

**A Report from the Center for Agricultural Business  
California State University, Fresno**

**Prepared for the California Department of Food and Agriculture**



## **Taking the Fast Plane to China:**

# **An Expanded Role for Air Freight in Increasing California's Fresh Fruit and Vegetable Exports**

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## Abstract

This report examines the feasibility and desirability of making more extensive use of air-freight services to supply fresh California-grown fruits and vegetables to a geographically dispersed array of urban markets in the People's Republic of China. These include not only such mega-markets as Shanghai, Beijing, and Guangzhou but also an increasing number of second-tier cities, especially those that U.S. Foreign Agricultural Service officials have identified as China's



most promising Emerging City Markets (ECMs). These ECMs, fifteen in number, are scattered throughout a country which covers an area approximately 20 percent larger than the territory occupied by the 48 contiguous U.S. states. They stretch from Harbin in the far northeast to Kunming in the south. While most are congregated along China's coastline, the roster of ECMs also includes Xi'an, Wuhan, Chongqing and

Chengdu in China's interior provinces. All are industrial centers which have attracted considerable foreign direct investment and have sizable expatriate business communities. Many are also major tourist destinations featuring luxury-class hotels and restaurants. Most importantly, all are home to a growing indigenous class of affluent consumers concerned with the quality and safety of domestic food supplies. However, access to these ECMs remains severely impeded by grave deficiencies in China's cold-chain systems. This has had the effect of restricting imports of perishable food items to regions immediately adjacent to China's principal international gateways. However, with an increasing number of direct and indirect flight connections available between California and China, and with the rapid development of China's domestic air transport networks, California exporters of perishable fruits and vegetables should take a new look at air-freight's potential for overcoming surface transport barriers. Because of a substantial imbalance in transpacific trade flows, California shippers enjoy favorable "back-haul" air-freight rates that have in recent years as low as one-fifth of the rates charged Asian exporters of air-freighted goods to the U.S. At the same time, the steady appreciation of the yuan against the dollar in the past year has made American goods more price-competitive in Chinese markets.

## Acknowledgements

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Domestic Produce Counter – Supermarket in Shanghai's Xujiahui Shopping District

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# Taking the Fast Plane to China: An Expanded Role for Air Freight in Increasing California's Fresh Fruit and Vegetable Exports

April 2008

Worldwide demand for fresh fruits and vegetables is expected to soar over the next decade as high rates of economic growth bring steadily rising levels of prosperity to a number of countries long been mired in economic malaise. Among these nations, economic development has been most remarkable in Brazil, Russia, India and China (the so-called BRIC Bloc), which collectively account for 42 percent of the earth's population. Within these and other developing economies worldwide, demand for imported goods remains largely concentrated in a handful of major metropolitan areas. However, significant markets for imported merchandise have also been emerging in population centers some distance removed from each country's historical hubs of industry and government. Even now, for example, more than half of the goods China imports from the United States are destined for locales other than Beijing, Shanghai, and Guangzhou.<sup>1</sup>



Unfortunately for exporters seeking to reach consumers in these rapidly expanding second-tier markets, the brisk pace of economic expansion has almost universally overwhelmed the existing goods movement infrastructure. Congested highway and rail networks impede shipments of all kinds of goods to destinations beyond traditional ports-of-entry, which themselves have often become near impenetrable bottlenecks to trade. In the case of perishable products, the widespread absence of extensive, well-integrated cold-chains in geographically vast countries like China, India, Russia and Brazil can impose trade barriers as effective as any erected by government authorities.

This report examines the logistical challenges involved in shipping fresh fruits and vegetables from California to urban markets throughout the People's Republic of China, the most populous of the BRIC Bloc countries and the one whose economic ascendancy over the past two decades has been the most astonishing. By all accounts, the market for imported food products in China is expanding not only in the old familiar places -- Beijing, Shanghai,

Guangzhou, and Hong Kong<sup>2</sup> -- but also in the nearly four dozen other Chinese cities with populations currently exceeding one million. Within each is a rising class of affluent and increasingly discerning consumers along with substantial expatriate communities with ample discretionary income. And that is just today. In 20 years, China's cities are expected to add another 350 million people, more than the current population of the United States. By 2025, China is projected to have some 219 cities with over one million inhabitants. Of those, 24 will feature populations in excess of five million.<sup>3</sup>

But demand is not the issue here. Meeting it is. China's increasing appetite for fresh farm produce will hardly profit California growers unless the means can be found to overcome the limitations of a cold-chain system lately described as being "in its infancy" by A.T. Kearney, a global management consultancy.<sup>4</sup> With spoilage rates reportedly as high as one-third on shipments of fresh fruits and vegetables from China's farms to its urban markets, the scale of economic loss is overshadowed only by the threat posed to food safety and public health.<sup>5</sup>

To be sure, China is investing heavily to extend the reach and to expand the carrying-capacity of its highways and railroads along with its inland waterways. Over the next three years, Beijing plans to spend \$190 billion on rail construction projects, including 10,000 kilometers of track and a Beijing-Shanghai high-speed train. Plans also call for capacity enhancements on key freight lines and double-tracking in heavily-traveled stretches where freight trains vie with passenger trains for limited trackage. Similarly, China's investment in highway construction has increased enormously since 2000, stimulated in part by the growing number of private motorists who have been taking to the road.<sup>6</sup> There are already more than 34,000 kilometers of expressways, second only to the U.S. in total mileage. And some 3,000 kilometers (1,860 miles) of new expressway are being added each year to better link the population and industrial centers in the nation's interior provinces with each other and with its coastal cities. Nor has the country stinted on boosting the through-put capacity of its seaports. China now boasts sixteen major shipping ports which are expected to handle 35 percent of the world's maritime commerce by 2010.

Yet extending and expanding the nation's transportation infrastructure over the next five or ten or even twenty years offers only a partial solution to the cold-chain problem. China must also deal with an acute shortage of refrigerated trucks and railcars, not to mention cold-storage facilities. One recent survey indicates that, by 2017, China would need 365,000 refrigerated trucks and 5 billion cubic feet of cold storage to safely transport, store and distribute perishable goods. Achieving that goal will be expensive, especially since the country currently only has an estimated 30,000 refrigerated trucks and 250 million cubic feet of cold storage. Bringing China's cold-chains up to Western European or U.S. standards would, according to at least one analysis of the existing situation, take at least ten years and cost some \$100 billion.<sup>7</sup>

Developing a modern cold-chain to serve China's food transport needs will also require that Chinese authorities establish and rigorously enforce new food safety standards, including clear guidelines for the appropriate handling of perishable food products. At present, trucking firms

and other logistical service providers currently have few incentives to invest in refrigerated vehicles and cold storage facilities so long as lax enforcement of food safety standards permit their competitors to use sub-standard equipment to conduct business-as-usual.<sup>8</sup> Although some steps have been taken toward defining new standards, there is considerable doubt about the extent to which authorities would evenly enforce new food safety regulations, particularly at the provincial and local levels.

<sup>9</sup> Until that time, Chinese roadways will likely continue to feature produce-hauling vehicles not unlike the one depicted in the adjacent photograph.<sup>10</sup>



While new rules and regulations for transporting and storing perishable food items are slowly being devised, demand for imported food products will continue to increase in China's largest and wealthiest cities, namely Beijing, Shanghai, and Guangzhou. But it will continue to spread into distant corners of China, thereby posing a potentially vexing logistics question: Can China's second-tier and even third-tier cities be supplied with imported fruits and vegetables without incurring unacceptable deterioration in quality and freshness and without driving up the price of those imports to a level that would strain even the most inelastic market demand?

Under the circumstances, California exporters of perishable products should consider the feasibility of by-passing problematic surface transport systems in China by exploiting California's extensive and growing aviation links to China's primary aviation gateways and using these and other hubs to access China's fast-expanding domestic air cargo system. To be sure, shipping by air is certainly not the least costly method of serving geographically dispersed markets within China. However, it may offer the only reliable means of supplying those markets with high quality perishable produce. Ultimately, it will be up to Chinese importers and distributors to determine whether demand in second-tier markets is sufficiently strong to tolerate the higher prices that would have to be charged to offset the additional costs associated with expedited delivery via air. Still, the use of air freight services to transport agricultural produce to distant markets is a well-established practice worldwide.<sup>11</sup> It is even finding a role in China. As a March 2008 report by the U.S. Foreign Agricultural Service in China found: "Purchasing managers at major hotels in some Emerging City Markets (ECMs) resort to transporting imported products primarily by air."<sup>12</sup>

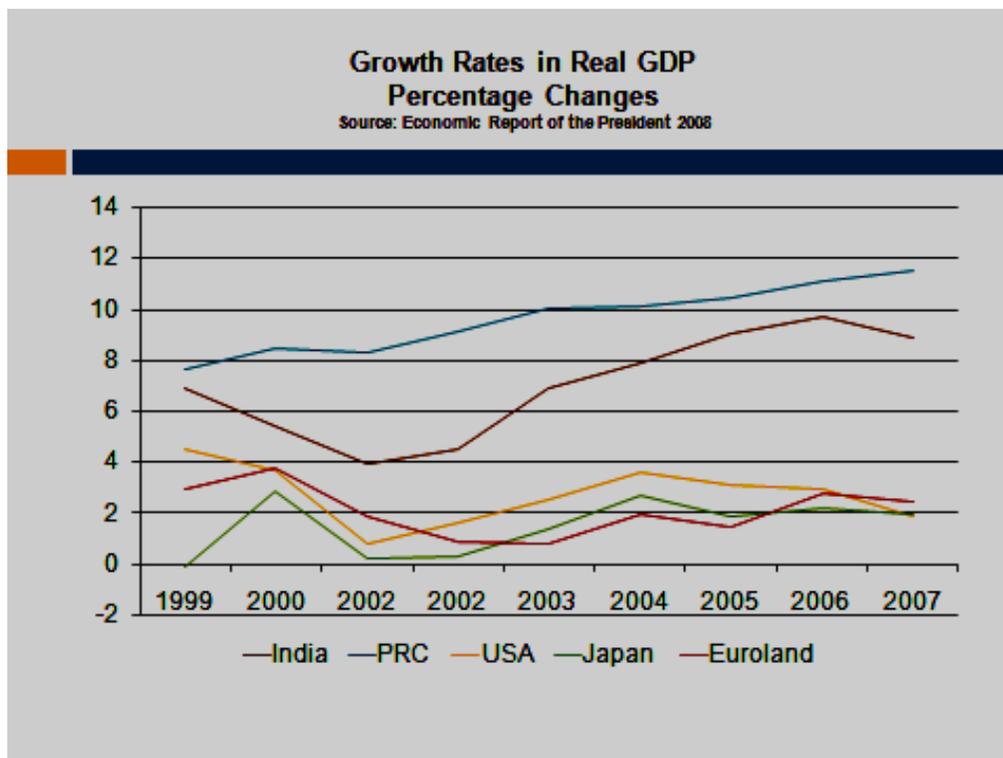
The use of air freight to transport perishable produce to overseas markets is not something unfamiliar to California growers. "Vegetables, fruit and nuts" comprise the leading export

category, in tonnage terms, shipped from Los Angeles International Airport, accounting for some 15 percent of the total weight of outbound international freight.<sup>13</sup> Moreover, as recent studies from the Center for Agricultural Business at California State University, Fresno have documented, the dollar value of California’s airborne agricultural export trade has exceeded a half-billion dollars in every year since 2003,<sup>14</sup> suggesting that shipping costs alone do not necessarily make air-freighting fresh produce to distant markets a non-starter. And when the target market is populated by the surging ranks of increasingly affluent and discerning Chinese consumers, it is worth a close look.

### Chinese Demand for Imported Food Products

Demand for imported fruits and vegetables is expected to increase appreciably in coming years in China, where the ranks of upper middle-class consumers are rapidly swelling, where there is acute concern over the safety of domestic food sources, where the presence of foreign and western-style food retailers is more and more pervasive, and where younger consumers are quickly shedding the dietary norms and food purchasing practices of their elders.<sup>15</sup>

While the Chinese market for imported food products will continue to expand rapidly, the market will likely remain confined to a relatively narrow social strata composed of affluent Chinese, resident expatriates, and foreign visitors (along with the hotels and restaurants catering to them). Still, commanding a small market share in a country with 1.3 billion people can strain any prospective supplier.



It is perhaps excusable for Americans of a certain age to harbor some decidedly obsolete impressions of China. Reports of exceedingly high rates of economic growth in China over the past two decades scarcely convey the extent of the transformation the country has undergone. Indeed, it has become something of a cliché for returning visitors to remark that what they saw was definitely not their grandfather's China.

The truth is that, in many places, it is not even your older brother's China.



For example, anyone assuming that there is no appreciable market in China for expensive specialty crop imports should consider the remarkable Chinese market for luxury merchandise. Gucci, for example, currently operates stores not only in Beijing and Shanghai but also in Chengdu, Hangzhou, Qingdao, Xi'an, Shenyang and Tianjin. Coach has 15 stores throughout China. Tiffany & Company, which has had stores in Beijing and Shanghai, opened a new store in Tianjin in

December 2007 and another in Shenyang the following month. Not to be outdone, Cartier reportedly plans to open thirty new stores throughout China over the next few years. In March 2008, Louis Vuitton, which has three stores in Beijing, opened its 21<sup>st</sup> store in China in Suzhou. Last year, the French luxury goods retailer established outlets in Nanjing and Tianjin. In an interview with Business Week last August, Louis Vuitton's Chairman and Chief Executive Yves Carcelle revealed that: "Today, the mainland Chinese are Louis Vuitton's third-largest customer segment in the world."<sup>16</sup>

A September 2005 report by Ernst & Young, entitled *China: The New Lap of Luxury*, notes that Chinese consumers were then buying 12 percent of all luxury goods being sold worldwide, trailing only Japan, the United States, and the European Union. In a similar report, Goldman Sachs predicted that by 2015, China would be the world's foremost consumer of luxury goods. Statistics cited in the Goldman Sachs study showed that, in 2003, approximately 45 million Chinese consumers had a purchasing power at



least the equivalent of \$30,000. The Goldman Sachs report also pointed out that most purchasers of luxury goods tend to be in the 20-30 age group, a cohort which is 11 times larger in China than in Japan. There are reportedly 300,000 Chinese whose net worth exceeds \$1 million.<sup>17</sup> Echoing this theme of exponentially rising prosperity, McKinsey & Company forecasts that the number of indisputably affluent Chinese households will increase to 8.5 million by 2015 and to 24.7 million by 2025.<sup>18</sup> (For comparison's sake, there are some 12.5 million households of all income levels in California today.) Nearly 6 million Chinese households already enjoy “Western” levels of disposable income with annual disposable income exceeding \$10,000, according to the U.S. Foreign Agricultural Service.

Among Chinese nationals, demand for imported fruits and vegetables is being driven primarily by increasing levels of prosperity, particularly among urban entrepreneurial classes, as well as by well-justified concerns about food safety among the general population. Among other factors underlying this market growth is China's one-child policy, which has produced a generation of doting parents and grandparents who are often willing to pay premium prices for food considered to be especially healthy and nutritious. The market also features the presence of numerous Chuppies, a colloquial term used to describe young, urban professionals with a demonstrated capacity for lavish spending on luxury goods.



**Domestic Organic Produce Display - Beijing Carrefour**

Quite apart from the indigenous population, substantial growth is also anticipated in the size of expatriate communities in China and in the number of high-end hotels and restaurants serving business travelers and tourists.

Demand for imported food products is forecast to be less dominated by China's very largest metro areas. Particularly as a steadily expanding class of affluent, sophisticated consumers takes root in scores of cities throughout the nation, the geography of the Chinese market for imported food products is being reshaped. No longer will demand be concentrated predominantly in a handful of major metropolises such as Shanghai, Beijing, and Guangzhou. The U.S. Foreign Agricultural Service has been focusing particular attention of late on the opportunities for American food exporters in some fifteen second-tier or "Emerging City Markets" stretching from Harbin in the north to Kunming in the south. As a group, they are home to nearly 70 million people – even more if surrounding regions are included. More importantly, these cities reportedly already account for more than half of China's imports of U.S. food products. Even further afield, there are over 80 other municipalities scattered throughout the nation with current populations exceeding one million.<sup>19</sup> Reflecting the changing patterns of prosperity, major multinational retailers like Wal-Mart and Carrefour have been opening most of their new hypermarkets in these less familiar locales.

China is administratively divided into 23 provinces, five autonomous regions, four centrally administrative municipalities (Beijing, Shanghai, Chongqing and Tianjin), and two special administrative regions (Hong Kong and Macao).

Shanghai is China's largest city, its leading commercial and financial center, and the home of its largest seaport. With an official population of 18.6 million and a 2007 GDP of \$167 billion, per capita GDP reached \$8,594, significantly higher than the rest of China and some twenty percent higher than the previous year. Shanghai is an exceptionally cosmopolitan city with a rich history of association with the West. The city boasts more than 1,600 western and other foreign style restaurants as well as over 70 hotels rated four stars or higher. The city has embarked on a major construction drive, adding more new hotels and doubling the length of its subway system, in anticipation of the 2010 Shanghai World Expo. Shanghai also features a resident expatriate community number some 500,000.

Beijing, the Chinese capital, is also a major business center as well as a popular tourist destination. The city's total population reached an estimated 15.8 million in 2006. Beijing is also one of the wealthiest cities in China with a per capita disposable income of nearly \$2,600 in 2006. Over the past five years, Beijing's GDP grew 12.1 percent on average, reaching over \$100 billion in 2006. Beijing's per capita GDP in 2006 was \$6,210, placing it just behind Shanghai, which enjoys the highest purchasing power in China.<sup>20</sup> Beijing has the highest growth rate of new hotel buildings in Asia. Some 17 star-rated hotels were newly opened between 2006 and 2007, with additional 12 new properties planning to open in 2008. The latest estimates indicate that Beijing will have approximately 800 star-rated hotels open by the start of the Olympic Games in August 2008.

Guangzhou, in southern China's Guangdong Province, occupied the center of China's largest market for fresh fruit. Formerly known as Canton, its current population is estimated at 8.5 million. Located on the Pearl River approximately 75 miles northwest of Hong Kong, it is a major trading crossroads in its own right. It is also the home of the Jiangnan Wholesale Produce Market, reportedly the largest such market in China. Guangzhou has 32 hotels recognized as four stars or higher. The city is currently gearing up to host the 2010 Asian Games. Guangzhou's hotel sector serves an estimated 30 million domestic and international visitors each year, especially during the twice-a-year China Import & Export Commodity Fair (more commonly known as the Canton Trade Fair) in April and October of each year. Together with neighboring Shenzhen, Guangzhou is China's main point-of-entry entry for agricultural and food imports into China, including poultry, fruit and nuts, cereals, cotton, soybeans and dairy products.

Beyond these high-profile, first-tier markets, there are the U.S. Foreign Agricultural Service's Emerging City Markets which range from Harbin (population: 9.7 million) in the northeast to Kunming (5.7 million) in the south. In between lie Shenyang (7.0 million), Dalian (6.0 million), Tianjin (9.3 million), Qingdao (7.3 million), Nanjing (6.5 million), Hangzhou (6.45 million), Ningbo (5.5 million), Xiamen (2.3 million), Shenzhen (5.7 million), Xi'an (7.3 million), Chengdu (5.3 million), and Wuhan (8.8 million), and the sprawling municipality of Chongqing whose population is estimated to range between 4.1 million and 31.5 million, depending on how its boundaries are defined.<sup>21</sup>

Collectively, these cities are home to more than 100 million residents. They are also some of China's fastest-growing urban areas and are among the largest beneficiaries of the tens of billions of dollars in foreign direct investment (FDI) that has been flowing into China in recent years. (China was the world's fourth-largest recipient of foreign direct investment in 2006 after the U.S., United Kingdom, and France according to the United Nations. Spending by overseas companies climbed 4.5 percent from a year earlier to \$63 billion. That figure increased to \$80 billion in 2007, according to the Chinese Ministry of Commerce.)

Ford Motor Company, together with its Chinese partner Changan Automotive Group, is investing over \$1 billion to expand operations in China, specifically in Chongqing and Nanjing. At its



Chongqing assembly plant, the joint venture now produces some 360,000 vehicles annually. Intel has over 6,000 employees engaged in assembly, testing, research and development, and sales and marketing in 16 cities throughout China including Shenzhen, Chengdu, Chongqing, Shenyang, Nanjing, Xi'an, Harbin, Kunming, and Wuhan. In Chengdu, Intel has constructed a state of the art model facility to assemble and test the company's most advanced microprocessors.

Anheuser-Busch, whose Budweiser brand is reportedly very popular among China's urban beer consumers, has built a large brewery in Wuhan. Dalian's industrial landscape features the presence of over 230 international IT companies, including Hewlett-Packard, IBM, and Dell. The European aircraft maker, Airbus, plans to manufacture 300 A320 aircraft on its assembly line located in Tianjin by 2016. Xiamen has attracted many international manufacturing companies, including Dell, Kodak, and Siemens. In order to better meet the needs of the world's fastest-growing air transport market, Boeing and Airbus have both been investing in the development of an aviation industry cluster in and around Xi'an. Such direct investments bring not only new capital and technical as well as managerial expertise to these cities but also small armies of resident foreign businesspeople (along with their demand for imported food products).

Although the Chinese market for imported fruits and vegetables may be generally confined to the more well-to-do class of consumers, there is a broader market for imported produce. China has a highly ritualized gift-giving custom steeped in traditional values. Chinese consumers are said to be increasingly seeking out high-quality and safe imports to satisfy their gift-giving needs. Fresh fruit is a common gift item in China, with a decided preference shown for high-quality fruit. Price is largely ignored, with consumers willing to pay high prices for large, smooth, unblemished fresh fruit. Imported fruit including apples, oranges, and grapes from the United States have earned a reputation in the Chinese market for superior quality and are probably more often used as gifts rather than for daily consumption.<sup>22</sup>

Competition to satisfy China's hunger for fresh produce will be intense, both from foreign and domestic sources. China itself produces fruits and vegetables in great abundance and with a variety that mirrors the range of specialty crops grown in California. China's growing season also overlaps California's, a disadvantage not shared by Australia, New Zealand, South Africa, Chile and several other nations currently supplying fresh produce to China.

The quality of Chinese produce is commonly adjudged to be inferior to the quality of imported produce, and food safety is definitely an issue on the minds of Chinese consumers. But so is price, when the purchase is being made for household consumption rather than gift-giving. Imported fruits and vegetables routinely cost at least twice as much as domestically-grown produce. And that means that for all but a relatively small segment of the Chinese public, there is no real choice in the marketplace. Indeed, for the great majority of Chinese consumers, purchases of imported fruits are likely to be limited solely to those special occasions which call for gift-giving. (Unfortunately for California growers, the single biggest special occasion, the Lunar New Year, falls in mid-winter, a relatively dormant period for California agriculture.)

Although it may be some years before the Chinese public's food safety concerns are satisfactorily allayed, the taste and the appearance of Chinese-grown produce have been gradually improving. As one observer remarked, "Sunkist oranges grown five years from now will not taste all that much better than the Sunkist oranges we eat today, but Chinese oranges almost certainly will." To remain competitive, produce importers warned that California growers would have to stay ahead of improvements in Chinese produce by continuously bringing new products and new varieties to market.

China imports an abundant quantity of frozen vegetables from the U.S., but there is surprisingly much less overall demand for imported fresh vegetables. There is a certain irony in this. Consumer surveys consistently show Chinese consumers to be profoundly more concerned with the safety of Chinese-grown vegetables than with domestic fruit. Yet produce suppliers interviewed for this report explained that a combination of lower prices and the perception that vegetables home-grown are necessarily fresher than vegetables that have traveled great distances generally trump safety concerns. “We know to wash everything thoroughly,” was one comment.

One area in which imported fresh vegetables could find an especially promising market is in pre-packaged organic produce. Official certification for domestically-produced organic foods is not deemed altogether reliable. However, because the methods commonly used to retard the deterioration of perishable produce in ocean containers often vitiate organic certification, fresh organic produce is commonly air-freighted to distant markets.<sup>23</sup>



Imported Organic Vegetables – Beijing Grocery Store

China’s fast-expanding hotel, restaurant and institutional sector (HRI) also merits close attention.<sup>24</sup> Although growth continues to be driven to a very large extent by the demands of

foreign business travelers, resident expatriates, and a surging international tourist trade, the HRI sector has lately been undergoing a significant shift in clientele. "Today, China's wealthy, and urban consumers are the primary demographic targets of star-rated hotels, upscale restaurants, and other foodservice operators."<sup>25</sup> In addition, the World Tourism Organization estimates that China will be the world's most popular travel destination by 2010 when 130 million international visitors are expected.<sup>26</sup>

## **Logistical Barriers to Market Access**

The parlous condition of China's food transportation and distribution systems represents a daunting impediment to satisfying this increasing demand for perishable food products. The cold-chains needed to maintain perishable products in a condition that reflects well upon agriculture in the producing nation are simply inadequate in most developing countries, and China is no exception. Such serious deficiencies in China's cold-chain systems sharply increase the risk of intolerable rates of spoilage for fresh produce shipped to many second-tier and third-tier cities. Until dramatic improvements are made in the scope of China's cold-chains and in the enforcement of regulations aimed at improving food safety, air freight may offer the only feasible means of transporting perishable food products to geographically dispersed markets.

Estimates of building out an adequate cold-chain with national reach have been as high as \$100 billion. Moreover, until national and provincial governments establish and implement clear standards for the handling of perishable food products to ensure consumer safety, logistical service providers may have little incentive to invest in new cold storage facilities or in refrigerated trucks. In many instances, upgrades in cold-chains within China have been the result of more stringent food quality standards imposed by foreign restaurant chains such as McDonalds and food retailers such as Carrefour and Wal-Mart. Foreign capital and management expertise have also been playing a more and more prominent role in China's transportation and distribution systems, especially in the realm of airport and air cargo operations.

That said, high value-added imported perishables are apt to fare somewhat better in their handling than other produce. U.S. officials in China also report that customs clearance at major airports may be less time-consuming than at sea ports. Most studies critical of China's cold-chain focus on the problems of transporting fresh produce from China's farms to its urban populations. By contrast, imported food products typically begin their journeys within China at one of the country's major cities, where the demand remains strong and where the distances to be covered from airports to cold-storage facilities to retailers or HRI customers tend to be fairly short.

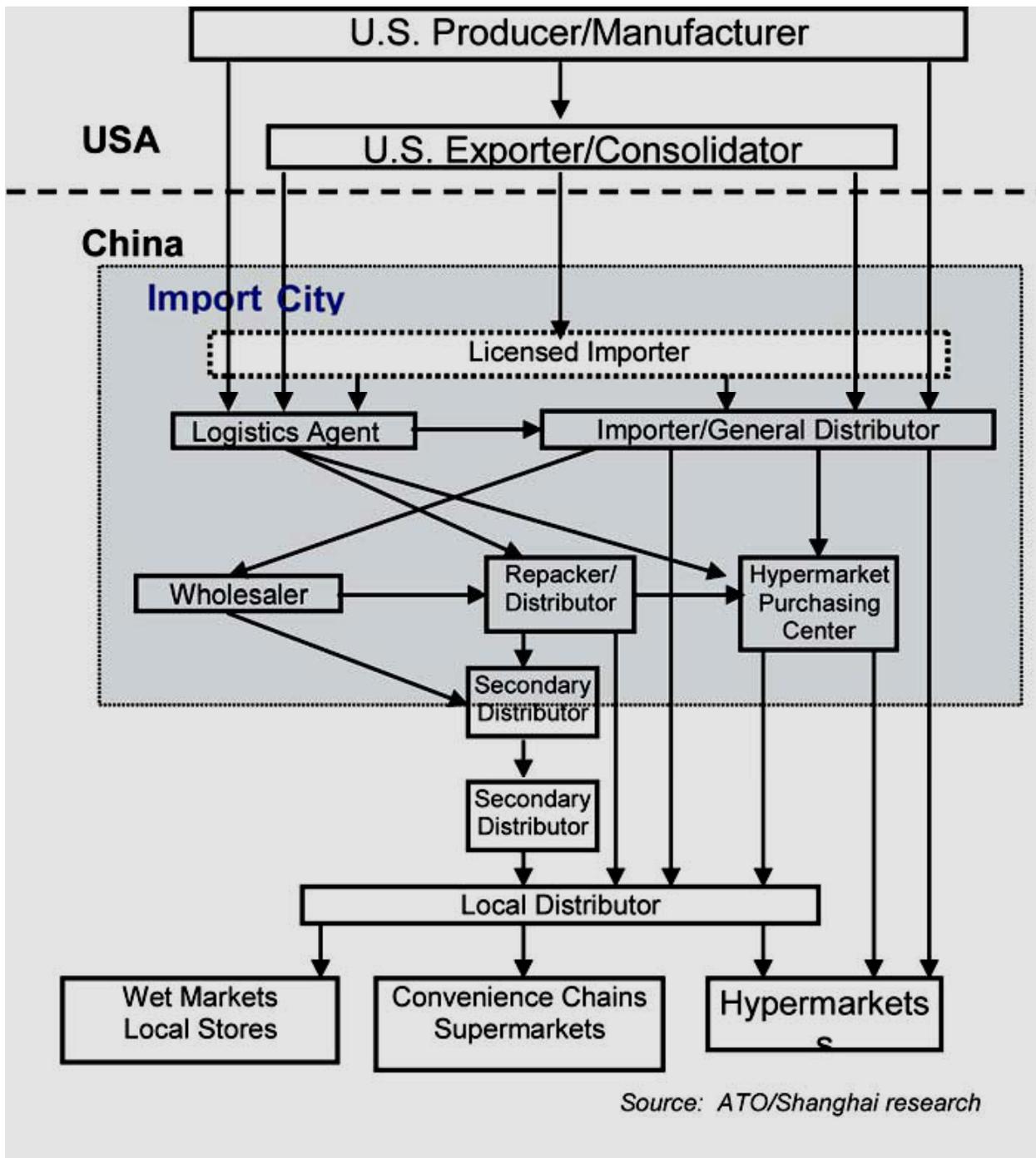
Quality control at the retail level greatly influences the handling of fresh produce. A recent survey of retail food stores in China suggests that nearly 80 percent do not monitor the temperature of products during shipping and that two-thirds do not check temperatures upon

receiving. However, some distinction should be drawn between the methods typically used in handling domestic produce and those employed in handling imported perishables. Precisely because the price of imported merchandise is comparatively quite high, the most likely points-of-sale will be upscale markets catering to wealthy Chinese and expatriate communities. A small chain like City Shop, for example, is not apt to take delivery of substandard produce that it cannot sell to discerning customers. Even larger retailers serving upper middle-class consumers are likewise becoming more mindful of the need for stricter quality control. The U.S. Agricultural Trade Office in Shanghai actually takes a rather sanguine view of the logistical situation: "Fresh fruit appears to have the best distribution, working through a patchwork of wholesale markets and specialized distributors that works better than it should."<sup>27</sup>

Decisions involving the trade-off between quality and price should be of at least equal concern to the California exporter who presumably would not wish to tarnish its reputation or, indeed, the reputation of California agriculture by permitting Grown in California labeled produce to reach consumers is inferior in quality or unhealthy to be sold to consumers.

There are opportunities for serving the China market for fresh fruits and vegetables, but the opportunities decrease the greater the distance from a major international airport served by flights from California. Perhaps the most tangible manifestation of the huge imbalance in merchandise trade between the U.S. and China (\$236 billion in 2007) is the differential between inbound and outbound shipments through our major international airports and seaports. The cargo holds of aircraft flying from the Far East to North America are normally crammed full of merchandise, while the holds of aircraft flying the opposite direction seldom are. The absence of comparable amounts of "backhaul" cargo make for a buyer's market with airlines charge shipping rates that have often been a fraction of the rates paid by shippers in Asia.

Even though international air freight charges tend to be much lower than is commonly assumed, the cost of air freight within China will certainly add considerably to the total transportation charge. While the resulting market prices may deter many consumers, not all will be driven off. Moreover, there may be no practical alternatives to quenching demand for several years.



**Imported Goods Distribution Chain: Emerging City via Major Airport**



**Fresh Imported Grapes Aisle – Jiangnan Wholesale Produce Market, Guangzhou**



**Delivery Vehicle - Jiangnan Wholesale Produce Market, Guangzhou**

## **Air Freight and Agricultural Trade**

Aircraft have long played a valuable role in transporting perishable food items to and from places that, while perhaps not literally inaccessible, cannot easily be reached without jeopardizing product quality. In many instances, having the option of shipping by air has proved to be the decisive factor in permitting certain crops to prosper in relatively remote regions. Absent international flights to lucrative markets in North America and Europe, for example, it is not conceivable that Peru would have become the world's leading exporter of fresh asparagus. In another example, dreadfully poor and landlocked Ethiopia reportedly earned \$125 million from exports of fresh cut flowers in 2007, with virtually all of that trade air-freighted to the European Union. Indeed, so promising has been this avenue of trade that Ethiopian Airlines in November 2007 leased two additional Boeing 747-200 air-freighters to cope with growing European demand for Ethiopia flowers. Even in war-ravaged Afghanistan, weekly airborne shipments of fresh fruit have been initiated from Jalalabad to Dubai, opening a new trade route between Eastern Afghanistan and the United Arab Emirates. Closer to home, Colombia and Ecuador annually flood the U.S. market with roses and other fresh-cut flowers at Valentine's Day, Easter and other special occasions. Even within the U.S., bluefin tuna caught off the coast of Maine are packed in ice and flown from New York's JFK International Airport to Tokyo's Narita International Airport for next-day delivery to Tsukiji, the largest wholesale seafood market in the world.

The desire to share in the worldwide trade in perishables has prompted intense competition among U.S. airports. In 2006, 72 percent of the cargo at Miami International Airport consisted of agricultural produce, fish and flowers, of which 71 percent in volume came from Latin America. It is business that airports in Atlanta, Houston and Los Angeles are vying to share. Houston's George H. W. Bush International Airport is currently constructing an on-airport perishables facility in conjunction with developer Trammel Crow. The new facility, which will be able to store perishables at a variety of temperature ranges, will be located adjacent to the airport's newly-constructed 34,000 sq. ft. fumigation and perishables processing facility. Atlanta's Hartsfield-Jackson International Airport features a 42,000 sq. ft. Perishables Complex with four massive cooling facilities, featuring a full range of temperatures from -5 degrees F to + 55 degrees F. If nothing else, the impressive amounts of capital being invested in on-airport facilities for handling perishable agricultural products gives ample testimony that airborne shipments of fresh produce is not considered a trivial sideline either by the world's airports or by its international air carriers.

## **California's Airborne Agricultural Export Trade**

California's agricultural exporters have access to an increasing range of air-freight connections to China. Utilizing Boeing 747 aircraft and other widebody aircraft with capacious cargo holds, several passenger airlines offer non-stop service from San Francisco and Los Angeles to Shanghai, Beijing, Guangzhou, and Hong Kong. Somewhat less direct connections linking California to these gateways, along with several of China's second-tier urban areas, are also

available via Seoul's Incheon International Airport and Tokyo's Narita International. Scheduled air-freighter service offered by several cargo carriers provides additional channels for transporting perishable farm produce to Chinese markets, although shipping rates on all-cargo aircraft are generally a good deal higher than for goods transported in the bellies or cargo-holds of passenger aircraft. (See the photograph on page 21 illustrating the lower-deck cargo space of a modern widebody passenger aircraft.)

China is currently embarked on a program to spend the equivalent of \$19 billion to construct 97 new airports by 2020, while upgrading and expanding the capacities at scores of other airports. At Shanghai, Guangzhou and Hong Kong (the former British colony and, since 1997, a Special Administrative Region under Chinese control), new international airports have been built within the past decade, while Beijing Capital Airport has been hugely expanded and overhauled.

At present, there is ample air-freight capacity available for transporting California agricultural goods to Mainland China's primary aviation gateways (Shanghai's Pudong International, Beijing's Capital International, and Guangzhou's Baiyun International) as well as to Hong Kong. Both U.S. and foreign carriers offer frequent non-stop passenger as well as air-freighter service linking LAX and SFO to Shanghai, Beijing, and Guangzhou. A substantial number of additional flights also enable California exporters to reach Mainland Chinese markets via Hong Kong.

Shipping food products by air to distant markets is nothing new for California agriculture. Although the vast majority of California's agricultural exports are shipped by sea or journey overland by truck and rail to markets in Canada and Mexico, the state's airborne agricultural export trade is not inconsiderable. A report issued last August from the Center for Agricultural Business at Fresno State University reveals that, in 2003, the value of that trade edged above the half-billion dollar mark and has remained consistently above that level ever since.<sup>7</sup> In 2007, some \$685 million in California farm exports were flown to the destinations around the globe in 2007. By way of comparison, California exports more agricultural products by air than 23 other states do by all modes of transport.

The principal destinations of California's airborne agricultural export trade are in the Far East, primarily Japan, China, South Korea, Taiwan and Hong Kong. A much more moderate airborne export trade is conducted with Europe and Latin America. Not surprisingly, given the efficiency of modern trucking and rail operations, there is very little airborne trade with Canada and Mexico.

Even though these shipments represent a modest share of California's overall agricultural export trade, the ability to ship products by air is vital to growers of such highly perishable crops as fresh cherries, asparagus, strawberries, salad ingredients, and a wide range of organic fruits and vegetables. Air freight is also a valuable mode of transport for a vast array of processed food products, food preparations, and seeds for sowing horticultural plants and trees.

Air freight is typically reserved for high-value goods with brief storage lives or for shipments requiring expedited delivery. For most of the types of agricultural products exported by California, there is no compelling reason to utilize air freight so long as normal supply-chains function efficiently and emergency shipments are not required to meet a valued customer's sudden needs. The bulk of the state's farm export trade is comprised of hardy travelers such as almonds, walnuts, cotton, rice and dried fruits, as well as such fruits and vegetables as oranges, apples, table grapes, carrots, and onions. All of these are quite amenable to confinement in steel shipping containers for periods ranging from several days to a few weeks. However, for exporters of highly perishable items like cherries, strawberries, asparagus, and a range of organically-produced fruits and vegetables, the ability to ship products to distant markets by air is immensely important, if not indispensable. In 2007, for example, fully 67.7 percent of California's fresh cherry exports travelled by air, as did 33.2 percent of the state's export trade in fresh or chilled asparagus.

Given production trends and market developments around the world, agricultural economists expect that that the mix of farm, dairy and ranch products produced in California will continue to migrate toward more and more high value-added products and toward even more specialized specialty crops. High productions costs as well competing demands on farm land and scarce water supplies will oblige California growers to produce only those crops which command the highest prices at home and in the global marketplace. If nothing else, this trend line points to the increased probability that California agriculture will make even more frequent use of air freight to transport the state's agricultural products to overseas markets in coming years. In addition, efforts to liberalize both trade in agricultural products and international air transport agreements which currently restrict flights between nations should open new markets while further expanding existing markets for California farm exporters.

## The Air Cargo Picture in China

China is currently seeking to expand the number of its commercial airports to 186 by 2010.



Beijing has set aside more than \$17.5 billion for modernization and construction of airports over the next four years as part of its effort to increase the number of commercial airports serving the nation to 186 by 2010. The plan calls for 44 new airports and the expansion of 52 mid-sized airports such

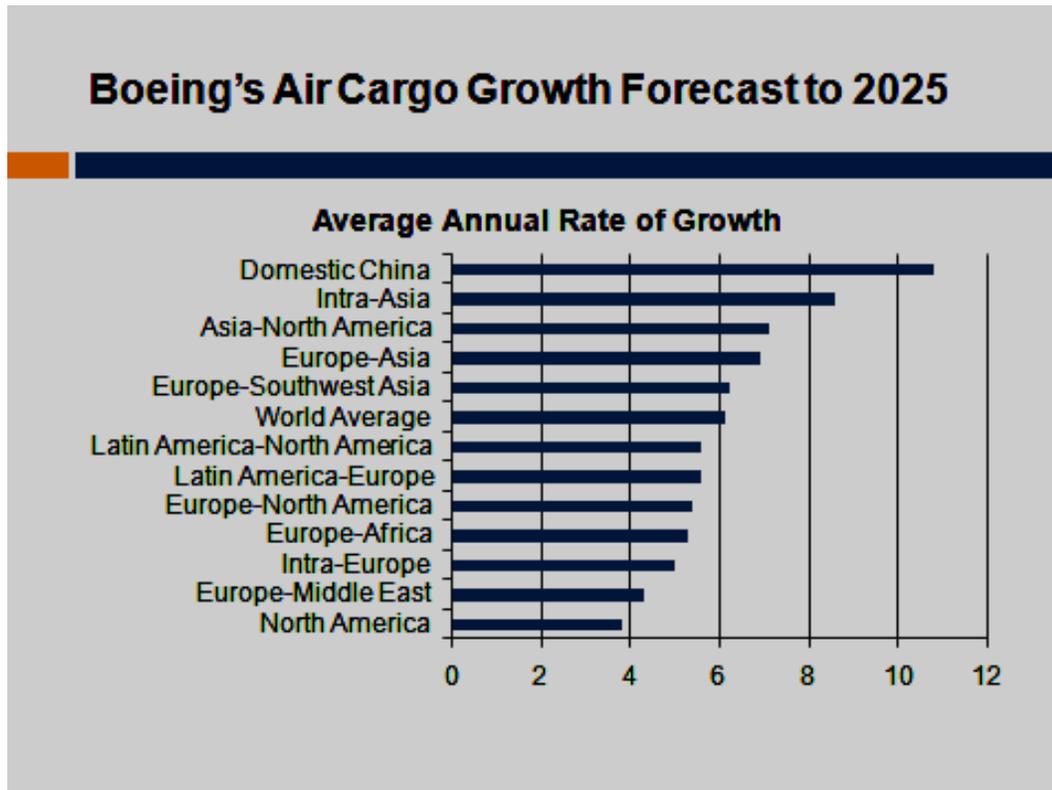
as those at Qingdao, Ningbo, Dalian, and Xiamen. The drive is attracting foreign capital and administrative expertise, which should prove beneficial if government financing slackens. While the plan focuses on improving air links for China's second-tier and third-tier cities, the country's principal gateways are also undergoing expansion of cargo services.<sup>28</sup>

One key development is the construction of hubs within China by the leading express delivery companies, FedEx, UPS and DHL. FedEx Express is developing a \$150 million hub at Guangzhou's Baiyun International Airport, which would make it the company's largest hub outside the United States. UPS is building a new hub at Shanghai's Pudong International Airport. Scheduled to open later this year, it will link all of China via Shanghai to UPS's international network with direct service to and from the Americas, Europe and Asia. It also will connect points served in China by UPS through a dedicated service provided by Yangtze River Express, a Chinese all-cargo airline. UPS currently operates 76 takeoffs and landings per week in Shanghai, with an additional 24 dedicated movements operated by Yangtze River Express. These numbers will increase as UPS's hub becomes operational and the capacity at Pudong International Airport continues to grow.

DHL meanwhile is Guangzhou's Baiyun International Airport, which is pursuing a \$2.16 billion expansion project only a few years after its opening in 2003, has signaled it is considering bringing in foreign partners to help bankroll its expansion plans. Notably, Northwest Airlines Cargo shifted its freighters from Hong Kong to Guangzhou. Having scrapped its six weekly 747-200 freighter flights into Hong Kong in December, the carrier is using its latest batch of China traffic rights to step up its Baiyun flights from four to seven frequencies a week beginning in April. Last year the U.S. carrier doubled its freighter frequency to Baiyun from two to four weekly flights. FedEx is building an 880,000-square-foot facility sitting on 156 acres with a capacity to handle up to 24,000 packages in an hour. DHL, which expanded its express facilities at several Chinese airports last year, has pledged to set up an operations center at Baiyun.

Beijing Capital Airport launched a \$248 million expansion project at the end of 2005 to boost passenger capacity in preparation for the Olympics in 2008. On the cargo side, facility developer ProLogis started work last year on a \$36 million logistics park less than two miles from the airport. The company secured land use rights to 26.7 acres there to develop four facilities with a total footprint slightly more than a million square feet. Shanghai, Mainland China's top gateway, continues to expand its cargo business and is now ranked as the world's sixth largest air cargo airport in terms of tonnage handled. (By contrast, New York's JFK is ranked 14<sup>th</sup> Chengdu was 17th among the world's fastest growing airports in 2006 and yet it only placed fourth among China's airports. The expansion in China not only picked up steam, but the growth extended beyond Shanghai and Beijing as airports such as Shenzhen and Chengdu showed a higher profile in world trade lanes. Beijing Capital Airport, with its 31.6 percent expansion to move beyond a million metric tons of cargo, showed remarkable growth, but Shanghai's young Pudong International Airport also grew 16.3 percent to move from eighth to sixth place among world airports. Pudong's cargo business has grown more than three-fold since 2003 and tonnage at Beijing has nearly doubled in that time. The latest growth means five

of the six largest cargo airports in the world - and seven of the top 10 - are either in Asia or, like Anchorage and Los Angeles, heavily depend on Asia trade.<sup>29</sup>



Lufthansa Cargo has partnered with Hua Yu Air Cargo Terminal Co. at Tianjin Binhai airport to establish a new 90,000 square meter air cargo center that is expected to become operational later this year and will be able to handle 360,000 metric tons of cargo annually. According to a report in *Air Transport World*, Tianjin's growing importance as a Chinese cargo hub will be enhanced this summer during the Olympic Games when most cargo flights are expected to divert from Beijing to TSN. Lufthansa Cargo already is party to cargo joint ventures at Shanghai Pudong and Shenzhen. It also owns 25 percent of Jade Cargo International, which operates six 747-400Fs from Shenzhen.<sup>16</sup>

Express delivery companies such as FedEx and UPS are rapidly gaining experience in operating seamless, door-to-door delivery systems in China that closely resemble the services provided their U.S. customers. However, FedEx officials interviewed for this report pointed out that the company does not operate refrigerated delivery vans in China and that any perishable merchandise consigned to them would make the last leg of its journey without benefit of refrigeration. Assuming inbound shipments of perishable produce could be moved swiftly through Chinese customs and agricultural inspectors at gateway airports, the special packaging to maintain product quality while outside of a temperature-controlled environment would further add to the cost of transportation.

Currently, most air cargo shipments within China are being carried aboard passenger aircraft. A major reason for this is the more extensive use Chinese as well as other Asian airlines make of widebody aircraft, which feature ample lower-deck cargo capacity. In 2006, 38.9 percent of commercial aircraft based in the Asia-Pacific region were widebody. By contrast, widebodies accounted for just 20.2 percent of commercial aircraft in Europe and only 16.5 percent in North America. Nearly half of the world's 747s (450 out of 910) in 2006 were being flown by Asia carriers. By 2026, according to Boeing's latest forecast, the number of twin-aisle planes in the Asia-Pacific region will more than triple, to 2,920 from 860 in 2006. By then, Boeing projects that five hundred more widebody planes will be in service in the Asia-Pacific region than in all of the Western Hemisphere.

The number, frequency and destinations of flights between the United States and China are governed by a bilateral agreement that is permitting a gradual expansion of passenger service but which will remove most restrictions on all-freight operations in 2011. Almost all of the additional passenger flights which will be allowed will not involve California airports. Suggesting how much the advent of long-haul aircraft has diminished the Golden State's role as a connecting point in transpacific aviation, Delta initiated non-stop service between Atlanta and Shanghai in March 2008.

## **California-China International Aviation Links**

Most Californians probably conceive of international trade as an activity pretty much confined to either the waterfront or to our land border with Mexico. After all, few news reports dealing with foreign trade are complete without at least one iconic photograph of a large container vessel or long traffic lines at San Ysidro. Most Californians are surprised to learn that, while the state's major seaports do the heavy-lifting of trade, more of California's merchandise export trade by dollar value leaves through the state's airports. In 2007, for example, more of California's \$127 billion dollar export trade flew to its destination than journeyed by sea and land *combined*. (See the chart on the next page.)

The great majority of California's airborne foreign trade passes through just two gateways, Los Angeles International Airport (LAX) and San Francisco International Airport (SFO). This is certainly the case with agricultural shipments. The two airports have long maintained an effective monopoly over the state's airborne export-import trade. In 2007, for example, LAX and SFO together handled no less than 97.5 percent of all airborne international trade entering or leaving the state.<sup>30</sup> Although this may create headaches for agricultural exporters whose trucks must negotiate some of the nation's most congested road systems to reach cargo terminals at the two airports, there is probably as little likelihood that highway traffic will ease as there is that international flights will soon be staged from airfields in, say, the Central Valley.

Market forces are largely responsible for the role played by LAX and SFO as California's premier international air cargo gateways. Both airports serve huge metropolitan areas which also

happen to be major destinations for tourists and conventioners. Unlike many smaller aviation markets such as Sacramento or Fresno, the sheer volume of passenger traffic at SFO and LAX means that both airports are served by widebody aircraft, especially on long-haul flights. Such aircraft (including most notably the Boeing 747 and Airbus 380 but also Boeing's 767 and 777 classes as well as the Airbus 330) feature ample lower-deck or belly capacity for carrying freight. At the same time, the demand for air-freight services in both the Los Angeles Basin and the San Francisco Bay Area is sufficiently large to warrant regular service by a several carriers operating all-cargo freighter aircraft.<sup>31</sup> Both airports also benefit from the presence of networks of freight-forwarders who specialize in facilitating air cargo shipments. So even though the overall importance of LAX and SFO as national entrepôts of international trade is steadily diminishing, both will almost certainly remain as the state's primary global gateways for airborne commerce.<sup>32</sup>



Several non-stop daily flights link California exporters with first-tier markets in Shanghai and Beijing as well as Hong Kong and Guangzhou. In addition, air-freighters operated by a number of foreign and U.S. airlines provide even more lift, although typically at higher shipping rates than are charged for cargo carried in the bellies of passenger aircraft. By June 2008, SFO will offer 2 non-stop flights daily to Shanghai and four non-stops a day to Hong Kong. It will also offer five flights a week nonstop service to Guangzhou (to be added in March). LAX features four daily non-stops to Hong Kong; one daily non-stop to Beijing; one daily non-stop to Shanghai; and four weekly non-stops to Guangzhou. By 2011, the Chinese and American governments have agreed to lift all restrictions on cargo flights between the two countries,

although restrictions on passenger service will remain in effect pending the outcome of a future round of aviation talk between Washington and Beijing.

There are also indirect connections to Chinese cities through major Asian airports like Seoul's Incheon International where Korean Airlines (KAL) is based. KAL projects a 40 percent increase in weekly China flights and aims to cover 32 Chinese cities by 2010. Chengdu, added in March, is KAL's eighth freighter destination in China. (It is worth noting that much of the foreign direct investment entering many of China's second-tier cities originates in Japan and Korea. In the case of Dalian, for example, some 40 percent of its international trade is conducted with these two Asian neighbors. Not surprisingly, several ECMs boast direct flight connections with Korea as well as Japan to facilitate both business travel and air cargo shipments.)



Illustration of "Belly" Cargo on Passenger Aircraft<sup>33</sup>

Likewise, Tokyo's Narita International, the home base of Japan Airlines and an important transshipment hub for a number of major international carriers, has non-stop air links with nine Chinese cities as well as with both LAX and SFO. Later this year, Japan's ANA (All Nippon Airlines) plans to offer cargo flights linking Tokyo's Haneda Airport to Xiamen and Qingdao to every weekday. To accomplish this, the airline will take delivery of two converted widebody 767-300ERs, one in June and the other in December.

Generally, the most expeditious (although not necessarily the least expensive) way of transporting cargo as well as passengers is aboard a non-stop flight. By June 2008, SFO expects to offer a total of 54 nonstop widebody passenger flights per week to three mainland Chinese destinations: Beijing, Shanghai, and Guangzhou as well as Hong Kong, the Special Administrative Region on the south China coast. In addition, a total of four non-stop air-

freighter flights per week will link SFO with Beijing and Shanghai. LAX currently features two non-stop flights daily to Shanghai's Pudong International as well as to Beijing and Guangzhou. There are four daily non-stops from LAX to Hong Kong. However, many transpacific flights originating in Los Angeles make intermediary stops at SFO.

Cargo does not always follow the most direct route to its destination. To cite one rather extreme example, the lack of sufficient space on non-stop flights from SFO to Tokyo's Narita International Airport has at times prompted freight-forwarders to ship a consignment of fresh cherries from Stockton packing houses aboard Hawaiian Airlines flights from Sacramento International Airport to Honolulu International, where the fruit was then loaded onto a Japan Airlines or Northwest Airlines passenger flight bound for Tokyo.<sup>34</sup>

A far more common indirect route across the Pacific involves Anchorage's Ted Stevens International Airport (ANC), where large freighter aircraft operating on transpacific routes often stop for refueling. In 1989, Anchorage received a major boost when Russian airspace was opened allowing flights between the Far East and North America to follow more direct "Great Circle" routes, thus cutting transit time and reducing fuel consumption. Soon thereafter, FedEx and UPS established major transpacific sorting hubs in Anchorage. Over the past several years, ANC has emerged as a major transloading center for carriers including Northwest, FedEx and UPS. It is currently the world's third largest air cargo airport by tonnage handled. By comparison, LAX ranks tenth, Oakland 31st and San Francisco 33rd.

In addition to airlines providing passenger and air-freighter service, there are the so-called integrated air carriers. The most familiar of these are FedEx, UPS and DHL, companies which provide door-to-door air cargo services. They are distinguished from air carriers which essentially offer only airport-to-airport transport, leaving to the shipper (or more likely a freight-forwarder or another third-party logistics provider) to arrange ground transportation to and from airports. The role of the integrated carriers has been growing more and more prominent in transporting air cargo internationally. They are expanding beyond expedited delivery services for small parcels and documents. They are also increasing their penetration of key overseas markets such as China.

FedEx has established its Asian Pacific hub at Guangzhou's Baiyun International Airport in Southern China. The transport hub, covering a total area of 82,000 square meters, will have a capacity of 179,000 express packages, or more than 1,800 tons per day by the year 2010. Guangzhou is the gateway to the Pearl River Delta, a manufacturing region that takes up 30 to 40 percent of China's foreign trade. The Pearl River Delta ranked second in the domestic air cargo handling market, next to the Yangzi River Delta.

The UPS International Air Hub at Pudong International Airport in Shanghai will be the first constructed by a U.S. carrier. Scheduled to open later this year, the new hub will be built on a 1 million square foot site and will operate around the clock, throughout the year. The carrier will increase cargo load capacity to Shanghai by switching its planes from the MD-11s in current

service to Boeing 747-400s. Service will ramp up over time with sorting capacity projected to reach 17,000 pieces per hour by 2012. The hub will link all of China to the UPS international network through Shanghai. Service will continue from there to the rest of Asia, Europe and the Americas. In the mix are points in China served by UPS through services provided by an all-cargo airline, Yangtze River Express. Yangtze operates 24 dedicated movements each week, while UPS has 76 weekly takeoffs and landings in Shanghai.

In January 2007, DHL Global Forwarding announced that it had become the first international forwarder to obtain a China Air Transport Association domestic airfreight license, allowing the company to provide service to 17 Chinese cities. DHL maintains a West Coast hub at March GlobalPort in Riverside County. Recent months have witnessed some progress in liberalizing air transport agreements between the United States and China. Historically, national governments have granted selected foreign carriers the right to operate a fixed number of flights per week to specified destinations within the host country. These arrangements were typically arrived at through bilateral negotiations and frequently reflected the desire of governments to protect the interests of each nation's principal airlines, some of which were government owned. Even when market forces warranted an expansion of air service between two countries, the details had to be negotiated by the respective governments. Open-skies accords, by permitting market forces and the airlines themselves to more directly determine the selection of international air routes, bring closer the prospect of direct or even non-stop air service linking Europe and Asia with California airports other than the traditional international gateways at LAX and SFO.<sup>18</sup>

To better manage increasing air cargo traffic, aviation and surface transportation planners in Southern California have sought – so far with very limited success – to encourage air carriers to shift more air cargo activity away from LAX to other regional airports, most notably Ontario International Airport. By contrast, there is no similar strategy in Northern California to alleviate the burden on SFO. Indeed, SFO officials have consistently discouraged efforts to formally coordinate operations of the San Francisco Bay Area's three major airports.

A substantial portion of the state's international air cargo capacity will eventually migrate from LAX and SFO to airports further inland and, hence, nearer to California's agricultural heartland. This migration will be spurred not merely by the need to ease the air cargo burden on LAX and SFO but also by the desire to provide better air transport services to the fast-growing population and industrial centers in California's Inland Empire and Central Valley. It will also be shaped by investment decisions made by the so-called integrated carriers (most notably, FedEx, UPS and DHL) that are poised to seize larger and larger shares of the international air cargo market.

Several inland airfields between Sacramento's Mather Field and Riverside's March GlobalPort have been aggressive in promoting themselves as future air cargo hubs. Clearly, not all will succeed, since airlines are typically reluctant to provide scheduled passenger service to the less densely-populated regions where some of these vying airports are located. Geographic remoteness would not necessarily be a disqualifying factor for a dedicated air cargo airport

were it not for the fact that an airport needs to attract both air carriers and the myriad logistical and other support services needed to sustain significant air cargo operations. Freight-forwarders, customs brokers, trucking companies, aircraft servicing firms, and other providers of essential support services are more apt to be persuaded to establish a presence at or very near airports featuring passenger as well as air-freighter flights. For that reason, this report submits that demographic considerations – the presence of a burgeoning population and expanding economic base – will be critical in determining which of California’s airports garner significant shares of the state’s international air cargo trade.

There is also some question as to whether air freight rates at secondary airports would be attractive to shippers. The proliferation of both passenger and air-freight flights at LAX and SFO ensures a high level of competition among carriers trying to attract revenue-earning cargo. Less frequent flights by fewer carriers traveling to fewer destinations does not immediately suggest a scenario that would lure shippers away from SFO and LAX.

In Southern California, the migration will most likely benefit Ontario International and March GlobalPort. These airports are situated in San Bernardino and Riverside counties, two of the fastest growing counties in California. The airports also happen to be regional hubs for UPS and DHL, respectively. (The FedEx hub in Southern California is at LAX.) Meanwhile, San Diego will have to resolve a long-standing controversy over if and where to build a major new airport before it attracts appreciable international air cargo, despite being California’s second largest city.

In Northern California, Oakland International should gain larger shares of the San Francisco Bay Area’s international air cargo traffic, but SFO is apt to remain Northern California’s dominant hub for international air cargo so long as passenger aircraft carry a substantial portion of air cargo. Over time, though, some industry analysts expect that certain foreign air carriers will shift their all-cargo operations from SFO to Oakland.<sup>35</sup>

Efforts have been periodically made to provide international air freight service from Central Valley airports, but none have succeeded. With its steadily growing population base, Sacramento International Airport (SMF) may eventually feature direct or perhaps even non-stop passenger flights to Europe, but the airport’s own forecasts do not anticipate similar service to the Far East. The introduction of new middle-sized widebody aircraft such as Boeing’s 787 and the Airbus 350 should only enhance the prospects that SMF will be offering overseas service by the end of the next decade. By contrast, while grower-exporters in the Central Valley may hope to see overseas air freight flights originating from nearby airfields, the economic and logistical barriers to such service are exceptionally daunting.<sup>36</sup>

Periodic efforts have been made to launch overseas cargo flights from Central Valley airports in order to better serve the needs of agricultural exporters. The most notable such effort involved Farmington Fresh whose packing house occupies land adjacent to taxiways at Stockton Metropolitan Airport. No carrier has thusfar succeeded in establishing a reliable overseas cargo

service for a variety of reasons. Of these, the most salient factor is the huge merchandise trade imbalance between the United States and the economies of the Far East. Because more goods are being shipped from Asia to North America than in the opposite direction, freight rates are much higher on eastbound transpacific flights. On westbound flights, air carriers offer rates that are almost concessional in comparison. As a result, air carriers depend on revenue yields from eastbound flights to compensate for losses they are frequently obliged to absorb on westbound flights. Air cargo industry executives state that air carriers seek to charge rates on eastbound flights that are sufficient to cover the cost of the return or “back-haul” leg as well. Under the circumstances, any party considering the inauguration of air cargo flights serving Central Valley agricultural exporters soon realizes that the profit lies in transporting goods from the Far East to the United States, not the other way around. And because goods being shipped from the Far East to North America are overwhelmingly destined for metropolitan areas well outside of the Central Valley, no existing air cargo carrier has seen virtue in providing international service at a Central Valley airport.

Although the introduction of international air service to airports nearer to the state’s agricultural packers and shippers may seem desirable, it is far from clear whether the initiation of overseas flights would be cheered by growers justifiably nervous about the risks of disease or pest infestation that return flights might bring. Even though the almost relentless urbanization of agricultural land – especially in the Central Valley and Inland Empire<sup>37</sup> – will almost certainly make regular international air service inevitable, growers have a legitimate reason to fear pest or disease invasion – either accidental or deliberate – into California’s farmlands. Appropriate prophylactic measures would have to be devised to protect state agricultural production.

Ultimately, the issue of whether California’s agricultural exporters as well as other businesses will continue to enjoy the quality and frequency of air cargo services needed to sustain a presence in the global economy will hinge on the fostering of a political climate hospitable to increased flight operations. That climate is currently conspicuous by its absence in virtually every corner of the state. As was seen in the defeat of proposals to establish new regional airports at the former El Toro Marine base in Orange County and at Marine Corps Air Station Miramar in San Diego County, even those who make extensive use of air transport for personal or commercial reasons resist having a major airport in their neighborhood. Community resistance to expanded air cargo operations is also affecting DHL’s plans for March Global Port, where a planned direct link with China has reportedly been postponed for at least a year and is apt to play a significant role in the future of Sacramento’s Mather Airport.<sup>38</sup>

Finally, it is vital to rectify the popular tendency to think of maritime trade and airborne trade in similar terms and to assume that the West Coast is necessarily the first landfall for all kinds of craft plying transpacific trade routes whether by sea or by air. The world maps most commonly which have most commonly adorned the walls of grade school classrooms and from which most of us understandably derive our basic geographical orientations. These conventional maps typically align the continents by latitude. (See the next illustration.) By such reckoning, it would only seem natural that an air-freight company in Tokyo (35.40 north latitude) shipping goods to

New York (40.65 north latitude) would find San Francisco International (38.70 north latitude) a far more direct transshipment point than, say, Anchorage International (61.17 north latitude).



**A Conventional View of the Pacific World**



**Northern Pacific Great Circle**

Unfortunately, most conventional world maps severely distort distances, and in few regions of the world is the misrepresentation greater than in the northern Pacific. A more accurate depiction of the positioning of land masses along the northern Pacific littoral (next page) reveals how the world actually looks to the modern aviation industry. It is obviously not a world

in which San Francisco International and Los Angeles International sit on a direct line from the Far East to most of the major cities of North America. If anything, California falls well outside the most direct and expeditious air routes between the Far East and most major North American metropolitan areas. Ever since Russian airspace was opened to commercial airliners in 1989, the most direct air routes linking North American cities with such key Asian economies as Japan, Korea and China have either traced a “Great Circle” route that converges over Anchorage, Alaska or cross-polar (so-called “over-the-top”) routes. Not only are distances reduced but winds play a less critical role on the most northerly routes. That, to a very large extent, explains why Anchorage, an otherwise remote city of some 280,000 residents, is home to the world’s third largest air cargo airport, in terms of tonnage handled.<sup>39</sup> By contrast, SFO and LAX together handle less cargo tonnage than does Ted Stevens Anchorage International Airport (ANC). Even in the case of Anchorage, the airport’s future role as a transshipment hub is limited by the introduction of new generations of extended range aircraft. For example, in March 2008, Delta Airlines initiated non-stop service between Atlanta and Shanghai using a Boeing 777-200ER flies a polar route. The fact that modern jet aircraft are capable of flying without refueling from the southeastern United States to the coast of China suggests that California’s international airports will increasingly be restricted to the business of meeting California’s air transport needs.

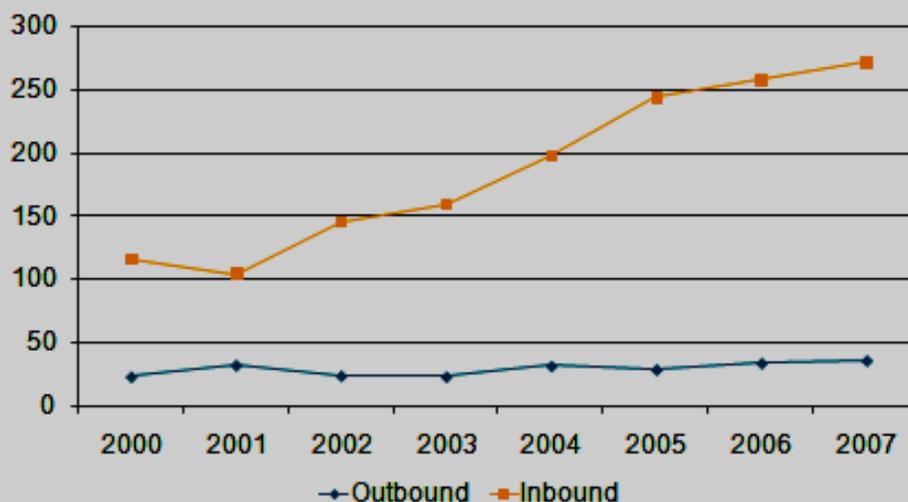
### **The Back-Haul Advantage**

As the next chart demonstrates, the airborne trade imbalance between California and China grew sharply in recent years, at least on a weight basis.<sup>40</sup> For every pound of goods shipped by air from California to China in 2007, for example, 7.5 pounds of cargo arrived by air from China in 2007. Although the appreciation of the *yuan* against the dollar coupled with the general slowdown in the U.S. economy has caused the imbalance to subside somewhat in the very latest months. (Through the first two months of 2008, for example, the ratio of airborne imports to airborne exports fell to 6.8.) But even that imbalance creates a severe logistical problem for air carriers eager to maximize their yields. Simply put: aircraft inbound from China arrive full or nearly full of cargo and almost invariably depart with significantly lighter loads on the “back-haul.” With inbound aircraft providing an over-abundance of cargo capacity or supply, the comparatively low level of demand for space on outbound flights means that air carriers have to offer very attractive rates to California shippers – indeed, rates frequently low enough to attract shipments that might otherwise have gone by sea.

## California-China Airborne Trade

In Millions of Pounds

Source: U. S. Census Bureau Foreign Trade Division, WISER



It is, of course, inevitably more expensive to ship by air than by sea. But if air freight is the only effective way of getting a product to market, it is certainly worth exploring. The widespread belief that air freight charges are prohibitively expensive has doubtless deterred many prospective exporters from even considering overseas markets where air shipments might be necessary. Regrettably, much of what passes as the conventional wisdom about air cargo rates is incomplete or exaggerated information derived from worst-case experiences.

Actually, few people outside of the air cargo industry have a realistic appreciation of the rates charged for transporting different types of goods to various overseas markets. The rates on over 90 percent of all air freight shipments are negotiated between the shipper or freight-forwarder and the air carrier. Because of intense competition within the air freight industry, the parties involved are normally reluctant to publicize pertinent information rates and conditions of carriage. There are organizations such as the Airlines Tariff Publishing Company (ATPCO) which collect and disseminate data on passenger fares and air cargo rates on a subscription basis to companies within the air freight industry. ATPCO, which is jointly owned by two dozen of the world's largest airlines, maintains a Cargo Rates System database containing worldwide air cargo rates which is available on a subscription basis to airlines and freight-forwarders. The data are updated several times a day.

International air cargo rates are negotiable, with only maximum rates set by the International Air Transport Association. The U.S. airline industry was deregulated in the late 1970s, and individual carriers are free to set cargo rates. However, the methods used in setting international air cargo rates are from transparent, and there are strong indications that several airlines as well as some large freight-forwarders have been engaged in collusion. Of late both the European Union and the U.S. Department of Justice have been investigating possible anticompetitive behavior in the international air freight forwarding industry. Some carriers, notably Cathay Pacific, have already made settlements with the authorities (whole denying any wrongdoing). It is unclear what these investigations will have on future rates, although any steps that would deter collusion in rate-setting should be beneficial to shippers. In November 2007, the Australian airline Qantas paid a \$61 million fine to settle with U.S. authorities investigating the carrier's role in a widespread price-fixing scheme related to fuel surcharges on international cargo flights, after similarly large fines were levied against British Airways and Korean Air. Practices adopted by Qantas Freight and the cargo industry allegedly involved colluding with other air carriers to fix and impose fuel surcharges in violation of anti-trust laws. These investigations continue.

Not unlike passenger fares, air freight rates are in constant flux due in part to raising costs of jet fuel and security charges imposed on shipments in addition to basic shipment charges. Air cargo rates vary considerably depending on the commodity being transported and by the type of carrier, with cargos travelling in the cargo holds or bellies of passenger aircraft normally being charged lower rates than goods moving aboard air-freighters. Perishables are charged at a higher rate than non-perishables. Shipping fees are also subject to a variety of surcharges and additional costs for such services as offloading merchandise, fuel surcharges and security surcharges to cover soaring jet fuel costs and the expense of complying with new security regulations and guidelines. One of the more common misconceptions about international air cargo rates involves the assumption that rates are uniformly assessed. In fact, West Coast exporters typically pay air cargo rates that are often one-fifth of the rates paid by shippers in the Far East.

California exporters have been beneficiaries of the massive U.S. merchandise trade deficit, especially with China. The U.S. trade deficit with China reached \$256.3 billion in 2007, as imports grew by 12 percent. China's share of total U.S. imports has grown from 7 percent to 16 percent since 1997. Because of the very substantial disparities in the volume of air freight moving across the Pacific, California exporters pay shipping rates that are a fraction of those paid by Asian exporters seeking to ship cargo to North America. Unlike most airline passengers, air freight nearly always travels on a one-way ticket. In the case of transpacific trade, there has been an abundance of goods moving westbound from the Far East to North America. By contrast, a much smaller volume of goods are being transported on westbound flights back to the Far East, even with sharply discounted rates.

Borrowing terminology from the trucking industry, airlines customarily refer to the direction in which the preponderant amount of cargo is being carried as the "front-haul", while returning

flights are “back-haul.” In 2007, inbound cargos constituted 60.9 of the total international freight tonnage handled at LAX, up from 58.7 percent in 2000. AT SFO, inbound shipments in 2007 accounted for 59.7 percent of total international freight tonnage, up slightly from 56.5 percent in 2000.<sup>41</sup>

Not surprisingly, competition for limited cargo space on the eastbound or “front-haul” leg of transpacific flights bids up cargo rates charged to Asian shippers. Conversely, air carriers are in no position to extract such high shipping charges from U.S. exporters because the imbalance in trade. The problem airlines face once on the ground at a California airport is a lack of sufficient “back-haul” cargo. As a consequence, the back-haul rates paid in recent year by West Coast exporters sending goods across the Pacific have generally been at least one-fifth of the rates paid to ship goods from Asia to North America. In some cases, California exporters have reportedly been asked to merely pay fuel and security surcharges to have their goods transported by air carriers anxious to recover some of the cost of their flight operations. However, with oil hovering over \$100 a barrel and new, onerous security regulations anticipated, fuel and security charges may actually run higher than actual shipping rates on a number of routes, according to Chris Coppersmith, president and CEO of Target Logistic Services, a major freight-forwarder based in Carson, California.<sup>42</sup> At least one Central Valley freight-forwarder expects that the “all-in” rate for fresh cherries going to Japan this spring will be around \$2.50 per kilogram. If this rate holds up, it will be in marked contrast to the previous two prime shipping seasons when freight-forwarders specializing in agricultural shipments reported that “all-in” rates were often reduced to less than \$1 per kilogram for cargos going to certain destinations in the Far East.

How long this boon will persist is subject to speculation. There is already evidence that the volume of U.S. imports from the Far East is ebbing because of the declining value of the dollar. The chart on the preceding page depicts how much the gap between imports and exports has diminished lately with the depreciation of the dollar making U.S. exports cheaper in most overseas markets while causing imported goods to be more expensive for American consumers to purchase. The current economic downturn prompted by the collapse of home values will almost certainly dampen American demand for imported goods. In addition, Chinese steps to shift away from an export-driven economy to one more reliant on domestic consumption of the nation’s industrial output are apt to further erode the existing merchandise trade imbalance. Nonetheless, there remains a significant imbalance in transpacific trade that will continue to exert downward pressure on the rates charged for Asian-bound air freight.

## **California’s Agricultural Exports to China**

California would appear to be ideally suited to meeting a substantial share of China’s rising demand for fresh fruits and vegetables. California is by far the nation’s leading agricultural state, even though it is not a major producer of wheat, corn and soybeans. In 2006, California’s farms, ranches and dairies generated \$31.4 billion in cash receipts, slightly more than the cash receipts of agriculture in Texas and Iowa combined.<sup>43</sup> There are 77,000 farms and ranches in

California. California produces more than 350 crops, including more than half of America's fruits and vegetables.

In 2007, California's agricultural exports to China in 2007 totaled \$695.4 million, down 10.9 percent from \$780.3 million the preceding year owing largely to a sizeable fall-off in cotton shipments. Exports to Hong Kong, meanwhile, amounted to \$375.7 million, an 8.5 percent increase over 2006. The former British Crown Colony is one of the world's premier entrepôts. With a population of no more than 7 million, it hardly consumes all of the food products it imports. An indeterminate portion is shipped on to the Mainland both through legitimate and "gray channels" which may involve repackaging and relabeling. It is therefore difficult to determine precisely how much of Hong Kong's imports are for local consumption or for transshipment to the Mainland or to other Far Eastern markets.

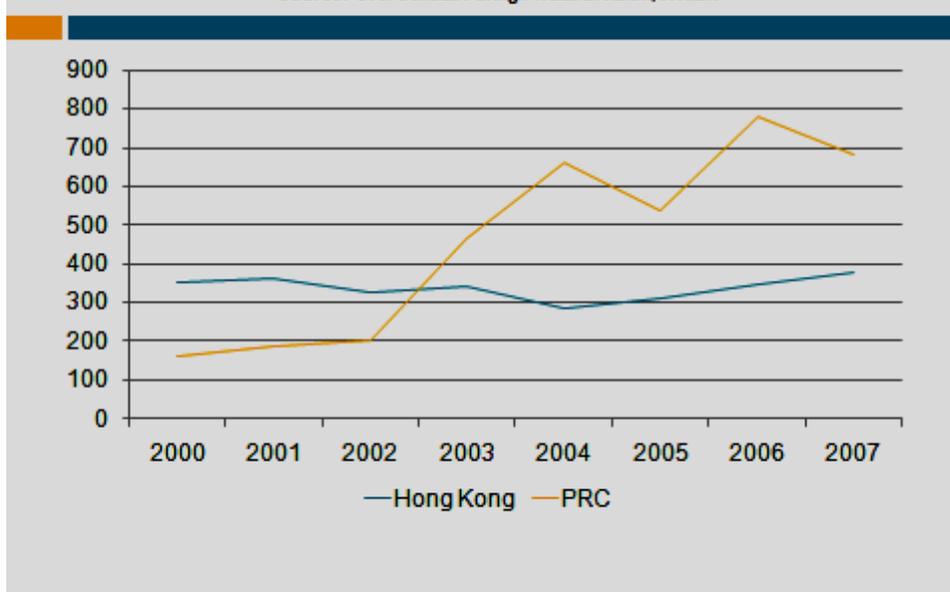
Given strong evidence that Chinese demand for imported food products is growing, it is somewhat puzzling that California's exports of fresh produce to China and even to Hong Kong have been relatively unimpressive. According to the U.S. Agricultural Trade Office in Guangzhou, the United States exported fresh fruit worth just \$69 million to mainland China in 2006.<sup>44</sup> This included:

- ❑ grapes (mostly Red Globes, Thompson Seedless, and Crimson)
- ❑ oranges (mostly Valencia and Navels)
- ❑ apples (mostly Red Delicious, Granny Smiths, and Galas)
- ❑ plums (mostly Angeleno and Fortune)
- ❑ lemons (Eureka, Lisbon, and other varieties)
- ❑ cherries (mostly Bings, Lapin and Sweet Hearts)

Grapes, oranges, and apples accounted for fully 92 percent of U.S. fruit shipments to China that year.

## California's Agricultural Exports to China

Millions of U.S. Dollars  
Source: U.S. Census Foreign Trade Division, WISER

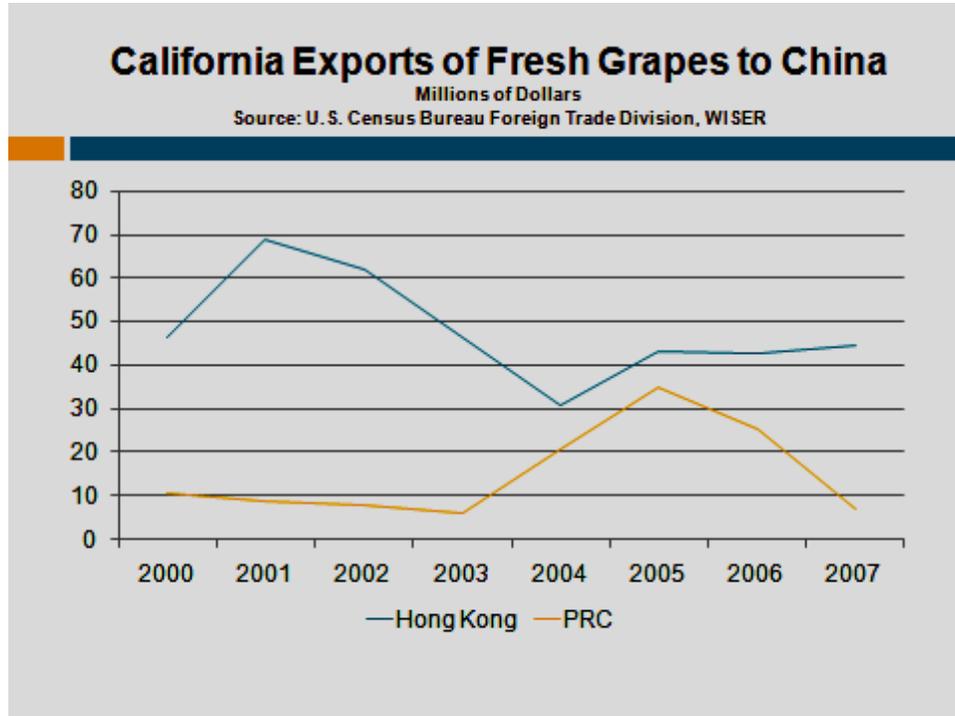


For growers of fresh fruits and vegetables, the chart above is even more discouraging than it appears. After rising precipitously from 2002 through 2006, California's overall agricultural export trade with Mainland China declined from \$780.7 million in 2006 to \$685.0 million in 2007. A sharp drop in shipments of cotton, which has been California's leading agricultural export to China over the past ten years (representing as much as 46 percent of the state's total export trade to China in 2006) was largely to blame.<sup>45</sup> The bulk of California's remaining agricultural shipments to China were meat products (sausages, chicken parts, and pork) along with such hardy travelers as nuts, dried fruits, and a wide variety of food preparations and ingredients. Yet, while meat products showed strong gains last year, doubling the previous year's trade in most instances, the same was not the case with fresh fruit and vegetables.

Almost invariably, California's exports of fresh fruit to China declined substantially in 2007. On a dollar value basis, shipments of fresh grapes were down by 70.1 percent; oranges by 45.5 percent; plums by 60.7 percent; and apples by 74.1 percent. Only lemons and limes and strawberries showed any gains last year. Exports of fresh cherries were also off by more than half, although the amounts are insubstantial. Cherry shipments of only \$82,000 were recorded in 2007. (By comparison, exports of fresh cherries from California to all countries in 2007 totaled almost \$110 million, a 41 percent increase over the preceding year.)<sup>46</sup>

California has maintained a modest airborne agricultural export trade with China and Hong Kong. In 2006 (the most recent year for which complete data are available), California air-freighted \$14.2 million in agricultural products to China and another \$10.5 million to Hong Kong. China ranked as the seventh largest importer of airborne agricultural shipments from

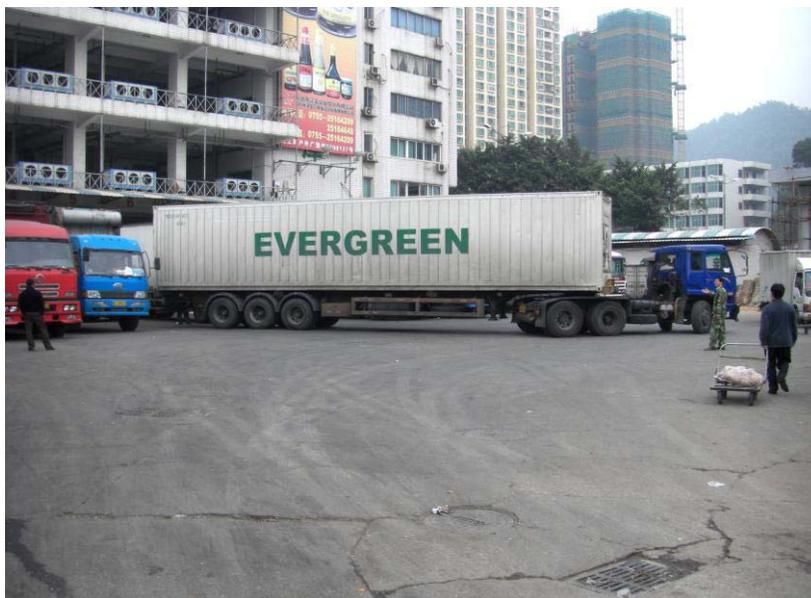
California and Hong Kong ranked 10th. Taken together, China and Hong Kong would rank just behind Australia in fifth place. Preliminary data for 2007 indicate that airborne agricultural exports to China increased to \$15.9 million, while exports to Hong King rose to \$14.1 million.



Some sense of the potential size of the Mainland Chinese market can be gleaned from a comparison with Taiwan, population 23 million (98 percent of whom are Han Chinese and therefore share many of the ethnic traits and customs of their Mainland cousins.) In 2006, California exported 241 million worth of farm products to Taiwan, according to the Agricultural Issues Center at UC Davis. In that same year, California’s farm exports to China and Hong Kong amounted to \$611 million. If non-edibles like cotton are excluded from the totals, Mainland China and Hong Kong imported just about twice as much consumable produce from California as did Taiwan, even though there are roughly fifty-six times as many Mainland Chinese as there are Taiwanese. To be sure, on a per capita basis, Taiwan’s populace is over six times wealthier than their neighbors on the Mainland. However, an ever-increasing segment of the Mainland population rivals or even exceeds the affluence of the average Taiwanese. If wealthier Mainland consumers follow buying trends seen in recent years in the Taiwan market for imported produce, it is hardly unreasonable to expect to see substantial surges in California fruit and vegetable exports to China. In 2006, for example, Taiwan imported \$29 million in peaches and nectarines, \$17 million in table grapes, \$14 million in broccoli, \$12 million in plums, and \$5 million in cherries. By contrast, China and Hong Kong, while buying \$78 million in California table grapes, imported just \$4 million in peaches and nectarines, \$9 million in plums, and no appreciable amounts of either broccoli or cherries from California.<sup>47</sup>

## A Note on Export Opportunities for Cold-Chain Technology Firms

There are significant business opportunities in China (as well as in India and other developing nations) for California firms with expertise in designing, installing, and operating key components in cold-chain systems. Indeed, the long-term prospects for increasing California's exports of perishable foods to the emerging economies of Asia, Latin America, and Eastern Europe hinges on the introduction of new cold-chain systems to, in essence, pave the way to the fast-growing but globally dispersed markets for fresh fruits and vegetables. It goes without saying, however, that any improvements in China's ability to transport perishable agricultural produce from the countryside to urban areas could ultimately pose a threat to foreign imports.



China's food retail sector has been growing by double-digit figures annually since the mid-1990's, displacing wet markets and other traditional outlets. According to a November 2007 report by the Shanghai ATO: "With markets in the affluent coastal cities approaching saturation, many chains are expanding to second-tier and third-tier urban centers with populations of 3-10 million."<sup>48</sup>

However, because procurement systems and retail distribution networks have not kept pace, most retail chains continue to rely on independent suppliers. An estimated 90 percent of the products on sale in supermarkets are locally sourced, even in foreign-owned hypermarkets like those run by Wal-Mart and Carrefour. Outside of Shanghai, Beijing and Guangzhou, the penetration of imported products is "extremely low." remains relatively low, although, as the report notes, "intermediate and consumer-ready products hold good potential." Mounting food safety concerns in China should particularly benefit multinational retailers with their reputation for higher food safety and store sanitation standards.

It remains, however, that China suffers from a lack of adequate facilities for storing and transporting perishable food products. California companies with expertise in the field of cold-chain technology and management should closely examine opportunities in China and other developing economies. On more than one occasion, Chinese fruit and vegetable importers interviewed for this study lamented that the absence of more cold-storage facilities inhibited

their ability to place more orders for imported perishables. And it was not so much a dearth of investment capital that was seen to stymie efforts to expand cold storage capacity but rather the paucity of the indigenous expertise needed to design a modern cold storage facility and the computer programs to operate it efficiently.<sup>49</sup>

## **Principal Findings and Conclusions**

The opportunity clearly exists for California agriculture to expand its export trade in perishable fruit to China. However, apart from bagged or wrapped organic vegetables, there does not appear to be an appreciable market in China for fresh imported vegetables.<sup>50</sup> Although there is an identifiable customer base to be served, the Chinese market for imported fruit will remain fairly rarified. Price differences between imported and locally-grown produce alone will prevent the vast majority of Chinese consumers from purchasing foreign fruit under almost any circumstance. At the same time, steady improvements in the taste and appearance of domestic fruit will gradually make deeper and deeper inroads into the market for imported fruit -- especially where the imported fruit comes from areas whose growing seasons overlap China's and thus competes head-on with domestic fruit. Still, there does appear to be a steadily growing demand among retailers serving an affluent Chinese and expatriate clientele. There is also likely to be a similarly increasing demand among the fast increasing of luxury hotels and upscale restaurants throughout the country. These are apt to be markets that can be ideally served by relatively small but frequent shipments of fresh fruit and organic produce.

Further appreciation of the *yuan* against the U.S. dollar, by making foreign goods cheaper for Chinese consumers and businesses, should result in greater volumes of imported products, including agricultural produce. In 2007, the *yuan* rose in value against the dollar by 7.6 percent; the first quarter of 2008 has seen a further 4.5 percent appreciation of the *yuan* against the dollar. This trend should yield an additional and perhaps less obvious benefit to California exporters seeking to reach urban markets throughout China: Logistics firms that have customarily focused almost exclusively on facilitating China's extraordinarily lucrative export trade will likely give new attention to serving the nation's suddenly expanding import trade. Transportation channels designed for handling exports will increasingly become channels for moving imports more expeditiously than ever before.

In competing for an ample share of China's growing hunger for fresh produce, California growers also benefit immeasurably from the Grown in California label, a well-established international brand. There is said to be a decidedly positive cachet attached to products from California, the mere mention of which seems to conger Technicolor images of health and prosperity in the minds of many Chinese consumers. Promotions of California fruits and vegetables are wise to emphasize nutrition and food safety. That fresh produce from California is also pricier than domestic produce probably only enhances its appeal among those who populate the high-end of the market for food products in China. And, even a small percentage of a consumer public as large as China's constitutes what in other countries might be regarded as a mass market.

Marked deficiencies in China's cold-chains demand shippers to give serious consideration of alternate supply-chain models for meeting the burgeoning demand for imported perishable fruit and vegetables in major metropolitan areas throughout China. This report has identified one such alternate model – specifically one that involves a more aggressive and extensive use of international air freight in conjunction with China's rapidly evolving domestic air cargo network. California exporters enjoy access to a multiplicity of air routes for expeditiously transporting perishable produce to China's primary aviation gateways and beyond – via China's fast-expanding domestic air cargo system – to its Emerging City Markets. California exporters also benefit from the comparatively lower “back-haul” rates air carriers have been obliged to charge for shipments destined for markets in the Far East.

Developing a seamless process for air-freighting perishable food products from California directly to second-tier metropolitan areas throughout China will depend in large part on expedited clearance at Chinese airports to permit inbound shipments to be transferred onto domestic flights without undue delay. For that reason, it is essential for California exporters to work closely with Chinese importers who have ample experience in negotiating the intricacies and peculiarities of airport inspection procedures.

The prospects of seeing overseas air cargo service based at airports nearer to the state's primary growing regions are fairly remote in the short to medium term. The volume of agricultural trade generated by California growers is not in itself sufficient to lure air carriers to Central Valley airports or to airfields adjacent to other leading growing regions. Ultimately, it will be the continued growth of large population centers and the emergence of more technology-intensive industries in California's interior counties that will eventually prompt airlines to offer direct and even non-stop service to airports in the Central Valley and other agricultural regions. That the very factors that will bring international air service to these regions are also factors which will likely threaten the viability of production agriculture is yet another in a long list of ironies with which California growers will have to contend. For the foreseeable future, though, LAX and SFO are apt to remain the state's principal international gateways for air shipments of perishable agricultural products.

U.S. agricultural attaches in China have documented the emergence of a host of vibrant urban markets for imported food products. By all accounts, those markets – located throughout the country -- are forecast to grow briskly, particularly as younger and more sophisticated generations of consumers come to dominate the marketplace. Growers of specialty crops should be poised to take advantage of these developments. And growers of perishable fruits and vegetables should not be discouraged by distance or logistical hurdles. The means and the opportunity exist for expanding into new markets for perishable fruits and vegetables in the world's fastest growing economy.

# Endnotes

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<sup>1</sup> See “Emerging City Markets: The Next Miracle” (U.S. Agricultural Trade Office, Beijing, March 21, 2007), p. 5.

<sup>2</sup> Although the former British Crown Colony of Hong Kong is formally a Special Administrative Area with some unique rights and privileges, it is also a major gateway of trade between Mainland China and the rest of the world. An unknown volume of fresh produce imported by Hong Kong ultimately winds up in Mainland markets.

<sup>3</sup> McKinsey Global Institute, “Preparing for China’s urban billion” (March 2008).

<sup>4</sup> See A.T. Kearny, “Food Safety in China: What it means for global companies” (2007), available on the company’s website.

<sup>5</sup> A 2004 report from the Pacific Economic Cooperation Council put the spoilage rate at 35 percent. See “Pacific Food System Outlook 2004-2005: The Role of Transportation Infrastructure in a Seamless Food System. See also Yang Yang and Jennifer L. Turner, “A China Environmental Health Research Brief : Food Safety in China,” Woodrow Wilson Center for Scholars, June 28, 2007.

<sup>6</sup> Private car ownership is one clear measure of a nation’s economic well-being. In 2007, the total number of private cars in China jumped by 32.5 percent to more than 15.2 million vehicles, according to Chinese government statistics released in February 2008..

<sup>7</sup> “Fixing China’s Food Safety Issues will Require a \$100 Billion Investment, According to New A.T. Kearney Research.” A.T. Kearney press release. June 26, 2007.

<sup>8</sup> Comments of Bill O’Brien, President of HAVI (China) which coordinates sourcing for McDonald’s in China. Telephone interview.

<sup>9</sup> A. T. Kearney is attempting to organize a coalition of logistics providers and investors to build a state-of-the-art cold-chain for China.

<sup>10</sup> The adjacent photo was taken in December in Guangdong Province. Unless otherwise indicated, all of the photographs in this report were taken by the author.

<sup>11</sup> It is also an increasingly controversial practice in some parts of the globe. In the European Union and the United Kingdom in particular, there is a growing political opposition to such shipments on environmental grounds.

<sup>12</sup> “HRI Food Service Sector 2008 Annual,” (U.S. Agricultural Trade Office, Beijing; GAIN Report CH8401, February 29, 2008), p. 30.

<sup>13</sup> See <http://www.lawa.org/lax/cargo.cfm>.

<sup>14</sup> See Jock O’Connell, Bert Mason and John Hagen, “The Role of Air Cargo in California’s Agricultural Export Trade,” Center for Agricultural Business, California State University, Fresno. 2005.

<sup>15</sup> See Fred Gale and Kuo Huang, “Demand for Food Quantity and Quality in China,” USDA Economic Research Report No. (ERR-32) 40 pp, January 2007. They observe: “As their incomes rise, Chinese consumers are changing their diets and demanding greater quality, convenience, and safety in food. Food expenditures grow faster than quantities purchased as income rises, suggesting that consumers with higher incomes purchase more expensive foods. The top earning Chinese households appear to have reached a point where the income elasticity of demand for quantity of most foods is near zero. China’s food market is becoming segmented. The demand for quality by high-income households has fueled recent growth in modern food retail and sales of premium-priced food and

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beverage products. Food expenditures and incomes have grown much more slowly for rural and low-income urban households.”

<sup>16</sup> See “Louis Vuitton's Life of Luxury,” *Business Week*, August 6, 2007.

<sup>17</sup> “China’s hunger for luxury goods grows,” *Boston Globe*, March 21, 2006.

<sup>18</sup> It should be noted that a December 2007 revision by the World Bank of its estimate of the size of China’s economy may require a somewhat more modest appraisal of the speed with which China is developing a genuine middle-class. The Bank’s estimate was based on purchasing power comparisons that were subsequently found to be overstating China’s GDP by a considerable margin. The Bank’s new calculations of so-called purchasing power parity, which compare the buying power of citizens around the world, put China’s output at roughly 40 percent less than the Bank’s previous estimates. The new calculation depicts a much poorer China than previously thought. The World Bank had previously calculated that China’s output was worth \$8.8 trillion in 2005, if the goods and services produced in the country were valued at American prices. That figure was revised in mid-December 2007 down to \$5.3 trillion.

<sup>19</sup> See “Emerging City Markets: The Next Economic Miracle 2007” (USDA Foreign Agricultural Service GAIN Report CH7403, March 16, 2007). The report cites Chinese Customs figures indicated that the 14 Emerging City Markets absorbed 56 percent of Chinese food imports from the U.S. in 2006.

<sup>20</sup> These figures are taken from reports prepared by U.S. Foreign Agricultural Service personnel in China.

<sup>21</sup> Population estimates for Chinese are notoriously variable. Part of the reason is the extensive migration of people moving from rural areas to cities in recent years. Some population are based on the numbers of legal residents, while other estimates take some account of “undocumented” workers who have come to work in factories or construction sites in major cities. Another cause of the variability of population statistics is that some data include the surrounding region, while others cover only the residents of the city itself. To cite on extreme example, population estimates for Chongqing range from 31.4 million to 4.2 million. The figures used in this report tend to err on the conservative side.

<sup>22</sup> U.S. Foreign Agricultural Service, GAIN Report Number: CH8402, Gift Giving in China, January 16, 2008.

<sup>23</sup> But that practice is becoming increasingly controversial. Concerns raised by environmental groups in Europe about the allegedly deleterious effects of aircraft on the earth’s ozone layer have prompted some British and European Union groups to demand a cessation of airborne shipments of organic foods. While such concerns do not appear to have surfaced to any appreciable extent in China, it is worth pointing out that environmental concerns do tend to resonate most keenly among consumers who are most apt to purchase organic food products.

<sup>24</sup> Inter-Continental Hotels was the most ambitious player in China with a portfolio that includes 51 hotels with plans to develop 74 more by 2008. Hong Kong Shangri-La Group has 20 properties and plans to develop 17 more by 2008; Marriott has 26 hotels and plans to grow its holding to 35 by 2008, 10 in Beijing alone; French Accor Group has 30 hotels scheduled to open prior to the 2008 Olympics. Chinese-managed five-star hotels, private and state owned, purchase far less imported food than international hotels, which consume an average \$350,000 of food imports annually. Internationally branded hotels cater to a more diverse clientele and provide multiple dining options including international cuisine. In major business and tourist destinations such as Beijing, Shanghai, Guangzhou, Chengdu, Hangzhou, Xiamen, and Xi’an, hotels purchase larger volumes of imported food items to satisfy business and their international traveler based business.

<sup>25</sup> HRI Food Service Sector, 2008 Annual Report, GAIN Report CH-8401, U.S. Foreign Agricultural Service, Beijing, February 29, 2008, p. 2.

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<sup>26</sup> See The United Nations World Tourism Organization's "Tourism Market Trends: Asia and the Pacific" (July 2007), p. 55.

<sup>27</sup> "Retail Food Sector: All China Retail Annual Report 2007," (ATO Shanghai, GAIN Report CH7821, November 7, 2007), p. 18.

<sup>28</sup> Anming Zhang, et. Al., *Air Cargo in Mainland China and Hong Kong* (Burlington, VT: Ashgate Publishing Company, 2004).

<sup>29</sup> "The World's Top 50 Cargo Airports," *Air Cargo World*, July 2007.

<sup>30</sup> This is not to say that goods bound for overseas destinations do not leave the state from other airports. FedEx, for example, transports an unknown volume of cargo from Oakland International Airport (OAK) to Anchorage International Airport (ANC), where the cargo is then transferred to larger freighter aircraft journeying on to FedEx hubs in the Far East. Unfortunately, it is entirely likely that such shipments will not be identified and counted as exports until they are consolidated with other shipments at ANC. In many if not most instances, a shipment of electronics gear or fresh cherries flown from OAK to ANC would generally be regarded as a domestic movement, even if the goods were ultimately destined for Tokyo. This is one of anomalies in the manner in which official U.S. trade statistics are collected that result in a misappropriation of credit for exports to gateways far from where the export shipment originated. In this instance, rules permit those filling out Shippers Export Declarations to identify the origin of the shipment as the place at which the shipment was consolidated with other items for overseas shipment. For a more detailed discussion of the shortcomings of U.S. export data, see Chapter 2 of "The Role of Air Cargo in California's Agricultural Export Trade," previously cited.

<sup>31</sup> Freighters are estimated to account for approximately 60 percent of the total international airborne tonnage at SFO and LAX.

<sup>32</sup> See the discussions on pages 24ff. regarding California's geographic liabilities in international aviation.

<sup>33</sup> Cross-section of Airbus A-300 at Munich's Deutsches Museum. Photograph by Aaron Siirila.

<sup>34</sup> U.S. Government export statistics routinely contain reports of exports of fresh cherries from Hawaii and even Alaska during peak harvest and shipping seasons in California and in the Pacific Northwest. Cherries, of course, are not commercially grown in either Hawaii or Alaska.

<sup>35</sup> See Robert W. Moorman, "Finding the California Pass", an article summarizing the air cargo situation in California, in the November 2007 issue of *Air Cargo World*.

<sup>36</sup> For a detailed discussion of the various deterrents to establishing regular international air cargo service from Central Valley airports, see "An Analysis of Local Air Cargo Operations" by Jock O'Connell, prepared in March 2008 as part of a Regional Goods Movement Study commissioned by the Sacramento Area Council of Governments.

<sup>37</sup> The Central Valley encompasses some 19 counties in the interior of California and extends approximately 400 miles from Shasta County in the north to Kern County in the south. It is bounded by the Cascade Range to the north, the Sierra Nevada to the east, the Tehachapi Mountains to the south, and the Coast Ranges and San Francisco Bay to the west. The Inland Empire is generally associated with San Bernardino and Riverside counties to the east of Los Angeles. Imperial County in the southeastern corner of the state is sometimes included as part of the Inland Empire.

<sup>38</sup> See the November 2007 issue of *Air Cargo World* for more on the controversy over DHL's operations at the former March Air Force Base.

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<sup>39</sup> Only Memphis and Hong Kong handled more cargo in 2006.

<sup>40</sup> Because the types of goods air-freighted from California to China tend to have a significantly higher value-to-weight ratio than goods coming in from China, the imbalance is far less grave on a dollar value basis. However, for air carriers who assess shipping rates based on the weight and the volume of space occupied by a shipment, the actual dollar value of shipments is not especially material.

<sup>41</sup> Air freight statistics for SFO and LAX were obtained from the airport's respective websites.

<sup>42</sup> Quoted in the December 2007 issue of *Air Cargo World*.

<sup>43</sup> State by state agricultural data are compiled by the National Agricultural Statistics Service of the U.S. Department of Agriculture. 2006 is the latest year for which comparisons are available.

<sup>44</sup> See "South China, Vibrant Gateway for China's Imported Fruit," GAIN Report CH7610, June 8, 2007, p. 4. This report cites export data compiled by the U.S. Census Bureau's Foreign Trade Division.

<sup>45</sup> These export figures are derived from information supplied on Shippers Export Declarations which, by law, must accompany all exported shipments valued at more than \$2500. The raw data are subsequently aggregated by the Foreign Trade Division of the U.S. Census Bureau. Among other data products available are the export values attributed to the State of Origin of the shipments. For a more extensive discussion of the limits of State of Origin export statistics, see Chapter Two of "The Role of Air Cargo in California's Agricultural Export Trade."

<sup>46</sup> The disappointing data beg an obvious question. If, by all accounts, the market in China is ripe for fresh imported fruit and if, by most accounts, California products are held in high repute by Chinese consumer; then why is China not importing more fresh fruit from California? Of course, it is possible to contest the conventional wisdom about the "California cachet" and to conclude that it does not extend to food products. A survey conducted just last year by the market research firm TNS found that: "Although the Chinese love American fast food, only 21 percent of Chinese hold American food in high esteem, trailing the food of China and France." That survey also discerned "a compelling amount of patriotism in China, both for its people and products, particularly those tied into the Chinese culture." The survey involved an online research panel of approximately 400 Chinese, ages 18-44 and living in tier one and tier two cities in China. TNS is a market research firm headquartered in New York City. See [www.tns-us.com](http://www.tns-us.com). A strong sense of patriotism may also come into play as the Chinese public reacts to foreign condemnation of its treatment of Tibet.

<sup>47</sup> See Omid Rowhani and Daniel A. Sumner, "[California International Agricultural Exports in 2006](#)" (AIC Issues Brief #32), Agricultural Issues Center, University of California at Davis, November 2007.

<sup>48</sup> "Retail Food Sector: All China Retail Annual Report 2007" (USDA Foreign Agricultural Service GAIN Report Number CH7821, November 7, 2007).

<sup>49</sup> Companies interested in exploring this opportunity should contact the U.S. Commerce Department's Trade Development Agency for information about programs designed to help U.S. firms gain entry into developing country markets for cold-chain technology.

<sup>50</sup> There is, of course, a certain irony in this since consumer surveys consistently show Chinese consumers to be considerably more concerned with the safety of domestically-grown vegetables than domestic fruit. Consumer preference, however, appear to turn more on the issue of freshness since the average consumer firmly believes that vegetables grown several thousand miles away cannot be anywhere near as fresh as produce grown on a farm in a nearby province, regardless of the mode of transport used to bring fresh vegetables from abroad.