Did the Lufthansa Group GDS Surcharge Stimulate Direct Online Sales? A Causal Analysis

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Abstract

Lufthansa Group's €16 surcharge on bookings through the GDS sent shockwaves through the airline value chain. But what is the causal impact of this pricing strategy on direct online bookings, at the expense of the indirect channel? We develop a panel estimation strategy to investigate this question.

Keywords: Difference-in-differences; GDS surcharge, Lufthansa group, online traffic, cointegrationThis summer, Lufthansa Group announced a €16 surcharge to be imposed on all bookings made via the GDS, causing a stir in the airline distribution world. As of 1st September, every first ticket issued by the participating airlines is subject to the GDS surcharge (May 2015a).

While there is a long-standing debate in the industry about the value of the GDS, it remains a key component of the airline distribution landscape. Indeed, the demise of the GDS has long been predicted by researchers (e.g. Alamdari and Mason, 2006) and industry observers note a growing focus on direct online sales by all airlines, whether low-cost or full service (e.g. Harteveld 2012). However, so far, the role of the GDS in the market has not been seriously challenged (Thakran and Verma 2013). Despite the years of investment and improvements in direct online solutions, the booking ratio for all but the no-frills airlines has been disappointing (cf Klein et al. 2005). Furthermore, IATA's NDC initiative heavily promoted by the airline association and allowing for improved ancillary sales, one of the biggest drawback of existing distribution systems, is expected to even strengthen the position of GDS (Westermann 2013).

The GDS surcharge represents an innovation in airline pricing that may stimulate direct sales through several mechanisms. First, Lufthansa Group carriers may genuinely offer lower fares on their websites than OTAs can, attracting price sensitive customers. Second, OTAs may find themselves in a weaker position on fare comparison sites ("metamediaries") vis-a-vis the airline's direct offering. Third, leisure agents and travel management companies will be encouraged to use a dedicated web portal outside of the GDS. How strong these effects will turn out to be in practice is currently an open question, which we take up in this paper. We seek to estimate the *causal* impact of the GDS surcharge on *direct online traffic* of the participating airlines. Direct online traffic is known to be closely related to ticket sales (Gnutzmann 2015), and a stated motive of introducing the surcharge is to increase sales through the customer-facing website, making it important to estimate this effect

rigourously. Web traffic is often an important business objective in itself (see e.g. Kaiser and Kongsted 2005), in addition to being closely linked to ticket sales.

To identify the surcharge effect as precisely as possible, we develop a panel data method based on daily online airline traffic data. Daily online traffic data are highly volatile, but closely correlated between "similar" airlines. For example, the online visits of *klm.com* and *lufthansa.com* closely follow a common trend. This allows us to estimate the effect of the GDS surcharge as follows: using *klm.com* as a "control group" for l*ufthansa.com* – to isolate seasonal effects, common shocks to travel demand, etc. - we look how the difference between visitors to the two airlines changes after LH's introduction of the GDS surcharge. This "difference-in-differences" approach, expertly exposited in Angrist and Pischke (2008), may allow for a truly causal interpretation. The "difference-in-differences" approach has been widely applied in the different fields of tourism. The method has proved fruitful e.g. for the analysis of the impact of the sharing economy on the hospitality industry (Zervas et al., 2014) or to estimate the impact of overbooking experience for subsequent travel choices (Wangenheim and Bayon 2007). From an econometric point of view, daily online traffic data are not only highly volatile; they appear to be largely *non-stationary*, meaning that classic time series methods cannot be used to isolate these effects. For valid inference, our differences-in-differences model needs to take into account this non-stationarity. At a technical level, this means that we set up a panel data co-integration model and look for structural breaks in the co-integration relationship after the introduction of the surcharge. Given that Lufthansa Group implemented the surcharge less than two weeks ago at the time of writing, preliminary results and data are not yet available. However, thanks to the short publishing lead times of online data sources, this is set to change in the coming weeks and months – and certainly well ahead of the ENTER16 conference.

Data

A panel dataset of daily website visits as estimated by www.similarweb.com will be used for the analysis. Data has been collected for 9 airlines from 1st January 2015. 4 of the airlines Lufthansa, Swiss Airlines, Germanwings and Austrian Airlines belong to the treatment group, i.e. introduced the GDS surcharge on 1st September 2015. The other 5 airlines – British Airways, KLM, Air France, Air Berlin and Alitalia are the control group.

At the time of preparation of this note, for obvious reasons, the online traffic data after the introduction of the GDS surcharge was not available. However, the data set will be updated on continuous basis as the data becomes available on www.similarweb.com server.

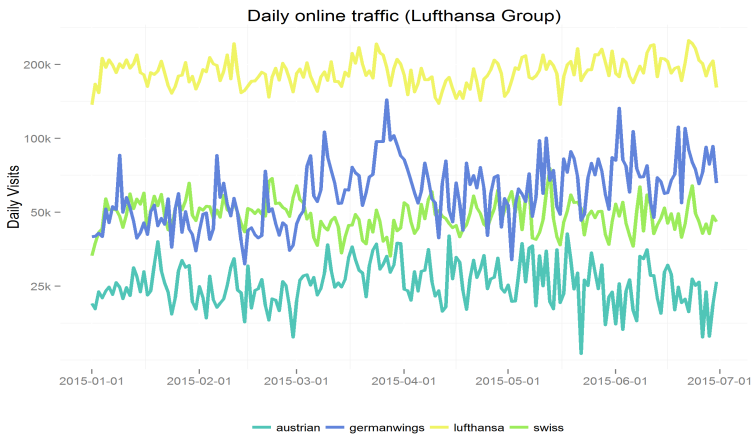

Fig. 1. Daily online traffic – treatment (Lufthansa) group

Daily website traffic for the treatment group, in the period prior to treatment, in the first half of 2015 is shown on figure 1. Similar data for the control group is available.

It is apparent from the figures that there is considerable daily variation in traffic figures, meaning the data are noisy. Moreover, seasonal effects are apparent. This makes it difficult, in principle, to infer causal effects from simple univariate time series observations. Moreover, the data appear from visual inspection to be potentially non-stationary; this is confirmed more formally in table 1.

However, the differences in traffic between airlines is stationary. This allows the use of cointegration methodology.

Empirical Strategy

Let x^{it} denote the number of visitors to the website of airline i on day t. As preliminary data exploration showed, this time series will in general be non-stationary , rendering direct time series regressions invalid. Instead, we rely on a cointegration approach.

Testing stationarity: For each airline traffic series in the sample, conduct a detailed stationarity analysis using a variety of unit root tests.

Cointegration Regression: Consider airlines j and k from the sample. Then estimate a regression of the form**:**

$$\boldsymbol{x_{jt} = a + bx_{kt} + cs_t + e_t} \qquad (1)$$

Levels		1st Differences		Integration
ADF	Lags	ADF	Lags	Level

Lufthansa	-3.305*	8	-4.724***	7	I(1)
Swiss	-2.768	6	-10***	5	I(1)
Germanwings	-5.066***	1	-7.947***	4	I(0)
Austrian	-2.649	8	-6.061***	7	I(1)
BA	-1.899	20	-4.024***	19	I(1)
KLM	-2.158	30	-3.89**	29	I(1)
Air France	-2.975	5	-9.762***	4	I(1)
Alitalia	-3.85**	6	-10.6***	5	I(0)
Air Berlin	-8.2***	2	-4.978***	26	I(0)

Table 1. Unit Root Tests

Where a and b are coefficients to be estimated, airline j is a member of Lufthansa group implementing the surcharge, and airline k is a not a member of Lufthansa Group (i.e. also not implementing the surcharge). s^t is a dummy variable, taking value one for days where LH group implemented the surcharge and zero otherwise. e^t is the error term.

Model (1) is estimated using ordinary least squares (OLS). The first hypothesis is that the residuals of this model are stationary, i.e. the regression is, in fact, cointegrating

H1. Daily airline traffic data are co-integrated

Effect of the surcharge: The surcharge is expected direct bookings through the mechanisms discussed in the introduction. As a proxy for direct bookings, we use online traffic volume. Assuming that the model is estimated in log-log form, we can interpret coefficient c as the elasticity of online visits with respect to the imposition of a €16 GDS surcharge. This leads to

H2. The GDS surcharge raises direct bookings

For c to represent a causal effect of the GDS surcharge a parallel trend assumption must hold (Angrist and Pischke. (2008)). This assumption is violated if something other than the treatment changes in one group but not the other at the same time as the treatment. If such changes happen to some of the control airlines, they will be substituted.

Understanding the GDS Surcharge: This section will turn to more descriptive data, e.g. analysing changes in web traffic sources of the participating airlines vis-a-vis comparison group (do metamediary referals rise?), and look into the pricing situation on OTA websites, e.g. how far the surcharge is passed on to consumers or whether leading OTAs develop direct sales relationships with Lufthansa.

Conclusions

Recent reports based on internal Lufthansa Group documents (May 2015b) suggest that the GDS surcharge has led to a significant decrease in the GDS bookings in the first weeks after the surcharge was imposed. The magnitude of this effect calls for deeper understanding of the overall impact. Did the customers switch to the competitors or was the reported outflow compensated by an increase in direct online booking? Given that transactional booking data are unlikely to be published soon, indirect estimates based on online traffic are a very attractive alternative: data are readily available, and the tightly linked to ticket sales through the conversion rate. So long as the GDS policy change does not directly affect the conversion rate, the number of website visits will allow to estimate the GDS surcharge impact on the direct booking volume.

Advanced time series econometric methods, especially cointegration analysis, have a great promise to improve our understanding of travel markets, where data availability is often limited, building on the success of other fields (e.g. Kaiser and Kongsted 2005 study cointegration between web visits and newspaper sales).

References

Alamdari, F.; Mason, K. (2006). The future of airline distribution. *Journal of Air Transport Management*, Vol. 12, Issue 3, pp. 122-134

Angrist, J. D.; Pischke, J. S. (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press

Economist (2012). The ineluctable middlemen. *The Economist*, August 25th 2012: Available online http://www.economist.com/node/21560866

Gnutzmann, H. (2015). Digital Airlines: Online traffic predicts 75% of passenger volume. *The flexponsive blog*: Available online https://www.flexponsive.net/blog/digital-airlines-online-traffic-predicts-passengers/

Harteveld, H. (2012). The Future of Airline Distribution: A Look Ahead. *IATA Special Report*

Kaiser, Ulrich, and Hans Christian Kongsted. "Do Magazines"Companion Websites' Cannibalize the Demand for the Print Version?." ZEW-Centre for European Economic Research Discussion Paper 05-049 (2005).

Klein, Stefan, Frank Köhne, and Anssi Öörni. "Barriers to online booking of scheduled airline tickets." Journal of Travel & Tourism Marketing 17.2-3 (2005): 27-39.

May, K. (2015a). Lufthansa to add surcharge to every booking made via the GDS. *Tnooz*: Available online http://www.tnooz.com/article/lufthansa-to-add-surcharge-to-every-booking-made-via-the-gds/

May, K. (2015b). Lufthansa takes GDS booking tumble with new surcharge, rival carriers benefit. *Tnooz*: Available online http://www.tnooz.com/article/lufthansa-takes-gds-booking-tumble-with-new-surcharge-rival-carriers-benefit/

Thakran, K.; Verma, R. (2013). The Emergence of Hybrid Online Distribution Channels in Travel, Tourism and Hospitality. *Cornell Hospitality Quarterly*. Vol. 54, No. 3

Wangenheim, Florian V., and Tomás Bayón. "Behavioral consequences of overbooking service capacity." Journal of Marketing 71.4 (2007): 36-47.

Westermann, Dieter. "The potential impact of IATA's New Distribution Capability (NDC) on revenue management and pricing." Journal of Revenue & Pricing Management 12.6 (2013): 565-568.

Zervas, Georgios, Davide Proserpio, and John Byers. "The rise of the sharing economy: Estimating the impact of Airbnb on the hotel industry." Boston U. School of Management Research Paper 2013-16 (2014).