



The Land of Silk and Money

AN ANALYSIS OF CHINA'S AVIATION MARKET

PART ONE | **China's Domestic Airline Industry**

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Contents

1. Introduction	2
2. Key Findings	3
3. Geography and Demographics	4
4. Background To China's Economic Development	8
5. The Evolution Of Commercial Aviation In China	15
6. External Influences On China's Airline Operations	18
7. Domestic Air Travel Patterns	22
8. Forecasting China's Domestic Traffic Flows	28
9. Conclusions	30
<hr/>	
Appendix 1	
Chinese Airline Fleets At 31st December 2016	31
<hr/>	
Appendix 2	
China's Airlines and Their Principal Bases	32

1. Introduction

With 1.375 billion people, China is the most populous country on earth, 5 times larger than the USA. Its economy, which has been growing at an average of 13% per annum over the past 20 years, now ranks #2 globally, trailing the US by 40% but closing rapidly and expected to reduce the gap to 20% within 5 years. However, whilst per capita GDP has increased from \$1,000 to \$8,000 since 2001, the gulf between the richest millions and the poorest hundreds of millions of citizens remains wide, resulting in a borderline GINI coefficient of 0.46¹. Within the wide-ranging strata of wealth and society, the ranks of the middle classes, a core element of growth for the air travel market, are increasing at a prodigious rate and now number 109 million, according to Credit Suisse, which is still less than 10% of the total population.

In 2015, over 380 million sectors were flown by passengers on Chinese domestic routes, filling most of the 500 million seats offered by 31 airlines. A further 120 million Chinese travelled overseas, of whom more than 50 million ventured beyond Greater China (PRC plus Hong Kong, Macau and Taiwan), in addition to 26 million inbound visitors from overseas. The vast majority of international travel into and out of China was undertaken by air on over 72 million seats and 350,000 flights, 53% of which were operated by Chinese airlines, whose fleets total more than 2,800 aircraft.

The scale and pace of development of China's commercial aviation sector are remarkable, but, on the face of it, familiar and in line with the myriad of other remarkable growth statistics emanating from China over the past 30 years. However, some of the factors behind the rapid emergence of an increasingly diversified aviation sector are less well known and have uniquely Chinese characteristics.

This paper examines the key geographic, demographic and economic features of China in the context of the country's transition from the immediate post-cultural revolution era to the present day and into the future. The development of the country's passenger airline system and aviation infrastructure, the evolution of the regulatory framework governing safety, operations and capacity and the growth and gradual maturing of domestic air travel are examined. The key drivers of demand are also identified, leading to an estimation of the future growth in domestic air travel over the next decade.

The burgeoning international air travel market, equally impressive in its scope and advancement, will be the subject of a subsequent White Paper, which will also include an analysis of China's future airline fleet requirements.

¹ on a scale where inequality of income distribution increases from a low value of 0 to a maximum of 1 and 0.4 is regarded as a "warning level" by the UN

2. Key Findings

- China's economic development is entering its 3rd phase. The principal central planning themes are around realignment of the economy, with emphasis on upscaling industry and manufacturing and reducing dependence on foreign demand for manufactured products through stimulation of domestic consumption.
- The unintended consequences of previous policies and growth plans, including an ageing population, shrinking labour force, rising labour costs and extensive damage to the environment, pose risks to the successful delivery of these turn-around strategies.
- Although GDP growth has been gradually slowing over the past number of years, absolute increases in the economy, measured in RMB, remain the highest in the world, helping to sustain growth in sectors such as commercial aviation.
- The Chinese airline industry continues to experience strong demand, with multiple new entrants and a nascent but fast-growing low cost carrier segment. In 2015, Chinese airlines operated over 3 million flights and carried over 380 million passengers on domestic sectors. Traffic flows continue to diversify away from the most populous and wealthiest Eastern Region towards the Centre and West of the country.
- Structural problems, including inefficient and limited airspace capacity, congested airports, a shortage of pilots and bureaucratic approval procedures will continue to challenge current operations and potentially hamper future growth.
- Nevertheless, domestic traffic growth is forecast to average 6.8% over the next decade, driven by economic growth, increasing urbanisation, rising consumerism and the availability of more, and more affordable, low cost airline capacity.
- LCCs will generate the highest growth rate to reach 20% market share on domestic routes over the next decade.

3. Geography and Demographics

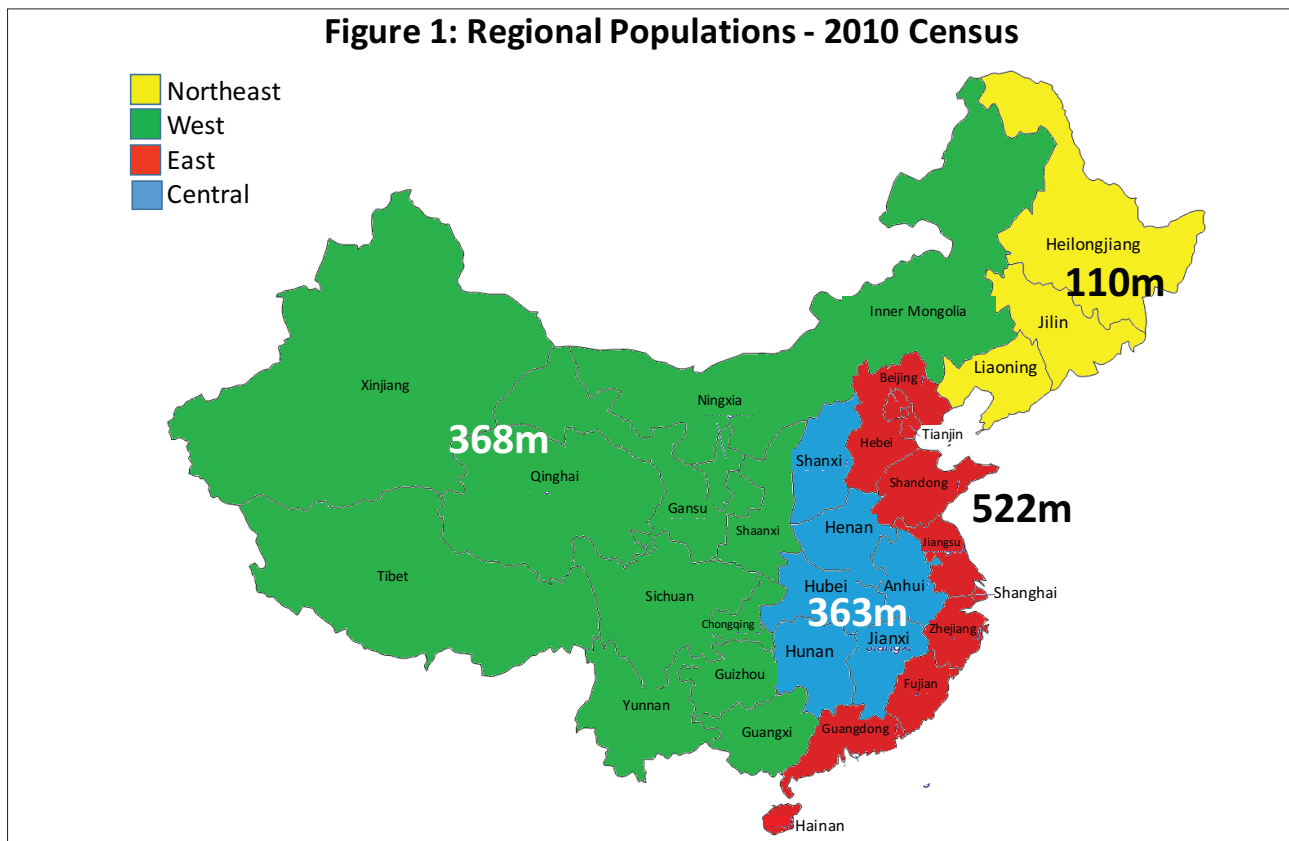
3.1 Regional characteristics

Administratively, China consists of 22 provinces, 5 autonomous regions (such as Tibet and Inner Mongolia) and 4 central-government-controlled municipalities (Beijing, Shanghai, Chongqing and Tianjin). Each of these enjoys a significant level of fiscal and administrative autonomy but remains answerable to central government, from which broad budget funding and targets are allocated.

Geographically, China can be split into four regions – East, Central, Northeast and West (*Figure 1*).

The Eastern Region includes 11 cities with more than 5 million inhabitants (2010 census), including Shanghai, Guangzhou, Tianjin, Shenzhen and Beijing. It is home to 522 million people, making it the most populous region of the country with 38% of the total population. The Eastern Region has the highest level of urbanisation, with 66% of the population living in cities. The region also accounts for 51% of total GDP and 50% of the total urban workforce, achieving all of these superlatives with the smallest land area, at 924,000 km² just 10% of the total. Per capita GDP is consequently the highest of the four regions, at US\$11,000.

The Western Region comprises the largest land area, more than 70% of China's total, but is sparsely populated, having a total of 368 million inhabitants and only 3 cities with more than 5 million inhabitants. The region includes some of the most remote parts of the country, including Inner Mongolia and Tibet, less than 45% of the population are urban residents. Nevertheless, the region now accounts for over 20% of the country's urban workforce, many of them in Chongqing whose greater metropolitan area accommodates over 30 million people and is one of the leading beneficiaries of China's "Go West" policy for redistributing economic activity. The region's average per capita GDP remains 25% below the national average, however, at slightly more than US\$6,000.



Central China accounts for just 11% of the land area and, with 363 million inhabitants, 27% of the population, making the region second only to the East in terms of population density. However, only one city, Wuhan, has more than 5 million residents and, although there are 55 with 1 million or more inhabitants, the Central Region has the lowest level of urbanisation, at 38%. Per capita GDP is similar to the Western Region, at around US\$6,000.

The Northeast region is the smallest in terms of population (110 million), urban workforce (14.5 million) and land area, each of which accounts for 8% of China's total. However, over 60% of the population is urban, centred on 14 cities with over 1 million inhabitants, including two with more than 5 million. This helps to raise the regional per capita GDP figure to \$8,500, second to the Eastern region and 4% above the national average.

3.2 Demographics

China's people are highly homogeneous. 92% of the population are ethnic Han, sharing strong cultural ties and values and also a strong patriotic sense of duty that fosters a generally compliant regard for authority and the greater good. This is an important consideration for the government when planning significant structural changes to the economy, employment and social services and helps to smooth difficult transitions.

A wide range of minorities spans 56 recognised ethnic groups, the largest being Zhuang, Mongols, Tibetans and Uighurs. Many of these, collectively numbering more than 100 million, live in the more remote autonomous regions and, as news coverage from time to time suggests, are not always amenable to moves towards greater integration.

A key feature of central planning policy in the 1970s and '80s was the introduction of the "one child policy", which featured in the 6th five-year Plan (1981-1985), but actually ran from 1979 until 2015, when it was finally phased out. The policy was intended to drive China's population down to a target level of 700 million, which "experts" had calculated was the optimum scale to balance economic and social development with essential resources such as food and water. Although the policy was originally to be applied only for a single generation, its extension over 35 years has created a deep-rooted problem for China's future economic development.

The latest data from China's National Statistics Bureau, for 2015, reveal a new low in the Total Fertility Rate², which at 1.05, ranks China in last place globally, behind even developed countries. It is estimated that China needs a TFR of 2.2 to maintain the current population and even the recent relaxation of the one-child policy is unlikely to result in more than a short-term spike in the birth rate, since many urban parents find that the rising cost of living and raising a child has made larger families unaffordable.

The consequences (*Figure 2*) leave a challenging legacy for China's 21st century society, with an increasingly skewed population breakdown by age and gender, the former steadily ageing and the latter having an abnormally high imbalance of men/boys over women/girls.



2. Total Fertility Rate is the number of children a woman may expect to have if she lived to the end of her child-bearing years

The gender imbalance, which compounds the low fertility rate, is a direct result of the one-child policy, as traditional Chinese society favours sons over daughters, and the “rationing” of children has led to the level of male births exceeding female births by a margin that is 10% greater than the global average. Consequently, projections of the future population indicate a peak of around 1.4 billion sometime in the next decade, followed by a gradual decline to stabilise at around 1 billion. Well before that occurs, China's position as the most populous country will have been overtaken – by India.

One manifestation of the ageing population is a decline in the working age population – those in the 15-64 year age bracket. These numbers peaked in 2013 and are forecast to be at least 25 million lower by 2025. At the same time, the number of senior citizens is growing more rapidly. In 2015, China's over-65s were more numerous than the entire population of Japan, at 144 million, with the number forecast to increase to 225 million in ten years.

The one child policy not only drives a shrinking workforce and increases the dependency ratio (how many family members a worker must support), but also limits the size of the core consumer market of 18-35 year-olds, which is direct opposition to the need to increase domestic consumption.

Unfortunately, events have already moved beyond China's control and the consequences for the development of the economy are significant, both in terms of the availability and cost of labour and in the ability to sustain economic growth, both of which now depend on the economic rebalancing that is now under way.

3.3 Urbanisation

Since the 1970s, the movement of rural populations to the cities has been unprecedented, encouraged at both central and provincial government levels. China's population has been transformed from 85% rural in the 1960s, and still only 20% urban in 1980, to 56% urban today. This trend absolutely reflects the development of the Chinese economy, and in particular the focus on raising manufacturing and industrial production that has characterised multiple five-year development plans, creating the largest mobilisation of labour ever seen.

Along the way, existing cities have been massively expanded and countless new ones have been built, some of which have yet to see the anticipated numbers of residents or business enterprises. Across China, over 200 conurbations now boast populations of 1 million or more, with 17 of these in excess of 5 million, of which 6 are larger than 10 million – and with substantially larger metropolitan catchment areas.

Established Chinese cities have tended to grow by extension of their perimeters, since acquiring land outside the city limits is considerably cheaper than developing existing high value urban real estate upwards. A significant number of city dwellers have therefore become so by accretion, as boundaries have been expanded, however the vast majority of urban dwellers have migrated from their rural origins, either alone or with families in tow.

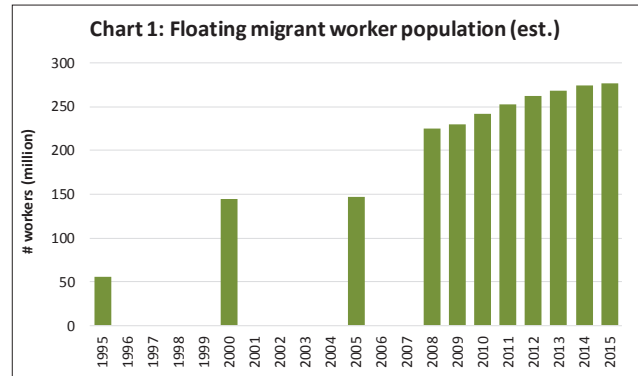
Despite the addition of more land around the edges, city centres are increasingly congested as the majority of industrial and commercial activity is still concentrated towards the centre, leaving commuters to add traffic congestion to the challenges of air pollution and rising living costs. Although all modern cities have extensive public transport systems, increasing numbers are commuting by road, with car ownership approaching 200 million and increasing by more than 2 million a month, making China the largest market in the world, with over 130 car brands and 950 models on the market. This has put extraordinary pressure on city infrastructure as well as contributing to the poor air quality, but with car ownership growth still at the steepest part of the economic S-Curve, the situation is expected to worsen, unless strict curbs are introduced along with incentives to move to electric or hybrid engines.

Central government plans to raise the urbanization rate to 60 percent by 2020. That will require an additional 100 million people to leave the countryside over the next four years. By 2030 China's cities are expected to be home to 1 billion people, representing a 70% urbanisation rate, a remarkable level which would nevertheless be consistent with the per capita income level. This continued expansion will have direct benefits for air travel demand, but also have profound effects on China's economic and social landscape.

3.4 Migrant workers

A significant demographic feature arising from the economic and social policies of the past 30 years has been the rise of the migrant worker population, which has been a product of, but also central to achieving China's economic growth. The number of floating workers – people who have left their places of origin to work elsewhere – has been growing since the early 1980s. Growth was initially gradual, but accelerated in the 1990s and again in the second decade of the 21st century (*Chart 1*), to reach a level of 277 million in 2015, equating to 36% of the working population of 770 million. Although the rate of increase has been slowing recently, this number is forecast to exceed 290 million by 2020.

Migrant workers can be classified as short- or long-distance migrants, the former relocating to work in a city close to their home city and the latter moving greater distances, over half of them to another province. Most short-distance workers relocate on their own, whilst a greater proportion of long-distance migrants move with their families. Long-distance migrants numbered 169 million in 2015, 60% of the total, but are growing at a much slower rate (0.4% in 2015) than short-distance migrants (2.7%). The slowdown is driven by two factors, i) the contraction of China's working-age population as the ageing trend gathers momentum and ii) the economic slowdown and particularly a marked reduction in construction activity and the transfer of some export manufacturing to lower cost countries. It is likely that the migrant worker population will peak around the end of the decade, with a gradual but steady decline thereafter, although remaining a very substantial element of the labour force.



Within the urban migrant group, their sub-division into employment in industry and manufacturing (31%), construction (21%), retail sales (12%), hotel and restaurant services (6%), transport and logistics (6%), etc. further stratifies their income levels, which remain at a low base – the average migrant wage is less than US\$500 a month. Nevertheless, from a domestic travel perspective, virtually all long-distance migrants will take part in the mass movement back to their home towns that occurs around Lunar New Year and, price notwithstanding, tens of millions could be in the market for a domestic flight at least once a year as disposable incomes rise.



The gender imbalance, which compounds the low fertility rate, is a direct result of the one-child policy, as Chinese society favours sons over daughters, and the “rationing” of children has led to the level of male births exceeding female births by a margin that is 10% greater than the global average.

4. Background to China's economic development

4.1 The importance and focus of the five-year plans

China's centrally planned economy is now entering its third phase since the first five-year plan was introduced by Mao Tse Tung in 1953. Many of the policies and goals set out in the plans, or adjunct to them, have had a lasting impact, not always positive, that will continue to influence China's economy well into the future.

During Phase One, which lasted until 1980, the nascent communist state was focussed on developing an ideologically-driven economy, built around the Soviet model and featuring the collectivisation of agriculture and state ownership of heavy industry, with smaller enterprises organised into cooperatives. Policies included the Great Leap forward (Second Plan: 1958 - 1962), which aimed to turbocharge economic growth by diverting agricultural workers into industry, and the Cultural Revolution, launched in 1966 to remove the remaining elements of capitalism. Although they largely failed in their objectives and caused great hardship, their mostly unintended consequences imprinted an indelible form on China's society and economy.

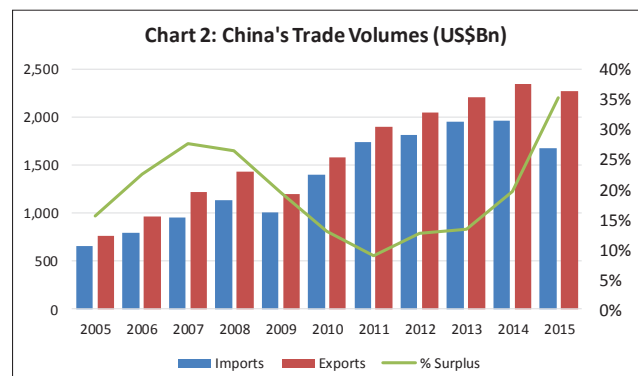
Phase Two of the centralised planning cycle, which moves the focus away from the "class struggle", commenced under the auspices of Deng Xiaoping, who took forward a series of economic reforms starting in 1978, under the "Four Modernisations" plan, covering agriculture, industry, science & technology and defence. The reforms included an open door policy to encourage foreign trade and inward investment through liberalisation. They also included setting up Special Economic Zones ("SEZs") in Southern China, where it was intended that foreign and domestic investors could build new businesses free of many of the bureaucratic rules in place elsewhere, with China benefitting from knowledge transferred from foreign JV partners and cheap labour providing a competitive environment for manufactured exports. Shenzhen and Xiamen were amongst the initial SEZs set up in 1980, along with Zhuhai and the entire Hainan province. Shanghai, Tianjin, Guangzhou and 11 other cities followed in 1984, ultimately leading to large parts of the eastern coastal region being absorbed in conurbations such as the Pearl River Delta (now with a population of over 50 million), the Yangtze River Delta and Shanghai's Pudong business city.

The past 20 years have seen the SEZ concept extended to virtually every inland provincial capital in addition to 15 free trade zones and close to 100 "development zones" launched and promoted by local authorities across the country.

Whilst the initial concept of the SEZs and their expansion throughout the eastern seaboard has played a pivotal role in the emergence of China as the global manufacturing capital of just about everything, the economic benefits for China have not been as deep and meaningful as might be expected, with issues now starting to surface in the form of rising labour costs, pressures on housing and a maturing migrant worker population. In addition, not all of the smaller and more recent development zones have generated investment returns and the policy of "build it and they will come" has failed to materialise in too many second tier cities.

The underlying economic theme of Phase Two, which is now drawing to a close, has been explosive growth in industry and exports. This led to the build-up of a substantial prima facie trade surplus, especially over the past 3-4 years, reaching 35% in 2015 (Chart 2).

The 4th plan (1971-1975) set a 12.5% annual GDP growth target which was carried through into the 5th plan (1976-1980). The establishment of the SEZs enabled these growth targets to be achieved, but also led to a serious over-heating of the economy, raising inflation close to 20% by the end of the 1980s.



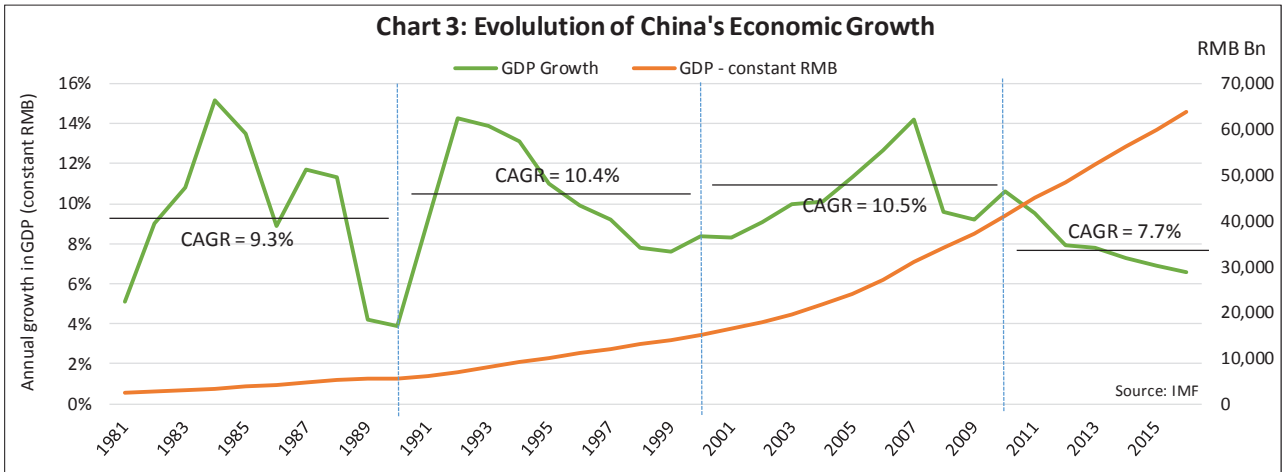
Subsequent five-year plans reinforced the growth and economic development imperatives, with a gradual opening of the market to the outside world starting with the 7th Plan (1986-1990), which included a 7.5% annual GDP growth target. This was ramped up to double digits in the 8th plan (1991-1995), during which time trade volumes grew by almost 20% per annum and the period ended with an almost six-fold increase in foreign exchange reserves.

GDP quadrupled between 1980 and 2000 and the 10th Plan (2001-2005) focussed on rebalancing regional prosperity and increasing the urban workforce (the start of the migrant worker surge), while the GDP growth target was moderated to 7%.

At around the same time, a critical challenge to future economic growth started to become apparent. Growing levels of atmospheric pollution provided tangible evidence of the damage to the environment caused by the headlong industrial growth strategies of the previous 30 years, exacerbated by the indiscriminate zoning of heavy industries adjacent to residential areas and city centres and the high dependency on low cost fossil fuels to power industry and keep the lights on. The levels of life-threatening pollutants present in the atmosphere of almost every city in China are now beyond the red lines set by international agencies for much of each year and the damage to the health of the population cannot be ignored.

The 11th Plan (2006-2010) introduced the concept of environmental protection and this was substantially reinforced in the 12th Plan (2011-2015), which acknowledged the maturing of the economy and the need to rebalance from production to consumption by stimulating domestic demand and reducing the reliance on exports. Nuclear and hydro-electric power projects were prioritised to accelerate a reduction in CO² emissions whilst other infrastructure development plans targeted roads, airports and the high-speed rail network for further rapid expansion. The “Go West” policy was renewed with a call to shift focus from coastal cities to rural and inland areas.

The 12th (2011-2015) five-year plan identified aviation as one of seven “major strategic industries” and allocated 1.5 trillion RMB (around US\$225 billion) for investment in all areas of the sector, a 50% increase over the previous plan. However, although such initiatives result in rapid advances in the hardware and infrastructure required for a modern an efficient aviation sector, they do not address softer, but equally important, factors, such as coordination, cooperation and harmonisation across regions and provinces, government offices and regulators, which affect not only commercial aviation but also many other sectors.



Realignment of the economy towards a greener future is a core element of the current 13th Plan (2016-2020), which has at its heart a comprehensive restructuring of economic objectives that signal the start of Phase Three of the planning cycle, which will take China into a period of moderate growth to build “a moderately prosperous society”. Target growth rates for GDP are further lowered, to “at least” 6.5%, accompanied by an economic plan designed to move China up the manufacturing value chain, significantly shrink and restructure the activities of State Owned Enterprises (“SOEs”) and materially grow the services sector.



Target growth rates for GDP are further moderated, to “at least” 6.5%, accompanied by the launch of an economic realignment plan that will move China up the manufacturing value chain.

4.2 Realignment and the new normal

The current (13th) five-year plan is dedicated to development – indeed the word appears more than 70 times in the text – and its key theme is the redesign of China's development path for the coming decades. The Plan defines the "new normal" for the country, anticipating a "deep reform that would have profound impact on the overall development of the nation". In the near term, the Plan calls for a "moderately prosperous society" by 2020, one of President Xi Jin Ping's "four comprehensives" (see Box). The term was coined by Deng Xiaoping in 1979 and is now understood to describe China's future as a modern industrialised country offering increased personal wealth, quality of life, environment and culture.

The "Four Comprehensives"

1

To comprehensively build a moderately prosperous society

2

To comprehensively deepen reform

3

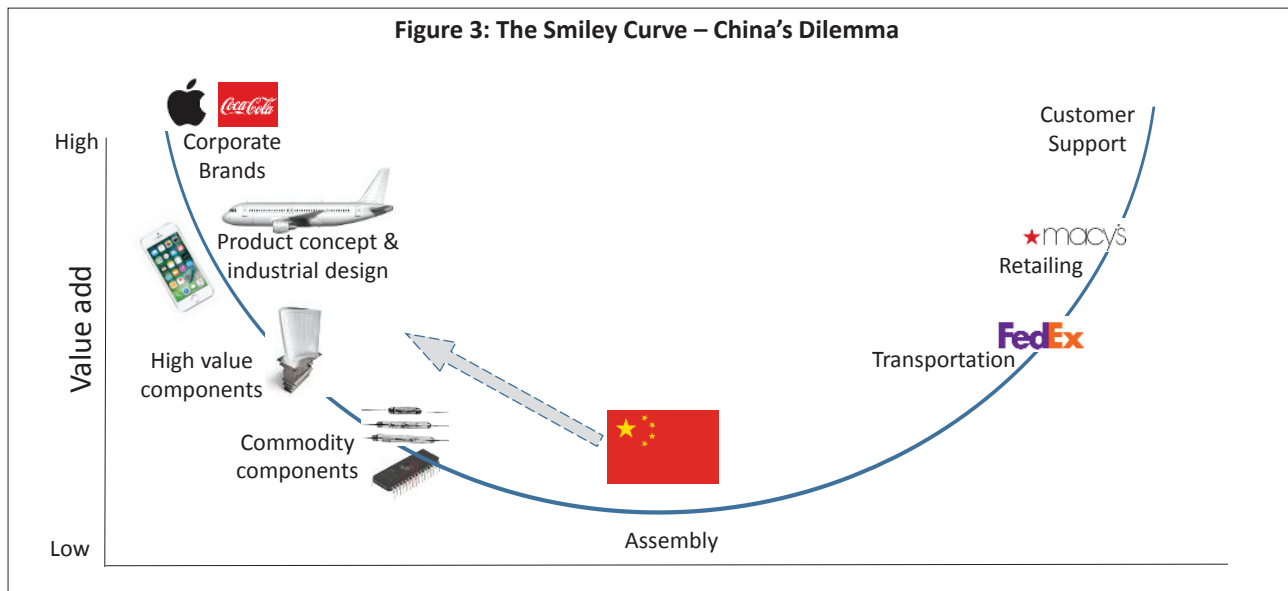
To comprehensively govern the nation according to law

4

To comprehensively strictly govern the Communist party

Within the "new normal", economic targets include lowering average GDP growth to 6.5% (from 7% in the 12th Plan and closer to 8% achieved), which will result in a doubling of GDP by 2020 compared to 2010, but linked to reductions in carbon emissions, green lifestyles (renewables, recycling, hybrid vehicles), improved energy efficiency and reductions in pollution levels. Inter alia, reforms will focus on expanding the middle-income group and raising incomes for lower earners.

Even at the lower growth rates, however, China continues to generate the highest absolute economic growth of any country. Measured in RMB, every 1% of GDP growth in 2017 is worth 1.5% of growth five years ago and 2.5% in 2007. This is of considerable significance in addressing one of the key challenges for government in the process of economic realignment – namely, how to wean the country and the economy off its growth dependency. The level of capital formation throughout the 2000s has been significantly higher than in other major economies, principally driven by nation-wide construction projects on a massive scale, building new roads, airports and railway networks, entire new cities with apartments, factories, schools, hospitals and metro systems. The fact that much of this development is not currently required did not slow the pace of development, which was promoted by central government as a cornerstone of fiscal stimulus and full employment following the global financial crisis. Local governments, which were also keen to support their own local projects to attract greater wealth and status, took up the challenge enthusiastically and provided substantial financial and political support for investment projects, including airports and airlines.



The large absolute increases in the wealth being generated by the economy may, over time, help to absorb some of this excess infrastructure. Today, though, this wealth is not trickling down far enough or fast enough into the pockets of workers or their dependents and the inequalities reflected in the low GINI coefficient are becoming more widely felt.

Nevertheless, the rate of manufacturing expansion has resulted in the rapid escalation of China's position in the global trade rankings, to the point where exports have generated a trade surplus equivalent to around 0.5% of *global* economic output. However, because the domestic consumer base is still small, the dependency on foreign customers to create demand and jobs has been extremely high, leaving China exposed to the increasingly real risk that the globalisation trends may be reversed.

There is now clear recognition, articulated in the 13th Plan, that the rate of capital formation, its dependency on foreign consumption and its role in stimulating economic activity cannot be sustained. The Plan recognises the limitations of the labour force and the unsustainability of fossil fuel dependency and calls for a major up-scaling of manufacturing production, significantly increasing the value-add component and trading quantity for quality and efficiency.

This strategy not only recognises the labour shortages that will increasingly limit China's ability to raise production volumes, but also seeks to break the country out of the bottom segment of the "Smiley Curve"³ (Figure 3) an economic representation of where profits are generated through the development of any product.

This trading up on the value curve will be essential if China is to maintain even the moderate growth rates targeted in the 13th Plan, and will also need to be underpinned by increased domestic consumption, increased private investment and design and technology innovation. To date, levels of innovation have been low and have not materially flowed through into manufacturing. This is starting to change, but must be taken to a new level, which requires a combination of funding, collaboration and, critically, a level of openness with global innovators that will challenge traditional conservative thinking. The drive for technological advancement and innovation is being boosted by expanding the number of city clusters along the major development corridors, which will allow resources to be leveraged more effectively. The benefits are already starting to be seen in Shenzhen and the Pearl River Delta, where high tech companies are incubating with remarkable speed.

3. Named after the eponymous yellow stickers popular in the 1970s

As this economic transition progresses, a further slowing of the existing economy should be expected whilst the new normal gains traction. The impact can be eased by the introduction of additional structural reforms to the fiscal system, market regulation and the business environment to improve market access and strengthen the rule of law - not too challenging to Western cultures, but still difficult concepts for some within the Chinese system.

4.3 Two far-reaching and influential policies

4.3.1 The Hukou registration system

Large parts of the migrant worker cohort are marginalised and disadvantaged due to an inflexible and outdated household registration system - the Hukou. This system was introduced in the late 1950s to support the management of social welfare, taxation, domestic migration and (political) surveillance. Every citizen is entitled to a hukou from their city of origin, giving them rights to housing, a pension and food subsidies, as well as free access to social services such as education and healthcare in that city. These benefits are not transferable, however, and the hukou is not reissued if the holder moves to a new location, leaving migrants severely disadvantaged.

The hukou was originally designed to keep rural families in situ and ensure continued agricultural production, but was never updated to accommodate changing economic policy and demographics. The hukou permanently defines an individual as "urban" or "rural", depending on the classification of their home town - again, this classification does not change with relocation, resulting in millions of urban resident workers being classified as "rural", with limited access to basic facilities, services and even legal rights. Children are assigned the hukou location of one of their parents', even if they are born in the city where the parents work, resulting in even greater inconsistencies and inequalities and leaving migrant worker families with a choice between having no access to subsidised services or prolonged separation of parents and children. The problems are exacerbated as the migrant population ages and as an increasing number of grand-parents move to cities to help with child-care. As urbanisation has increased, the pressure on city infrastructures and services has also been increasing, leading to more restrictions on migrant workers, rather than any easing of the controls.

4.3.2 One Belt, One Road

"One Belt, One Road" is an ambitious development strategy announced by President Xi Jinping in 2013 and launched in early 2014 to build connectivity and co-operation among countries lying along the original legendary Silk Road trading routes between Asia and Europe. One Belt, One Road ("OBOR") is intended to both broaden China's trading footprint and increase China's presence and role on the international stage through four broad areas; connectivity, trade, educational and cultural exchange and government cooperation.



The terminology refers to two separate zones of influence identified by President Xi - the "Silk Road Economic Belt" and the "21st Century Maritime Silk Road" (Figure 4).

In fact, the "Belt" is a land route connecting China with countries all the way to Europe and physically is actually a road (sometimes rail-). The maritime "Road" is a set of shipping lanes. The land Silk Belt will connect with Central Asia, Russia and Europe, whilst the Maritime Road will largely focus on Southeast Asia, Oceania and Africa, but also extend to the Mediterranean.

In total, around 60 countries are included in the scope of the plan, which envisages a new grouping of economic interests, built on cooperation, new infrastructure and broad trade agreements. These countries account (with China) for around 65% of the world population, 1/3rd of global GDP and 25% of total goods and services.

At the same time as OBOR initiatives were launched, a new Chinese development bank, the Asian Infrastructure Investment Bank (AIIB) was announced, with a remit to provide capital for infrastructure projects, particularly those connected with OBOR. Initially capitalised with 1 trillion RMB, the AIIB is an integral part of the OBOR initiative and China's rising participation in global commerce.

Clearly the OBOR plans are hugely ambitious and require substantial levels of engagement, not only from Chinese companies and financial institutions, but also from global players. Funding is arguably the greatest challenge, with the AIIB financing projects at only modest levels (\$27bn in 2015), although other Chinese funds, including the New Development Bank and the Silk Road Fund, are also available and international support is starting to come in, with countries like Singapore linking with Chinese banks to fund projects. However the total funding levels remain well below the US\$2-3 trillion annual capital requirements envisaged by the architects of the plan and China will need to provide sovereign support for the bulk of the funding for years to come.

To date, Chinese companies have been mostly focussing on Central Asia, where they are building roads, bridges and railways - they also plan to extend the high-speed rail network into large parts of Southeast Asia. Construction projects that can absorb some of China's domestic excess capacity are favoured, however China has also been strategically investing in Central Asia, building oil and gas pipelines and also acquiring stakes in oil and gas production.

The near-term benefits are unlikely to outweigh the massive investments required, but, in the longer term, the potential to develop new export markets to support the up-scaled value-added manufacturing sector is an alluring goal and the potential benefits suggest that projects will receive substantial long-term government support and encouragement.

Whilst most of the associated aviation benefits will be felt in the international markets, OBOR will also benefit regional development within the country, since the belt starts in Xian and routes through Urumqi in the far northwest of the country, whilst the maritime road utilises coastal ports along the eastern seaboard.



Funding is probably the greatest challenge, with the AIIB financing projects at only modest levels (\$27bn in 2015). Other Chinese funds, including the New Development Bank and the Silk Road Fund, are also available and international support is starting to come in, with countries like Singapore linking with Chinese banks to fund projects.

5. The evolution of commercial aviation in China

5.1 Early history

In the immediate post-war years, China gave commercial air transport a low priority, with most aviation-related activity and investment dedicated to military application. However, having identified the strong relationship between commercial air services and economic and trade development in other countries, China introduced the framework for a nascent airline industry in 1954, under the auspices of what quickly became the Civil Aviation Administration of China (CAAC). Initially, and indeed for much of its existence, CAAC has acted as airline, airport operator and regulator.

Prior to 1980, CAAC operated as an arm of the air force, administering control of the Chinese air transport industry under a four-tier management system. This comprised the centralised CAAC functions, plus, as a consequence of the decentralisation policies of the Great Leap Forward, six regional Civil Aviation Bureaux, 23 provincial bureaux and 78 civil aviation stations.

In addition to broad centralised oversight of the industry (principally financial fitness and safety), the CAAC ran all of the ancillary services, including flight operations, airports and the air navigation system. CAAC also regulated market and route licensing, service frequency and capacity, ticket prices and passengers' eligibility to travel.

In 1980, control of CAAC moved from the military to the State Council and, for the first time, it was given a remit to develop profitable air transport services, whereby the six regional CAAC bureaux became operational profit centres, albeit with limited control over routes, revenues and costs. Almost all of the route networks at that time remained domestic, however the country was now seeing more foreign visitors each year than over the entire previous 25 years, as China's new open door policy began to take effect.

5.2 Gradual relinquishing of CAAC control

A major policy change in 1987 saw the separation of regulation and operations, with CAAC handing over airline operations to six "independent" state-owned carriers, based on regional location – China Eastern, C. Southern, C. Northern, C. Southwest, C. Northwest and Air China. China Southwest Airlines, based in Chengdu, was the first to be established, in December 1987. They were followed in 1988 by Shanghai-based China Eastern, Air China (Beijing) and China Northwestern (Xian). China Northern (Shenyang) came into being in 1989 and China Southern (Guangzhou) only in 1991.

Also in 1987, the State Council announced the intention to transfer all civil airports, except for those in Beijing and Tibet, from CAAC control to local governments, giving them incentives to invest. As airport operations began to be separated from the airlines, the financial and operational burden also passed to the provincial governments. However, a rapid increase in traffic volumes in the following years put pressure on many airport infrastructures, leading to a spate of costly development and expansion of facilities, which slowed the transfer process and full transition of all of the regional airports was not completed until 2003.

5.3 The accelerating emergence of new airlines...

The first non-CAAC airlines were launched in the mid-1980s. By then, CAAC's responsibilities consisted of airline and route licensing, pricing, securing bilateral route rights, strategic planning, regulating safety and maintenance standards and the design and implementation of competition policy.

Over the next decade, new entrants included joint ventures between CAAC and local governments (starting with Xiamen Airlines in 1984), several airlines that were set up and owned by regional governments (e.g. Shanghai, Sichuan, Fujian) and some launched by independent investors and entrepreneurs, either on a stand-alone basis or in conjunction with local governments (e.g. Hainan Airlines).

It was not until the early-2000s that the process for applying for, and being granted, route authority was simplified and actively promoted to stimulate competition. However, the proliferation of air services that followed quickly gave rise to problems as traffic was not stimulated to match the increased capacity and several of the newer regional operators hit financial difficulties, racking up substantial losses and indebtedness, exacerbated by weak management. This led to intervention by CAAC in the form of price regulation (which allowed price competition subject to a “base” price floor) and, ultimately, enforced consolidation. The addition of capacity, either through direct purchase or by way of operating leases, was also now made subject to pre-approval by CAAC. In October 2002, the “Big Three” were officially defined for the first time, with Air China, C. Eastern and C. Southern achieving greater scale by absorbing smaller regional carriers.

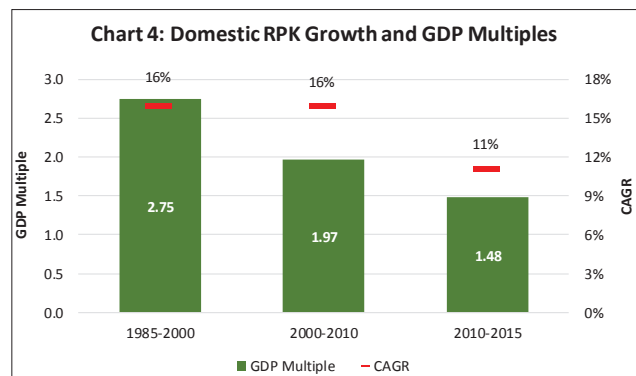
More recent liberalisation has led to the introduction of a small, but growing LCC sector, starting with Spring Airlines in 2004 and now including 9 Air, Lucky Air, Colorful Guizhou, West Air, Urumqi and others. Whilst some are offshoots of existing full service carriers, others are new, independent LCCs and all have the support (at least from a policy perspective) of CAAC and the State.

CAAC remains responsible for regulatory oversight and enforcement of flight safety, security and technical operations, including accident investigation. It also conducts air traffic management and controls civilian (but not military) airspace and associated services such as meteorology. Oversight of the construction, development and safe operation of airports is also a core remit, along with development and implementation of aviation pricing policies and upholding the rights and interests of air travel consumers.

5.4 ...Leading to sustained high traffic growth

Domestic RPKs increased 67-fold in the 30 years from 1985 to 2015, equating to average compound growth of 15% per annum. Whilst year-on-year variations in growth rates have occurred, the long-run average maintained 16% per annum through 2010. Growth has slowed since then, although still averaging 11% CAGR over the past five years.

The associated GDP multiples have also been declining (Chart 4), from the high levels typically seen in the early stages of market development to a current level of 1.48x which is trending closer to levels seen in more mature markets.



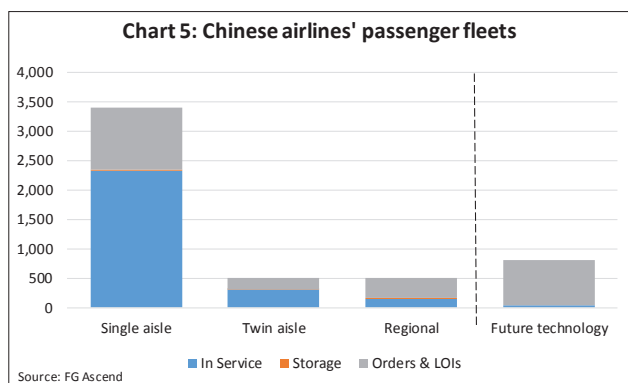
Business and government travel accounts for an estimated 80% of domestic air travel, with VFR (Visiting Friends and Relatives) and leisure trips accounting for the balance.

Growth continues to challenge infrastructure and resources, particularly pilots and en route navigation capacity, but also a growing number of airports that are operating at or close to capacity. 20 new airlines were approved in the five years from 2011 to 2015 and, in 2014 alone, 817 new routes were launched, including 686 domestic and 131 international services to 12 new cities. Much of this proliferation has been driven by the desire of provincial governments to have their own home-town airlines and constraints on market access that are driving existing airlines to open new regional bases, often with financial support from the regional governments, in order to deploy their committed capacity.

However, in a recent reversal of its previously liberal approach to authorisations, CAAC has announced a moratorium on new airline start-ups, citing safety concerns, pressure on infrastructure and what it sees as excessive market fragmentation, with a heightened risk of financial weakness leading to airline failures. This freeze may not be rigorously applied, as was the experience during previous official pauses, but for a while at least it will be more difficult for start-ups to secure approval.

5.5 Today's airlines and fleets

Appendix 1 contains details of the Chinese airlines' passenger fleets. At 31st December 2016, Ascend reported an active passenger fleet of 2,800 aircraft operated by 46 airlines, with a further 1,600 aircraft on order or under LOI (Chart 5). More than 75% of the fleet, including commitments, are "mainline" single aisle types.



Regional aircraft, comprising less than 200 turboprop aircraft and slightly more than 200 regional jets, account for a further 12% of the fleet, but only 3% of total seats.

Only 12% of the current passenger fleet, including forward orders, are widebodies, compared to 20% of the global fleet. Additionally, less than 20% of all passenger aircraft are future technology variants, which compares to a global fleet average of over 35%. This is a strong indication that Chinese airlines are under-ordered in both categories, however, it does not automatically imply that the corollary (that single aisle is over-ordered) is true, but rather is a reflection of the historical constraints that have held back development of long-haul international (i.e. widebody) air services.

The future fleet requirements of Chinese airlines for their domestic and international operations will be explored in greater detail in a subsequent White Paper.

Appendix 2 contains details of where the 46 passenger airlines currently active or in start-up mode have their main bases. Unsurprisingly, most of the airline bases are clustered in the eastern region of the country, home to half of the airlines and 85% of the fleet. There are six cities with populations of over 5 million that do not currently have a dedicated airline base, however only three - Wuhan, Shantou and Shenyang - are located more than 100km from an existing major hub.



Only 12% of the current passenger fleet, including forward orders, are widebodies, compared to 20% of the global fleet.

6. External influences on China's airline operations

6.1 The NDRC

The National Development and Reform Commission (NDRC), previously known as the State Planning Commission, is an agency of the State Council responsible for a wide range of development-related activities. These include economic planning policy, urbanisation and regional development, economic restructuring, climate change and environmental issues and the oversight of economic development, including the approval of all major business expansion activities, across all sectors of the economy.

Headquartered in Beijing, the NDRC has regional representation in many large cities and operates with a staff of around 1000 civil servants. One of the roles of NDRC is to issue approvals to airlines for their capacity growth requirements. They do this in conjunction with CAAC, who will be normally contacted by NDRC as part of the review process prior to approval.

In 2016, the NDRC issued new guidelines for fleet growth, based on the size of the airline and its operating performance. The NDRC normally issues block pre-approvals in March for the following year, and is now using the following criteria to frame the annual quotas:

- Airlines with <30 aircraft may induct an additional 3 aircraft plus a maximum of 3 more if the criteria are met
- Airlines with 30-60 aircraft start with a baseline of 5 aircraft, with up to 4 more
- Airlines with 60-100 aircraft get a baseline of 7 plus up to 5 more
- Airlines with >100 aircraft can be allocated up to 11% of the fleet

The four criteria used to measure performance are:

- i) Safety
- ii) On time performance
- iii) Flight operations performance
- iv) Financial fitness

With the exception of the first criterion, where any incident or accident will result in loss of incremental allowance, the metrics are relative across the airline community, rather than absolute, so airlines are not penalised, for example, by system-wide air traffic control problems that affect everybody.

Each airline is rated on each criterion, with the top 20% of airlines awarded an "A" and the next 30% a "B". The additional flex is granted on the basis that 4x As will get the maximum allowance, 3x As plus 1x B get 1 less than the maximum, 2x As and 2x Bs get 2 less, etc. In addition, before final approval is given for each delivery, the airline must demonstrate that they will have sufficient crews to operate their expanded fleet.

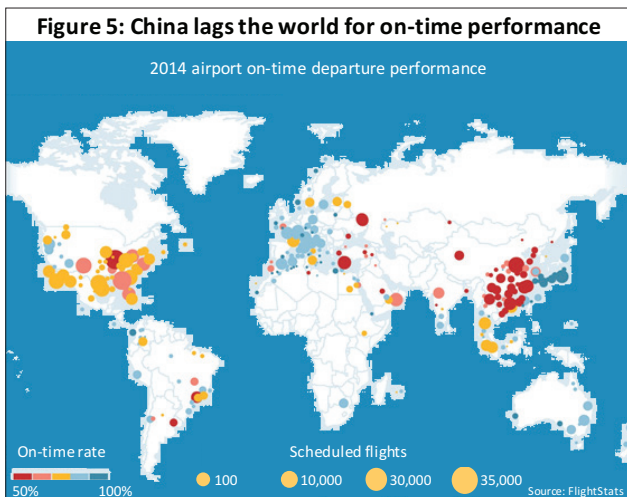
The perception of the approval process differs from airline to airline. There is agreement on one issue, however, which is that the lead time for approvals had significantly increased over the past 12-18 months, and most airlines believe that this, at least in part, is a response to the crack-down on corruption, which has resulted in something close to "work to rule" by civil servants intent on maintaining strict adherence to the process.

Where the Government, through the CAAC, imposes limitations on capacity growth, these are enforced by the NDRC, which from time to time also operates its own rulebook. As an example, they stopped issuing approvals for much of 2015 to try and force Chinese airlines to follow their "guidance" that they should source aircraft from Chinese lessors, not foreign ones – a policy that found no traction and quietly fell away.

6.2 Air Traffic Control services

One of the most significant infrastructure restrictions remains the limitations placed on airspace by virtue of the extent of its military control. With much of the country's airspace reserved for military use, commercial flights have been relegated to a lower priority despite China having become the second-largest market for commercial air travel in the world. China's usable airspace is 1/3rd that of the US, with half the number of air traffic controllers.

A legacy factor arising from the poor historical safety record of Chinese airlines that extended right up into the 1990s is that China's regulators take a more risk-averse approach to safety standards than those in many other parts of the world. For example, aircraft separation on landing approaches is up to three times greater than is required in the USA, thereby further reducing the limited airspace available. Ad hoc arbitrary closure of airspace by military controllers adds to the potential for disruption.



The level of flight delays at Chinese airports is consistently ranked bottom of world rankings (Figure 5) and even at off-peak times and without weather or visibility limitations, delays and cancellations are commonplace. Whilst some of the problems can be put down to airlines building insufficient slack into their schedules, the routine occurrence of delays across the country suggests that the airlines are not the root cause. However, whilst there is universal recognition that ATC provision is inadequate, when the issue is raised with airlines, most do not expect any near-term resolution of the problem, but continue to rely on finding work-arounds to eke more capacity out of existing airspace.

Nevertheless, recognising the increasing urgency of the situation, the Chinese authorities tabled a working paper at ICAO's assembly in August 2016 addressing "China's Strategy for Modernizing Air Traffic Management". Within the paper, a section on civil-military joint operations states that:

"The purpose is to improve efficiency in the utilization of airspace resources through flexible and effective management regimes. Unified planning, respective implementation and enhanced coordination are the key for ensuring a scientific layout of civil and military aviation infrastructure and seamless mutual communication and exchange of operational information. Civil and military joint air traffic control mechanisms will be established at busy terminal control areas to improve the performance of civil-military joint traffic control operations. Coordination on pre-tactical use of airspace will be strengthened. The civil and military sides will rely on the airspace management unit to collaboratively decide how the airspace will be used the next day and have their decision published via NOTAM or the aeronautical information network. The scope of convergent development between civil and military air traffic control departments will be expanded to increase the forms and levels of convergence. On the basis of information and systems sharing, vigorous efforts will be made to facilitate coordination in major activities, emergency response, flexible use of airspace, joint operations at busy terminal areas and other joint operational mechanisms in a bid to improve efficiency in airspace resources utilization and raise the level of civil and military collaborative operation in air traffic management."

6.3 Airport capacity

In addition to the ATC issues, China's airlines are facing increasing capacity constraints at many airports, despite the extensive and continuous upgrade and expansion programs. This is not only impacting their on-time performance but also impeding their expansion plans, as new slots are increasingly hard to secure at times that passengers want to fly.

Limitations apply to both runway and terminal capacity as the number of passengers and the number of flights have both been increasing faster than the infrastructure can absorb them. Delays are now so commonplace that, in 2016, CAAC refused to allow Beijing, Shanghai and Nanjing airports to add more flights until on-time performance (excluding ATC delays) improves.

New airport projects such as Beijing's Daxing Airport will help to alleviate the pressure. Beijing Capital, the world's second busiest airport (behind Atlanta) and Air China's primary hub, is full, handling 94 million passengers in 2016. Daxing's first terminal is scheduled to open in 2019, with capacity for 45 million passengers a year. Additional runways and terminals will follow, ultimately taking capacity to more than 100 million, which will be addition to Capital Airport, which will remain open.

6.4 High-speed rail - a competitive alternative?

From a standing start in 2007, China now has 20,000 km of high speed rail network, the longest such system in the world and destined to increase further, to 38,000 km by 2025. Most of the existing network is concentrated in the Eastern Region of China, where high population density, relatively short distances between cities and mostly unchallenging terrain justify the significant investments. However, the network is already extended well beyond the coastal region, serving 28 of the mainland's 31 administrative regions (Figure 6) and carrying over 1 billion passengers annually.

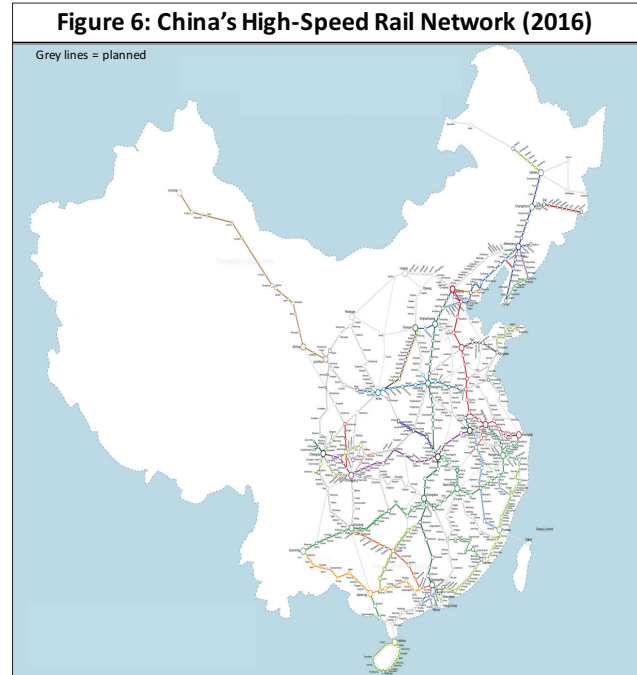


Table 1: Comparison of HSR vs Air Journey Times and Fares

Route	Great Circle Air Dist. (Km)	Flight time	Additional ground time ¹	Elapsed flight time	Fastest Rail Time	Rail Distance (Km)	Avg Rail Speed (Km/H)	Advance ² 2nd Cl Rail Fare (US\$)	Advance ² Y Air Fare (US\$)	2nd Cl. Rail Fare (US\$)	7 Days ³ Y Air Fare (US\$)
Chongqing - Chengdu	276	03:45 ⁴	02:20	06:05	01:27	307	212	23	277	23	537
Shanghai - Hefei	423	01:25	03:15	04:40	02:04	467	226	29	128	29	52
Xiamen - Shenzhen	488	01:20	01:55	03:15	03:28	502	145	21	200	22	58
Shanghai - Wuhan	682	02:05	02:00	04:05	04:20	818	189	45	185	63	54
Wuhan - Chongqing	738	01:35	02:20	03:55	06:12	934	151	36	181	36	52
Beijing - Harbin	1000	02:00	02:20	04:20	07:06	1249	176	80	148	80	63
Beijing - Shanghai	1074	02:15	01:50	04:05	04:49	1305	271	81	108	81	80
Shanghai - Guangzhou	1173	02:30	02:15	04:45	06:50	1790	262	117	99	117	86
Beijing - Guangzhou	1875	03:15	02:05	05:20	08:03	2298	285	129	136	129	180

¹ Travel city centre to/from airport + 60 minutes additional check-in/security
² 6 months advance booking for travel on 31st August
³ 1 week advance booking for travel on 1st March
⁴ No direct flights available - 1 stop selected

Sources: Skyscanner; ChinaTour.net

Table 1 above compares HSR and air journeys over a range of trip distances, using published standard fares for departures 1 week and 6 months in advance. The green cells show the more competitive mode for time and cost, with amber highlights indicating similar or identical values.

HSR fares are higher than conventional rail fares, but lower than for comparable high-speed networks elsewhere in the world. However, there is no price premium for booking rail seats close to the date of departure and the fastest trains on popular routes are often sold out a week or more prior to departure. Conversely, many air fares are significantly lower closer to the departure date and there appears to be little incentive for passengers to plan their travel far in advance. Significantly, no LCC appeared as the cheapest option for any of the routes sampled.

Although speeds of 350 km/hr are achievable across large parts of the HSR network, average speeds are lower, affected by the number of stops, making most journeys above 750 km uncompetitive on elapsed time, even when flight times are adjusted to take account of the extra ground time required. On the shorter sectors, some air service attrition has already taken place, including the direct flights between Chongqing and Chengdu noted in the table above, however no significant additional schedule cuts resulting from HSR competition are anticipated.

6.5 Pilot shortages

Boeing estimates that Chinese airlines will need to add 100,000 pilots over the next 20 years in order to meet their growth requirements – a recruitment rate of almost 100 per week. Pilot shortages are a recurrent issue for China's airlines, which in recent years have been employing foreign nationals in increasing numbers. However, the regulatory framework prevents these costly resources being utilised as efficiently as they might, with a number of restrictive rules in place. For example, foreign pilots must be rostered with a Chinese speaker in the second seat, as some regional ATC facilities have no English speakers. Combined civil/military airports are often off-limits to foreign crews, whilst experience earned outside the country is discounted, resulting in unequal seniority between pilots of equivalent capability.

Until recently, China's flight training capabilities did not extend much beyond CAAC's Flight Training University, since general aviation as it is understood in the West does not exist (Table 2), with a consequent lack of private pilot feedstock to qualify for flight instructors. There are still less than 3,000 private pilots in China and almost no airspace that is open to private flying. It is not possible to take to the skies on a weekend for pleasure - flight plans typically need to be filed days, rather than hours, prior to the flight and there are few facilities to fly out of.

Any move to open more airspace, especially the low level airspace necessary for general aviation, would, in time, facilitate a major expansion in pilot training capability, not only through the opening of more training schools, but also by allowing general aviation pilots access to flying time to build up hours and qualify as instructors.

Several airlines have set up their own pilot training schools to ensure they have access to pilots for future growth. Others make use of costly flight training facilities in the US or Europe and will typically indenture their trainee pilots for the duration of their careers. However, increasing the numbers of ab initio pilots does not fully address the pilot shortage issue, since ten years' of experience are required before promotion to captain is possible under current regulations.



Foreign pilots must be rostered with a Chinese speaker in the second seat, as some regional ATC facilities have no English speakers.

Table 2: General Aviation Comparisons - 2013

	# GA Airports	# GA aircraft	# Private pilots ¹
USA	>24,000	300,000	175,000
China	399	1,654	2,533

Source: China Daily, FAA

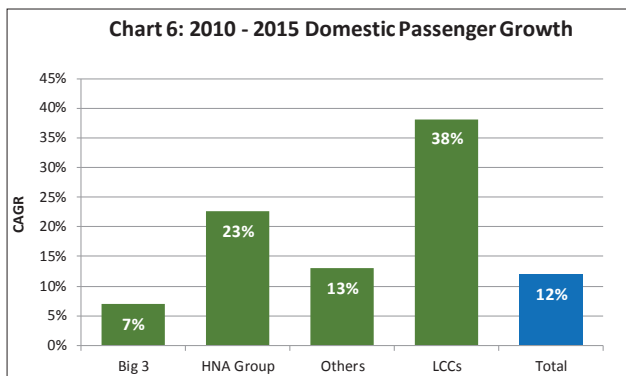
¹ 2014 data

7. Domestic air travel patterns

7.1 The current domestic air transport network

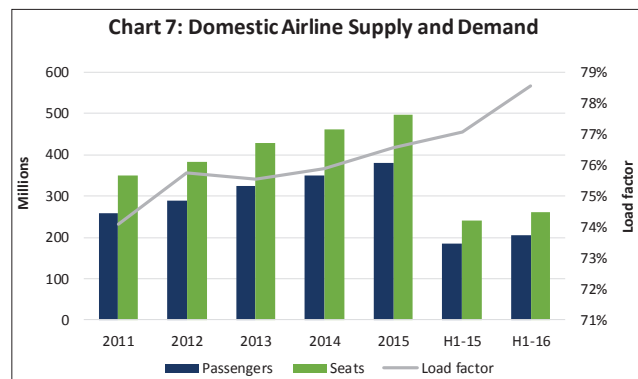
The analysis in the section is based on data extracted from OAG's Schedules and Traffic Analyser tools covering the period from January 2010 to June 2016. The schedules data reflect commercial airline schedules filed and operated during the relevant periods and are an accurate representation of the number of flights and seats available on each sector. The traffic data reflect passenger bookings made on the major GDS systems or with the airlines directly, collected, collated and adjusted by OAG to reflect the actual passenger flows by sector and route. As such, the latter is an estimation of traffic, rather than an exact record.

The overall domestic market increased by 76%, or 164 million passengers between 2010 and 2015, equivalent to a 12% average growth rate (Chart 6) which followed a slowing trajectory over a time frame which opened with 20% year on year growth and ended with 9%.



There are significant variations in the growth rates achieved by the different airline groups and market segments, with the LCCs increasing traffic volume by 38% per annum, followed by the HNA Group airlines at 23%. The "Big 3" (China Southern, China Eastern and Air China) averaged 7% annually and all of the other full service carriers ("FSCs") averaged 13%.

In 2015, the last full year for which detailed traffic data are available, more than 32 Chinese airlines⁴ operated over 3 million domestic flight sectors offering almost 500 million seats. Those flights carried more than 380 million sector passengers, representing an average load factor of 77% (Chart 7).



According to the OAG data, 97% of the passengers were travelling on a purely domestic itinerary, with 3% (but still 11 million passengers) connecting to or from international flights and 96% of the tickets were sold in China, levels that have remained consistent over the past several years.

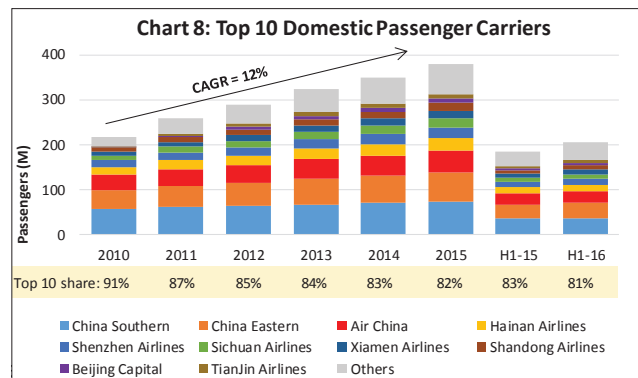


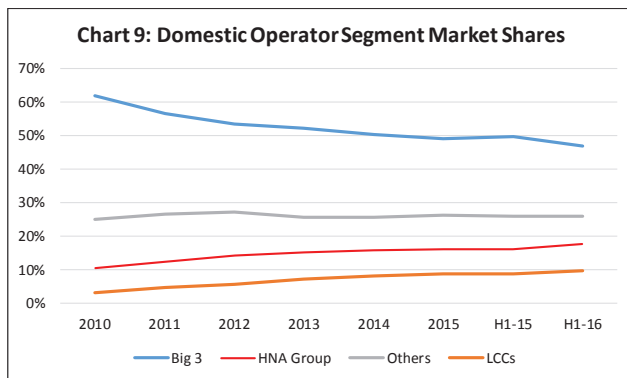
Chart 8 sets out the evolving distribution of passengers carried by the largest domestic airlines. The share of the Top 10 by passenger volume declined from over 90% in 2010 to 82% in 2015.

4. Several airlines that are subsidiaries of larger parents operate under their parent's code and are not identified separately in the data

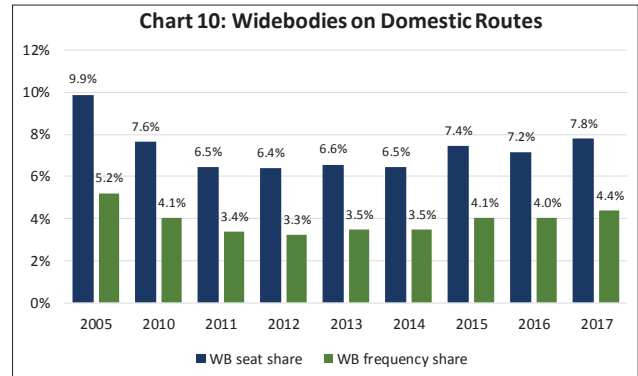
In 2015, China's Big 3 accounted for 49% of the total passenger flow, carrying 74 million (C. Southern), 65 million (C. Eastern) and 48 million (Air China) domestic sector passengers.

With 61 million passengers, The HNA Group's airlines accounted for 16% of the total in 2015, almost half being carried by Hainan Airlines. 11 low cost airlines carried 33 million passengers in 2015, representing 9% of the total market, a significant ramp up over a short period of time. The other FSCs, including several regional subsidiaries of the Big 3, slightly increased their aggregated share of the market, to 29%, with 112 million passengers carried.

Over the past five years, the share of the Big 3 has been steadily declining from 62% in 2010, when the HNA Group accounted for 10% of the market and LCCs made up just 3% of the total (*Chart 9*). However, the "new" entrants have not just taken market share, but also stimulated demand in a similar fashion to the market forces that have operated in other liberalising markets. Continuing the trend, a further five new entrant airlines opened domestic services in 2016.

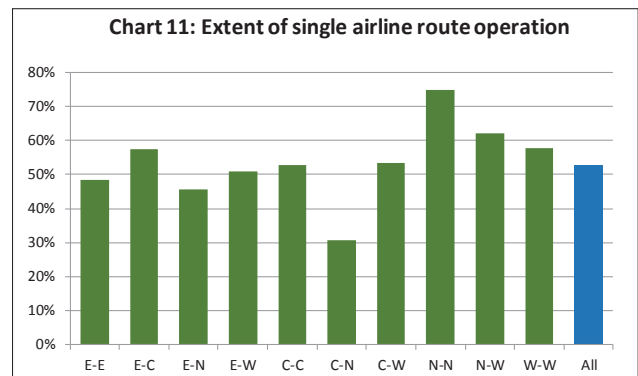


Contrary to popular perception, widebodies are not widely deployed on domestic routes. As far back as 2005, widebodies accounted for only 5% of frequencies and 10% of seats (*Chart 10*). The current levels are 4% and 7% respectively and many of these operations are extensions of long-haul international services.



7.2 Airline competitiveness

In 2016, over 50% of all city pairs were operated by a single carrier, and can be considered de facto monopoly routes (*Chart 11*). The concentration of monopoly routes varies from 75% of routes operating within the Northern Region to 30% of routes between Central and Northern Regions, while almost 50% of routes operating within the most densely served Eastern Region also had a single operator. In the majority of cases, the monopoly routes had more than 3 daily flights, suggesting that lack of market size is not the driving factor.



Incumbency per se is also not a factor, since only one of the Big 3 airlines is amongst the top ten airlines measured by concentration of monopoly routes (Table 3). However, many of the biggest monopolists (which is not intended as a pejorative) are relatively recent market entrants and/or operating from second tier airports, which suggests that the business models of new entrants are more focussed on avoiding head to head competition and finding niches where traffic and yields can be more readily maximised. The legacy carrier model of blanket service in as many markets as possible does not appear to have been adopted by the new generation of domestic carriers.

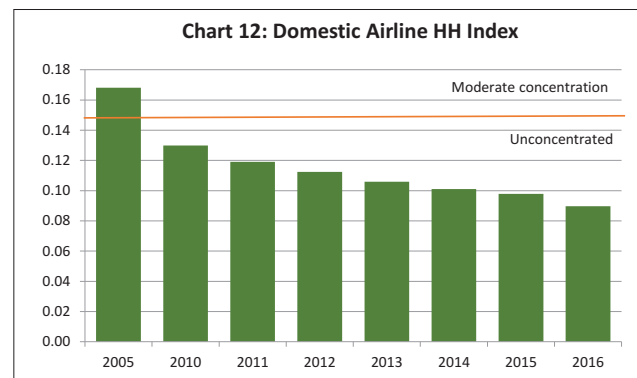
Table 3: The 2016 Monopoly League

Airline	Unique Sectors Operated	% as only operator
China United	164	79%
GX Airlines	94	53%
China Express	319	53%
Loong Air	137	36%
Tibet Airlines	108	31%
Ruili Airlines	68	29%
TianJin Airlines	546	29%
China Eastern	1174	27%
Okay Airways	202	27%
Colorful Guizhou	38	26%
Spring Airlines	266	26%
Shanghai Airlines	252	24%
Air China	660	24%
China Southern	1186	24%
Lucky Air	212	24%

Based on 2016 OAG schedule data

Note: Excludes routes with less than 26 annual frequencies

The size of the domestic market, the number of routes and frequencies and the number of active airlines all support a view that market concentration is not a significant concern. The Herfindahl-Hirschman Index (HHI) is a measure of market concentration based on the sum of the squares of each participant's market share. In markets where there is a single supplier, the resulting value would be 100², or 10,000 and, at the other end of the scale, multiple competitors would take the score towards zero, signifying perfect competition. Since 2005, the HHI scores for China's domestic market have declined steadily from 0.17 (rated as "moderate concentration") in 2005 to values below 0.1 by 2016, where 0.15 is the threshold for "unconcentrated" (Chart 12).



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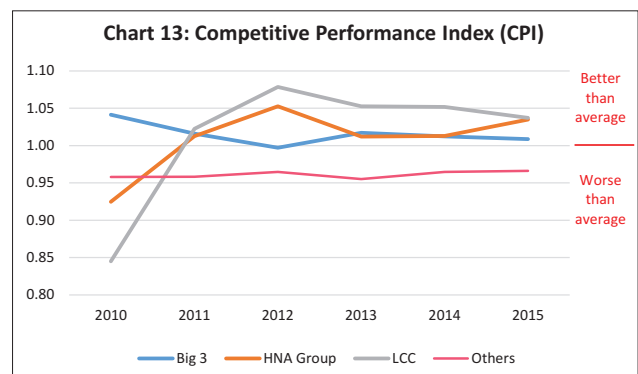
One measure of competitiveness frequently used by airlines to compare their effectiveness in capturing market share is the Competitive Performance Index, or CPI. This is a simple ratio of market share : capacity share. On any route or market, the aggregate CPI will be 1 (100% of the market divided by 100% of the seats). Each airline competing in that market will have a CPI at, above or below 1. A score below 1 indicates a worse than average competitive performance, since the market share achieved relative to the seats offered is less than the average. Conversely, a CPI greater than 1 indicates better than average competitive performance.

In their Chinese domestic airline operations, the Big 3 have inevitably trended down from their historically dominant market position as more carriers entered the market. They are now consistently achieving CPIs just above 1, making them the industry benchmark (Chart 13).

HNA Group airlines gained competitiveness through 2012, then declined as capacity was rapidly added, and have recently moved slightly ahead again.

The group of LCCs, from a modest start, put in a strong competitive performance through 2014, but fell back in 2015. Given the fluidity of route and capacity development as the LCCs expand, a degree of volatility is to be expected and it is likely that a competitive advantage of 3 to 5 points over the average can be sustained into the future.

In aggregate, the other airlines consistently underperform, which may reflect a fragmented market presence or a greater reliance on secondary markets. Clearly, though, their “monopolistic” non-compete route strategies are not delivering discernible benefits in this regard.



7.3 Airport Growth

In 2015, 380 million passengers were carried on a domestic route network comprising 2,400 city pairs, which connected 187 airports, with another 4 added to the system during the first half of 2016. The 10 largest airports accounted for over 50% of all domestic passenger movements – 221 million in total. The five largest, in order, were Beijing, Guangzhou, Shenzhen, Chengdu and Shanghai-Hongqiao, with the combined Shanghai airports of Pudong and Hongqiao taking 2nd place (Table 4). The densest city pairs were also those that connected the same five cities. 25% of all domestic passengers travelled through Beijing, Shanghai or Guangzhou and the top 10 airports accounted for almost 50% of all passenger movements in 2015.

Rank	2010		2015		
	Airport	Passengers	Airport	Passengers	
(1)	Beijing	51,072,678	Beijing	74,824,457	
(2)	Shanghai	42,818,295	Shanghai	66,237,651	
1	PEK	51,006,662	PEK	69,593,519	Beijing - Capital
2	CAN	31,515,109	CAN	43,148,073	Guangzhou
3	SHA	25,409,410	SZX	37,152,154	Shenzhen
4	SZX	23,159,450	CTU	35,860,136	Chengdu
5	CTU	21,410,851	SHA	35,291,041	Shanghai - Hongqiao
6	PVG	17,408,885	KMG	34,063,372	Kunming
7	XIY	15,753,873	PVG	30,946,610	Shanghai - Pudong
8	KMG	15,622,029	XIY	29,441,710	Xian
9	CKG	12,676,658	CKG	25,748,166	Chongqing
10	HGH	12,464,118	HGH	21,837,555	Hangzhou

The top 10 rankings have remained very consistent since at least 2010, however, there has been more movement in the next 10 rankings, with 3 new entrants (denoted by * in Table 5) rising through the ranks since 2010.

Rank	2010		2015		
11	CSX	10,463,967	XMN	18,611,765	Xiamen
12	WUH	9,915,808	URC	17,239,657	Urumqi
13	NKG	9,878,242	NKG	15,089,972	Nanjing
14	XMN	9,558,086	WUH	15,050,500	Wuhan
15	TAO	8,595,708	CSX	14,963,482	Changsha
16	URC	8,040,709	SYX	14,895,471	Sanya*
17	DLC	7,817,036	HAK	14,881,347	Haikou
18	CGO	7,715,051	TAO	14,543,300	Qingdao
19	HAK	7,326,697	CGO	14,301,567	Zhengzhou*
20	SHE	6,464,287	KWE	12,295,558	Guiyang*

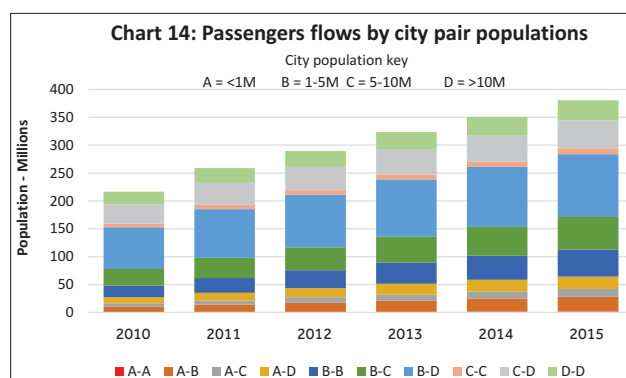
The 12th five-year economic plan set a target to build 55 airports between 2010 and 2015 and 90 by 2020, mostly in Western and Central China, with the objective of having 80% of the population located within 100km of an airport. Since 2010, 21 additional airports have opened to scheduled passenger services, which is below the reported rate at which new airports have been built and opened. Since a number of the new builds have been replacements for existing but outgrown facilities, a shortfall is to be expected, but there are also examples of new airport projects, such as Luliang in Shanxi province, opened in 2014, and Libo in Guizhou, that have failed to generate demand, often hand in hand with the ghost cities that they were built to serve.

The Government's 2016 budget for investment in aviation infrastructure was \$11.7bn, with plans for eleven major infrastructure projects and over 50 upgrades to existing facilities underway, including new airports in Beijing, Chengdu, Qingdao, Xiamen and Dalian. This budget also includes improvements to ATC facilities and airline fleet growth. Construction of a further 60 new airports by 2020 is also well advanced.

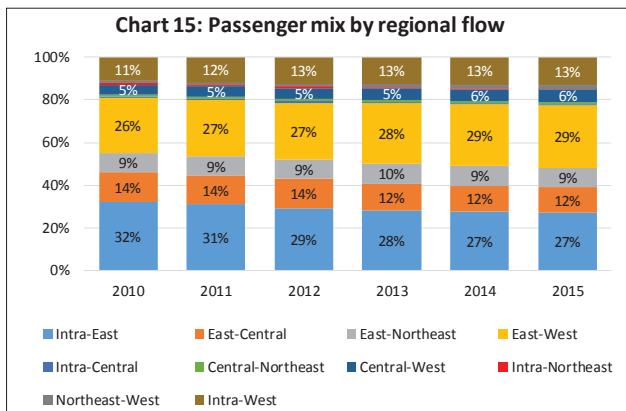
7.4 Traffic flows between China's cities and regions

In the five years from 2009 to 2013, the government subsidised regional air services to the tune of US\$800 million and over the past five years, traffic to, from and between "small" cities (with populations of less than 1 million inhabitants) has increased by 136%, well ahead of the 75% domestic average. Nevertheless, demand for regional air services remains low, with less than 1.6 million passengers (0.4% of the total) travelling on services linking small cities ("A-A" in Chart 14). A further 63 million passengers connected between small cities and larger ones ("A-B" through "A-D"), including 23 million passengers connecting with the largest cities, with populations of 10 million upwards.

The largest traffic flows are between the mid-sized (1-5 million) and large (>5 million) cities, which account for almost 60% of the total, or well over 200 million passengers.

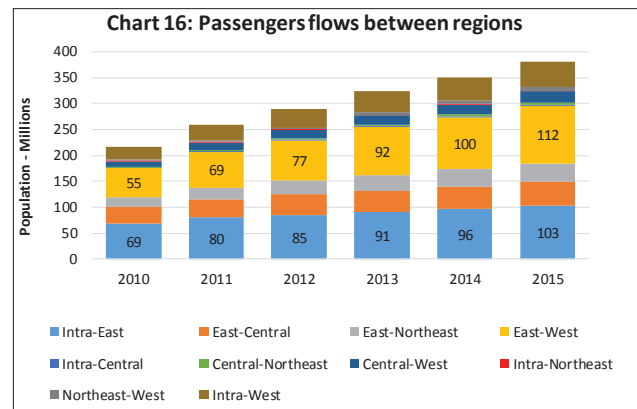


The proportions of passengers travelling within and between the regions (East, West, Central & Northeast) have also been changing over time, as might be expected given the economic and demographic drivers influencing the pace of urbanisation and the mobility of the labour market (Chart 15).

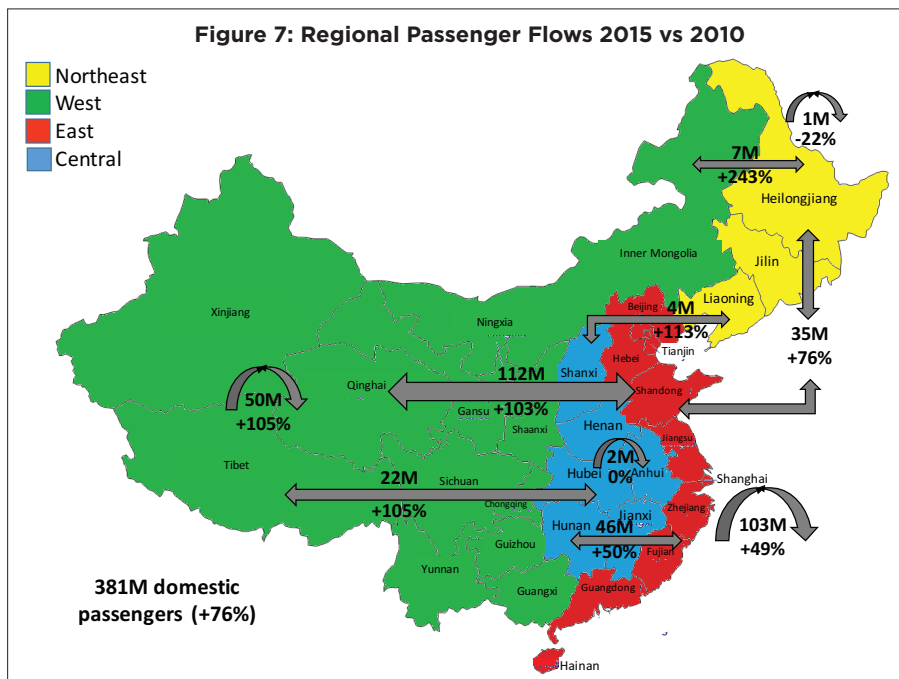


Passengers on routes operating within the Eastern Region have dominated regional flows since the earliest days of domestic air service. However, East-West traffic has been steadily increasing and overtook intra-Eastern passenger numbers for the first time in 2013.

By 2015, both markets had traffic levels well in excess of 100 million passengers (Chart 16), with East-West flows having more than doubled since 2010, while intra-Eastern traffic increased by 50% (Figure 7). Other traffic flows connecting the Eastern Region have also seen strong growth, with East-Central and East-Northeast flows up by 50% and 76% respectively, reflecting the continued economic importance of the Eastern region, whose airports are still included in almost 80% of all passenger journeys.



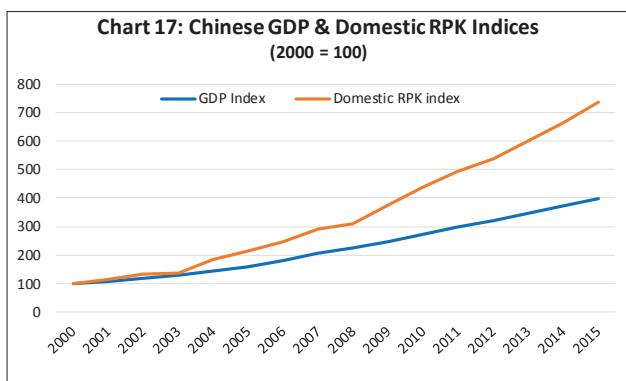
The strongest intra-regional growth has been between the Northeast and Western Regions, up by 243% since 2010, albeit off a small base. Intra-Central traffic volume is small but has remained static, whilst intra-Northeast traffic has declined by 22% to around 1 million, primarily due to the replacement of direct flights with high speed rail links.



8. Forecasting China's domestic traffic flows

8.1 Building the model

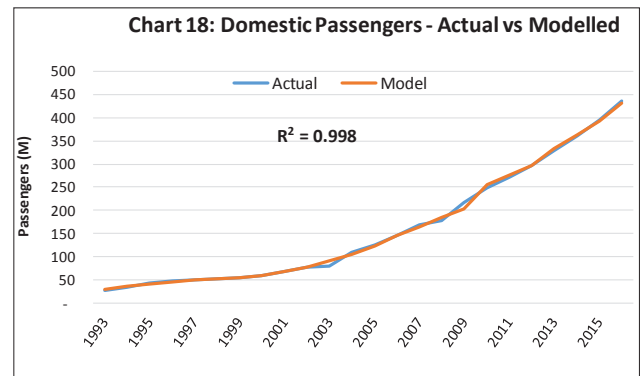
GDP remains a strongly-correlated driver of air travel demand at a global and regional level, however it is clear that additional forces are at work in the Chinese market, since the slowing of China's GDP growth over the past several years has not been tracked by a corresponding decline in the rate of expansion of domestic air travel (*Chart 17*).



Looking ahead, demand for domestic air travel will be influenced by the proposed re-alignment and up-scaling of economic activity, promotion of “go West” relocation initiatives and urbanisation plans which will affect regional economic activity and migrant worker patterns. Wages and disposable incomes will continue to rise, but so too will living costs, especially in the cities, which will also affect labour mobility. As disposable incomes rise, availability and affordability of air travel will be essential to satisfying demand, along with availability of core infrastructure, including pilots, airports and air traffic services. Whilst business travel has been the majority domestic travel segment to date, future trends will include a rising leisure travel component, although the HSR network and a steady rise in car ownership will absorb a growing share of that business.

Regression modelling has been used to identify significant independent variables that can be used to represent key historical influencers of demand which are expected to remain relevant into the future. In addition to a GDP variable, the rate of urbanisation is included, along with metrics that track the market share of the Big 3 and the penetration of LCCs.

Recognising that consumerism is becoming a more prominent feature of the air travel demographic in China, Avolon has developed an index of “consumer satisfaction” that measures the extent to which Chinese consumers are reaching thresholds of ownership for high value household items such as computers, mobile phones, motor cycles, cars, etc. that, once achieved, is likely to lead to increased expenditure on discretionary leisure items such as air travel. When included in the regression model as an additional independent variable, accuracy is improved and the overall model achieves a statistical R² value of 0.998 when applied to domestic RPK growth from 1993 to 2015 (*Chart 18*).

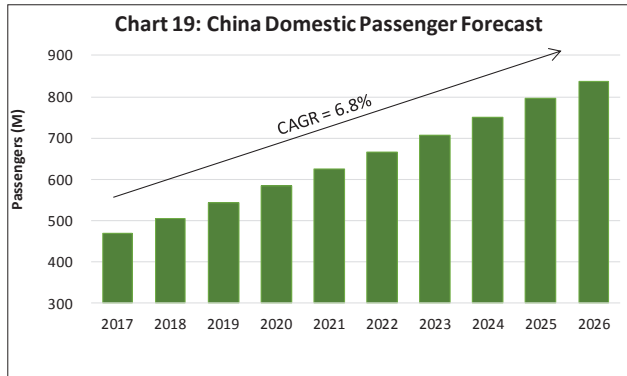


The future projections of domestic RPK growth out to 2026 that have been made using this model are themselves dependent on forecasts for each of the independent variables. In summary, these are as follows:

Independent variable	Growth forecast	Source
Chinese GDP (current RMB)	2017-'21: 6.5% CAGR	13th Plan
	2022-'26: 6.0% CAGR	Avolon
Urban share of population	65% by 2026	MacKinsey, UN & others
Seat share of the Big 3	40% by 2026	Avolon
LCC penetration	20% by 2026	Avolon
Consumer satisfaction index	6% per annum CAGR	Avolon

Applying these inputs, the model predicts an average growth rate for Chinese domestic passengers of 6.8% per annum over the decade to 2026, comprising an average of 7.7% from 2017-2021 and 6% from 2022-2026 (*Chart 19*).

Although the predicted growth rates show a clear maturing of the market over the next ten years, these levels still result in domestic passengers doubling to 840 million by 2026.

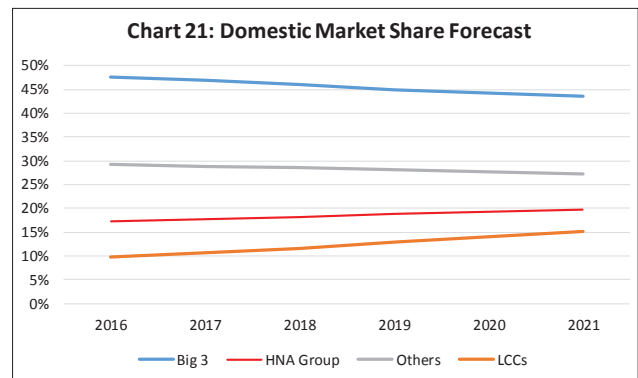
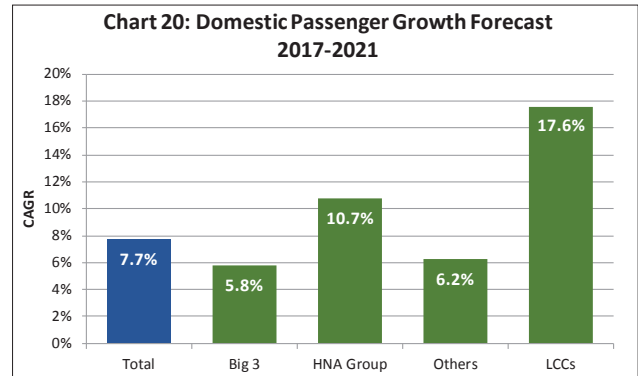


8.2 Who will be driving the growth?

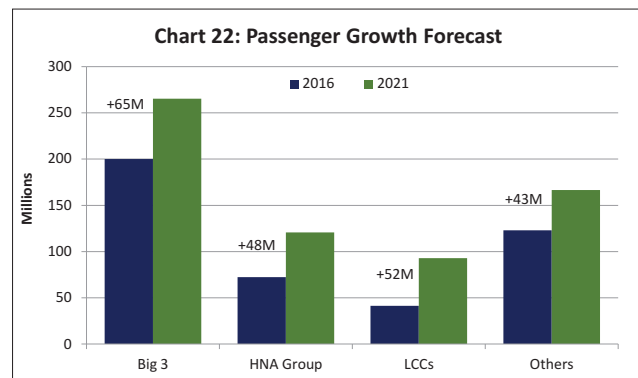
The recent trend in aviation policy has been to maintain a process of gradual deregulation and be generally supportive of market liberalisation and the sanctioning of new entrants. However, perhaps because of the rate at which capacity is being added relative to the availability of infrastructure, there are recent signs that this momentum may be paused. The regulatory authorities have yet to demonstrate definitively that they support a more liberal regime, but on balance the market forces already in play are likely to make permanent reversals in policy difficult.

For this reason, the outlook for future growth remains positive, but more favourable for Chinese airlines other than the Big 3, which are expected to maintain a slightly lower growth trajectory (Chart 20) and will continue to lose market share to the insurgents (Chart 21). The new LCCs in particular, will gain further ground, with 15% market share forecast by 2021.

The HNA Group is also expected to maintain above average growth as recent and future new airline ventures (both full service and LCC) expand their market presence, with aggregated market share increasing from 16% to 20% over the next five years. The other domestic full service operators are expected to broadly hold their ground in terms of aggregate market share, but with growth rates slightly below the underlying market average.



Taking the relative segment sizes into account, the forecast projects that the Big 3 will generate the largest number of additional passengers, up by 65 million on 2016 traffic levels. HNA Group and the LCCs will each increase traffic by around 50 million passengers and the other carriers will gain 43 million by 2021 (Chart 22).



9. Conclusions

- China's economic development is entering its 3rd phase. The core planning themes of the next 5 to 10 years will be around realignment of the economy, with emphasis on the upscaling of industry and manufacturing to deliver greater efficiency, greater innovation and greater value-add.
- A critical deliverable is to reduce dependence on foreign demand for manufactured products through stimulation of domestic consumption. Success here, as well as in ambitious and far-reaching policies such as One Belt One Road, will be pivotal in shaping and securing the next phase of China's economic development.
- Multiple threats arising from the unintended consequences of previous policies and growth plans will challenge the successful delivery of these turn-around strategies – notably the ageing population, shrinking labour force, rising labour and input costs and extensive environmental damage.
- The very low birth rate will result in China yielding its most populous nation status to India at some point in the future. However, the population of 1.38 billion is increasingly urban in location, with over 200 cities having more than 1 million residents and 17 cities with more than 5 million, where industrial growth, rising disposable income and large migrant worker populations will be central to supporting increased domestic consumption.
- Although GDP growth has been gradually slowing over the past number of years, absolute increases in the economy, measured in RMB, remain the highest in the world, helping to sustain growth in sectors such as commercial aviation.
- The Chinese airline industry continues to experience strong demand and growth, with a gradual relaxation in centralised CAAC regulation and control providing the framework for development of a broad-based airline community, with multiple new entrants, including a growing number of operators based in secondary cities and a nascent but fast-growing low cost carrier segment.
- In 2015, Chinese airlines operated over 3 million flights with 500 million seats on domestic routes. Over 380 million sector passengers were carried, producing a system load factor of 77%.
- Traffic flows are gradually diversifying away from the most populous and wealthiest Eastern Region, mostly towards the Centre and West of the country.
- The top ten airport rankings have remained stable over the past 5 years and account for almost 50% of total domestic passenger movements.
- Structural problems, including inefficient and limited airspace capacity, congested airports, a shortage of pilots and bureaucratic approval procedures will continue to challenge current operations and potentially hamper future growth for the foreseeable future.
- Nevertheless, domestic traffic growth is forecast to average 6.8% over the next decade, driven not only by GDP growth, but also increasing urbanisation, rising consumerism and the availability of more, and more affordable, low cost airline capacity.
- Within the domestic airline community, LCCs will generate the highest growth rate, whilst the Big 3 will see the largest increase in traffic volume over the next 5 years.

Appendix 1 – Chinese Airlines Fleets at 31st December 2016

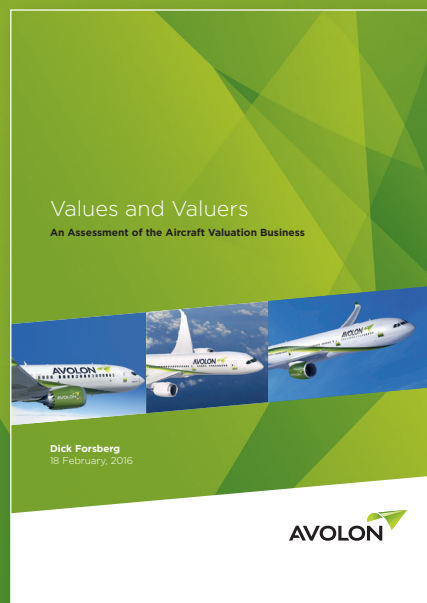
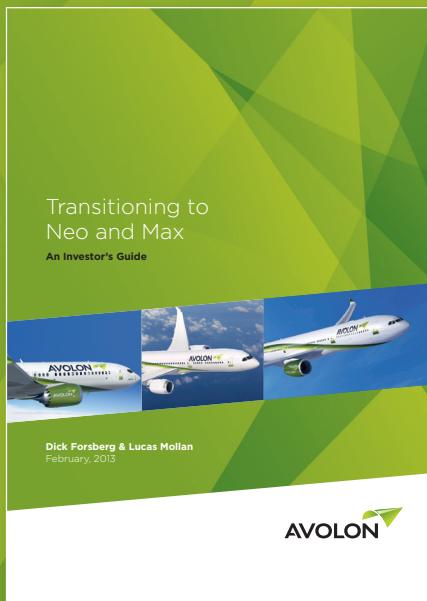
	Total	In Service	Storage	Orders & LOIs	Order	LOI
A320ceo family	1,345	1,167	12	166	36	130
A320neo family	215	2	0	213	23	190
B737 Classics	10	0	10	0	0	0
B737NGs	1,333	1,149	5	179	126	53
B737 MAX	389	0	0	389	99	290
B757	12	12	0	0	0	0
C919	95	0	0	95	55	40
A330ceo	247	183	0	64	39	25
A350	44	0	0	44	34	10
A380	5	5	0	0	0	0
B747	11	10	1	0	0	0
B767	9	9	0	0	0	0
B777	69	58	4	7	7	0
B787	128	42	0	86	62	24
CRJs	45	28	5	12	12	0
ERJs	22	14	8	0	0	0
C-Series	20	0	0	20	0	20
E-Jets E1	116	90	0	26	16	10
E-Jets E2	20	0	0	20	2	18
ARJ21	121	2	0	119	93	26
MA Turboprops	169	20	1	148	31	117
Total	4,425	2,791	46	1,588	635	953
Single aisle	3,399	2,330	27	1,042	339	703
Twin aisle	513	307	5	201	142	59
Regional	513	154	14	345	154	191
Future technology	816	44	0	772	220	552

Source: FlightGlobal Ascend

Appendix 2 – China's airlines and their principal bases



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