Hidden Baggage: Behavioral Responses to Changes in Airline Ticket Tax Disclosure

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Online Appendix

A Data

A.1 Data Construction

The data for our analysis consist of two main components: (1) the restricted-use (international) portion of the DOT's Origin and Destination Survey (DB1B) data (Bureau of Transportation Statistics (2009-2014*b*)), featuring ticket-level itinerary characteristics, total fares paid, and passenger counts for a 10 percent sample of all tickets redeemed by U.S. reporting carriers on a quarterly basis, and (2) detailed historical data on tax and non-tax airport charges from RDC Aviation, measured on an airport-route-aircraft-specific basis. The combined data span the period 2009Q4 (the earliest quarter of broad data availability from RDC Aviation) through 2014Q2.

In line with other applications of the DB1B data (see, e.g., Brueckner (2003) for a careful description), we apply multiple sample restrictions to ensure a relatively homogeneous product sample. A first, non-standard, restriction that we impose, however, is to *exclude* all domestic itineraries due to limited variation in unit taxes, and we focus exclusively on international itineraries that originate in the U.S. en route to a foreign destination (or the reverse).[1] Beyond that, we exclude at the outset all one-way or multi-leg itineraries (i.e.

[1]Based on reporting requirements, flights operated by foreign carriers appear in the sample only insofar

itineraries involving a sequence of destinations which the DOT distinguishes from layovers using flags for directional breaks); itineraries involving at least one first-class or business-class segment (accounting for at least 10 percent of miles flown); group tickets featuring 9 or more passengers, and all tickets flagged by the DOT as involving implausibly high prices per mile flown. This latter restriction appears targeted at fares in excess of $0.90 per mile (not inflation adjusted), albeit with unspecified exceptions, and covers approximately 1-1.5% of ticketed itineraries. We extend this restriction to exclude all fares—without exception—that exceed $1 per mile (0.4% of the remaining sample). At the opposite end of the distribution, we exclude all tickets with fares of less than $0.02 per mile or *base* fares of less than $0.01 per mile (or $50) as likely award travel.[2] Depending on quarter, this exclusion eliminates approximately 7-10% of ticketed itineraries from our sample. Among the remaining set of round-trip coach-class non-award tickets, we further exclude ticketed itineraries that fall outside of the 5^{th}-95^{th} percentile of the fare distribution within itinerary-quarter to limit the potential influence of promotional offers or last-minute purchases.

Multiple steps are required to match the resulting DB1B sample with historical data on airport-level tax and non-tax charges from RDC Aviation in order to decompose total fare amounts in the DB1B into base fares, ticket taxes, and non-tax charges. Airport-specific tax amounts are commonly dependent on flight distance or route (with differing levels of tax for transatlantic versus intra-EU or domestic flight segments, for instance), or whether passengers are exiting the airport versus catching a connecting flight. Taxes may also differ on rare occasion according to operating airline. Airport-specific non-tax charges—such as runway

as these form part of a longer itinerary which includes at least one segment operated by a U.S. carrier (e.g., as part of a code-share agreement or alliance affiliation). These are treated in the same manner with respect to ticket taxation and full fare disclosure requirements as flights operated entirely by U.S. carriers.

[2]Carriers are not required to distinguish award versus non-award tickets for reporting purposes. Dollar-valued total fare thresholds are commonly used elsewhere in the literature to make this distinction, but these ignore the fact that consumers remain responsible for paying certain ticket taxes on award travel. Ideally, we would prefer to exploit exogenously-flagged award tickets for purposes of conducting sensitivity analyses, but we remain concerned that many low dollars-per-mile fares may represent erroneous entries, and we do not have the ability—outside of U.S. ticket taxes—to identify which taxes apply to award travel and which do not. A large number of exact $0 fares is indicative of misreporting as all international award tickets remain subject to non-zero taxes. The distribution of total fares per mile reaches a local near-zero minimum density at $0.02 per mile, hence our choice of threshold.

fees, emissions and noise charges, etc.—likewise vary along multiple dimensions, but—with the exception of navigation and (international versus domestic) terminal charges—do not depend on route. Instead, non-tax charges vary primarily according to aircraft maximum take-off weight (MTOW), seating capacity and class configuration, and engine type of arriving and departing aircraft. Where possible (i.e. for all flight segments involving a U.S. airport), we utilize data from the DOT's Form 41 T-100 domestic and international segment databases (Bureau of Transportation Statistics (2009-2014*c*) and Bureau of Transportation Statistics (2009-2014*d*), respectively) to identify model types, seating capacity, and load factors for aircraft operated by U.S. and foreign air carriers along specific flight segments in a given quarter. A passenger traveling on the outbound leg of a round-trip flight Philadelphia to Paris on Delta Airlines (i.e. PHL DL CDG) in 2014Q2 would be identified, for example, as having flown on a 171-seat Boeing 757-200. In the case where airlines use multiple aircraft types in a given quarter to service the same segment, we use information for the most-heavily used aircraft based on passenger volume. The combined quarterly airport, route, airline, aircraft model, and seating capacity information is then fed into RDC Aviation's query system to extract the per-passenger tax and non-tax charges applied to the departing aircraft at PHL and the arriving aircraft at CDG. The corresponding inbound flight segment—which could in principle involve a different aircraft—triggers additional departure charges at CDG and arrival charges at PHL.

In cases where we cannot use the T-100 database to match flight segments to aircraft, such as for flight segments between foreign airports, we obtained this information through FlightAware's Flight Finder API in November 2016 (FlightAware, 2016). This procedure yields aircraft tail numbers and model types for recent and upcoming flights, which can in turn be matched to the DOT's Form 41, Schedule B-43 annual aircraft inventory (Bureau of Transportation Statistics, 2016) for aircraft owned by U.S. carriers to determine the relevant seating capacity of the aircraft. We assume for this purpose that airlines' selection of aircraft to service particular flight segments is largely fixed over time. Absent valid tail number

information (U.S. carriers only), we defer to RDC Aviation's airline-specific fleet information to determine seating capacity. Where neither the T-100 database nor FlightAware's Flight Finder yield any specific matching aircraft, we use information either from adjacent quarters or for the most common model of aircraft utilized over the same or similar routes in the same quarter.

Each round-trip itinerary in the DB1B requires data for at least two sets of arriving and departing charges, one at each endpoint of the passenger's journey. The addition of a single layover in either direction adds two additional flight segments and thus two further sets of charges. In a typical case, a single query for airport charges for a particular airport-route-aircraft-airline combination yields multiple applicable charges and corresponding charge amounts (converted to nominal U.S. dollars at prevailing quarter-average bilateral exchange rates). Charge amounts are classified by RDC Aviation as being either "per-movement" or "per-passenger" and fall broadly into ten categories: air navigation, aircraft security, government, infrastructure, noise, parking, passenger, passenger security, runway, or terminal charges. Charges are further distinguished by their applicability to arriving versus departing aircraft and terminal versus connecting passengers. Altogether, we utilize data for nearly 320000 charge amounts which we classify as passenger-specific tax amounts or non-tax charges before stringing these together for a sequence of flight segments into total itinerary-level taxes and charges for itineraries appearing in the DB1B.

Regrettably, the RDC data are not reliably coded in this manner, and are not linked exactly to specific international airport tax codes as defined by the International Air Transport Association (IATA). In order to make use of the RDC data, we therefore construct a concordance of ticket and airport tax codes with their corresponding names in a representative sample of flight segments by pulling these details from fare searches using ITA Software. We link the IATA tax codes and RDC data based on the description and dollar amount to named per-passenger charges in the data from RDC Aviation. Where applicable, we also consult the underlying government source documents to confirm our name- and amount-matching

procedure. As a representative example, Table A1 lists the set of taxes levied by the French airport authority for a round-trip flight PHL DL CDG using the precise names and IATA tax codes given by ITA Software, alongside the set of matching charge elements from RDC which forms the basis for our ticket tax concordance. We are thereby able to pass the list of charges from the RDC database (e.g., 16 charge elements for transatlantic flights arriving in and departing from CDG as of 2014Q2) through our ticket-tax concordance to come up with a complete historical record of tax amounts by IATA tax code, and we confirm that the remaining charges in the RDC database for which we do not have a matching tax represent per-movement non-tax charges (such as parking and landing fees, etc.). Table A2 provides an illustration of the latter types of fees, as applied to the same PHL DL CDG flight. Otherwise, we treat charges that are levied on a per-passenger basis without matching our tax concordance as miscellaneous ticket taxes.[3]

Out of the 253 unique tax codes represented in our original pull of over 30000 scraped fare searches, we are thus able to use our ticket tax concordance to construct complete historical records for 94 foreign tax codes from the RDC data with a high degree of precision.[4,5]

[3]We strive to avoid failed matches due to minor string mismatches in the naming of charges over time. Nevertheless, some such mismatches are largely inevitable. Failed matches can also reflect more substantive changes in applicable taxes over time, such that current IATA tax codes and descriptions may not capture ticket taxes that have been replaced or eliminated.

[4]The tax amounts recovered through our web-scraping procedure present only a static snapshot of applicable taxes from early 2015. We do not use these scraped tax amounts directly in our analysis due to the risk that this approach might introduce classical measurement error whose variance would grow the further we extrapolate post-FFAR tax amounts backward through time, thereby potentially biasing our results in favor of finding increased consumer sensitivity to ticket taxes in the more recent past. Non-classical measurement error due to the general tendency of new taxes to be added over time or statutorily-indexed and adjusted for inflation (and rarely eliminated or decreased) would result in similar bias. We do, however, use the scraped tax amounts to cross-validate our calculations based on RDC Aviation's airport charges database and use this information to improve our ticket tax calculator. Ultimately, the correlation between our RDC- and scrape-based ticket tax amounts in the last period of our estimation sample—closest to the date of fare scraping—is 0.94, and an earlier draft of this paper using only scraped tax amounts (adjusted historically for bilateral exchange rate movements and a complete history of applicable U.S. ticket taxes) presents qualitatively similar results to the ones presented here. To the extent that discrepancies between the RDC-based and scraped ticket tax amounts result from any missing per-passenger charge items in the *RDC Aviation database*, this would rather lead to overestimation of tax sensitivity in periods with missing data, which are more likely to occur earlier than later in the sample period given RDC Aviation's attempts to expand data coverage over time—contrary to the effect of FFAR documented in our paper.

[5]Of the remaining ticket tax codes, 30 represent presumptive ad valorem taxes—typically only applicable to flights originating in foreign countries—which were already required to be included in advertised fares prior to FFAR and thus do not figure in the calculation of applicable unit taxes. We distinguish ad valorem

We are furthermore able to construct complete histories of the six applicable U.S. ticket taxes (International Departure and Arrival Taxes (US), September 11th Security Fees (AY), Passenger Facility Charges (XF), APHIS Fees (XA), Immigration Fees (XY), and Customs Fees (YC)) from various sources, including the Federal Aviation Administration (2014, 2016), the Transportation Security Administration (2016), the Animal and Plant Health Inspection Service (2016), and Customs and Border Protection (2016).[6] This allows us to directly identify applicable tax amounts for all itineraries involving these 94 foreign and 6 domestic ticket tax codes based on our scraped fare search results (subject to caveats about variation in amounts owed for specific airport or ticket taxes based on route or airline), whereas without known tax amounts by tax code, we instead compute total tax amounts from miscellaneous airport-level taxes by adding these up across itinerary flight segments. We exclude from our final analysis all itineraries for which ticket taxes are altogether missing for any single airport in the itinerary. We apply a similar procedure to sum non-tax charges (by airport-route-aircraft-airline) into a single itinerary-specific total amount and allocate these to passenger fares assuming 100% capacity utilization.

Due to the complexity of the aforementioned procedure for constructing a historical record of itinerary-specific ticket tax amounts, this inevitably requires us to impose one further important restriction on our sample. Namely, we limit our ticket tax queries to the set of routes flown by no fewer than 9 passengers in a single quarter over the period 2012Q4-2013Q3 (or 36 passengers over the full four quarters) in the DB1B (i.e. implying an average of at least 1 passenger per day in the full 100% ticket sample). This is intended to mitigate undue influence from large idiosyncratic changes in passenger volume (measured in logs) along very low-volume itineraries. Likewise, we exclude all observations from itineraries involving relatively low-volume ticketing carriers (i.e. below the 1st percentile of the distribution of

taxes from unit taxes by running separate regressions of each tax code on scraped base fares plus a scrape date indicator. All taxes featuring a statistically significant effect of base fares in excess of 0.5 percent and a regression R-squared of at least 0.5 are treated as as ad valorem.

[6]We are also grateful to Joakim Karlsson and Amedeo Odoni of the MIT Airline Ticket Tax Project for sharing data on airport-specific passenger facility charges at an earlier stage in this project (MIT International Center for Air Transportation, 2009-2012).

carrier volume in the year 2011) out of concern that many of these carriers—including many foreign and charter operators—may not have been subject to FFAR.

As described in the next section, we nevertheless compute certain key control variables prior to applying these last sample restrictions using data from the full DB1B without regard to our ability to calculate matching ticket tax information.

A.2 Variable Definitions

Brief descriptions of the variables used in our analyses are presented in Table A3. HHI (HHI) and the number of total or competing itineraries within O&D airport pair ($Itineraries$) are each calculated using the full DB1B sample, whereas the remaining variables are all calculated exclusively within our sample of tax- and charge-matched itineraries.

B OTA Advertising Practices

As an illustration, Figure A1 shows a set of screenshots drawn from the Internet Archive's Wayback Machine capturing Expedia.com's fare advertising practices at the time of FFAR implementation. Importantly, in the period preceding the implementation of FFAR up through January 27, 2012, Expedia's featured flights page consistently included a small-print notice indicating "(+) Taxes and Fees Additional" with an accompanying explanation appearing at the bottom of the page (panel (a)).[7] No screen captures are available for January 28 or 29, but this notice had disappeared by January 30, 2012 (panel (b)) and screen captures after January 30, 2012 confirm its permanent removal. These screenshots are representative of the shift in industry advertising practices due to FFAR. Regrettably for our purposes, the Internet Archive only records static pages and links, such that dynamically-generated fare search result pages cannot be retrieved.

[7]Expedia's delay in compliance—one day beyond the statutory deadline of January 26—is again indicative of the industry's reluctance to come up with quick technical fixes to comply with FFAR.

C Extended Results

Tables A4 and A5 display the full set of coefficient estimates from estimation of our main empirical specifications, and replicate the results shown in Tables 3 and 4, respectively. First stage IV results corresponding to the specification shown in column 2 of Tables 4 and A5 are reported in Table A6.

Figure A2 plots quarterly pass-through rates from equation (12) estimated as an event study, whereby quarterly unit tax and non-tax charge pass-through rates are estimated via incorporation of a full set of quarterly interaction terms. Data from 2012Q1 are omitted for consistency with the main specifications in the body of the paper. The main message of this figure may be that our quarterly estimates suffer from low power and are subject to large standard errors. Only in rare instances can we reject pass-through rates of either 1 *or* 0, especially for unit taxes. Pass-through rates for non-tax charges are generally more precisely estimated. This pattern reflects our narrow identification strategy, which is based on relatively modest within-market $\times$ quarter variation in unit taxes and the crude mapping of FFAR to passengers' quarter of travel. Though smaller in magnitude, non-tax charges exhibit greater within-market variation due to the fact that they are *aircraft-* and route-specific, whereas unit taxes are generally only route-specific (and with very rare exceptions, operating carrier). Statistical imprecision notwithstanding, the remaining key message from Figure A2 is that our point estimates of unit tax pass-through are close to unity for most quarters prior to 2012, and these lie above the pass-through rate for non-tax charges for the corresponding period in all but one quarter pre-FFAR. Post-FFAR, unit tax pass-through rates appear to shift downward, as evidenced by point estimates near or below 0.5 in virtually every quarter. Moreover, these estimates are in many cases very similar to the point estimates for non-tax charges, especially over the period 2012Q4-2013Q4, 2012Q4 being the first quarter that FFAR would have affected virtually all passengers identified in the DB1B sample of *redeemed* flight coupons. Subsequent divergence between pass-through rates for non-tax charges and unit taxes—with rates on the former exceeding the latter in the last 2 or 3 quarters of our

sample period—are harder to explain except as a possible short-run over-correction.

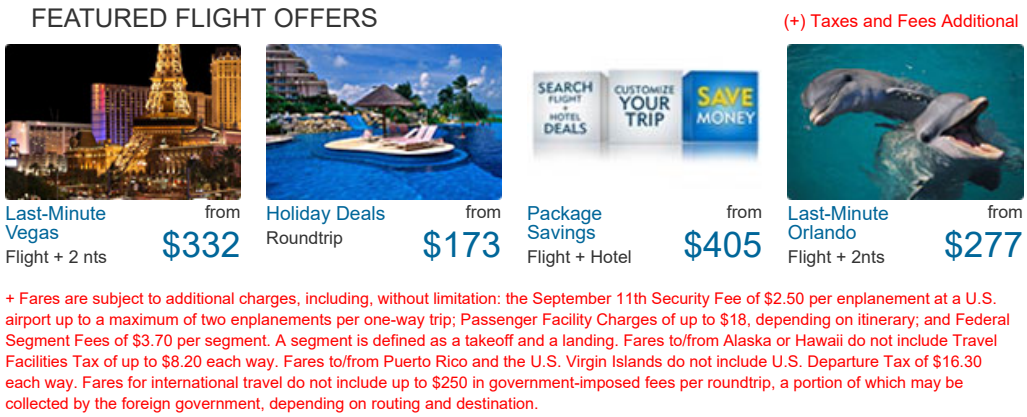
D Add-On Fees

Detailed data on airline charges and fees are relatively scarce. Nevertheless, U.S. air carriers' quarterly financial statements provide a rough breakdown of sources of revenue from domestic and international operations. Of particular relevance to understanding the proliferation of carrier-imposed fees are baggage fees, cancellation and change-of-ticket fees, ticketing and check-in fees, fees for seat assignments and upgrades, and charges for in-flight food and beverages, entertainment, Wi-Fi, pillows and blankets, etc. Only the first two longest-established of these fees are reported separately on Form 41, Schedule P-1.2 (Bureau of Transportation Statistics, 2009-2014*a*). More broadly, Schedule P-1.2 classifies revenues into: transport revenues from scheduled passengers, mail, freight, baggage fees, revenue from charter operations, change/cancellation fees, miscellaneous operating revenues, and transport-related revenues. Fees for seat assignments and upgrades or ticketing fees are included in general transport revenues along with base fares, while in-flight sales are included in transport-related revenues, which also incorporate revenue from code-share operations (flown by the partner airline), fuel sales, rental revenue, and revenue from maintenance performed for other carriers. Miscellaneous operating revenues includes pet transport fees (in the hold) and compensation for collection of passenger facility charges.

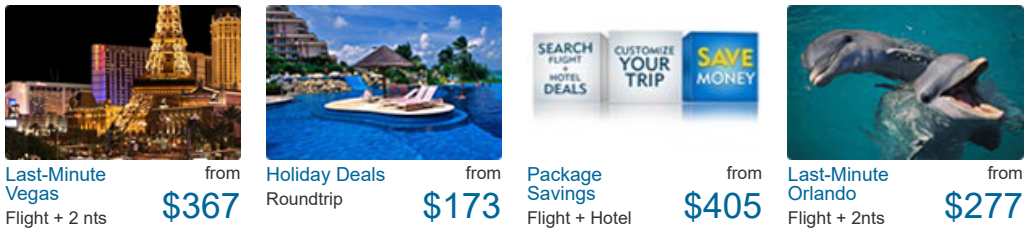
Figure A3 plots the evolution of six sources of revenue as a share of total revenue from international operations for the eight largest U.S. carriers by international revenue. The only notable break in reliance on baggage and cancellation fees around the implementation of FFAR occurs in 2012Q1 for the newly-combined United/Continental in their first period of joint financial reporting. Previously, neither constituent carrier levied baggage fees for international travel to any significant degree. Baggage fees for domestic travel on the "new United," meanwhile, decreased significantly as a share of total revenue (Figure A4) in the

post-FFAR period. These apparent trend breaks appear to coincide with merger consummation, but it cannot be ruled out that these changes were implemented in reaction to reduced revenues from ticket sales on high-tax international routes.

Figure A1. Archived Screen Captures of Expedia.com
Advertising Before and After Implementation of FFAR



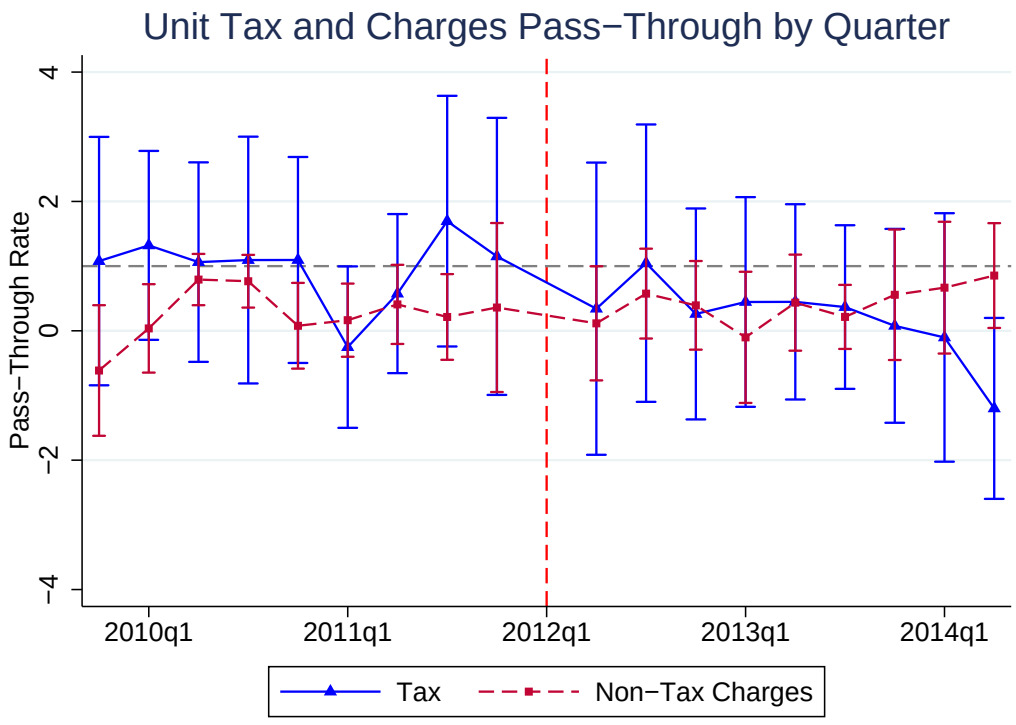
(a) Jan. 27, 2012 (Source: `https://web.archive.org/web/20120127042318/http://www.expedia.com/Flights`)



(b) Jan. 30, 2012 (Source: `https://web.archive.org/web/20120130050747/http://www.expedia.com/Flights`)

Red text coloration and positioning of detailed disclaimer immediately below featured fares added for authors' emphasis only.

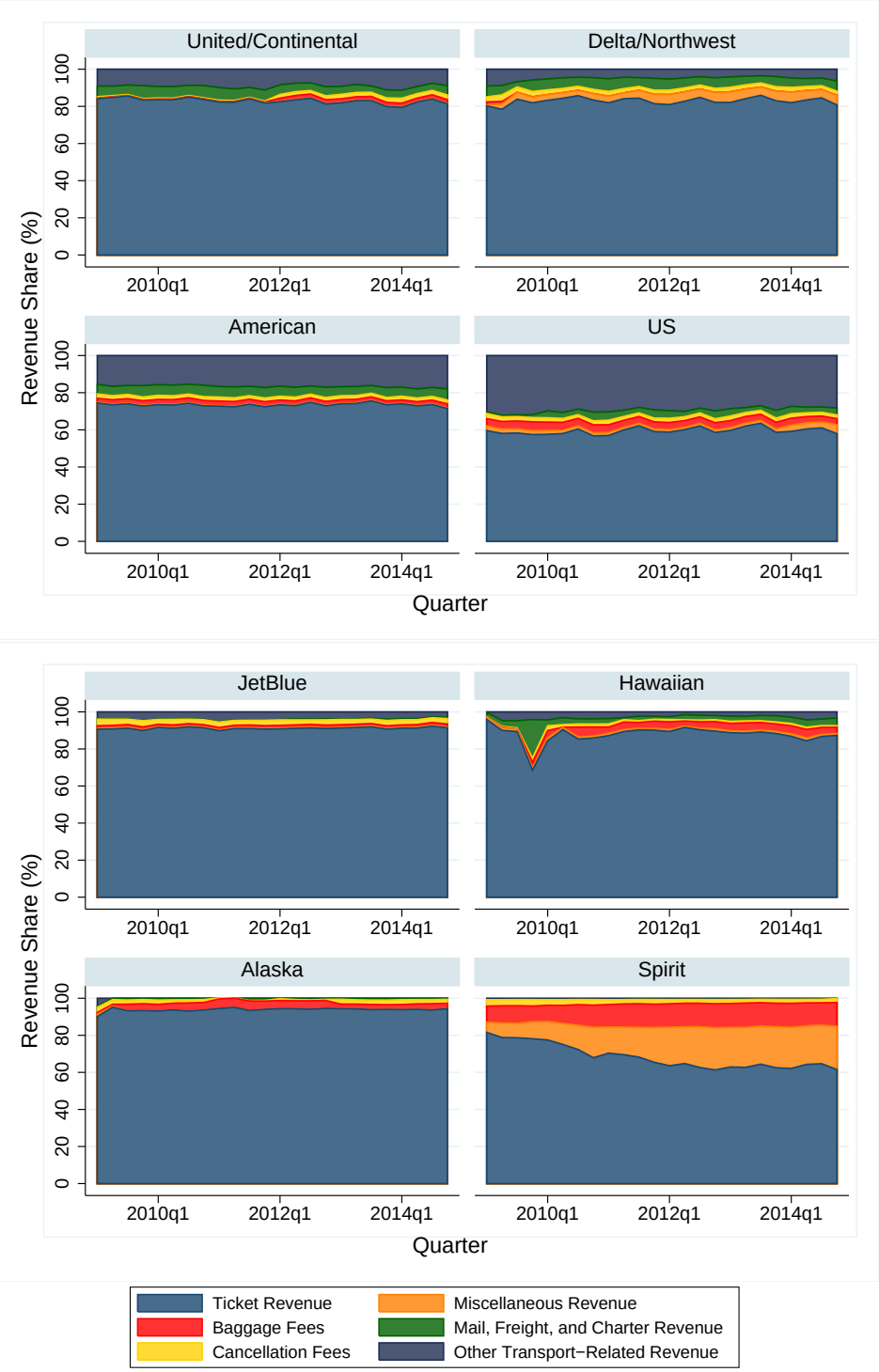
Figure A2



Whisker bars represent 95 percent confidence intervals.

Source: DB1B amd RDC.

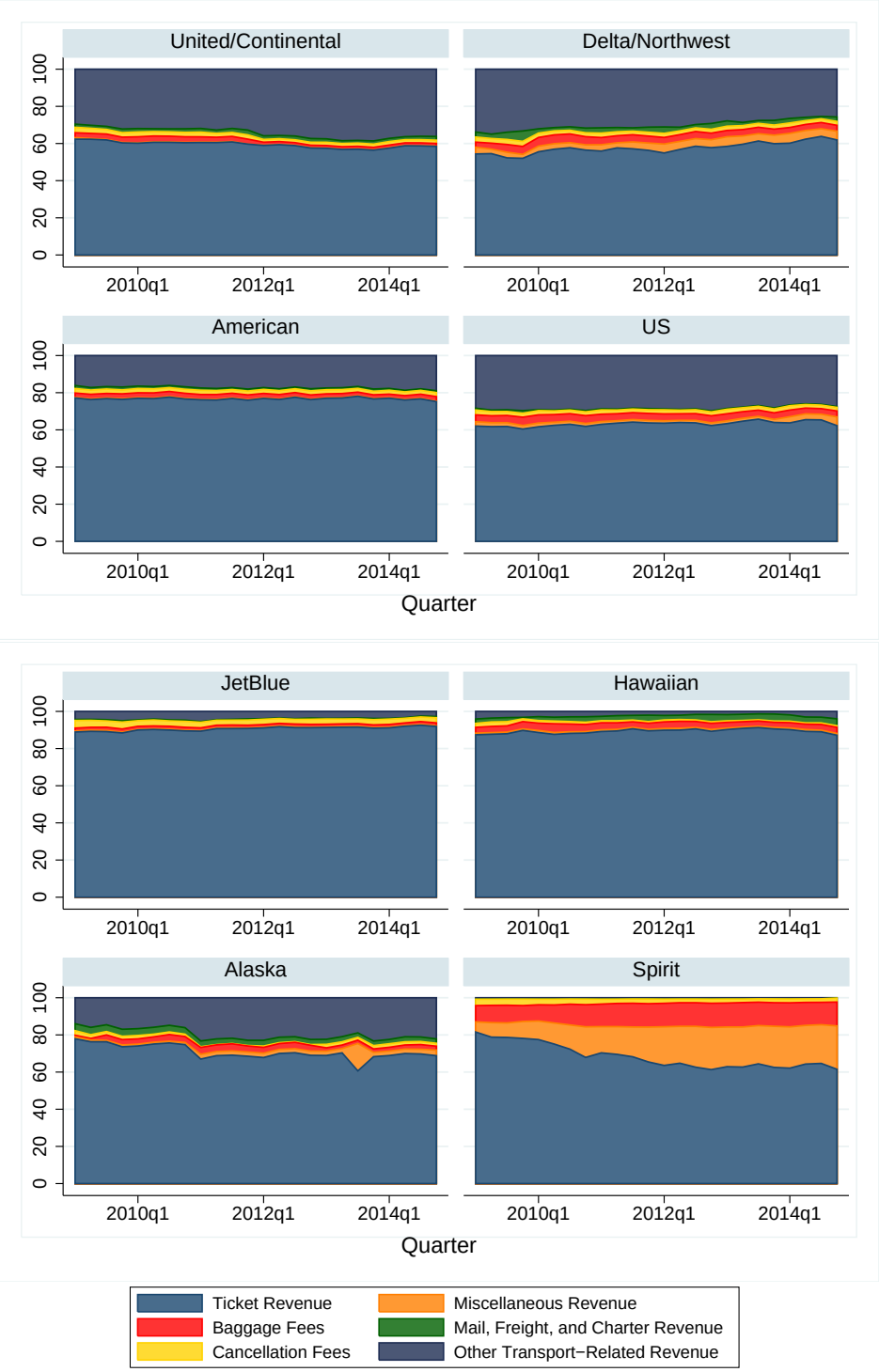
Figure A3. Carrier Revenue Sources from International Operations



Delta/Northwest and United/Continental began reporting combined financial statements in 2010Q1 and 2012Q1, respectively. Revenues from merged carriers are combined for the entire sample.

Source: Air Carrier Financial Reports, Form 41, Schedule P-1.2 (Bureau of Transportation Statistics, 2009-2014*a*).

Figure A4. Carrier Revenue Sources from Domestic Operations



Delta/Northwest and United/Continental began reporting combined financial statements in 2010Q1 and 2012Q1, respectively. Revenues from merged carriers are combined for the entire sample.

Source: Air Carrier Financial Reports, Form 41, Schedule P-1.2 (Bureau of Transportation Statistics, 2009-2014*a*).

Table A1. Sample Tax and Charge Concordance: French Portion of PHL DL CDG

Tax Description (IATA Code)	RDC Charge Element	RDC Item Detail
French Airport Tax (FR)	Airport Tax	Direct Passengers
	National Surcharge	Per Passenger
France Civil Aviation Tax Domestic And International (FR)	Civil Aviation Tax	Per departing passenger to other states
France Passenger Service Charge International (QX)	Passenger Fee	Per departing passenger, international
	PRM Fee	Per departing passenger
	Check-In Counters (Supplemental Rate)	Per passenger, other international
	Computer Check-in and boarding (Crews)	Per departing passenger
French Air Passenger Solidarity Tax (IZ)	Solidarity Tax	Economy passengers to other states

Source: ITA Software and RDC.

Table A2. Sample Non-Tax Charges: French Portion of PHL DL CDG (Aircraft-Specific)

RDC Charge Element	RDC Item Detail
Terminal Charges	Departing flights
Tax on Air Transport Noise Pollution	Acoustic Group 5a, Departure 06:00-18:00
Noise Level Coefficient	Acoustic Group 5a, Departure 06:00-22:00
Fixed Power Supply (Landing)	Category 1, other international, 400 Hz
Fixed Power Supply (Take-Off)	Category 1, other international, 400 Hz
Aircraft Parking Fee	Base charge, pier-side stands
Aircraft Parking Fee	Supplemental charge, pier-side stands 07:00-23:00
Aircraft Landing Fees	MTOW over 40 tonnes
De-icing Fees - Base Fee Per Landing	Class 4 aircraft

Source: RDC.

Table A3. Variable Definitions

Variable Name	Description	Unit of Observation	Source
$TotalFare_{cit}$	Average total fare per ticket	Itinerary-Qtr	DB1B
$BaseFare_{cit}$	Total fare net of ad valorem and unit taxes (and, depending on specification, non-tax charges)	Itinerary-Qtr	DB1B, RDC
$UnitTaxes_{cit}$	Sum of all specific (unit) taxes levied on a per-passenger basis, aggregated over all arriving and departing flight segments.	Itinerary-Qtr	RDC
$NonTaxCharges_{cit}$	Sum of all airport charges levied on a per-movement basis, aggregated over all arriving and departing flight segments.	Itinerary-Qtr	RDC
$ln(Passengers)_{cit}$	Natural log of passenger volume	Itinerary-Qtr	DB1B
$ln(Revenue)_{cit}$	Natural log of ticket revenue net of unit taxes (and, depending on specification, non-tax charges)	Itinerary-Qtr	DB1B, RDC
$Distance_i$	Total flight distance (in thousands of miles)	Route	DB1B
$Layovers_i$	Number of connecting flights	Route	DB1B
HHI_{jt}	Herfindahl-Hirschman Index of market concentration based on ticketing carrier revenue shares in full DB1B sample (scaled to $[0, 1]$ interval)	O&D-Qtr	DB1B
$Load_{cit}$	Percent of available seats sold on the U.S.-foreign flight segment of the ticketed itinerary (normalized by O&D city pair mean and std. dev.)	Itinerary-Qtr	T100
$LnOriginVolume_{cjo_t}$	Natural log of number of passengers transported by ticketing carrier at U.S. airport of origin for all domestic and international flights	Carrier-Origin-Qtr	T100
$Itineraries_{jt}$	Number of available itineraries in full DB1B sample	O&D-Qtr	DB1B
$Itineraries_{c^-jt}$	Number of available itineraries excluding ticketing carrier c's own route offerings (including alliance or code-share operations) in full DB1B sample	Carrier-O&D-Qtr	DB1B

Dollar-denominated figures are measured in hundreds of current dollars. O&D refers to origin-destination airport pairs.

Table A4. Ticket Tax Pass-Through

$Y = TotalFare_{cit}$	(1)	(2)	(3)
$UnitTaxes_{cit}$	0.768***	0.992***	0.958***
	(0.100)	(0.312)	(0.307)
$UnitTaxes_{cit} \times I[Qtr_t > 2012Q1]$	0.700***	-0.743*	-0.711*
	(0.134)	(0.418)	(0.413)
$NonTaxCharges_{cit}$	-	-	0.351***
	-	-	(0.127)
$NonTaxCharges_{cit} \times I[Qtr_t > 2012Q1]$	-	-	0.022
	-	-	(0.186)
$Distance_i$	29.647***	33.994*	31.512*
	(7.990)	(17.998)	(17.865)
$Distance_i^2$	10.782***	-6.785**	-6.417**
	(1.115)	(2.810)	(2.790)
$Distance_i^3$	-0.517***	0.216**	0.205*
	(0.045)	(0.108)	(0.107)
$I[Layovers = 1]_i$	-71.686***	-21.894***	-21.943***
	(5.500)	(4.107)	(4.099)
$I[Layovers = 2]_i$	-109.258***	-33.280***	-33.943***
	(7.220)	(5.991)	(5.929)
$I[Layovers = 4]_i$	-107.537*	-115.872***	-115.678***
	(61.591)	(17.567)	(17.575)
HHI_{jt}	51.533	661.766***	687.970***
	(170.581)	(210.405)	(208.671)
HHI_{jt}^2	424.729	-1,062.927***	-1,102.260***
	(319.866)	(411.793)	(408.013)
HHI_{jt}^3	-448.029**	542.313**	557.449**
	(179.686)	(235.436)	(233.122)
$LnOriginVolume_{cjot}$	339.867***	185.596***	182.505***
	(36.657)	(23.988)	(23.771)
$LnOriginVolume_{cjot}^2$	-39.894***	-21.971***	-21.687***
	(3.961)	(2.617)	(2.591)
$LnOriginVolume_{cjot}^3$	1.437***	0.824***	0.813***
	(0.136)	(0.091)	(0.090)
$Load_{cit}$	-5.142***	4.082***	3.895***
	(1.760)	(1.287)	(1.274)
$Load_{cit}^2$	-1.528***	0.085	0.058
	(0.454)	(0.364)	(0.364)
$Load_{cit}^3$	0.039	-0.086***	-0.084***
	(0.034)	(0.028)	(0.028)
Fixed Effects:			
Carrier × Qtr (η_{ct})	x	x	x
O&D City × Qtr (ν_{kt})		x	x
Observations	25,175	24,712	24,712
R-squared	0.854	0.964	0.964

Standard errors clustered by origin-destination airport-pair appear in parentheses. Observations are weighted by passenger volume.
*** p<0.01, ** p<0.05, and * p<0.1.

Source: DB1B and RDC.

Table A5. Itinerary-Level Passenger Volume and Tax-Exclusive Ticket Revenue

$Y =$	$ln(Passengers)_{cit}$		$ln(Revenue)_{cit}$
	(1)	(2)	(3)
$BaseFare_{cit}$	-0.008	-0.438**	-
	(0.011)	(0.180)	-
$BaseFare_{cit} \times I[Qtr_t > 2012Q1]$	-0.067***	-0.113	-
	(0.015)	(0.202)	-
$UnitTaxes_{cit}$	0.289**	0.304	0.195
	(0.121)	(0.218)	(0.119)
$UnitTaxes_{cit} \times I[Qtr_t > 2012Q1]$	-0.791***	-1.179***	-0.682***
	(0.198)	(0.350)	(0.195)
$NonTaxCharges_{cit}$	-0.017	-0.303**	-0.169*
	(0.092)	(0.134)	(0.087)
$NonTaxCharges_{cit} \times I[Qtr_t > 2012Q1]$	-0.154	-0.163	-0.135
	(0.128)	(0.161)	(0.122)
$Distance_i$	-0.348***	-0.206	-0.387***
	(0.097)	(0.133)	(0.096)
$Distance_i^2$	-0.031**	-0.059***	-0.030**
	(0.014)	(0.021)	(0.014)
$Distance_i^3$	0.001***	0.002***	0.001***
	(0.001)	(0.001)	(0.001)
$I[Layovers = 1]_i$	-2.483***	-2.586***	-2.526***
	(0.033)	(0.045)	(0.033)
$I[Layovers = 2]_i$	-1.927***	-2.084***	-1.978***
	(0.043)	(0.065)	(0.044)
$I[Layovers = 4]_i$	-1.510***	-2.009***	-1.701***
	(0.092)	(0.236)	(0.092)
HHI_{jt}	-1.579	1.580	-0.621
	(1.152)	(1.638)	(1.198)
HHI_{jt}^2	2.037	-3.046	0.556
	(2.060)	(3.013)	(2.173)
HHI_{jt}^3	-0.957	1.621	-0.201
	(1.155)	(1.700)	(1.234)
$LnOriginVolume_{cjo_t}$	-1.794***	-0.961***	-1.525***
	(0.204)	(0.323)	(0.205)
$LnOriginVolume_{cjo_t}^2$	0.211***	0.112***	0.178***
	(0.022)	(0.037)	(0.022)
$LnOriginVolume_{cjo_t}^3$	-0.007***	-0.004***	-0.006***
	(0.001)	(0.001)	(0.001)
$Load_{cit}$	0.013	0.031***	0.020**
	(0.008)	(0.011)	(0.008)
$Load_{cit}^2$	-0.054***	-0.054***	-0.053***
	(0.006)	(0.006)	(0.006)
$Load_{cit}^3$	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)
Fixed Effects:			
Carrier × Qtr (η_{ct})	x	x	x
O&D City × Qtr (ν_{kt})	x	x	x
Observations	24,712	24,712	24,712
R-squared	0.836	0.780	0.866
Kleibergen-Paap F-Stat		15.27	

Standard errors clustered by origin-destination airport-pair appear in parentheses. Observations are weighted by passenger volume.

*** p<0.01, ** p<0.05, and * p<0.1.

Source: DB1B and RDC.

Table A6. Itinerary-Level Passenger Volume - IV First Stages

$Y =$	$BaseFare_{cit}$ (1)	$BaseFare_{cit} \times I[Qtr_t > 2012Q1]$ (2)
$Itineraries_{c^-jt}$	-0.006***	-0.000
	(0.001)	(0.000)
$Itineraries_{c^-jt} \times I[Qtr_t > 2012Q1]$	-0.002	-0.009***
	(0.002)	(0.001)
$UnitTaxes_{cit}$	-0.079	0.793***
	(0.306)	(0.115)
$UnitTaxes_{cit} \times I[Qtr_t > 2012Q1]$	-0.761*	-1.970***
	(0.418)	(0.312)
$NonTaxCharges_{cit}$	-0.549***	-0.127***
	(0.127)	(0.035)
$NonTaxCharges_{cit} \times I[Qtr_t > 2012Q1]$	-0.018	-0.394***
	(0.187)	(0.141)
$Distance_i$	0.317*	0.161
	(0.179)	(0.165)
$Distance_i^2$	-0.062**	-0.027
	(0.028)	(0.026)
$Distance_i^3$	0.002*	0.000
	(0.001)	(0.001)
$I[Layovers = 1]_i$	-0.219***	-0.195***
	(0.041)	(0.034)
$I[Layovers = 2]_i$	-0.393***	-0.308***
	(0.058)	(0.051)
$I[Layovers = 4]_i$	-1.181***	-0.068
	(0.176)	(0.152)
HHI_{jt}	4.388**	3.027*
	(2.003)	(1.675)
HHI_{jt}^2	-7.408*	-5.804*
	(3.939)	(3.302)
HHI_{jt}^3	3.756*	3.180*
	(2.263)	(1.901)
$LnOriginVolume_{cjot}$	1.328***	0.662***
	(0.246)	(0.190)
$LnOriginVolume_{cjot}^2$	-0.159***	-0.081***
	(0.027)	(0.021)
$LnOriginVolume_{cjot}^3$	0.006***	0.003***
	(0.001)	(0.001)
$Load_{cit}$	0.042***	0.030***
	(0.012)	(0.010)
$Load_{cit}^2$	0.001	0.003
	(0.004)	(0.003)
$Load_{cit}^3$	-0.001***	-0.001***
	(0.000)	(0.000)
Fixed Effects:		
Carrier × Qtr (η_{ct})	x	x
O&D City × Qtr (ν_{kt})	x	x
Observations	24,712	24,712
R-squared	0.960	0.984

Standard errors clustered by origin-destination airport-pair appear in parentheses. Observations are weighted by passenger volume.
*** p<0.01, ** p<0.05, and * p<0.1.
Source: DB1B and RDC.

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