

MID-LIFE CRISIS?

How the air cargo industry's transition from growth to maturity will impact shippers, forwarders, airlines and industry suppliers over the next decade



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It is official – the global air cargo industry has now reached middle age. At a recent investor conference in Memphis, Fred Smith, Chairman and founder of FedEx, described a massive structural transformation in the global air express and freight markets triggered by permanent shifts in shipper demand. Within North America and Europe, customers are diverting overnight air to ground deliveries at an accelerated rate. In intercontinental markets, air shipments are increasingly switched to sea freight. Shippers seek to maintain profit margins for their products as retail prices decline. This is not a cyclical trend, it is permanent.

FedEx outlined a detailed plan to preempt the transition: Older aircraft will be replaced with more fuel efficient new aircraft. Increased non-stop flights in the intercontinental network will simultaneously improve service and lower round trip fuel burn. Real-time information will optimize delivery routes, facilitate labor scheduling for hub handling facilities, and enable bundled pricing for customers across multiple modes and service types. FedEx's response is significant, and it has a far reaching impact on the structure of the industry. The rest of the industry needs to consider the long-term strategic implications of this transition and develop a proactive plan to take action.

Why is this happening? We believe that a collision of several long term structural trends has created an environment that is forcing the transition. Ironically, all of these industry trends have been followed at conferences and in trade journal articles over the past ten years. The

impact of each trend, however, is now significant enough, in absolute terms, to make a difference.

U.S. and European consumers are less able to spend

The US and EU-27 together represent \$24 trillion (69%) of \$36 trillion of global consumer spending. Air express and freight import flows to the U.S. and EU-27 represent 50% of 20 million intercontinental tonnes. Additionally, an estimated 50% of imports to Asia (35% of total air import flows) are upstream feedstock for finished goods destined for US and EU consumption. We hypothesize that – due to income growth constraints and rising health care costs – consumers in the U.S. and Europe will not have the same spending power as in the last decade. We can expect that over the next ten years we will see fewer purchases of discretionary products at lower price points. As a result, there will be less volume to be transported, and shippers will use cheaper modes of transport to compensate for lower selling prices. It will be very difficult for faster growing ("BRICs") emerging markets to make up for the absolute decline in spending over the next decade even using the average growth rates over the last decade. The "economic decoupling" argument made three years ago, which assumes that emerging market countries would trade each other without dependence on developed economies, was simply not true, as 68% of global import air trade growth is driven by final consumption in the U.S. and EU-27.

Fewer higher value technology product shipments

The global high tech industry is experiencing significant structural change as tablets and smart phones cannibalize desktop and laptop computer sales by offering better functionality in a more efficient form factor. This inter-product competition has forced a significant selling price stratification where consumers purchase ultra-cheap PCs on-line for their homes and use the savings to buy significantly more expensive iPads and iPhones. Compounding the problem is the impact of product miniaturization as semiconductors, integrated circuits and disk drives become more compact, denser and more susceptible to transport in passenger aircraft bellies.

Sustained high jet fuel costs

The jet fuel market is global and even during times of slow economic growth, prices remain high due to increasingly escalating extraction costs and regional political instability. Jet fuel will not get much relief from the North America “shale gas boom” because it has had little effect on retail prices due to refinery capacity constraints (partial reason for Delta’s refinery purchase) in the Midwest and limited pipeline infrastructure to deliver oil to unconstrained refineries along the Gulf or east coast. The result is a global trading range for oil between \$80-120 per barrel over the next decade, sustained high jet fuel prices and a rising gap between air freight prices relative to other modes.

Our hypothesis is these trends have triggered long-term changes in the size and structure of the global air cargo industry. The specific impact of these trends includes:

Declining air freight share of global trade flows – The decades-long trend of air freight capturing a rising share of intra-regional and containerized trade flows will reverse as ground and ocean carriers offer increasingly sophisticated and reliable time-definite products with a fraction of the fuel cost of aircraft.

Tightening air cargo supply/demand balance for freighter capacity– Volatile demand and high fuel prices will force the early retirement of dozens of relatively fuel-inefficient freighters, causing air freight supply to fall even faster than demand and giving the surviving airlines more pricing power than they have today. Belly capacity will provide a majority of future supply due to rising cargo capacity per seat and will transport up to half of all intercontinental demand – up from 40% in previous years. Shippers and forwarders will continue to benefit from an abundance of belly capacity on mature routes outbound from North America and Europe. The biggest capacity changes will come in the freighter segment where we estimate that a portion of bottom quartile of the non-integrated carrier freighter supply curve will exit the market resulting in fewer carriers with larger fleets.

Increased long term competitive advantage for global integrated carriers that is enabled by their multi-modal service portfolios

and technology integration – DHL, FedEx and UPS are positioned to increase their share of the stagnant air freight market, and – by virtue of their well-developed trucking networks in North America and Europe – also to capture time-sensitive traffic diverted to time-definite ocean services.

On the following pages, we will elaborate on our hypothesis and provide supporting evidence and analysis. The necessary starting point is industry definition.

INDUSTRY DEFINITION

There are two basic business models in the air cargo industry: integrated and non-integrated. Integrated carriers own or exclusively control the assets, employees and information systems necessary to offer unbroken custodial control from the time a shipment leaves the shipper’s facility to the time it arrives at the consignee’s location. In contrast, non-integrated competitors consist of freight forwarders who arrange door-to-door transportation and rely on airlines to haul shipments from airport to airport.

The industry’s primary service is door-to-door transportation, and the typical value chain contains four links: pick-up, consolidation, line-haul and delivery. Industry competitors employ one of two business models: vertically integrated networks and non-integrated networks. Vertically integrated network carriers operate and/or control local pick-up and delivery, intercity air linehaul transportation and shipment handling in a closed loop network. The non-integrated network consists of freight forwarders and airlines working together to provide shippers door-to-door service. Carriers provide airport-to-airport transportation to forwarders on a wholesale basis and forwarders act as general contractors to shippers by purchasing and managing all of the elements required to accomplish door to door delivery.

The continuum of service types, shipment sizes and primary customer segments varies for each combination. The range of services consists of scheduled door-to-door and airport-to-airport transportation, charter services and aircraft wet leasing. The shipment size spectrum includes transactions ranging from a few kilos moving as a small package up to a full airplane load. Shippers mainly purchase door-to-door services in kilo or pallet quantities. Forwarders purchase pallets and occasionally partial or full planes. Carriers are customers for ACMI wet leases of full aircraft.

DHL, FedEx, TNT and UPS are the “big four” global integrators which collectively control over 70% of the intercontinental air package market using their integrated networks as a source of competitive advantage. The integrators also compete with regional parcel companies, postal authorities and freight forwarders for small package shipments in large and small country markets. Integrators enjoy advantages from economies

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of scale from pick-up and delivery stop density, aircraft size, sort facility handling automation, advertising and information technology. However, regional parcel and postal competitors compete effectively because of even higher network efficiencies and pricing power in their home markets where they have dominant share. Forwarders are able to compete with integrators for small packages by offering cost-effective solutions to price elastic shippers, especially when transit time commitments can be extended.

As their volumes have grown, integrated carriers have moved up the shipment weight spectrum and have captured share from freight forwarders in the small package segment. Integrators are invading the lower end of the air freight segment as their cost to serve falls with increased network size and density. This structural advantage has allowed integrated carriers to compete based on a balance of price and service levels for air package shipments and selectively cherry-pick freight forwarder air freight shipments in markets where they have excess capacity.

Freight forwarders control 90% of the retail sales channel for heavy air freight shipments. The heavy freight market is less concentrated than the small package sector: the top 20 forwarders carry 68% of the total intercontinental air freight tonnes, and the top 20 airlines transported 65% of total traffic in 2011. The rise in forwarder concentration has been driven by numerous cross-border mergers and acquisitions over the last five years, completed under the assumption that larger forwarders are more attractive to customers because of greater geographic scope and increased ability to make investments in information technology. Carrier capacity concentration has also been increasing due to changes in passenger belly fleets towards smaller aircraft, reduction in flight frequencies and bankruptcies of all cargo carriers due to high fuel prices.

We estimate that the global air cargo industry transported 175 billion FTKs (freight ton kilometers) of traffic in intercontinental markets in 2011. This consists of 20 million tonnes that were transported an average of 8,750 kilometers. The intercontinental air cargo market was only 2% of the size of container shipping market when compared in tonnes, reflecting the fact that very few products can afford to pay the premium prices for air service.

The geographic distribution of air freight is similar to that of containerized ocean traffic. Asia is the main manufacturing base for products that have a propensity to use air cargo services, both because of the product types and distance to the main consumption markets in Europe and North America, and is the single largest origin region. The Transpacific market has a directional imbalance of almost 1.66 to 1 while the Asia to Europe market is less imbalanced with a front haul of 1.30 to 1. On an aggregate basis, north-south markets linking North America with South America, and Europe with Africa appear almost balanced, but, in fact, are imbalanced on a country-by-country basis which requires carriers

to operate triangular routing patterns to improve route trip load factors.

Globally, the high tech industry was the single largest end-user segment of air package and freight services in 2011 with 27% share followed by capital equipment and related spare parts with 19% and apparel and footwear with 17%. The commodity mix varies considerably across air trade routes. In the Eastbound Transpacific market, high tech shippers generate 36% of total demand and apparel the next largest with 31% share. Asia to Europe has a similar pattern as the Transpacific where high tech goods are 32% of the total and the next largest segment are apparel shippers with 22% of the market. Flows into Asia from North America and Europe consist mainly of capital equipment to support Asia's manufacturing infrastructure, high tech components for final product assembly and intermediate material inventory to feed production lines. Fresh fruits, vegetables and seafood are the primary commodities originating in Latin America to North America. Market penetration of perishable goods is also high in the Latin America to Europe and Africa to Europe markets reflecting the importance of year round growing seasons along the equator and contra seasonal harvest seasons in the southern hemisphere which allow growers to supply consumers in North America and Europe with fresh produce during the Northern Hemisphere winter.

SHIPPER MODAL CHOICE DECISIONS

Historically, shippers have paid a premium to use air package and freight services, which can be 10-15 times more expensive than surface transportation on a unit volume basis, because the time-place utility achieved by the speed and reliability of air transport more than offsets its high cost. Shippers arrive at this conclusion by explicitly or implicitly using some form of a total distribution cost framework. The goal is to minimize total distribution costs by making trade-offs between transportation mode and inventory carrying costs. The decision is often not binary and requires determining the right mix of modes on a specific set of origins and destinations ("O&Ds") that best optimizes the total landed cost of the product mix being transported.

There are two types of end user customers for air package and freight service: planned users and emergency users. Based on past shipper surveys, we estimate that split between planned and emergency users is 50/50. Specific reasons for segment uses are summarized below:

Planned users:

- High value/weight ratios
- Physical perishability
- Economic perishability
- Small shipment cost indivisibilities

Emergency users:

- Economic process impairment
- Transportation service failure recovery

We estimate that products with high value-to-weight ratios make up 30% of total and 60% of planned user demand for air cargo services. These shippers can afford to use air cargo because its higher cost is offset by significantly lower inventory carrying costs relative to surface transportation. The complication is that product life cycles across all industries are compressing and the weighted average value of high tech and apparel products continues to decline with progressive globalization. Consider the example of the eastbound Trans-pacific market between 2002 and 2011. In the aggregate, the rate of air penetration of total containerized trade has fallen by more than one-third, from 4.1% in 2002 to 2.6% in 2011. The weighted average unit value of products being shipped by air has risen from \$77 per kilo to over \$100 per kilo during the same time period, which provides further evidence that the bottom end of the demand curve has diverted to sea freight. Video monitors, DVDs and non-digital cameras made significant shifts from air to sea freight over the last ten years as retail prices fell in response to competition that was enabled by lower production costs in Asia. The impact of generalized product price deflation will continue to depress the rate of air cargo growth regardless of the price of oil. However, its impact will be greater as the price of oil rises.

Shippers of physical perishable products face an even more challenging supply chain cost problem because most of their products already have low unit values, and they must use air cargo because of limited shelf life. Examples include products such as strawberries, cherries, fresh seafood, and cut flowers. Three things will happen: some shippers will stop exporting to certain markets due to high air freight costs, others will attempt to pass on the costs with higher prices to retailers, and a lucky few will take advantage of new refrigerated sea containers that are able to keep certain types of product fresh for long periods thus enabling modal diversion from air to sea.

Shippers that have used the reliability of air cargo to manage the economic perishability of their products due to short selling windows and high demand forecast error now have the option to use new time definite LCL and

FCL sea freight services offered by various competitors. The wholesale pricing of the new services is approximately 25-30% of air freight and have the same level of reliability, albeit with longer transit times.

Small shipments, weighing less than 68 kilos, will continue to use air package services since the minimum charges for sea freight are purposely set high to discourage these types of shipments as forwarders lack cost effective methods to handle and deliver small packages in the air or on the ground.

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The emergency use segment is essentially price inelastic because the economic cost of impairing a broader process far exceeds the cost of air cargo. The most common emergency is when a large, capital-intensive economic process will be shut down causing significant economic losses because a spare part or component inventory did not arrive on time. Examples of such emergency use include manufacturing line shut downs due to lack of specific components, aircraft on ground awaiting replacement parts or an expensive advertising campaign ruined by not having key marketing collateral distributed in time for a big promotional event. Emergencies will always occur but the definition of what constitutes an emergency will change with rising oil prices.

Overall, we expect traffic flows to continue steady migration from air to ocean, led by the switching of planned air freight shipments to time-definite ocean service. Emergency shippers do not have a choice and will have to continue to use air cargo.

ASYMMETRIC IMPACT ON AIR TRADE MARKETS

Overall, we forecast that the rate of growth of global air cargo FTKs will increase from 3.7% per year over the last ten years to 4.9% for the next ten years (2011-2021) and slow to 4.3% from 2021 to 2031. Our demand metric, FTKs, has two dimensions: originated weight and length of haul. Originated weight demand will grow slightly faster averaging 4.8% per year and a 0.2% decrease in average length of haul over the next 20 years.

For the twenty-year period from 2011-2031, we forecast a 4.6% annual growth for combined intercontinental, inter-regional and intra-regional air express and freight demand. In comparison to other widely tracked forecasts, such as those published by the airframe manufacturers themselves, LogCapStrat's forecasted growth rate is lower. Indeed, Airbus forecasts global air freight to grow by 4.9% annually between 2011-2031, and Boeing recently revised its 20-year forecast downward from 5.8% to 5.2% per year. LogCapStrat's air freight traffic forecast takes a comprehensive view of global supply chain networks, which accounts for shippers' increasing sophistication to cope with higher unit transportation costs, and the expansion of more reliable surface transport options. As detailed above, air freight growth will be impacted by shippers who have the knowledge and opportunity to lower their transport costs by shifting away from air freight to other, less costly alternatives. To appreciate the dynamics of the air cargo industry, it is interesting to compare growth rates on a directional trade route basis. The eastbound transpacific will grow at 5.0% per year reflecting a rebound in consumer spending in 2014-2015, and westbound demand, heavily influenced by the cheap dollar, will grow faster averaging 6.0% per year between 2012 and 2021. Asia to Europe will grow slower at 4.0% per year due to the continued consumer deleveraging that will continue over the next five years and

the backhaul market from Europe to Asia will grow faster, averaging 6.2% annually as China and other Asian economies GDP growth return close to the long term trend-line. The eastbound Trans-atlantic market will struggle over the next five years, as Eurozone consumer demand slowly rebounds resulting in only 2% growth between 2012-2021. Europe to North America will grow slightly faster averaging 2.5% per year. Intra-Asia market growth, which is partially driven by final product demand in North America and Europe due to intermediate component flows, will average 6.5% growth each year.

Intra-regional markets in North America and Europe are mature and will derive all of their future growth from the domestic portion of an intercontinental shipment's journey ("DPICJ"). Intra-North America will average 1.0% growth over the next ten years with domestic traffic growing only slightly at 0.3% per year due to truck modal substitution and DPICJ will grow faster at 8.0% per year benefiting from continued emergency shipping in intercontinental markets and the need to use at least one leg of the domestic air network to get to destination. The intra-Europe air package market, due to its compact economic geography relative to the U.S., will actually experience a contraction of -.25% per year of intra EU volumes as packages continue to shift to trucks but overall DPICJ will grow at 7.0% helping total intra Europe network traffic to average .5% over the next ten years.

NEW INDUSTRY SUPPLY CURVE

The increase of oil prices has caused jet fuel to become the largest component of a passenger or all cargo airline's cost structure averaging between 35-40% of total costs on a fully allocated basis. This has caused several mixed fleet, all cargo airlines and ACMI carriers to ground their most fuel inefficient aircraft, shrink network capacity by as much as 15%, suspend or delay certain international routes and file for bankruptcy. Belly capacity as % of total lift will actually increase in all of the three major markets due these changes.

Freighters will continue to be important to the global air cargo network because when measured on a FTK-basis, freighter aircraft transported 63% of total traffic in 2011. We estimate that 530 large widebody freighters were deployed in the major intercontinental markets in 2011 with 146 flown within an integrated carrier network, organically or ACMI carrier operated, and 384 operated by airlines. Large aircraft have payload capacities above 80 metric tonnes and include: MD-11F, 777F, 747-200F, 747-400F and 747-8F.

As older MD-11 and 747 aircraft are retired due to significantly higher fuel consumption and rising maintenance, carriers will have to make replacement decisions. The two primary dimensions of choice include: aircraft size in terms of payload/range versus new build or conversion. In our view the logical replacement aircraft for low demand

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markets is the converted 747-400BCF freighter which is competitive in a wide range of fuel prices and utilization levels. We believe that the clear winner is the 777-200F which has the largest area of competitive advantage in terms of fuel prices and utilization combinations. This is a key reason why FedEx and DHL have elected to use the 777-200F as the backbone for their intercontinental linehaul networks over the next two decades. We believe that the 747-8F is a special mission aircraft that requires very high utilization levels to be profitable which means the aircraft will be deployed in mainly the transpacific and Asia-Europe markets. The trade-off between aircraft size on the front haul versus total trip cost minimization on the backhaul will take on increased importance when looking at the combined impact of growing directional imbalances. This trend of increasing imbalances will, all else equal, lower round trip load factors and sharpen carriers' focus on the cash expense of flying empty aircraft on the backhaul re-positioning flight. We believe that these two factors will favor the 777-200F over the 747-8F and the 747-400BCF and the advantage could become even more pronounced if air downgrade to sea freight accelerates.

The accelerated retirements of older freighters should tighten the supply/demand balance for freighters in the next couple of years as older freighters will be retired faster than the drop in demand as a result of higher fuel cost. Replacement options for these retired older freighters is growing as new conversion programs, like the A330-200P2F, come to market to meet demand in faster growing regional markets driven by emerging economies and natural resource production.

The bad news is that the market for small freighters, defined as less than <40 tonnes, is limited to replacing aging aircraft with no new growth. The reason is that 55% of all small freighters used today are within one of the big four integrated express networks, and that the future fleet strategy for these carriers is to replace 727-sized aircraft with larger 757 freighters to drive down unit costs due to economies of aircraft size and reduce the network footprint of cities served by jets. Over time, the integrated carrier networks will become less air intensive and deploy significantly fewer small freighters.

STRATEGIC IMPLICATIONS

Our view is that the integrated carriers are the big winners in three ways: they will further improve their market position in intercontinental small package, divert the highest yield emergency air freight shipments away from airlines, and re-capture downgraded air freight demand with their vast ground package and LTL networks in North America and Europe. Essentially, they are structurally hedged in the intercontinental market. Their challenge is managing the air to ground diversion within the largest regional networks.

Freight forwarders will manage modal substitution of planned air freight users by re-capturing pallet-sized shipments as LCL sea freight or consolidated FCL shipments. Net revenue margins per kilo will

likely drift down forcing forwarders to explore new initiatives to reduce unit costs. They will continue to maintain some share of the emergency air freight market.

Non-integrated airlines that operate belly capacity always will have pricing flexibility due to the passenger revenue subsidy of flight costs. Carriers that can afford fuel efficient next generation freighters and successfully implement their fleet replacement cycle will benefit from an industry with fewer competitors operating larger aircraft with relatively low unit costs. Freightier airlines, including ACMI carriers, that have based their fleet strategies on low capital cost used aircraft and cannot afford to replace their fleets will be forced to exit the industry.

For shippers, one obvious implication is that air freight will become more expensive as weaker carriers and excess capacity are squeezed out by high fuel prices. The rise in prices will drive more and more shippers to accept higher inventory levels in order to reduce "emergency" air freight shipments and to make wider use of time-definite ocean services.

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