Aviation Policy and Performance in China: A Comprehensive Evaluation

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Outline

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2. Industrial Performance
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4. Corporate Governance & Competition
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1. Aviation Policy Developments

- Early aviation reform separated civil aviation from the air force
- Substantial reforms began in late 1980s:
  - Six trunk airlines: to separate CAAC from direct airline operation
  - Entry of non-CAAC carriers
- In 1990s, “Big Three” carriers were given further discretionary power (& allowed to list in stock market)
- Consolidation to “Big Three”

- Airline operation was separated from airport operation
- Historically, CAAC, representing Central Government, owned & operated airports
- Airport funding comes from fiscal spending
- Rapid traffic growth in 1980s-90s pressured on airport infrastructure
- To overcome funding shortage, CAAC set up:
  - “Airport infrastructure fee” (1992)
  - “Fund of infrastructure construction for civil aviation” (1993)

- To encourage local initiative & funding, localize airport control & management

- Test cases:

  Xiamen in 1988

  Shanghai Hongqiao in 1993

- Localization program accelerated in early 2000s

  & was completed by 2003 – except Beijing and Tibet

- From 2006, Central Government stopped subsidizing airports
  - Funding will be mainly from local governments
  - It was also hoped airports would improve efficiency
  - … and attract funds from private sector
- Since 2002, foreign investors allowed to invest in airports
  - e.g. HKIA invested in Hangzhou airport (35%) & Zhuhai airport
  - Fraport in Ningpo airport (25%); etc.
- Foreign investment in airlines; JVs in cargo business

- Airport privatization via IPO (Initial public listing):
  - In 1996, 25% shares of Xiamen airport floated in Shanghai Stock Exchange
  - So far, 6 airport companies incl. 7 airports are listed

- Airline IPOs

- Assets management transferred to SASAC under the State Council

- CAAC serves as the industry's regulator, aiming to
  - maintain a fair market environment:

    Competition
  - Protect consumers' interests:

    Safety; Air traffic control

    International affair & cooperation

- Thus, aviation policy liberalization paves the way for more market-oriented airline & airport management

2. Industrial Performance

- China ranked 2nd in the world in 2005, in terms of both pax-km (33rd in 1980) & ton-km (35th in 1980)
- The ‘Air’ proportion of domestic inter-city pax-km of all modes – Highway, Rail, Water, Air – has increased from 1.7% in 1980 to 9.0% in 2002
- Aviation has been the fastest growing transport mode – 1980-2005, annual growth rate:

  passenger: 16.8%

  air cargo: 16.6%

Aviation growth

	Passenger (Pax)	Pax-km	Air Cargo	Cargo Ton-km
Ave. ann. growth				
1981-1985	16.8%	24.2%	17.0%	24.2%
1986-1990	17.3%	14.6%	13.6%	14.5%
1991-1995	25.3%	24.2%	22.3%	22.2%
1996-2000	5.6%	7.3%	14.2%	17.7%
2001-2005	17.5%	n/a	13.8%	15.9%
1980-2005	**16.8%**	**n/a**	**16.6%**	**18.2%**

- Total factor productivity of airlines averaged about 3% ann. growth – higher than 1-2% for other SOEs
- Ann. growth of labour productivity: 11.4% for 1978-2000
- Good performance is a result of the policy liberalization
  - E.g. Entry of non-CAAC carriers; lately, private carriers
    →Ensuing competition; hence, improved productivities
  - Relaxed fare control: up to 45% below the official base rate; no limit for tourist routes
    → Stimulating demand and fleet expansion

- Airport decentralization: local initiative & investment in airport infrastructure

- This objective appears to be achieved
  - E.g. In 1999, 40% of investment in civil-aviation fixed assets from local governments
  - Shanghai government took initiative to build Pu-dong airport & contributed 80% of funds
  - Similarly, new Guangzhou airport

Safety performance

- CAAC controls financial fitness & safety qualification of new carriers; ATC
- Investigative group by the State Council after a major accident
- A major concern: when gov't started to withdraw from airline & airport operations, aviation safety would be compromised?
- Has the policy liberalization increased accident risk?

Figure 1. Fatal accident rate and number of flights (1950-2005)

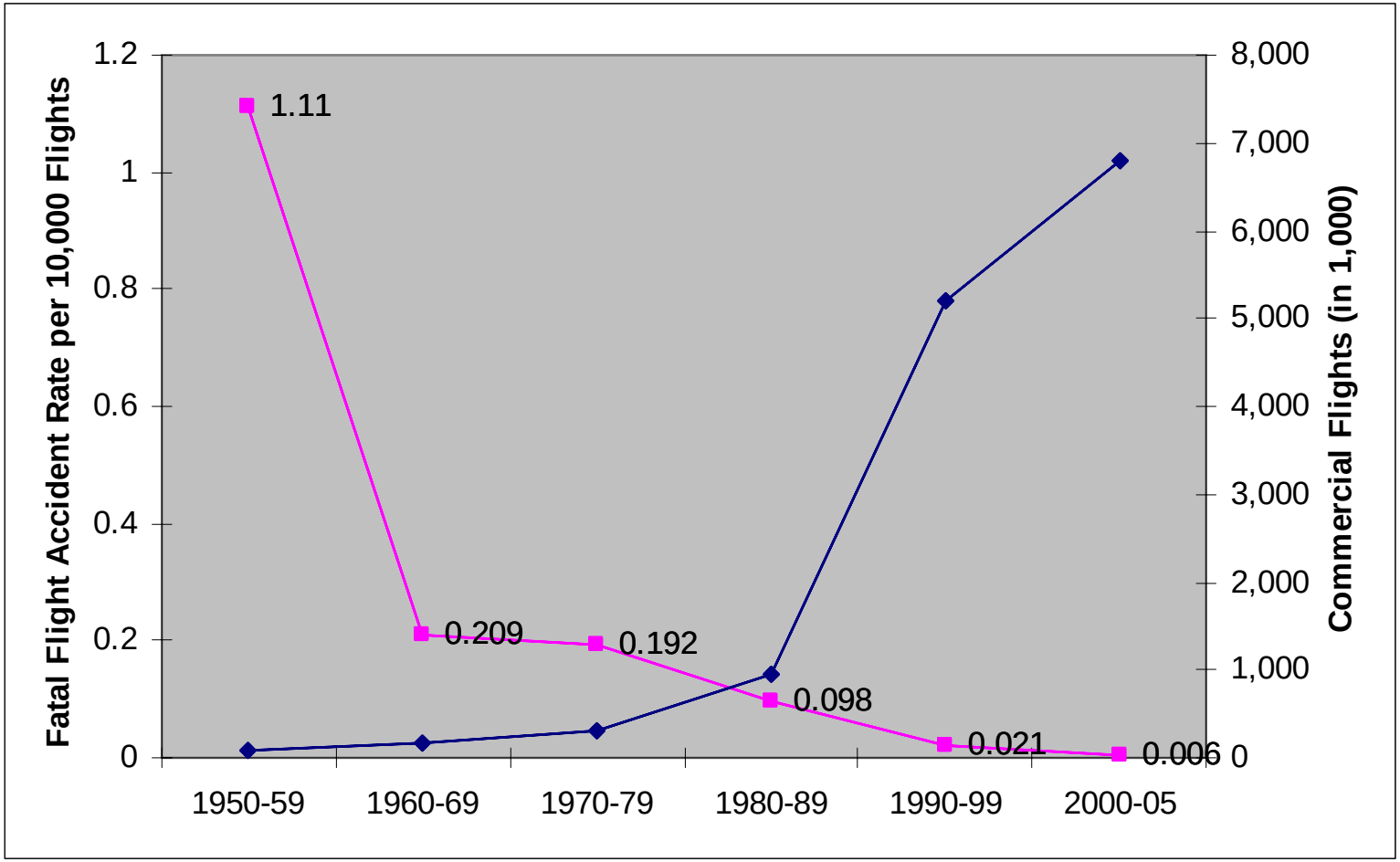
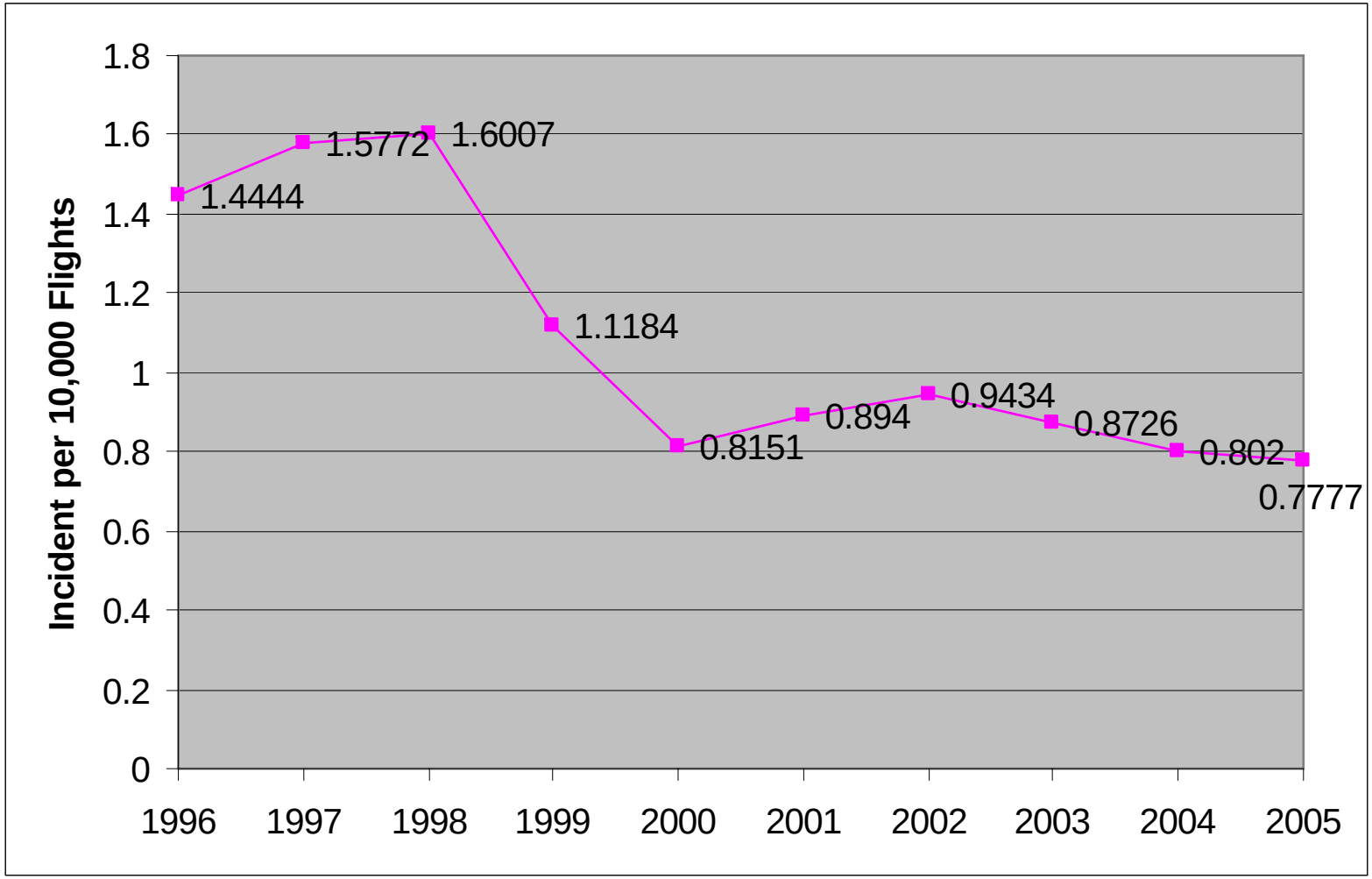


Figure 2. Incident rate (1996-2005)



- Accident rate has dropped since 1980s
- Incident rate dropped significantly during 1998-2000 – a period when most airlines were listed in stock markets – and remained stable afterwards
- Thus, safety improvement & liberalization may actually go hand by hand
- Commercially-oriented firms (airlines, airports) themselves have strong incentives to maintain safety

Air traffic control (ATC)

- Three-level management: CAAC ATC Bureau, 6 regional bureaus, and the ATC centers
- Better coordination between military and civil aviation authorities is important

  30% of air space available for civil aviation
- Sub-optimization in airspace utilization: airport congestion & delays become a major problem
  - Daily limits on take-offs/landings in Beijing & Shanghai
- Although underinvestment in ATC facilities, foreign investment is still restricted

3. Evaluation of Airport Privatization on Efficiency

- Privatization via IPO: improve efficiency?
- Prior expectation
  - Listed airlines/airports would be required to fulfil higher corporate governance standard, and be subject to capital market discipline
  - Hence, improve management and efficiency

- A major problem of Chinese airports: Low productivity

Table 1. ATRS airport productivities, 2004 (Vancouver = 1.0)

	Residual Variable Factor Productivity
Beijing	0.487
Shanghai	0.413
Guangzhou	0.776
Shenzhen	0.555
Asia Pacific Mean	0.682
Europe Mean	0.684
North America Mean	0.731
Hong Kong	0.931

- Performance outcome?
- Not an easy task to evaluate: Lack of data & existing studies
- Fung, *et al.* (2006) computed productivity for 25 major airports in China over 1995-2004
    - They asked: Convergence of productivity among airports from different regions?
- Here, I asked whether public listing improves productivity?

Table 2. Sample airports & listing status

Airport	Listing Year/ Stock Exchange
Beijing	2000/ Hong Kong
Changsha	
Chengdu	
Chongqing	
Dalian	
Guangzhou	2003/ Shanghai
Hailar	
Harbin	
Hefei	
Hohhot	
Jinan	
Kashi	
Kunming	
Lanzhou	
Nanning	
Qingdao	
Sanya	
Shanghai	1998/ Shanghai
Shenyang	
Shenzhen	1998/ Shenzhen
Taiyuan	
Tianjin	
Urumqi	
Xiamen	1996/ Shanghai
Xian	

Table 3. Listed airports

Airport	Listing Year/ Stock Exchange	State Share in 2003
Beijing	2000/ Hong Kong	65.0%
Guangzhou	2003/ Shanghai	60.0%
Shanghai	1998/ Shanghai	63.0%
Shenzhen	1998/ Shenzhen	64.0%
Xiamen	1996/ Shanghai	75.0% *

Notes: * State share in 1997.

Table 4. Efficiency scores from DEA analysis

	Listed Airports			Non-Listed Airports		
Year	Count	Mean	Standard deviation	Count	Mean	Standard deviation
1995	0	N.A.	N.A.	25	0.4811	0.2892
1996	1	1.0000	N.A.	24	0.4590	0.2891
1997	1	0.4184	N.A.	24	0.5628	0.3423
1998	3	0.7021	0.3003	22	0.5194	0.3213
1999	3	0.6727	0.3469	22	0.4740	0.3177
2000	4	0.6770	0.2929	21	0.4991	0.2965
2001	4	0.6976	0.2899	21	0.4487	0.3105
2002	4	0.6974	0.2391	21	0.4284	0.3020
2003	5	0.7586	0.2272	20	0.3950	0.2578
2004	5	0.7716	0.2521	20	0.4135	0.2638
Pooled	30	0.7161	0.2471	220	0.4703	0.2985

Regression analysis

Further run the following regression:

$$e_O^t = a_0 + a_1 L_j + \sum_i b_i H_i + \sum_t c_t Y_t$$

e_O^t = Efficiency score of airport *O* in year *t*

L_j = Dummy variable for listing (1 if airport is listed; 0 otherwise)

Y_t = Year dummy

H_i = Hub dummy with *i*=1,2 representing the international and regional hubs, respectively.

Control for hub status

- Definition of a hub airport:

  Either in a large city or strategically located so that it has large “connecting traffic,” or both

- International hubs:

  Shanghai, Beijing, Guangzhou

- Regional hubs in the sample:

  Shengyang, Xian, Chengdu

  Shenzhen (No.4), Kunming (No. 5), Uramuqi

Figure 3. Six regions & hubs

Table 5. Regression analysis of productivity level

Models	1	2 (excl. Xiamen)	3 (yr dummies)	4 (yr & other dummies)
Intercept	0.3980**	0.3960**	0.3907**	0.7585**
	(19.9097)	(19.7620)	(7.4898)	(4.7791)
Listing	0.0932*	0.1330**	0.1042*	0.2454**
	(1.7318)	(1.9952)	(1.8669)	(4.2085)
Hub Status				
International Hub	0.4818**	0.4653**	0.4777**	0.4052**
	(8.9546)	(8.1186)	(8.7529)	(7.5486)
Regional Hub	0.1640**	0.1660**	0.1650**	0.1635**
	(4.0118)	(4.0749)	(3.9933)	(4.0963)
Adjusted R^2	0.3080	0.3230	0.2933	0.4054
No. of Observations	250	240	250	250

Productivity growth

The Malmquist index,

$$M_O^{t+1}(x^t, y^t, x^{t+1}, y^{t+1}) = \frac{D_O^{t+1}(x^{t+1}, y^{t+1})}{D_O^t(x^t, y^t)} \times \left[\frac{D_O^t(x^{t+1}, y^{t+1})}{D_O^{t+1}(x^{t+1}, y^{t+1})} \times \frac{D_O^t(x^t, y^t)}{D_O^{t+1}(x^t, y^t)} \right]^{\frac{1}{2}}$$

D_O = Output distance function of airport O, which is the same as the efficiency score

Table 6. Mean productivity changes (1995-2004) & components

	Malmquist Productivity	Technical Efficiency	Technological Change
Listed Airports	1.2082	0.8499	1.4215
Non-listed Airports	1.3395	1.1045	1.2128

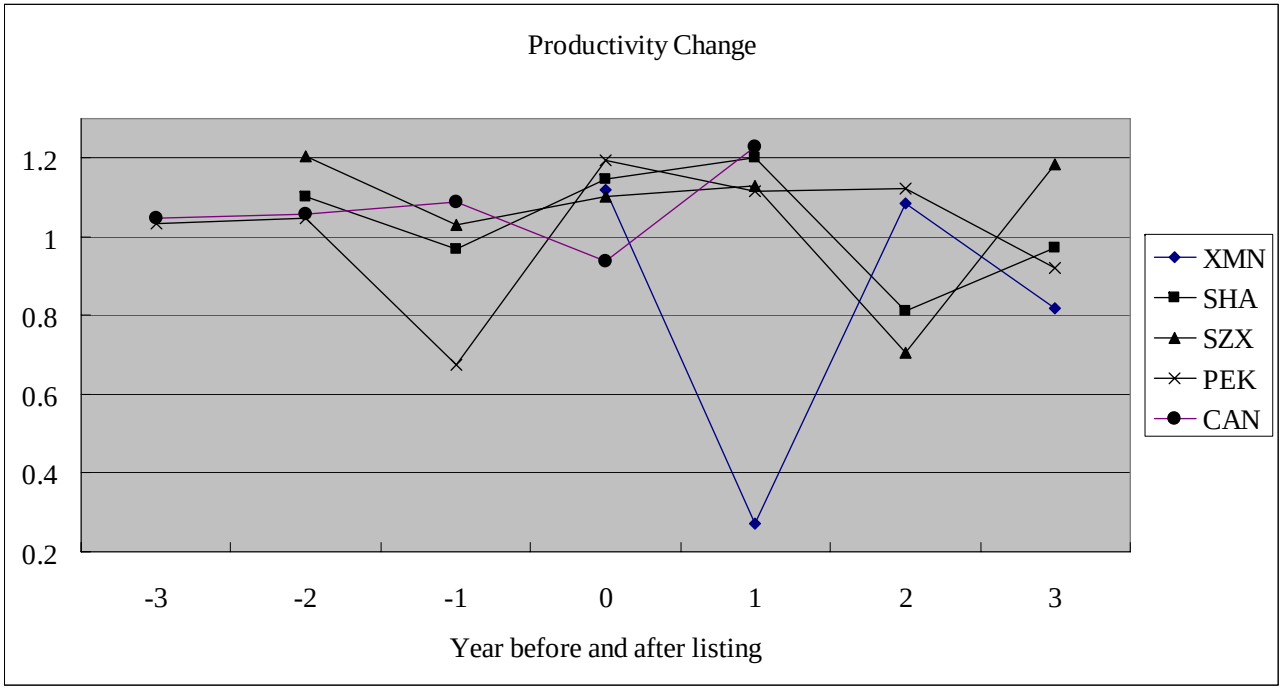
Regression analysis of productivity growth

$$M_O^t = a_0 + a_1 L_j + \sum_i b_i H_i + \sum_t c_t Y_t$$

Table 7. Regression analysis of productivity growth

Models	**1**	**2 (yr dummies)**
Intercept	1.0829**	1.139**
	(46.8068)	(21.2063)
Listing	-0.0307	-0.0488
	(-0.4979)	(-0.8191)
Hub Status		
International Hub	-0.0165	-0.0109
	(-0.2713)	(-0.1887)
Regional Hub	-0.0174	-0.0191
	(-0.3679)	(-0.4278)

Figure 4. Malmquist productivity change before & after IPO



4. Corporate Governance & Competition

4.1 Dominant state ownership of airports

- State share: dominant & non-tradable
- Little incentive for SOE managers to exert effort
- … and for Government, as the “owner”, to monitor the management
- On the other hand, dominant state ownership likely creates inefficiency

4.2 Corporate governance problems

- Info disclosure: accuracy & completeness of info
  - Critical to effective (external) market discipline
  - Light punishment on misstatement
  - IPO approval & supervisory handled by same Department
- Internal control system
  - E.g. Lack of independence of the Supervisory Board
- Institutional investor
  - For the 4 listed airports: Largest institutional investor only holds about 5% (Shenzhen airport)

4.3 International aviation policy & competition

- Used to be very conservative, due largely to:
  - Weak domestic carriers
  - Large imbalance between Chinese and foreign travelers
- As a result, limited international traffic rights
- Limited market opening & competition

4.4 Competition & HKIA's success

- In terms of productivity, HKIA (Hong Kong Int'l Airport) performs well relative to:
  - Airports for Asia, Europe & N. America
  - Mainland's airports
- Competitive airport charges
- World's No. 1 in international air cargo & No. 5 in international passengers

Important reason: Competitive pressures

- In 2005, 41 million passengers go through HKIA (6 times HK population), of which 1/3 are ‘hub’ traffic
- Of the 3.44 million air cargo, 86% are ‘gateway’ or hub traffic
- **Competition for gateway traffic** with PRD (Pearl River Delta) airports:

  E.g. Over 70% air cargo from/to PRD

- **Competition for hub traffic**
  - Asian competitors: Seoul, Tokyo, Osaka & Singapore
  - Lately, from Beijing, Shanghai & Bangkok
  - Threat of Mainland-Taiwan ‘Direct transport links’

4.5 Recent policy relaxations

- Over past decade:
  - Rising domestic income
  - Chinese carriers joining global airline alliances (e.g. Air China in Star Alliances)
  - Less restrictions on citizens' travelling abroad
  - Visa waive policy
- Liberal bilateral ASA with U.S., Korea, Japan, etc.
- Cargo liberalization first
- Improve corporate governance:

  E.g. attract foreign institutional investors
- 'Split share' reform: state shares in listed airports have been reduced to just over 50% (from 60% plus)

5. Conclusions

- Significant efforts have been extended to the reform of administrative and regulatory frameworks, with Central Government gradually withdrawing from direct airline & airport operations and management

- The policy liberalization has contributed to dramatic growth in air traffic and productivity, and has improved market competition and air safety

- Airport localization has been successful in encouraging local investments in airport infrastructure

- Mixed results regarding the efficiency impact of partial privatization via IPO:
  - Listed airports are productively more efficient than non-listed airports
  - Little evidence that listed airports' productivity performance has improved significantly after IPOs
  - In effect, listed airports' productivity grows slower than non-listed airports' productivity

- Given majority state ownership will remain in foreseeable future, strengthening corporate governance and introducing competition should be vital for efficiency improvement
- Implications of Northeast Asia aviation liberalization and integration
- Finally, Central Government needs to strengthen ATC management and funding

Thank You