Besides its tremendous growth, China's airline industry offers an interesting and prominent example of profound changes in a state industry caused by a historic reform experiment. Taken together, these two observations suggest that an examination of this industry may be particularly useful to study China's SOE reform and to draw implications for the general process of completing the transition from a centrally planned economy to a market economy.

My second objective in this article is to understand better the development of China's air transport and aviation policy. The airline industry is currently undergoing major structural changes throughout the world. There is a world-wide tendency to deregulate/liberalize the airline industry and to promote competition in both domestic and international markets. Globalization of the industry seems increasingly likely; experts predict that a small number (5-10) of global carrier networks will be formed within the next decade. The rapid growth of China's economy, the size of its population, and the geopolitical importance of its location in Asia, all suggest that China will likely play a key role in shaping the pattern of airline networks in Asia and in linkages with other continents. Despite its importance, little has been written on the Chinese airline industry. This article is a step towards filling that void.

The present paper focuses mainly on China's domestic airline market; its international aviation policy and operation will be discussed in a separate paper. The article is organized as follows. Section II contains a description of China's general economic and industrial reforms. Section III describes reforms in the air transport sector. This is followed, in Section IV, by an

examination of the impact of these reforms on the growth and development of the industry. Airline competition in China's domestic markets is also discussed in Section IV. Finally, Section V contains concluding remarks.

## **II. INDUSTRIAL REFORM**

China's economic reform policy was instituted at the Third Plenary Session of the 11th Central Committee of the Communist Party of China in December 1978. A "gradual" reform strategy was adopted (as opposed to the "big-bang" approach applied in some East European countries). Agriculture was the first area in which China implemented reforms. The results were clear: agricultural output increased by 67% between 1978 and 1985, and productivity (measured as the amount of output for a given amount of inputs) increased by nearly 50%, in contrast with no increase in productivity over the previous two and half decades (Lin, 1992; McMillan et al., 1989). The increase in agricultural productivity in turn spurred the growth of rural enterprises, or Township Village Enterprises - TVEs, by generating a pool of savings and excess labour (Byrd and Lin, 1990). Beginning from a small base, TVEs were allowed to grow with few of the restrictions that hobbled state-run industries and TVEs expanded rapidly. A number of studies have recently been done to explain the success of TVEs (e.g., Weitzman and Xu, 1994; Chang and Wang, 1994; Li, 1995).

Industrial reforms were begun in 1979 and reaffirmed at the Third Plenary Session of the 12th Central Committee of the Communist Party of China late in 1984. The thrust of this reform program was to transform thousands of large- and medium-size SOEs into profit-seeking economic units in a market economy. A popular official slogan was that "the goal of the SOE reform is to make enterprises independent, autonomous and responsible for profits and losses." Accordingly, the reforms involved an evolutionary process of re-assignment of decision rights and residual claims from the state to members within the enterprise (i.e., the manager and workers). The argument for shifting decision rights to the manager of the firm was based on the assumption that managerial decisions are more efficiently made at the firm level than at the central planner level owing to information/ communication problems. While the theoretical legitimacy of this assumption dates at least back to Hayek (1945), Chinese economists were mainly basing their argument on the observed poor performance of its central planned system (Zhang, 1996). In particular, the rationale for shifting residual claims to the members of the firm was based on incentive considerations. Although modern theory of incentives was just recently introduced into China, pre-reform Chinese experience seemed sufficient for both Chinese economists and reform-minded political leaders to understand how

essential an incentive system is for economic performance.

State-owned enterprises are the natural focus of any effort to evaluate the progress of China's industrial reforms. Indeed, SOE reform has been the central component of China's overall reform package since the early 1980s. The dominant view among Chinese economists is that SOE reform has not been very successful, at least in terms of profit (Zhang, 1996). The number of SOEs running at a loss has been rising, and the amount of loss has been increasing. In 1993, for instance, total losses from state-owned industrial enterprises were 45.3 billion yuan (RMB), about 14 times losses in 1985. Due to wide scope and huge amount of losses in the state sector, government subsidies to SOEs also swelled, taking a 37% jump from 1986 to 1992. Furthermore, SOEs' contributions to government revenues have been declining. The ratio of profit plus tax over sales revenues for the SOEs dropped from 26% in 1980 to 12% in 1992 (Lin, 1996).

Studies by western economists, focus mainly on the effects of reform on total factor productivity (TFP) growth in Chinese state enterprises. The results have been mixed. Woo, *et al.* (1994), for example, found that, in the 1984-1988 period, TFP growth in SOEs was zero at best. This is in contrast to several other studies (Chen, *et al.*, 1988; Jefferson, Rawski and Zheng, 1992; World Bank, 1992; Gordon and Li, 1995), that found significant improvements in SOEs' productivity. Their estimates of annual TFP growth in the 1980s range from 2 to 4%, compared with almost zero percent growth prior to the reforms.

From the social perspective, the increase in SOEs' TFP indicates the success of SOE reform. But the government, as the owner of the SOEs, does not seem to directly benefit from the reforms. The improvement in productivity and the decline of profits may be reconciled, however. As indicated above, SOE reform can be characterized as a process of re-assignment of decision rights and residual claims from the state to the members of the enterprise. This improves the incentives for managers and workers to improve efficiency and pursue profits. However, managerial discretion associated with managerial decentralization may be abused such that managers become actual residual claimants, even though the state is the legal residual claimant of the enterprise. More specifically, SOEs are owned by the state but run by managers and workers. Due to asymmetric information and high monitoring costs, managers might reduce the profits submitted to the state by overstating costs and/or underreporting revenues. Although managers cannot easily pocket the profits, they have many opportunities to spend the enterprise's money. As a result, we see an improvement in SOEs' efficiency on the one hand, but a decline in profits in official statistics on the other.

The above discussions suggest two directions for deepening China's SOE reforms. First, given the current structure of public ownership, one solution to the managerial discretion problem is to create a competitive product market. An enterprise's profit level in a fair, competitive product market may be a sufficient information indicator of the managers' performance. Second, a longer-term solution should have residual claim and control rights be paired as much as possible. This calls for the privatization of state enterprises. The Chinese airline industry, building on earlier reform measures, appears to move in these directions.

### **III. REFORMS IN THE AIRLINE INDUSTRY**

China's airline industry was founded during the early 1950s when the country was newly established and the airlines were used as instruments of national policy for government administration, trade and tourism. Prior to 1980, the industry was a semi-military organization with the Civil Aviation Administration of China (CAAC) being a department of the air force. The "chain of command" within CAAC was a four-level administration system: CAAC, six regional civil aviation bureaus, twenty-three provincial civil aviation bureaus, and seventy-eight civil aviation stations. CAAC not only acted as a regulator of civil aviation, but also directly managed air transport services. Lower-level operations units could not make important operational decisions and were not independent economic entities responsible for their own profits and losses. The industry was regulated in every facet of air services provision including market entry, route entry, frequency, pricing and even passenger eligibility for air travel. It was, therefore, a CAAC monopoly.

Reform of the Chinese airline industry, which started in the late 1970s, was due primarily to unsatisfactory performances of the traditional centrally-planned system. First, the industry had been suffering persistent financial losses. From 1953 to 1978, it had witnessed fourteen years of losses even after the central government's subsidies to the industry was taken into account. Of these fourteen years, the 1968-74 period produced six consecutive years of losses totalling 360 million yuan (Shen, 1992).

Second, demand for air services was severely suppressed under the old system and as a result, development in the airline industry had stagnated. The air share of domestic intercity traffic volume remained largely constant at about 1% over the 1950-80 period. Air transportation was used primarily for government administration: most passenger travel by air was for administrative affairs for various levels of governments and large state-owned enterprises rather than for conducting business. This lack of commercial demand made the airline market rather small. Moreover, the military management of airlines and airports created no competition in the market and resulted in



inefficient and low quality services, further stifling demand. In fact, it took 24 years (after 1950) for CAAC to reach the highest traffic level in the Chinese aviation history (Wang, 1989).

The process of airline reform may be divided into two stages. The first stage occurred between 1980 and 1986, when the goal was to focus on the economic aspects of air transportation. Reforms began in the administrative structure in 1980 and continued in 1982, when civil aviation was effectively separated from the air force. Beginning in 1981, the central government adopted the policy of "self-responsible for losses and extra-profit retention" in the airline sector. The policy was simply a one-nine division of airline revenue between the state and CAAC. Within CAAC, six regional civil aviation bureaus became basic units for recording profits and losses in 1979. The practice was further extended to twenty-three provincial civil aviation bureaus a year later. Furthermore, CAAC in 1982 extended the profit-retention system to six regional civil aviation bureaus and gave them more autonomy in making operational decisions. During this period, however, CAAC continued to be the operator of all flights, all airports and the National Air Traffic Service.

The second stage of reform began with the passage of "Report on Civil Aviation Reform Measures and Implementation" by the State Council in January 1987. The main goal of this reform program was to separate the regulator from also being the operator, thereby breaking CAAC's monopoly. More specifically, the program included: (i) simplifying the traditional four-level administration system for air transportation to a two-level system, the CAAC and regional civil aviation bureaus; (ii) establishing six state-owned trunk airlines based on the partition of regions; (iii) separating airport operations from airline operations; and (iv) easing market entry (Wang, 1989).

The new program was implemented initially within the Chengdu and Shanghai regional civil aviation bureaus, respectively. As a result, China Southwest Airlines, based in Chengdu, was established in December 1987. The following June, China Eastern Airlines, based in Shanghai, was established. With the success of the Chengdu and Shanghai "test-runs", four other airlines were established: Air China (based in Beijing) in late 1988, China Northwestern Airlines (based in Xian) and China Northern Airlines (based in Shenyang) in 1989, and China Southern Airlines (based in Guangzhou) in 1991. These air carriers are profit-seeking units and are directly responsible for air services provision. Each decides its flight frequency and sales outlets, selects inputs (e.g., crew members, flight attendants and their employment and compensation contracts), proposes aircraft purchase and route entry, and makes other operational decisions.

With the establishment of these independent airlines, CAAC's main role became one of regulation and coordination, involving issuing airline licenses, approving route entry and exits,

pricing, designing strategic plans for the industry, issuing policies and regulations to maintain safety and to improve competition and efficiency, and negotiating bilateral air services agreements with foreign countries. CAAC was no longer the operator of air transportation, and the new role allows it to focus on designing efficient mechanisms to fulfil its regulatory function in adjusting and regulating the market. Similarly, the main mandate of regional civil aviation bureaus is administrative, such as coordinating air traffic control and regional airport development.

As mentioned earlier, airports were operated by CAAC. One component of the second-stage of reform was to separate airport operations from airline operations and decentralize airports. As an experiment to test the efficacy of the new policy, in October 1988, CAAC approved the transfer of the operations of the airport in Xiamen (one of the four Special Economic Development Zones in China) to the Xiamen municipal government. The transfer included all the fixed and working capital of the airport and personnel. Other airports were decentralized gradually over the next several years while new airports were managed by local governments from inauguration.

Another important reform measure was to ease both market entry and route entry. For the former, the policy has been to encourage local carriers entering the market. The local carriers were set up by provincial or municipal governments or by large enterprises. These non-CAAC carriers started to enter the industry in 1986. There are so far more than a dozen local carriers operating mainly on small regional routes.

As for route entry, CAAC simplified its approval procedures and, in general, encouraged carriers to open new routes. Here airlines, in consultation with airports, proposes their new routing plans and CAAC holds meetings every year to coordinate route entry among airlines. Although CAAC's approval is required for route entry, most of the airlines' requests seemed to get approved without much trouble.

#### **IV. AIR TRANSPORT DEVELOPMENT AND COMPETITION**

This section examines the impact of reforms on the growth and development of China's airline industry. In particular, the following aspects of the industry will be discussed: air traffic growth and route development, market structure, and airline operation and competition. Other aspects such as airline pricing and costs, revenue and financial performance, civil aviation investment (airport and aircraft fleet), and air safety will be discussed in another paper.

##### **A. Air Traffic Growth and Route Development**

As indicated earlier, the Chinese airline industry had stagnated in its growth prior to the airline

reforms but has grown tremendously since. Tables 2 and 3 report data on, respectively, air traffic volume and number of routes over the 1950-94 period. Both the total tonne-kilometres and revenue passenger-kilometres performed in 1994 were about 20 times those of 1978. The total number of routes in 1994 was more than 4 times the number in 1980 (4.0, 4.3 and 4.7 times for domestic, regional and international routes, respectively).

Table 4 shows this recent growth in the context of world aviation. In 1994, China ranked 8th (11th) in the world in terms of revenue passenger-kilometres (total tonne-kilometres) performed, compared with its 33th (35th) place in 1980. In 1994, China's domestic passenger-kilometres ranked 4th, behind the U.S., Russia, and Japan. Its annual growth rate during the 1980-94 period averaged 21% for both domestic and international traffic. This was 4.3 times the world average.

**TABLE 2: Traffic Volume in China's Airline Industry**

Year	Revenue Passengers (Million)	Cargo/ Mail Tonne	Revenue Passengers-km (million)	Cargo/Mail Tonne-km (million)	Total Tonne-km (million)
1950	0.01	767	9.78	0.82	1.57
1955	0.05	4711	56.85	5.14	10.12
1960	0.21	31788	161.88	26.46	40.45
1965	0.27	27163	248.35	25.10	46.62
1970	0.22	36891	179.24	35.20	48.22
1975	1.39	46555	1538.54	60.16	171.81
1978	2.31	63815	2791.91	97.05	298.66
1980	3.43	88866	3955.52	140.60	429.35
1985	7.47	195059	11671.63	415.12	1271.02
1987	13.10	298758	18877.09	652.36	2028.33
1990	16.60	369721	23047.98	818.24	2499.50
1992	28.86	575269	40612.04	1342.40	4284.56
1994	40.39	829434	55158.02	1857.66	5841.22

Source: Transport (1985-95)

**TABLE 3: Number of City-pair Routes in China's Airline Industry**

Year	Domestic	Regional <sup>1</sup>	International	Total
1950	7	0	0	7
1955	15	0	1	16
1960	12	0	5	17
1965	51	0	6	57

1970	67	0	4	71
1975	128	0	7	135
1980	159	3	18	180
1985	233	7	27	267
1987	277	7	39	323
1990	385	8	44	437
1992	492	13	58	563
1994	630	13	84	727

1

Regional routes refer to routes connecting Hong Kong and a city in Mainland China. Source: Transport (1985-95)

**TABLE 4: Overview of Chinese Airline Performance, 1980-94**  
(Index 1980 = 100; the numbers in the parentheses are rankings in the world)

A. Passenger-kilometres Performed					
	1980	1985	1990	1994	Annual Growth 1980-94
Domestic	100 (18)	313 (9)	514 (7)	1488 (4)	21.3%
International	100 (60)	412 (34)	701 (31)	1287 (23)	20.0%
Total	100 (33)	339 (20)	562 (15)	1436 (8)	21.0%
B. Tonne-kilometres Performed (passenger, freight and mail)					
	1980	1985	1990	1994	Annual Growth 1980-94
Domestic	100 (17)	302 (9)	487 (7)	1396 (4)	20.7%
International	100 (51)	416 (33)	758 (28)	1577 (20)	21.8%
Total	100 (35)	338 (21)	572 (18)	1453 (11)	21.1%

Source: ICAO (1981-95)

This dramatic growth in the Chinese airline industry can be attributed to several factors: increased disposable income, more leisure time, developing trade and tourism, and the airline reforms discussed above. Real GDP has increased almost 3 times from 1980 to 1994, with an average growth rate of 8.7% per year, compared with that of 5.8% in 1970s and 4.0% in 1960s (Yearbook, 1995). Research on airline demand using data from industrialized countries has found that the income elasticity of airline demand ranges between 1.5 to 1.8.<sup>1</sup> This means that a 10% increase of national income would increase demand for air travel by 15% to 18%. The annual economic growth rate in China was 8.7% during the 1980-94 period. Even applying the high end of the income elasticity estimates to China would, thus, imply an annual growth rate of 15% for airline demand, which is still less than the actual rate of about 21%. This suggests that factors other than general economic growth may be at work. It would be very interesting to do further research to isolate the positive impact of the airline reform (the liberalization of regulations and aviation policies, etc.) on the industry growth. It is quite clear, for instance, that the government's policy of encouraging both market and route entry has facilitated the large expansion of new routes and total traffic.

#### **B. Market Structure and Route Concentration**

The breakup of CAAC into independent airlines and the entry of new carriers have significantly changed market structure. As mentioned above, before 1987 (when the second-stage of airline reform was implemented), the industry was a CAAC monopoly. Now the Chinese airline industry may be characterized as an "oligopoly." The market participants include ten CAAC carriers (carriers under CAAC) and more than a dozen non-CAAC carriers. Table 5 shows passenger traffic (including both domestic and international traffic) performed by the Chinese airlines in 1991 and 1994. As can be seen, the six CAAC trunk airlines controlled the majority of market share. In 1991, the top three airlines, namely, Air China, China Southern and China Eastern, together had a 60% of the total revenue passengers performed while the other three trunk airlines had 26% market share. The remaining 14% traffic was supplied by four other CAAC carriers and more than a dozen local airlines. The dominance of the top three carriers has weakened, with combined market share falling from 60% in 1991 to 53% in 1994. The decline was due mainly to the growth of local, non-CAAC carriers, whose market share rose from 7% in 1991 to 12% in 1994.

In fact, the rise of local carriers in China has been dramatic. As can be seen from Table 6,

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<sup>1</sup> Oum, Gillen and Noble (1986), for example, estimate an income elasticity of 1.5 for business travellers and of 2.0 for leisure travellers, using a data set of 200 U.S. domestic routes in 1978. The mean estimate is about 1.7 given the business/leisure travellers mix in their data.

local carriers started to serve domestic routes in 1986 and regional routes (routes connecting Hong Kong and a city in the mainland of China) in 1987. After entry they grew quickly, especially in the domestic market with average growth rate 104% per year over the 1986-94 period, which was much higher than the growth rate for CAAC carriers. Note that services on international routes are reserved only for the top three CAAC carriers.

As a consequence of the growth of local carriers, the 3-, 4- and 6-firm concentration ratios in the Chinese airline industry have been falling in recent years, as reported in Table 7. (The 3-, 4- and 6-firm concentration ratios are calculated as the sums of the market shares of the 3, 4 and 6 largest firms, respectively.) On the other hand the Herfindahl index, the sum of the squared market shares of all firms, stayed almost constant over the period. For illustration, the available figures for the U.S. airline industry were also reported. Although direct comparison is problematic, if we take these figures at face value they suggest that the Chinese airline industry is slightly more concentrated than the U.S. airline industry.

**TABLE 5: Traffic Performed by China's Airlines**

Airline	1991		1994	
	Revenue Passengers (million)	Revenue Passenger-km (billion)	Revenue Passengers (million)	Revenue Passenger-km (billion)
CAAC Trunk Carriers				
Air China	2.90	8.10	5.37	11.79
China Southern	5.69	5.48	9.91	10.74
China Eastern	4.20	4.65	5.61	6.91
China Northern	2.00	2.98	3.59	5.41
China Southwest	2.06	2.77	4.38	5.85
China Northwest	<u>1.58</u>	<u>2.11</u>	<u>2.10</u>	<u>2.74</u>
Sub-total	18.43	26.09	30.96	43.44
Other CAAC Carriers <sup>1</sup>	1.14	1.83	3.08	4.86
Local Carriers <sup>2</sup>	2.21	2.26	5.35	6.86
Total	21.78	30.13	40.39	55.16

<sup>1</sup> Other CAAC carriers are: Xinjiang Airlines, General Aviation Airlines, Yunnan Airlines,

and Great Wall Airlines.

- <sup>2</sup> Local carriers are non-CAAC airlines which include Xiamen Airlines, Shanghai Airlines, Sichuan Airlines, Hainan Airlines, United Airlines, Shenzhen Airlines, Wuhan Airlines, New China Airlines, Zhongyuan Airlines, Changan Airlines, Fujian Airlines, Guizhou Airlines, Nanjing Airlines, and Shandong Airlines.

Source: Transport (1992, 95).

**TABLE 6: Entry of New Local Airlines in China**

A. Revenue Passenger-kilometres Performed (thousand)							
	1985	1986	1987	1990	1992	1994	Annual Growth
CAAC							
Carriers	5949	8301	10503	12197	21120	28212	18.9%
Domestic	768	896	1008	1864	2779	2948	16.1%
Regional <sup>1</sup>							
Local Carriers <sup>2</sup>	0	21	583	1259	2821	6242	103.8% <sup>3</sup>
Domestic	0	0	52	140	126	116	12.1% <sup>4</sup>
Regional <sup>1</sup>							
B. Total Tonne-kilometres Performed (million)							
	1985	1986	1987	1990	1992	1994	Annual Growth
CAAC							
Carriers	674.2	919.0	1172.	1348.	2338.	3183.	18.8%
Domestic	90.6	103.6	3	2	8	0	16.5%
Regional <sup>1</sup>			118.4	214.4	323.9	358.4	
Local Carriers <sup>2</sup>	0	2.0					103.7% <sup>3</sup>
Domestic	0	0	51.4	103.4	265.8	593.0	8.9% <sup>4</sup>
Regional <sup>1</sup>			3.7	7.6	7.1	6.7	

Notes: <sup>1</sup> Regional routes refer to routes connecting Hong Kong and a city in Mainland China.

<sup>2</sup> Local carriers refer to non-CAAC carriers.

<sup>3</sup> Growth rates are over the 1986-94 period.

<sup>4</sup> Growth rates are over the 1987-94 period.

Source: Transport (1986-95).



**TABLE 7: Firm Concentration Ratios in China's Airline Industry**

	1991	1992	1993	1994	U.S. 1990
3-firm Concentration Ratio	58.7%	58.8%	54.4%	51.7%	NA
4-firm Concentration Ratio	67.9%	68.4%	64.1%	60.6%	61.5%
6-firm Concentration Ratio	84.6%	82.9%	80.2%	76.7%	NA
Herfindahl Index	0.17	0.18	0.17	0.17	0.12

Notes: The 3-, 4-, and 6-firm concentration ratios are the sums of the market shares of the 3, 4, and 6 largest firms, respectively. The Herfindahl index, the sum of the squared market shares of all firms, ranges between 0 and 1.

NA: Not available.

Source: Transport (1992-95).

It is often argued in airline research that the markets at the city-pair level are more relevant for the purpose of competition and consumer welfare than the markets at the national level. Table 8 thus examines concentration at the 30 largest domestic city-pair markets in China, in descending order of market size. An equivalent number of firms is reported for each route. (The equivalent number of firms is the inverted Herfindahl index, calculated using each carrier's market share on the route). In 1993 there were, on average, 2.06 firms on one of the top 30 domestic routes. The number increased to 2.40 in 1994 (a 20% increase). The increase also occurred for both the top 10 and top 20 city-pairs. These observations suggest that there were two or three "equivalent" carriers operating on the busiest domestic routes and that concentration declined at the route level between 1993 and 1994.

### **C. Airline Operation and Competition**

With the liberalization of China's airline industry, several trunk airlines and more than a dozen small local airlines have emerged, and the airline network has expanded rapidly. The number of domestic, regional and international routes increased by an annual rate of 10.3%, 11.0% and 11.6% for the 1980-94 period, respectively (see Table 3). There were more than 600 domestic routes as of 1994, almost four times the number of routes in 1980. Moreover, the network pattern has fundamentally changed from a single airline, linear network to a local, "hub-and-spoke" system. The country has been divided into six air regions



**TABLE 8: Concentration at the 30 Largest Chinese City-pair Markets, 1993 and 1994**

1993			1994		
City-pair	Passenger s	Equivalent Number of Firms	City-pair	Passenger s	Equivalent Number of Firms <sup>1</sup>
Beijing-Guangzhou	907420	2.87	Beijing-Guangzhou	969751	2.52
Guangzhou-Shanghai	859876	2.86	Guangzhou-Shanghai	840961	3.40
Beijing-Shanghai	742683	2.11	Beijing-Shanghai	677707	2.40
Guangzhou-Haikou	521693	1.27	Guangzhou-Haikou	515944	2.15
Guangzhou-Guilin	503810	1.05	Beijing-Xian	501146	1.61
Beijing-Xian	476154	1.62	Guangzhou-Chengdu	493649	2.66
Guangzhou-Chengdu	439011	2.12	Guangzhou-	450909	2.83
Guangzhou-	418078	2.82	Hangzhou	438454	3.34
Hangzhou	379833	1.80	Guangzhou-	419293	3.19
Beijing-Shenzhen	344531	1.55	Chongqing	406779	2.25
Beijing-Chengdu			Beijing-Shenzhen		
	330272	2.41	Beijing-Chengdu	365573	2.00
Shanghai-Xiamen	328973	3.54		353735	1.05
Shanghai-Shenzhen	315867	1.00	Guangzhou-Wuhan	353004	2.17
Guangzhou-Shantou	308342	2.43	Guangzhou-Shantou	334228	1.00
Guangzhou-Xiamen	306411	1.82	Nanjing-Beijing	331711	3.81
Beijing-Nanjing	300982	3.26	Guangzhou-Guilin	331418	1.89
Guangzhou-	293841	1.72	Shanghai-Shenzhen	331135	2.29
Chongqing	281408	1.37	Dalian-Beijing	321365	3.05
Guangzhou-Kunming	269155	2.69	Hangzhou-Beijing	318955	2.21
Guangzhou-Wuhan	257594	1.89	Guangzhou-Xiamen	310201	2.70
Beijing-Hangzhou			Guangzhou-Kunming		
Beijing-Dalian	252592	2.44	Shanghai-Xiamen	270628	1.85
	224252	1.61		258030	2.48
Guangzhou-Nanjing	210159	1.00	Beijing-Shenyang	257096	2.84
Shanghai-Fuzhou	204400	2.07	Guangzhou-Nanjing	255289	2.15
Chengdu-Lhasa	303165	2.41	Shanghai-Wuhan	254769	3.93
Shanghai-Chengdu	191415	1.59	Shanghai-Fuzhou	240347	2.85
Shanghai-Xian	179719	1.00	Beijing-Harbin	238830	2.19
Beijing-Urumqi	177325	2.98	Beijing-Wuhan	223151	1.00
Beijing-Shenyang	176606	1.86	Chengdu-Shanghai	211704	1.30
Chengdu-Kunming	175220	2.50	Chengdu-Lhasa	209160	2.78
Shanghai-Guilin			Shanghai-Xian		
Shanghai-Wuhan			Haikou-Shenzhen		
Average	353129	2.06	Average	382831	2.40

<sup>1</sup> The equivalent number of firms is the inverted Herfindahl index, calculated using each carrier's market share on that route.

Sources: Transport (1994, 95), Timetable (1993, 95), OAG (1994) which correspond to the operational bases of the six trunk airlines. By centering in its hub city,<sup>2</sup> each trunk airline is a dominant carrier in its own region while competing with each other on routes linking major cities of different regions. For instance, China Eastern, a trunk carrier, competes with China Southern, another trunk carrier, on routes Shanghai-Guangzhou (respective hub cities) and Nanjing-Xiamen (inter-regional, non-hub cities). However, China Eastern is a dominant carrier on its intra-regional Shanghai-Ninbo route, competing only with Shanghai Airlines, a local carrier. The inter-regional routes which see competition between hub carriers usually are busy routes; they cover more than half the volume of total domestic air traffic. As shown in Table 8, typically there are at least two "equivalent" carriers on those routes.

Competition amongst China's airlines is mainly in the domain of non-price aspects. (The prices of all domestic flights are still regulated and set by CAAC). An important competitive device is a carrier's networking or route structure. In particular, a network which can offer more destinations and convenient connections has a competitive advantage. Although CAAC's approval is required for route entry, most of the airlines' requests seemed to get approved without much trouble. Another competitive device which carriers can use is flight frequency. A high flight frequency on a route can reduce passengers' schedule delay costs (load factor will fall, however) and thus improve service quality. Other competitive devices include: flight scheduling, safety, aircraft type, airlines' travel agents and reservation, marketing promotions, service quality (e.g., in flight services and meals), and flight punctuality.

Competition has played a positive role in the airlines' drive to maximize economic profits and/or minimize costs, reflected in the improvements in their financial performance and productivity. Competition is good for business; apart from forcing the players to be more competitive, competition can create demand. Many Chinese, for example, have yet to fly an aircraft, so flying is a novel experience for them. The entry of new local carriers in the late 1980s and early 1990s helped to fill that need especially for people living in remote areas.

Competition also plays an important role in airlines' adopting new technology and/or ensuring the efficient use of technology. This is achieved through a longer-term view of investment in technology and the principle of survival of the fittest. A necessary condition here is that firms can retain profits and make their own capital purchase decisions. In the Chinese airline industry, observations suggest that now each carrier has greater incentives to acquire new and more efficient

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<sup>2</sup> Beijing for Air China, Guangzhou for China Southern, Shanghai for China Eastern, Shenyang for China Northern, Chengdu for China Southwest, and Xian for China Northwest.

aircraft and to develop efficient computer reservation systems and hub-and-spoke delivering systems.

## V. CONCLUDING REMARKS

The (former) centrally planned economies share at least some common feature with the market economies: the transport sector is one of the largest sectors of their respective economies. It is no small challenge to understand the functioning of this vital economic sector in a process of transition. In this paper I have described China's dramatic airline expansion. This expansion is made possible, not only by China's general economic growth creating new levels of affluence and business travel, but also by the enterprise and regulatory reforms focusing on economic incentives, corporate governance and competition. However, in more recent years, traffic growth is probably more than matched by capacity, and rationalization of the industry has the potential to further improve efficiency while at the same time maintaining competition. Based on the Chinese experience in airline reform, two lessons may be drawn for general enterprise and industry reforms.

First, major carriers' attitudes towards entry and competition were essential for the success of the reforms. This point is related to the role of economic/output expansion in the initial stage of industrial reforms. From the above discussions, we have seen that allowing (almost) free entry in the air transport industry has had little adverse effect on state-owned companies. This is because there is enough business for everyone. Political pressure to restrict entry has consequently been limited and has been outweighed by the objective of creating competitive markets. This would then build the momentum for furthering the shift to unlimited competition and making it irreversible. As capacity becomes more adequate, however, coordinated efforts may be needed to limit the entry of inefficient carriers or to allow them to be merged with other carriers.

Second, we need to examine transitional industrial policies such as merger/competition policy in the presence of various imperfect markets (e.g., imperfect financial markets). This approach will help re-focus our attentions towards enterprise reform from the enterprise *per se* to surrounding industrial and market environments.

China, with a population more than double that of the U.S. and Western Europe combined, will undoubtedly play a more important role in world aviation in the future. The traffic growth rate for China will depend upon its rate of economic growth and, in turn, on its political evolution. The regulatory regime will continue to change to reflect these trends. These trends, and the aviation system arising from them, will contribute to bringing China and other nations closer together.

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