

THE BROAD DIMENSION

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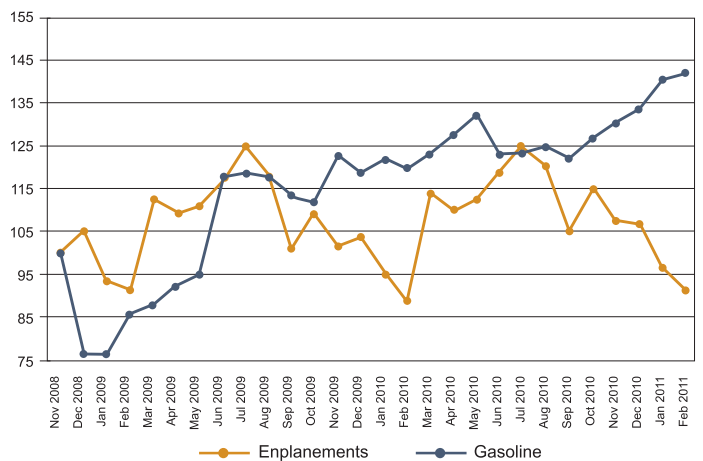
Market Soaring ... or Stalling

This quarter we are looking specifically at aviation, and in many ways that market is reflective of the general market, especially if we use the stock market as a gauge for the general market. Stocks have certainly had their ups and

downs as they pulled up and out of the hole they sank into during the Great Recession, but the trend has been steadily upwards. Likewise, the aviation market has been doing well. Even Aer Lingus, despite the Irish economy being in the dumps, having been virtually grounded for periods in April last year by the volcanic ash from Iceland, and been affected by record-breaking severe weather during December, still managed to show a profit Of \$64 million compared to a \$177 million loss the previous year. But just as the stock market seems to be stalling at the time of writing (mid May 2011), so the airline industry is warning that things are not going to be as rosy in 2011.

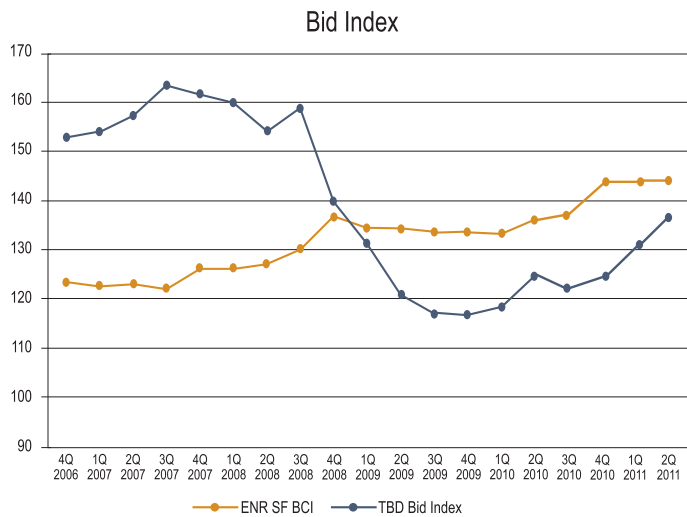
A major factor affecting both the aviation industry and the general market is the price of oil. In the following chart we have indexed the number of domestic enplanements and (to represent fuel costs) the cost of gasoline, and then compared them.

Enplanements vs. Fuel Costs



To start with, the two sequences follow similar patterns as both rise out of the recession. But getting to the more recent part of the chart we see the two deviating markedly, as fuel costs rise, leading to fuel surcharges by the airlines

and a drop-off in enplanements. Rising fuel prices are also a major influence on the costs affecting construction materials and bid prices, as reflected in our Bid Index.



There have been a number of articles about ‘new norms’ in the economy and one of those norms is stated to be lower levels of employment. We have all seen articles about the ‘jobless recovery’, and that is expected largely to continue because companies are finding ways to do more with less. The airline industry is certainly not missing out on this trend, with the check-in procedure being almost fully automated now. Often the only time you will interact with a live person during check-in is if you have bags that need to be tagged, and you would probably be doing that yourself if regulations in the US didn’t prevent it. In other parts of the world you do not need to be assisted by airline staff in checking in your baggage, and with all baggage being screened this does not really present a security risk.



Politics has also been affecting the general market and the aviation industry. Political turmoil in the Middle East has led to a drop in air travel, as well as speculation in oil prices and fluctuations in the stock market. And new regulations regarding sustainability and green building are affecting all industries including aviation.

The Greening of Aviation

A study in New Scientist magazine in December 2009 reported on how the cost of climate change policies would affect consumers in the UK. Apart from electricity and other fuel costs, cost impacts ranged from 0% to 2%, with one major exception. That exception was the aviation industry, where a 140% increase in the cost of air travel was predicted over the four decade period the study used. That is because there is currently no real low-carbon alternative fuel available, so airlines are expected to have a high ‘carbon tax’ to pay.



But alternative fuels are being studied, and the following are some options:

- Synthetic fuel, made from coal, natural gas, etc., is an alternative to oil-based fuels that could easily be implemented with modern-day aircraft, and would avoid the cost fluctuations of oil, but does little for the climate and is still using non-renewable resources (even though they are more plentiful than oil).
- Biofuels, derived ideally from food waste or algae, can be mixed in small percentages with jet fuel in some aircraft, and new developments in biofuels are leading

to it being a direct alternative for jet fuel. Of course, we don't want to be cutting down rain forests to grow the crops to make biofuels. There are also problems with the temperature biofuels freeze at, and the cost of producing it.

- Liquid hydrogen only produces water as a by-product when burnt as a fuel, so it is extremely clean, but the requirements for storing it makes its use in aircraft unlikely, at least in the reasonably short term. There is also the question of whether the water residue would add to cloud creation, and compound the climate effects that contrails already generate. Along with biofuels, hydrogen is more likely to find a use in ground vehicles than in aircraft in the foreseeable future.
- Aircraft can fly above the clouds, so how about powering them with solar energy? While prototype craft have used this power source, its use in commercial aircraft does not seem practical.

The Commercial Aviation Alternative Fuels Initiative (CAAFI) is a coalition working to promote the development of alternative aviation fuels, but their timeline is realistically measured in decades. In the short run, reducing the amount of fuel that aircraft waste is likely to contribute more for the climate's benefit.

Air traffic controllers have not been asleep when it comes to making aircrafts' flights more fuel-efficient. Traditionally the aim was to get aircraft leaving on time, then if traffic built up at the destination airport the aircraft would get stacked, flying in circles until a landing slot was available, but wasting a lot of fuel in the process. A new procedure is being introduced whereby the scheduling of flight landings reaches back to the departing airport, and aircraft are

held on the ground until it is likely that the aircraft will be able to land directly on arrival. Of course that plan might be frustrated by changing weather conditions, and the implementation of such a system requires air traffic control equipment that can handle the planning and processing.

You have probably sat in an aircraft as it waited in a queue for its turn to reach the runway and take off. This is another time that aircraft are wasting fuel, and better planning of aircraft departures from the gate is another procedure, along with things like single-engine taxiing and limiting the use of reverse-thrust on landing, that can reduce the carbon-footprint at airports.

Aircraft design is also evolving to improve efficiency and reduce fuel use including the use of propfan technology (giving more thrust for the same fuel usage), composite structures (reducing weight – think Boeing 787 Dreamliner, but forget the delays), new airfoil concepts (improving efficiency), boundary layer control (increasing performance and control), and active controls (increasing performance). There are also more revolutionary ideas to improve efficiency, such as the use of flying wing aircraft, but we will wait and see if these long-discussed concepts finally get implemented.

The use of alternative fuels for ground vehicles, such as maintenance vehicles, shuttle buses, etc., has already been mentioned. Plus, just about every aspect of green building technology can be applied to airport structures, just as they do to other building types.



Terminal Developments

There are a number of drivers for changes to airport design in general and terminals in particular, including security issues, the sustainability movement, economic issues, an aging population, and technology developments. Very often the changes are driven by a number of these issues.

The events of September 2001 certainly brought security front and center, and we have seen the area needed by the TSA grow and more technology being introduced to scan passengers and carry-on luggage, as well as all checked-in luggage being scanned.

Security has also been an issue in changes to how passengers are dropped off and picked up at airports, with the aim of keeping possible car bombs away from the terminal itself. But that change has also led to functions that traditionally were part of the terminal moving out, such as check-in for passengers and luggage in areas associated with the parking structure.



ACRP (Airport Cooperative Research Program) Report 10 defines three types of 'out-of-terminal' passenger processing facilities:

- Adjacent passenger-processing facility (APPF) such as a bag-check plaza in a parking garage, from which the passengers would proceed through the terminal.
- On-airport passenger processing facility (OPPF), being similar to an APPF but from which the passengers would proceed directly to a secure portion of the terminal, possibly by means of a people mover.
- Remote passenger-processing facility (RPPF), being an off-airport facility, possible in a city center, from which the passengers would be transported by a non-secure method of transit, such as a bus, to the terminal.

Apart from the fact that people can often check-in remotely, the check-in area of the terminal has been changing to an automated zone, where each airline has its own check-in kiosks or even the use of a common-use self service (CUSS) system.

At one time, if you were meeting someone from a domestic flight, you could meet them at the gate, or you could see a departing friend or relative off at the gate. Now you

cannot get anywhere near the gates if you do not have a boarding pass, and this has led to consolidated meeters and greeters areas in domestic terminals, just as they have traditionally been for international flights. There has also been the introduction of cellphone parking areas, where drivers who are meeting someone can wait until the arriving passenger(s) calls them. Also on the arrivals side you might now find arrivals lounges where you can comfortably wait for your shuttle bus (which these days is likely to be powered by an alternative, more economically friendly, fuel).

Low profile baggage carousel or other devices make it easier for anyone, but particularly for the elderly, to recover their checked bags. So now you have your bags loaded on a cart, but then you find that you have to move up or down to different level in the terminal. Do you dump the cart and carry your bags onto the escalator or wait for an elevator? Now you have another option as we are starting to see banks of high-capacity flow-through elevators that work on a schedule (you do not have to call them) and operate rather like a vertical people mover.

Talking of people movers, there is now an alternative to them, known as high-speed moving walks. There have been a number of attempts at producing high speed moving walks, but the need to accelerate the walk after people get on it and before they exit it has proved problematic. The most successful system to date is the one in Pearson International Airport in Toronto, Canada, on which the walkway and the handrails use a comb-and-slot system that allows them to expand as the walk speeds up at the start, and compress at the end allowing it to slow down so riders can exit easily. The system runs at about 2 km/hr at the start and finish, but running at about 7 km/hr for the majority of the distance.

