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Assessing the Impact of Open Skies Agreements.

D.E.Pitfield
Transport Studies Group
Department of Civil and Building Engineering
Loughborough University
Loughborough
Leicestershire LE11 3TU
UK
E-mail: D.E.Pitfield@lboro.ac.uk

Abstract

This chapter outlines the individual country open skies agreements between the
USA and other countries as well as the EU-US Open Skies Agreement signed in
2007, which came into force in 2008. Evidence is provided on the impact of both
the individual agreements as well as the EU-US Agreement by using time series
analysis with intervention terms to estimate the impact on passenger numbers.
The empirical focus is on British Airways (BA) and its *Open Skies* off shoot airline
serving New York from Paris Orly. Comments are also made on the recently
discontinued service from Amsterdam (AMS) as well as the impact on slots at
airports, including London Heathrow, and on airline start ups given the change in
ownership regulations, for example the case of Virgin America. The data
requirements of a more widespread assessment looking at costs and pricing is
reviewed, following the reports of the Brattle Group and Booz Allen Hamilton, as
well as the difficulties of dealing with the counterfactual, if such data became
available.

1. Introduction.

At the most recent meetings of the Air Transport Research Society, held in Abu Dhabi in June 2009, a paper by Eichinger, Drotleff and Fongern (2009) explored the schedule changes seen to result from the EU-US Open Skies Agreement[1] and described it as muted. Another paper at the same meeting raised the issue of the counterfactual. As Pitfield (2009a) noted, the observed scheduled changes may not be all attributable to the Agreement. These issues in causality suggest a methodology needs to be adopted that can deal with this difficulty.

Earlier work on alliances by Iatrou and Alamdari (2005) suggested that airlines benefited from the formation of alliances[2] and, in particular, the advent of code sharing and the gain of immunity from US Antitrust legislation when countries signed individual open skies agreements with the USA. Iatrou and Alamdari surveyed and reported on the expectations and perceived impacts of alliances. There is an expectation of a positive impact on traffic on a route as well as on the shares of the alliance members and these impacts will be greater if the participating airlines operate hub and spoke systems based at both the origin and the destination. In addition, these impacts are thought to reach fruition "between 1 and 2 years of the inception of the partnerships" (Iatrou and Alamdari, 2005, p.129) and will be greater from the inception of antitrust immunity. These findings were based on surveys of manager's opinions. These open skies agreements are shown in Table 1 for Europe (Pitfield, 2009b).

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[1] On the 30th April 2007 EU and US leaders signed the Open Skies Agreement at a summit in Washington. This came into force on March 30th 2008 and superseded the individual EU country Open Sky Agreements that many EU countries had with the US, commencing with the Netherlands in 1992.
[2] A recent conference has discussed the importance of alliances, see Air Transport News(2009)

Table 1 near here

In Pitfield (2007b) a methodology was used to see if these opinions were empirically founded in evidence of changes in market share or total passengers on the routes. No such evidence was found but the methodology used may well be appropriate to deal with the issue of the counterfactual in passenger numbers in the assessment of the EU-US Agreement. If the first application of the model can produce good fit for the period before any interventions, then the significance of those interventions when added to the model will demonstrate their contribution. It was suggested that this methodology could address the significance of the change in passenger numbers attributable to the EU-US Open Skies Agreement. The conclusion of the assessment of alliances was that,

> "It is hard to see how these results can be viewed as compatible with the views of the Brattle Group (2002) that the spread of open skies agreements will increase transatlantic traffic. Open skies agreements do not seem to result in either a significant growth in traffic or in increased competition. Indeed, the strength of the alliances could act as a barrier to entry, contrary to the rhetoric that surrounds open skies policies." p.201

2. The Need to Assess Open Skies Agreements.

Several industry oriented meetings have been set up to discuss the EU-US Open Skies Agreement and the impending advent of the policy led to some considerable research effort by consultancies for the EU by Brattle (2002) and Booz Allen Hamilton (2007). These works, along with the more emotive views of the industry, including those of airlines and regulators, are summarised in Pitfield

(2009a, 2009b) and a special issue of the Journal of Air Transport Management contains some of the key papers from the AirNeth conferences held in anticipation of the Agreement in Belgium in 2008, for example, Button (2009) and Humphreys and Morrell (2009).

Brattle and Booz Allen Hamilton were both anticipating an open aviation area but the actual Agreement was implemented, subject to a suspension clause, short of the items that motivated that clause, that is, the absence of full ownership and full cabotage rights.

Indeed, the main provisions summarised in Pitfield (2009a,2009b) are:

- Removal of restrictions on route rights – any EU airline is allowed to fly from any EU city to any US city. Conversely, any US airline can fly into any EU airport and from there onto third destinations. In addition, EU airlines can fly between the US and non-EU countries that are members of ECAA, the European Common Aviation Area, such as Norway and Croatia. The unequal treatment of cabotage is an issue; although US airlines can fly onwards in Europe, EU airlines cannot fly domestically in the US.

- Foreign Ownership – the main change here is that US companies can now only own 49 percent of the voting rights in European Airlines, whereas European Airlines can still hold only 25 percent in US airlines, although they can own more in non-voting shares. It is the intransigence of the US position here, as well as on cabotage, that has led first to a delay in the implementation of the Agreement and then the EU's right to suspend the Agreement if insufficient progress towards a revised Agreement is made by mid-2010.

Whereas the earlier work on alliances was concerned just with passenger numbers attributable to a change in the regulatory environment, the assessments

suggested by these two reports covers not only the resultant passenger numbers, that can be assessed in a similar way as before, but also the changes in airline costs, competition and cooperation. The passenger numbers can be due to a stimulation of demand due to the fall in output restrictions or to a fall in prices due to a fall in costs due to a stimulus to efficiency. Prices may also fall due to increased cooperation, although this lessening of market power maybe less easy to see. To the extent that all these things happen, subject to estimates of price elasticity, there is a rise in consumer surplus. Clearly these issues are of some policy significance.

It is obvious that attributing any change in passenger numbers to these causes is difficult. In the first instance, just identifying passenger growth due to the Agreement is important. In addition, to deal with the other issues requires better information on airline costs, on fare variations and their causes as well as to account for the counterfactual. It may well be the case that our ambitions must be limited to the assessment of passenger numbers and this is the subject of the empirical part of this chapter.

3. The Approach to Assessment.

The difficulties with costs and fares data is dealt with in Pitfield (2009a, 2009b). In short, cost data is lacking, except at a periodicity that does not tie in with passenger data and then only for larger airlines. No data is regularly gathered on changes in fares offered on transatlantic flights and to derive elasticities would require linking this to demand. Passenger data for the affected north Atlantic sector is kept by the US Bureau of Transportation statistics and is freely available

online from 1990.

It seems that assessment of the impact is largely hampered by the absence of relevant data. The exception is passengers. However, to attribute the change in passengers to the Agreement means that the counterfactual needs to be addressed. What would the traffic have been if the EU-US Agreement had not been signed? If that can be determined, then the difference between this and the actual traffic is that due to the Agreement. A time series model, given the monthly periodicity of the data, is appropriate and the long time history from 1990 is helpful.

The approach is to model the passenger data up to the start of the Agreement and then to allow for an intervention variable to capture the additional effect of the Agreement. This variable can be specified as a short, sharp shock, as it was when the impact of Ryanair start-ups was investigated (Pitfield, 2007a), or as a gradual term when impacts of alliance formation were investigated (Pitfield, 2007b). To avoid confounding influences, despite the fact that the time period covered is nearly 20 years and will contain a variety of economic peaks and troughs, specific allowance will be made for the events of September 2001 as well as the current global downturn. Past experience suggests that the former will again be found to be immediately influential whereas the latter may not for the reasons addressed in this paragraph although its impact at the time of writing is short in the time series data and it may be longer in its actual impact than previous recessions since 1990 that are embodied in the variations in the data since 1990.

4. An Overview of ARIMA Modelling and Goodness-of-Fit

Wei (1994) contains an introduction to ARIMA modelling, intervention analysis and the assessment of the fit of the model to the data. Another very useful guide is McDowell et al (1980). In a variety of publications, including Pitfield (2007a, 2007b, 2008), the author has used these techniques in air transport applications so the following description is bound to owe something to these previous papers.

Acceptable goodness-of-fit statistics will be generated by a model and the residuals will be white noise if the model replicates the main movements in the data. In this case, all the indigenous factors that cause the original data to vary will be covered by the model.

ARIMA models are described by three parameters, (p,d,q). p is the order of a vector of autoregressive parameters AR(p), d is the degree of differencing and q refers to the order of a vector of moving average parameters, MA(q). So a ARIMA(1,0,0) or AR(1) model can be written as

$$Y_t = \varphi_1 \, Y_{t-1} + a_t \qquad\qquad (1)$$

and using the backshift operator, B $Y_t = Y_{t-1}$

$$(1 - \varphi_1 B) \, Y_t = a_t \qquad\qquad (2)$$

where Y_t is the time series data and a_t is the disturbance or random shock at time *t.* There is a tendency to favour parsimonious models as well as to avoid some

mixed models which may suffer from parameter redundancy (McDowell et al, 1980)[3].

It may be necessary to difference the data Y_t to ensure stationarity If so a (1,1,0) model results and Y_t is replaced by $z_t = Y_t - Y_{t-1}$ and the backshift operator now is in terms of z_t as B $z_t = z_{t-1}$

If the model has a seasonal component, for example, if the data is gathered over a long period of time and is recorded for short intervals within this period as it is for the data used here, then it will be necessary to specify a seasonal ARIMA model. These are also described by three parameters (P,D,Q)S where P is the order of a seasonal autoregressive vector, D is the degree of seasonal differencing and Q refers to the order of a vector of moving average parameters. S is equal to 12 as the data is monthly with an annual periodicity. So a SAR(1) or Seasonal ARIMA(1,0,0)12 model can be written as

$$Y_t = \Phi_{12} \; Y_{t-12} + a_t \qquad\qquad (3)$$

and using the backshift operator, B^{12} , which as it is raised to a power involves repeating it,

$$(1- \Phi_{12}B^{12}) \; Y_t = a_t \qquad\qquad (4)$$

If seasonal differencing is required, then this model is applied to the seasonal differences, $w_t = Y_t - Y_{t-12}$.

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[3] In Table 3, AR(1) refers to an autoregressive model component with one parameter and SMA(1) refers to a seasonal moving average one parameter component.

Combining the two model components multiplicatively, gives an ARIMA(p,d,q)(P,D,Q)S model which can be generally represented as

$$\varphi_P(B^S)\ \Phi_p(B)(1\text{-}B)^d(1\text{-}B^S)^D z_t = \theta_q(B)\ \Theta_Q(B^S)a_t \qquad (5)$$

Variations can be derived from (5), for example an ARIMA (1,1,0)(1,1,0)12 is applied to the regularly and seasonally differenced data where

$$w_t = z_t - z_{t\text{-}12} = (\ Y_t - Y_{t\text{-}1})\text{-}(\ Y_{t\text{-}12} - Y_{t\text{-}13})$$

and is given by

$$w_t = \varphi_1\ w_{t\text{-}1} + \Phi_{12}\ w_{t\text{-}12} - \varphi_1\ \Phi_{12}\ w_{t\text{-}13} + a_t \qquad (6)$$

and using the backshift operators, B and B^{12} now applied to w_t

$$(1\text{-}\varphi_1 B)(1\text{-}\Phi_{12}B^{12})\ w_t = a_t \qquad (7)$$

Inspection of the Autocorrelation Coefficient Function (ACF) and Partial Autocorrelation Coefficient Function (PACF) determine p,d,q and P,D,Q as indicated above, although it is the consensus that this process is as much art as science.

For the monthly traffic data a model is calibrated, including seasonal components, as this is appropriate for this data.

The procedures followed for calibrating the passenger data model is described below. For the monthly data, from 1990, to ensure that the series has a constant variance a logarithmic transformation may be necessary. ACF and PACF plots

are examined at 12 month lags to establish whether seasonal differencing is required. The ACF and PACF plots are then used to determine whether an AR or MA model is appropriate along with the number of parameters, with a preference to avoid some mixed models and those with a large number of parameters. ACF and PACF plots are then calculated again for the residuals of this model to see what the non-seasonal form is and whether non-seasonal differencing is required. The residuals from this combined model must have white noise residuals. This will be shown by the Box-Ljung Q statistics and the ACF of the residuals.

The model is determined for the data before the commencement of the Agreement, then the same model form, plus intervention variables, is applied to the whole data series to establish the impact on the total series of the start of the Agreement or the start of BA's *Open Skies* service. This can then be compared to the actual size of the passenger numbers and inferences drawn on the impact of the start of service. A picture of a BA *Open Skies* Boeing 757 in this livery is shown landing at New York John F. Kennedy Airport (JFK) in December 2008 in Figure 1.

Figure 1 near here

An abrupt step function is used initially for the intervention term even though it might take a variety of forms, for example, individual pulses or gradual interventions. Other forms are subsequently investigated if intervention effects are hard to estimate. These resulting coefficients are then properly interpreted as representing the impact on the whole time series. It is also necessary to cater for

the impact of any other exogenous impacts on the data and this is done for the terrorist attacks of 9/11 where it is obvious that the effects are marked as well as the recent global economic downturn, although the start date for this could be the subject of a debate.

Visual inspection is sufficient to ensure that the model replicates the cycles in the data, given that the residuals are white noise but the assessment of the general applicability of the fit requires a formal assessment and this can be undertaken using the root mean square error. This is

$$\text{RMSE} = \sqrt{1/T \sum_{t=1}^{T} (Y_t^s - Y_t^a)^2} \ . \qquad (8)$$

where Y_t^s = forecast value of Y_t

Y_t^a = the actual values and T = time periods

Comparison between model fits is difficult as this statistic is influenced by the absolute scale of the errors. Theil's inequality coefficient, U, is used to counteract this difficulty as the denominator of the coefficient corrects for differences in scale.

$$\text{U} = \sqrt{1/T \sum_{t=1}^{T} (Y_t^s - Y_t^a)^2} \Big/ \sqrt{1/T \sum_{t=1}^{T} (Y_t^s)^2} + \sqrt{1/T \sum_{t=1}^{T} (Y_t^a)^2} \qquad (9)$$

In addition, it can be broken down into the bias, the variance and the covariance proportions of U where U^M is an indication of systematic error, U^S indicates the ability of the model to replicate the degree of variability in the data and U^C shows the unsystematic error.

$$\text{U}^M = (\bar{Y}^s - \bar{Y}^a)^2 \Big/ (1/T) \sum (Y_t^s - Y_t^a)^2 \qquad (10)$$

$$U^S = (\sigma_s - \sigma_a)^2 \Big/ (1/T)\sum (Y_t^s - Y_t^a)^2 \qquad\qquad (11)$$

$$U^C = 2(1-\rho)\sigma_s\sigma_a \Big/ (1/T)\sum (Y_t^s - Y_t^a)^2 \qquad\qquad (12)$$

U^M, U^S and U^M sum to 1 and ideally, U^M, U^S = 0 and U^C = 1. (Pindyck and Rubinfeld, 1998).

In addition, Stationary R-Squared and Normalised Bayesian Information Criterion (Normalised BIC) are shown. The former has a range of negative infinity to 1 with positive values showing that the stationary part of the model is superior to a simple mean baseline model[4]. The Normalised BIC is a measure of overall fit that also accounts for model complexity so it is useful for examining different models of a single series[5].

5. Empirical Studies

5.1 Supply Side Changes

The abrupt changes at London Heathrow (LHR) between 2007 and 2008 were first shown by Cole (2008) and reproduced in Pitfield (2009a,2009b). The interest of the US carriers in gaining access to such an important, if slot constrained hub, are well known and the changes reflect that. These are illustrated in Table 2 taken from Cole (2008). The jockeying for valued LHR slots by alliance partners is interesting and these often represent moves from London Gatwick (LGW) to

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[4] See Harvey (1989).
[5] This information is from SPSS online help at mk:@MSITStore:C:\Program%20Files\SPSSInc\SPSS16

LHR. In Figures 2 and 3 illustrations are made of the planned slot allocations in 2009.

Figures 2 and 3 near here

As a result of examining these changes and the frequencies offered the most important candidate routes for assessment by volume are London (Heathrow, Gatwick, Stansted and Luton, respectively LHR, LGW, STN, LTN) – New York (Kennedy and Newark, JFK, EWR), London – Chicago (O'Hare and Midway, ORD, MDW), London – Los Angles (LAX) and London – Washington Dulles (IAD)[6]. In each case the total traffic at origin city and destination city must be addressed to cover cases where flights are switched, say between LHR and LGW or between JFK or EWR.

Further, a similar approach could be taken to investigate the impact of Virgin America (VX) that set up in August 2007 as a result of the ownership changes in the Agreement and operates between western and eastern seaboard cities in the USA. At present the airports served are LAX, San Diego (SAN), San Francisco (SFO), Las Vegas (LAS), JFK, IAD and Seattle (SEA).

In addition the BA initiative of setting up a new subsidiary airline, first in Paris and then in AMS can also be assessed. It is this venture that is the empirical focus of the paper, and Paris is concentrated on as the AMS service finished in August 2009 and the length of service post the Agreement may not be long enough for

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[6] Washington Reagan has no transatlantic traffic but a case could be made for including Baltimore.

the assessment technique to work. This may also be true of Paris where there is only 12 months of data post the Agreement and less of actual traffic experience.

5.2 The Passenger Data.

To analyse the impact of the BA *Open Skies* airline initiative it is necessary to avail the analysis of data on passengers carried between France and the USA. This is available online and can be downloaded, from 1990 (US Bureau of Transportation Statistics, 1990.) Statistics indicating the traffic carried between New York (both JFK and EWR) and Paris (Charles de Gaulle, CDG and Orly, ORY) are filtered and pasted into a new spreadsheet for each year. Flights that have no passengers, for example those by Federal Express, are deleted before the file is sorted in ascending monthly order. It is then relatively trivial to deduce the monthly totals for each year between Paris and New York before, in turn entering this monthly data into an SPSS data file for subsequent analysis.

June 2008 saw the first of these flights by the BA subsidiary between JFK and ORY and by the year end this traffic totalled 14,406 or less than one percent of total passengers between the cities. However, this total for 6 months is being compared to an annual total so it is perhaps a better indication to examine what has happened so far in 2009. In the first three months traffic has amounted to 4,927 and this is 1.49 percent of the three month total passenger traffic between Paris and New York. Over the whole period of operation, load factor has averaged 51.59 percent and this, plus the demise of the similar service offered from AMS to JFK, plus the failure to fulfil plans to introduce service from further EU major cities, like Milan, suggests that it is hard to expect that the impact of

BA's *Open Skies* has been significant, but a time series analysis with intervention analysis will determine this.

Figure 4 shows the monthly passenger traffic from 1990 to the first quarter of 2009 between Paris and New York. It can be seen that traffic has a cyclical pattern over each year peaking in the summer months and declining in winter. Initially this variation was large and it has declined over the period. Peaks have tended to rise from about early 2002 and troughs have been less steep over much of the period.

Figure 4 near here

5.3 The Results of the Assessment.

The procedures outlined in section 4 were followed. Preliminary analysis reveals that there are outliers in the series, most notably in late 2001, so the need to explicitly model 9/11 is empirically justified. The interpretation of the ACF and PACF plots suggests alternative models as appropriate to the data up to September 2001 and indeed, it is not clear that a logarithmic transformation is required to ensure a constant variance, so there are a variety of models that are alternatively specified in terms of passengers or the logarithm of passengers. These include (2,0,1) (1,0,0)12, and (1,0,0) (0,1,1)12 on the original data and on the logarithmic transformations. The goodness-of-fit statistics and the relative parsimony along with the ACF of the residuals suggests the latter form is the preferred model applied to the original data with no constant term.

Applying the intervention variables yields no significant impacts for the Open

Skies Agreement, BA's start-up of *Open Skies* in Paris or of the current economic

downturn[7]. This is true whether these interventions are specified as steps,

exponential increases, or pulses[8].

The impact of the terrorist attacks in 2001 is significant and alternative

specifications indicate marginally different impacts. The coefficient of -46,859.97

(t = -7.366) indicates an abrupt drop in passengers when a continuous step

change is specified. Compared to September the year before, this is a 31 percent

fall. If this intervention is allowed to have lagged impacts specified, then at lag 0

there is a decline of 47,135.21 (t = -7.393) and at lag 2, in November 2001, there

is a further impact of -29,933.95 (t = -4.726). Although the goodness-of-fit of this

model is slightly inferior, Table 3 shows the results for both of these models

(Model 1 and Model 2). It also shows the best results from specifying the 2001

intervention as a simple pulse that gives the best overall goodness-of-fit statistics

(Model 3). The intervention is then -48,799.48 with a slightly reduced t = -7.267.

Table 3 near here

Figures 5 and 6 near here

Figure 5 shows the ACF plot of the residuals from Model 3. It can be seen that

these are white noise as they are within the confidence levels for all lags shown.

Figure 6 demonstrates that this model also replicates the turning movements of

the original series whilst its goodness-of-fit is demonstrated by the statistics given

in Table 3.

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[7] The start date here was taken as August 2008, just prior to the demise of Lehman Brothers. However, the various economic cycles contained in the data since 1990 suggest this intervention is unnecessary irrespective of its start date or form.

[8] As there is no non-seasonal differencing, steps and pulses can be examined. The constant is excluded as there is seasonal differencing.

The model fit could be improved if another intervention variable were allowed to account for the identified level shift outlier identified in November 2003. Investigating this month in some detail shows New York – Paris traffic at 62,668 of which Air France carried 28,476 and the US carriers, Delta, Continental and American carried 23,477. The difference is the passengers carried by Air India. Paris – New York, totals 56,391 of which Air France has 26,591, the US airlines, 22,197 with the balance due to Air India. It may be that the shift is due to Air India's operation. However, this started in December 2002 and so it may be, but this seems unlikely, that comparing the two Novembers gives rise to the outlier and, if this is the case, an intervention term should be specified for December 2002, not November 2003. Traffic between the two Novembers differed by 18,230.

6. Conclusions

The intervention analysis here failed to find a significant effect of the start of service of BA's *Open Skies* airline from Orly, but given the scale of the Paris – New York traffic and its relative size, as well as how long the service has been in operation, this is not surprising. However, there is no doubt that the Agreement facilitated this service and this in turn facilitated traffic. On this basis it cannot be argued that there was no impact. However, the fact that BA discontinued the AMS service and has not initiated service at Milan, Frankfurt or Brussels, as it originally planned, plus rumours about its desire to sell the subsidiary all suggest that the degree of success is relatively disappointing even though its share of high yielding business traffic from Paris may not be.

In addition to BA's subsidiary operating at ORY, it is also clear that considerable changes in supply took place at LHR in 2008 and these changes were largely maintained in 2009. These changes are also directly attributable to the EU-US Open Skies Agreement and empirical estimation of the impact on passenger numbers from London to key destinations still has to be undertaken.

Considerable changes in data availability will also be necessary if any change in passenger numbers can subsequently be linked to changes in fares and airline costs resulting from increased cooperation or competitiveness.

Previous work also failed to find significant changes in passengers and alliance market share as a result of code sharing and the entry into individual country open skies agreements with the US so the nature of the findings here are consistent with this.

Although they were never the main focus of this investigation, the impacts of September 2001 can be seen to vary depending on the model and variable specification. However, the impacts are relatively close to each other whichever model is chosen and, as a result, they can be taken to represent a robust indication of the impact, which is considerable.

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Tables

Table 1: The European Open Skies Bilaterals[1]

Country	Date
Netherlands	14/10/92
Belgium[2]	1/3/95
Finland	24/3/95
Denmark	26/4/95
Norway	26/4/95
Sweden	26/4/95
Luxembourg	6/6/95
Austria	14/6/95
Czech Republic	8/12/95
Germany[3]	29/2/96
Italy[4]	11/11/98
Portugal	22/12/99
Malta	12/10/00
Poland	31/5/01
France	19/10/01

1 The full list for the US is at US Department of State (2009)

2,3 Provisional

4 Comity and Reciprocity

Source: Button (2008) repeated in Button (2009)

Table 2: Sources of Open Skies slots

Airline	Slots
Air France	Reduced Paris from 12 to 7 per day: 3 to DL, 1 CO, 1 AF to Los Angeles (LAX)
KLM	Dropped 2 to Eindhoven (EIN) and reduced Rotterdam (RTM) by 1: Funded Northwest's (NW) Detroit (DET), Minneapolis (MSP), Seattle (SEA) Service as Skyteam partner
Alitalia	Dropped 3 at Milan Malpensa (MXP) as part of strategic retrenchment: 1 to CO, 1 to US Airways (US) and 1 BA
GB Airways	Sold LHR slots: 2 to CO, 1 to BA, 1 to Qatar Airways (QR)
Iberia	Dropped 1 to Bilbao (BIO): Funded 2nd AA Dallas (DFW) move to LHR from LGW

Source: Cole (2008)

Table 3 Alternative Models of Paris – New York Passengers, 1990 – March 2009

Model 1 (1,0,0) (0,1,1)12	Parameters	t tests	Goodness of Fit
AR(1)	0.753	16.795	
SMA(1)	0.429	6.583	Stationary R-Squared = 0.764
Intervention 9/11	-46859.974	-7.366	Normalised BIC = 18.145
			RMSE = 8091.859
			U = 0.031 U_m = 0.004
			U_s =0.002 U_c = 0.972

Model 2 (1,0,0) (0,1,1)12			
AR(1)	0.758	16.615	
SMA(1)	0.417	6.350	Stationary R-Squared = 0.748
Intervention 9/11, Lag 0	-47135.211	-7.393	Normalised BIC = 18.197
Intervention 9/11, Lag 2	-29933.950	-4.726	
			RMSE = 8302.462
			U = 0.032 U_m = 0.000
			U_s =0.005 U_c = 0.987

Model 3 (1,0,0)(0,1,1)12			
AR(1)	0.750	16.712	
SMA(1)	0.446	6.973	Stationary R-Squared = 0.771
Intervention 9/11	-48799.481	-7.267	Normalised BIC = 18.142
			RMSE = 7982.063
			U = 0.031 U_m = 0.001
			U_s =0.001 U_c = 0.971