Aviation Infrastructure Taxes and Fees in the United States and the European Union (November 11, 2005; 5,167 words)

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ABSTRACT

This paper estimates the impact of infrastructure-related add-on taxes and fees on the cost of domestic air travel in the United States and of domestic and intra-EU air travel in the European Union. For the U.S., an analysis of the large DB1A database shows that the effective tax rate on the average base fare increased from 10.9% in 1993 to 16.1% in 2004. A large portion of the increase is due to a striking 25% decline in the real average base fare. The relative impact of taxes and fees is much heavier on the least expensive tickets. The effective tax rate on tickets issued by low-cost carriers is moderately greater than on those issued by legacy carriers. For the EU, a sample of about 335,000 tickets from January 13-14, 2004 was used, with the effective tax rate estimated at 12.5%. However, EU taxes and fees do not cover the cost of air navigation services and, thus, the 12.5% effective tax rate should not be compared with the 16.1% for the U.S. A preliminary correction for this suggests that the true effective tax rate is higher in the EU than in the U.S. The intra-EU average of 12.5% also masks large differences among countries, ranging from 6.6% for Luxembourg to 24.4% for the United Kingdom. The relative impact of taxes and fees on the least expensive tickets is even heavier than in the U.S.

1. INTRODUCTION

The question of restructuring aviation taxes and fees is the focus of an ongoing debate. In the U.S., the aviation tax system is under scrutiny, as declining fares are causing tax revenues to drop (*1*). In the EU, new fees are being considered, for example to offset carbon emissions (*2*). Airlines on both sides of the North Atlantic are particularly concerned about taxes and fees that are added to the base fares they charge. Add-on taxes and fees increase the direct cost of air travel to consumers. The Air Transport Association contends that "as a result of competitive forces at work in the industry, the absence of industry pricing power results in government imposed taxes and fees directly reducing industry revenue on virtually a dollar-for-dollar basis" (*3*).

The objective of this study is to provide background for the policy debate by presenting a number of statistics and observations on infrastructure-related taxes and fees. The paper focuses on aggregate and distributive characteristics of the effective tax rate (ETR). ETR is defined as the percentage by which the base fare (BF) charged by an airline is increased as a result of the total taxes and fees (TTF) paid directly by air travelers. This analysis covers domestic airfares in the U.S. (Section 2) and domestic EU and intra-EU airfares (Section 3).

The existing literature on the subject is limited and confined to the U.S. domestic market. Earlier work includes a paper by the authors (*4*) with an analysis of 2002 data, a report by the Government Accountability Office (*5*), several publications by the Air Transport Association (*3, 6*) and a report by Morrison and Winston with a focus on business travelers (*7*). To the authors' knowledge the only publication with EU data is a dissertation by S. Yamanaka (*8*), to which the reader is referred for additional details on both U.S. and EU results.

2. U.S. TAXES AND FEES

2.1 Identification and History of U.S. Taxes and Fees

Four types of taxes and fees are currently levied on domestic airfares in the U.S.: the federal ticket tax (FTT), federal flight segment tax (FST), passenger facility charge (PFC), and federal security service fee (FSSF). A history of these is shown in Table 1.

The federal ticket and segment taxes are paid into the Airport and Airway Trust Fund. This fund finances congressional appropriations to cover "those obligations of the United States…which are attributable to planning, research and development, construction, or operation and maintenance of air traffic control, air navigation, communications, or supporting services for the airway system" (*9*). The federal ticket tax is equal to 7.5% of the base fare.

The segment tax was $3 per flight segment in 2002 and 2003 (Internal Revenue Code, 1986). A built-in inflation adjustment raised the segment tax to $3.10 in 2004 and $3.20 in 2005 (*10*). Several exceptions exist: designated rural airports are exempt from the segment tax (*9*) and special taxes exist for Alaska/Hawaii arrivals and departures (*11*).

TABLE 1 History of U.S. Infrastructure-related Taxes and Fees on Domestic Airline Fares

Year	FTT (%)	FST ($)	PFC (max.) ($)	FSSF ($)
1941	5.0	-	-	-
1942	10.0	-	-	-
1943	15.0	-	-	-
1955	10.0	-	-	-
1956	5.0	-	-	-
1970	8.0	-	-	-
1980	5.0	-	-	-
1982	8.0	-	-	-
1990	10.0	-	-	-
1992	10.0	-	3.00	-
1997	9.0	1.00	3.00	-
1998	8.0	2.00	3.00	-
1999	7.5	2.25	3.00	-
2000	7.5	2.50	3.00	-
2001	7.5	2.75	4.50	-
2002	7.5	3.00	4.50	2.50
2003	7.5	3.00	4.50	2.50
2004	7.5	3.10	4.50	2.50
2005	7.5	3.20	4.50	2.50

Note: A dash (-) indicates the tax or fee was not applicable. Years with no changes in the tax and fee structure are omitted.

The segment tax did not exist prior to October 1, 1997. A flat federal ticket tax rate was used that peaked at 10% in modern times (during the period 1990-96). It was subsequently reduced to 7.5% after the introduction of the segment tax. The PFC was instituted to assist commercial airports to "finance eligible airport-related projects, including making payments for debt service" (*12*). Starting on June 1, 1992, authorized airports could collect PFCs in the amount of $1, $2, or $3 per enplanement. A higher PFC of $4.50 was introduced April 1, 2001 (*12*, *13*). PFCs are collected for up to two boardings per one-way trip (*12*), resulting in a maximum of $18 per round-trip. In 1993, PFCs were collected at 89 airports, all but one of which charged the then-maximum of $3; by 2004, roughly 35% of the 315 airports that collected PFCs charged $3 and 65% charged $4.50.

The federal security service fee is the most recently adopted domestic ticket tax. It was created by the Aviation and Transportation Security Act (*14*), which authorizes a $2.50 tax per enplanement as of February 1, 2002 (*15*). It is limited to a maximum of two segments per one-way trip, or $10 per round-trip.

A number of other federal infrastructure and security taxes and fees are assessed on air carriers. These are outside the scope of this paper as they apply only to international travel or are not directly added to the price of an airline ticket, or both. Air carriers also pay non-federal

charges such as landing fees and airport leases, but these are not added directly to the price of an airline ticket and also fall outside the scope of this study.

2.2 Methodology and Data Analysis

The total fare for an air trip consists of the sum of two parts: BF, the base fare, which is the total fare less any applicable taxes and fees, and TTF, the total taxes and fees:

$$TTF = FTT + FST + FSSF + PFC$$

For any sample of tickets, the effective tax rate, ETR, is defined as:

$$ETR = \frac{E(TTF)}{E(BF)} \times 100\%$$

where E(TTF) and E(BF) represent the average values for that sample, weighted by number of passengers.

The U.S. Department of Transportation (DOT) *Origin and Destination Data Bank 1A Ticket Dollar Value* (DB1A) survey was used to sample domestic airline tickets. It provides "the full itinerary and the dollar amounts paid by each passenger" for a "continuous 10% sample of airline tickets" (*16*). DB1A aggregates sampled tickets with identical combinations of itinerary and fare. Thus, each record can correspond to more than one passenger.

The specific database used in this study is a modified version of the original DB1A (*17*), referred to here as DB1A*. In DB1A*, round-trip tickets are broken into two records, each representing a one-way trip.

Data for the second quarters of 1993, 2002, and 2004 was obtained for this study. The second quarter of 2002 (2002Q2) was the first quarter in which the FSSF was assessed during all three months of a quarter. The purpose of looking at 1993 data was to obtain a longer-term perspective on how the tax burden has evolved. Table 2 shows the original data availability for each of the three quarters before processing.

TABLE 2 DB1A* Data Availability

Quarter	Ticket Category	Records	Passengers
1993Q2	One-Way	216,559	1,490,367
	Roundtrip	2,789,104	2,762,341
	Total	3,005,663	4,252,708
2002Q2	One-Way	342,605	965,105
	Roundtrip	3,796,366	4,325,318
	Total	4,138,971	5,290,423
2004Q2	One-Way	434,568	1,169,361
	Roundtrip	3,968,092	4,666,534
	Total	4,402,660	5,835,895

Because DB1A only includes the total fare paid, the component taxes and the base fare had to be computed for this study. A procedure was prepared for this purpose (*4*), which was then tested with a sample of fares obtained from two online travel agencies, Expedia and Orbitz.

2.3 Overall Effective Tax Rate

After application of four filters to the data to reduce the level of abnormal data (*4*), the results shown in Table 3 were obtained. The overall effective tax rate (i.e., including both one-way and round-trip) has increased from 10.9% in 1993 to 16.1% in 2004. The average total taxes and fees in 2004 were $40.57, with the average base fare equal to $251.43. In 2004, the federal ticket tax was responsible for slightly less than one-half of total taxes, while the segment tax, security fee, and PFC contributed to the other half in roughly similar amounts. In 1993, the federal ticket tax (at the time equal to 10% of the base fare) accounted for about 92% of the average total taxes and fees.

TABLE 3 Comparison of 1993, 2002, and 2004 Average Fares, Taxes, Fees, and ETR

Quarter	Ticket Category	Total Fare ($)	Base Fare ($)	TTF ($)	FTT ($)	FST ($)	PFC ($)	FSSF ($)	ETR	Segments per Ticket	O-D Distance (miles)
1993Q2	**All**	**373.99**	**337.25**	**36.74**	**33.72**	**–**	**3.02**	**–**	**10.9%**		
	One-way	153.49	138.29	15.20	13.83	–	1.37	–	11.0%	1.18	579
	Roundtrip	493.29	444.89	48.40	44.49	–	3.91	–	10.9%	2.71	1009
2002Q2	**All**	**321.99**	**278.83**	**43.16**	**20.91**	**7.62**	**8.27**	**6.35**	**15.5%**		
	One-way	242.91	215.05	27.86	16.13	4.04	4.33	3.36	13.0%	1.28	871
	Roundtrip	338.00	291.74	46.26	21.88	8.35	9.07	6.96	15.9%	2.65	1005
2004Q2	**All**	**292.00**	**251.43**	**40.57**	**18.86**	**7.25**	**8.62**	**5.84**	**16.1%**		
	One-way	208.58	182.97	25.60	13.72	3.96	4.72	3.20	14.0%	1.28	959
	Roundtrip	312.54	268.29	44.25	20.12	8.06	9.58	6.50	16.5%	2.60	1048

Note: All fares and taxes and fees are shown in 2004 dollars. A dash (-) indicates the tax or fee was not applicable.

Because of the very large number of tickets in the sample, estimates of the means for all three periods are very robust. In all cases the 95% confidence interval is within 0.1% of the corresponding estimate (*8*).

A remarkable aspect of Table 3 is that the overall average base fare has declined by 25% in constant (2004) dollars. This reflects the much-discussed recent inability of most U.S. airlines to price fares at a profitable level despite significant increases in their largest cost components, as a result of competitive pressures. The average total taxes and fees per ticket increased by only 10.4% between 1993 and 2004. Therefore, it is clear that the increase in ETR from 10.9% to 16.1% is due in large part to the decline in fares. As a further illustration of this effect, had the base fare been the same in 2004 ($337.25) as in 1993, the ETR would have been about 13.9% instead of the actual 16.1%, *ceteris paribus*.

Table 3 shows that the average origin to destination distance has increased over the years. This trend may have accelerated since 2001, due to the increased processing times at airports and the resulting shift to other modes for trips of 200 miles or less. Also, in both 2002 and 2004, about 70% of itineraries consisted of non-stop flights. This is significant, since non-stop

itineraries reduce the impact of segment-based tax components (i.e., the segment tax, security fee, and PFC) on the effective tax rate.

2.4 Distributive Aspects and Sensitivity of the Effective Tax Rate

Some distributive characteristics of the effective tax rate were also examined, namely its magnitude relative to the base fare, trip distance and type of airline. The overall ETR has increased significantly between 1993 and 2004, but the increase has not been as dramatic as claimed in several media articles (*18, 19*) and is largely due to the decline of the average base fare. However, a striking change has taken place in how the ETR varies with base fare. As shown in Table 4, passengers whose base fare was under $200 experienced an average ETR of greater than 20% in both 2002 and 2004. At the opposite extreme, passengers whose base fare was more than $800 experienced an average ETR of 10% or less. This is not entirely surprising, as the segment tax, security fee, and PFC vary only with the number of connections and are independent of the base fare. However, the steepness of the increase is remarkable. A detailed review of the effective tax rate experienced by each individual passenger shows that in 2002, 63.6% of passengers experienced a rate greater than the overall average of 15.5% for that year.

TABLE 4 Average Effective Tax Rate by Base Fare Range in 2004Q2 (All Tickets)

	Passenger Share		Average BF ($)		Average TTF ($)		Average ETR	
Base Fare Range	2004Q2	2002Q2	2004Q2	2002Q2 (2004 Dollars)	2004Q2	2002Q2 (2004 Dollars)	2004Q2	2002Q2
BF ≤ $100	10.8%	10.7%	77.72	82.81	19.65	21.04	25.3%	25.4%
$100 < BF ≤ $200	38.6%	41.3%	156.49	161.38	32.79	33.84	21.0%	21.0%
$200 < BF ≤ $400	38.7%	34.0%	271.30	285.18	44.29	45.85	16.3%	16.1%
$400 < BF ≤ $600	7.1%	7.6%	480.95	506.80	60.34	62.74	12.5%	12.4%
$600 < BF ≤ $800	2.5%	2.8%	689.88	723.17	75.29	77.81	10.9%	10.8%
$800 < BF ≤ $1000	1.2%	1.5%	889.81	936.06	89.18	93.09	10.0%	9.9%
$1000 < BF ≤ $2000	1.1%	1.9%	1,294.38	1,397.74	119.37	127.78	9.2%	9.1%
$2000 < BF	0.1%	0.3%	2,517.17	2,593.99	210.54	216.91	8.4%	8.4%
All	100.0%	100.0%	251.43	278.83	40.57	43.16	16.1%	15.5%

In sharp contrast, ETR varied only slightly with base fare in 1993, ranging from 11.9% when the base fare was less than $100 to 10.1% when the base fare was greater than $2,000. For fares of $800 or more, the ETR in 2004 and 2002 was under 10%, or *lower* than in 1993! It is safe to conclude that the increase in effective tax rate was *not* a leading cause of the dramatic decline in demand for high-priced tickets experienced since 2000. The blame must be placed elsewhere.

Perhaps surprisingly, effective tax rate currently varies little with trip distance. For example, the ETR in 2002 varied from a low of 13.8% for trips longer than 2,000 miles each way to a high of 16.5% for trips between 200 and 500 miles. This is partly because the average base fare increases less than linearly with trip distance. For example, the average base fare for a distance in the 1,000-2,000 mile range is only 78% greater than for a distance under 200 miles. Also, trips with longer distances are more likely to include a connection at an intermediate airport. This increases the total segment tax, security fee, and PFC for such trips.

Table 5 contains a comparison between legacy and low-cost carriers for 2004. The legacy carriers in the sample are American, Continental, Delta, Northwest, United, and US Airways; the low-cost carriers are ATA, JetBlue, and Southwest. The overall ETR for the low-cost carriers is about 3.2% higher than for the legacy carriers. This differential is also observed in the 2002 data and has apparently not been sufficient to slow down the continuing growth in the low-cost carriers' market share.

TABLE 5 Legacy vs. Low-Cost Carriers (2004Q2)

Carrier Type	Ticket Category	No. of Pax	Base Fare ($)	TTF ($)	FTT ($)	FST ($)	PFC ($)	FSSF ($)	ETR	Segments per Ticket	O-D Distance (miles)
Legacy	All	2,110,520	297.92	44.62	22.34	7.39	8.93	5.96	15.0%		
	One-Way	315,599	255.75	31.07	19.18	3.93	4.80	3.17	12.1%	1.27	1,102
	Roundtrip	1,794,921	305.33	47.00	22.90	7.99	9.66	6.45	15.4%	2.58	1,200
LCC	All	1,251,888	165.73	30.14	12.43	6.06	6.77	4.88	18.2%		
	One-Way	345,282	112.74	19.02	8.46	3.62	4.04	2.92	16.9%	1.17	845
	Roundtrip	906,606	185.91	34.37	13.94	6.99	7.81	5.63	18.5%	2.25	843

Nonetheless, the 3.2% difference is smaller than expected given that the low-cost carriers charge a base fare of only 56% of that charged by legacy carriers ($165.73 vs. $297.92). One reason for this is that the average number of segments per itinerary is significantly lower for low-cost carriers than for legacy carriers. This means that the total segment tax, security fee, and PFC charged to low-cost carrier tickets is less, on average. This reflects two aspects of low-cost vs. legacy carrier operations: first, the average O-D distance flown by low-cost carrier passengers is 844 miles vs. 1,186 miles for legacy carrier passengers; second, the route networks of legacy carriers rely more heavily on connections at hub airports.

Finally, the following simple example illustrates the potential applications of this work to policy-making. In February 2005, the Bush administration proposed, as part of its 2006 budget, to increase the security fee from $2.50 to $5.50 per enplanement, with a cap of $8 each way. The intent was to generate an additional $1.5 billion to meet the funding requirements of the Transportation Security Administration (TSA). As expected, the airlines reacted negatively to the proposal and a heated public debate ensued (*20*). Using the 2004Q2 DB1A* ticket sample, it is estimated that the proposal would have increased the overall effective tax rate from 16.1% to a range of 18.3–18.7%. The lower limit assumes that the airlines would have left the base fare unchanged and passengers would have absorbed the entire security fee increase; the upper limit assumes that the airlines would have left the total fare (*BF+TTF*) unchanged and, therefore, would have absorbed the entire increase. The proposed increase did not make it to the final budget for 2006 (*21*).

3. EU TAXES AND FEES

This section presents the results to date of an analysis of the effective tax rate in the "original 15" European Union member countries ("EU-15"), namely, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. Of interest are both domestic travel within these countries and international travel between any pair of them (i.e., intra-EU travel).

3.1 Complexity of European Taxes and Fees

Estimating the impact of infrastructure-related aviation taxes and fees on the cost of EU-15 air travel has proved a far more challenging task than for the U.S. The most fundamental reason is that a comprehensive publicly available database, analogous to DB1A, does not exist for EU air travel. One must resort to partial and less accessible data for a study of the type attempted here. Also, the structure of taxes and fees in the EU is far more complex: 43 different kinds of ticket taxes and fees are currently in effect for domestic and intra-EU air travel in the 15 countries investigated (*8*). Many of these taxes and fees vary depending on such details as point of boarding, country of destination, and, in some cases, even choice of airline (*22*). Simply understanding how these taxes and fees apply requires a major effort.

Another important point to be considered is that the cost of en route and terminal air navigation services (ANS) is not reflected in any taxes and fees charged directly to passengers in the EU. This is unlike the U.S., where the federal ticket and segment taxes are used in part to fund the Federal Aviation Administration's air traffic control operations. Carriers flying in European airspace make payments to EUROCONTROL for en route ANS and either to EUROCONTROL or to the Member State involved for terminal area ANS. EUROCONTROL, in turn, distributes its ANS revenues among the Member States according to well-established formulae. Because of this, comparisons of ETR values between the EU-15 and the U.S. must be performed carefully in order to be meaningful.

EU tickets also frequently include two tax codes, YQ and YR (here collectively referred to as YQYR), which are reserved for airline surcharges. These include temporary surcharges for fuel or for increased security costs. Despite appearing on the tickets as add-on taxes and fees, YQYR proceeds actually constitute additional revenue for the airlines. In our analysis these are therefore added to base fare, instead of being included in the total taxes and fees. The total amount of YQYR charges observed in the EU-15 ticket sample was approximately 26% of the total add-on charges, significantly affecting ETR estimates.

3.2 Methodology and Data Analysis

Due to the lack of a database similar to DB1A, this study relied on ticketing data made available by Amadeus Global Travel Distribution S.A. for the EU-15 analysis. Amadeus is a Global Distribution System (GDS) company with access to seat inventories of over 400 airlines worldwide, processing approximately 450 million bookings yearly (*23*). Amadeus is a leading GDS in Europe with a regional market share of 55% (*24*).

The study team collected ticket data for the two-day period January 13-14, 2004, consisting of 1,120,507 issued tickets representing 2,626,580 flight segments. The data was filtered to exclude personal information and include only information about itineraries, fares, taxes, fees, country where the ticket was purchased, currency in which the fare was computed, and other transactional details. All monetary values were converted into U.S. dollars using currency exchange rates provided by the OANDA Corporation (*25*).

A sequence of six filters was applied to the database to exclude tickets for travel outside the EU-15 nations and to eliminate bad or incomplete records (see Table 6). These filters reduced

the number of usable tickets to about 335,000, far fewer than the several million contained in the DB1A* database per quarter for the U.S.

TABLE 6 Filters Used for Preparing EU-15 Records

Filter Step	Filter Description	Records Remaining	Tickets Remaining	Remaining Tickets %
	Unfiltered data	2,626,580	1,120,507	100.0%
1	Bad and irrelevant records elimination	2,218,776	970,853	86.6%
2	EU market filter	864,341	423,556	37.8%
3	Fare and tax detail availability filter	799,365	393,426	35.1%
4	Segment numbering filter	729,746	362,809	32.4%
5	Base fare discrepancy filter	688,471	341,093	30.4%
6	Number of segments filter	663,825	334,782	29.9%

Similarly to the U.S. study, ETR was defined as the percentage by which the base fare charged by an airline is increased by the total taxes and fees paid directly by travelers. However, to account for YQYR, the ETR expression was modified to:

$$ETR = \frac{E(TTF) - E(YQYR)}{E(BF) + E(YQYR)} \times 100\%,$$

where E(TTF), E(BF), and E(YQYR) represent the weighted average of total taxes and fees, base fare, and the total amount of YQ and YR per ticket.

It is important to keep in mind that the EU-15 results are based on a narrow sample of two consecutive days in January, which could be distorted by exogenous events or seasonal variations. At the time of writing, our ongoing research is focused on expanding this limited sample (see Section 4). Another important caveat is that some low-cost carriers, including the two largest European low-cost carriers, Ryanair and easyJet, do not use GDS services. Low-cost carriers constitute approximately 20% of the EU-15 market (*26*). Since the GDS ticket sample does not cover these carriers, the estimates of the effective tax rate for the EU-15 presented here are possibly on the low side, as tax rates tend to be higher when BF is low.

3.3 Results for the EU-15

Table 7 summarizes the ETR results for the EU-15. These values indicate how much add-on taxes and fees increase the cost of a ticket for domestic EU and intra-EU air travel. The overall effective tax rate for our two-day sample of 2004 tickets was 12.5%. One-way tickets have a relatively high base fare compared to round-trip tickets ($166.43, or 58% of the round-trip base fare, $287.96), leading to a significantly lower ETR (8.8%). Also, many one-way tickets were issued in countries with low tax rates.

TABLE 7 Average Effective Tax Rate (2004 Data)

Ticket Category	No. of Tickets in Sample	Base Fare (US$)	TTF (US$)	YQYR (in TTF) (US$)	ETR	Segments per Ticket
All	334,782	264.84	43.57	9.40	12.5%	
One-way	63,688	166.43	18.18	3.21	8.8%	1.12
Roundtrip	271,094	287.96	49.54	10.86	12.9%	2.18

It is worth noting that if YQYR were treated as part of total taxes and fees instead of base fare, the overall effective tax rate would be equal to 16.5%. While there is little logical basis for treating YQYR in this way, the 16.5% estimate may be an important indicator of how passengers perceive the size of the effective tax rate. One can reasonably assume that most passengers view YQYR the same as the many other tax codes that appear on their tickets and not as a surcharge that represents airline revenue.

The aggregate results of Table 7 mask the fact that ETR values vary greatly across EU-15 countries (see Table 8 and Figure 1). The EU-15 nations can be divided into three groups: four "low ETR" (under 10%), seven "average ETR" (between 10% and 15%) and four "high ETR" countries (more than 15%). It is important to point out that a high ETR value can be the result of either high taxes or low fares. For example, the effective tax rate in the United Kingdom is the highest in all itinerary categories (overall, domestic, and intra-EU), but low fares are clearly the main cause. In Spain, a low tax rate keeps the effective tax rate consistently low despite relatively inexpensive fares. Finally, Denmark has the highest total taxes and fees, but relatively high fares keep the effective tax rate lower than it would otherwise be.

In all countries, except Ireland and Spain, the domestic effective tax rate is considerably higher than the intra-EU rate. This is not because higher taxes and fees are levied on domestic tickets, but due to the fact that intra-EU base fare levels are significantly higher than domestic levels. At the same time, the intra-EU total taxes and fees are only slightly higher than domestic totals in most countries. The intra-EU ETR values also vary less from country to country than the domestic ETR. This is simply because differences in tax rates among the EU-15 countries are less extreme when two or more countries are involved in an itinerary instead of just one.

As shown in the last column of Table 7, the average number of flight segments for EU-15 itineraries is clearly smaller than that in the U.S. About 88% of one-way trips and 82% of round-trips in the EU-15 sample were non-stop flights, compared to approximately 70% for the U.S. The most important reason for this difference is the short distances between principal Western European traffic-generating areas, which encourage non-stop service. In addition, major European airlines do not use hub-and-spoke strategies as intensively as their U.S. counterparts.

The study also looked at how the EU-15 effective tax rate varies with base fare. This was motivated by the earlier finding that taxes and fees have a much larger impact on low-fare tickets in the U.S. Table 9 indicates that this effect is even more severe in the EU: ETR values vary greatly across base fare, ranging from 2.0% to 42.3%. This is because total taxes and fees only increased by a factor of two between the lowest and highest base fare ranges, while the base fare increased by a factor of 40. Also, note that passengers with a base fare of less than $250 (62.3% of passengers in the sample) face a significantly higher average effective tax rate than the overall mean of 12.5%.

TABLE 8 Effective Tax Rate by Origin Country

Origin Country	O-D Type	No. of Tickets in Sample	Base Fare (US$)	TTF (US$)	YQYR (in TTF) (US$)	ETR
Austria	**All**	**4,437**	**375.47**	**68.21**	**19.39**	**12.4%**
	Domestic	384	248.23	53.59	15.87	14.3%
	Intra-EU	4,053	387.53	69.60	19.73	12.2%
Belgium	**All**	**3,289**	**362.19**	**52.38**	**6.00**	**12.6%**
	Domestic	0				
	Intra-EU	3,289	362.19	52.38	6.00	12.6%
Denmark	**All**	**6,624**	**357.75**	**65.19**	**12.48**	**14.2%**
	Domestic	2,339	214.57	58.97	9.38	22.1%
	Intra-EU	4,285	435.91	68.58	14.17	12.1%
Finland	**All**	**10,240**	**269.72**	**58.70**	**11.46**	**16.8%**
	Domestic	6,137	186.79	57.96	10.23	24.2%
	Intra-EU	4,103	393.76	59.81	13.30	11.4%
France	**All**	**67,935**	**344.50**	**51.24**	**9.77**	**11.7%**
	Domestic	51,479	279.84	50.23	9.38	14.1%
	Intra-EU	16,456	546.77	54.38	10.99	7.8%
Germany	**All**	**71,609**	**306.03**	**56.74**	**17.02**	**12.3%**
	Domestic	44,998	254.77	54.09	15.94	14.1%
	Intra-EU	26,611	392.72	61.24	18.83	10.3%
Greece	**All**	**2,073**	**203.27**	**47.95**	**8.09**	**18.9%**
	Domestic	1,159	121.24	37.98	4.57	26.6%
	Intra-EU	914	307.29	60.59	12.56	15.0%
Ireland	**All**	**1,829**	**165.54**	**42.29**	**9.07**	**19.0%**
	Domestic	45	132.47	20.85	2.82	13.3%
	Intra-EU	1,784	166.38	42.83	9.23	19.1%
Italy	**All**	**12,942**	**291.70**	**39.69**	**14.17**	**8.3%**
	Domestic	8,024	201.45	32.91	12.71	9.4%
	Intra-EU	4,918	438.93	50.75	16.54	7.5%
Luxembourg	**All**	**1,189**	**350.80**	**37.36**	**13.28**	**6.6%**
	Domestic	0				
	Intra-EU	1,189	350.80	37.36	13.28	6.6%
Netherlands	**All**	**3,231**	**351.77**	**58.17**	**7.00**	**14.3%**
	Domestic	9	170.42	56.11	6.82	27.8%
	Intra-EU	3,222	352.28	58.18	7.00	14.2%
Portugal	**All**	**1,597**	**293.31**	**32.54**	**4.49**	**9.4%**
	Domestic	491	170.87	22.94	0.00	13.4%
	Intra-EU	1,106	347.66	36.81	6.48	8.6%
Spain	**All**	**85,797**	**195.56**	**14.94**	**1.02**	**7.1%**
	Domestic	69,957	159.33	10.90	0.02	6.8%
	Intra-EU	15,840	355.54	32.77	5.41	7.6%
Sweden	**All**	**13,169**	**310.73**	**58.88**	**12.49**	**14.4%**
	Domestic	8,397	231.82	55.35	10.49	18.5%
	Intra-EU	4,772	449.58	65.10	16.01	10.5%
United Kingdom	**All**	**48,821**	**163.15**	**51.26**	**9.14**	**24.4%**
	Domestic	19,282	130.48	49.44	8.47	29.5%
	Intra-EU	29,539	184.47	52.45	9.58	22.1%

FIGURE 1 Average effective tax rate by origin country (sorted in increasing order)

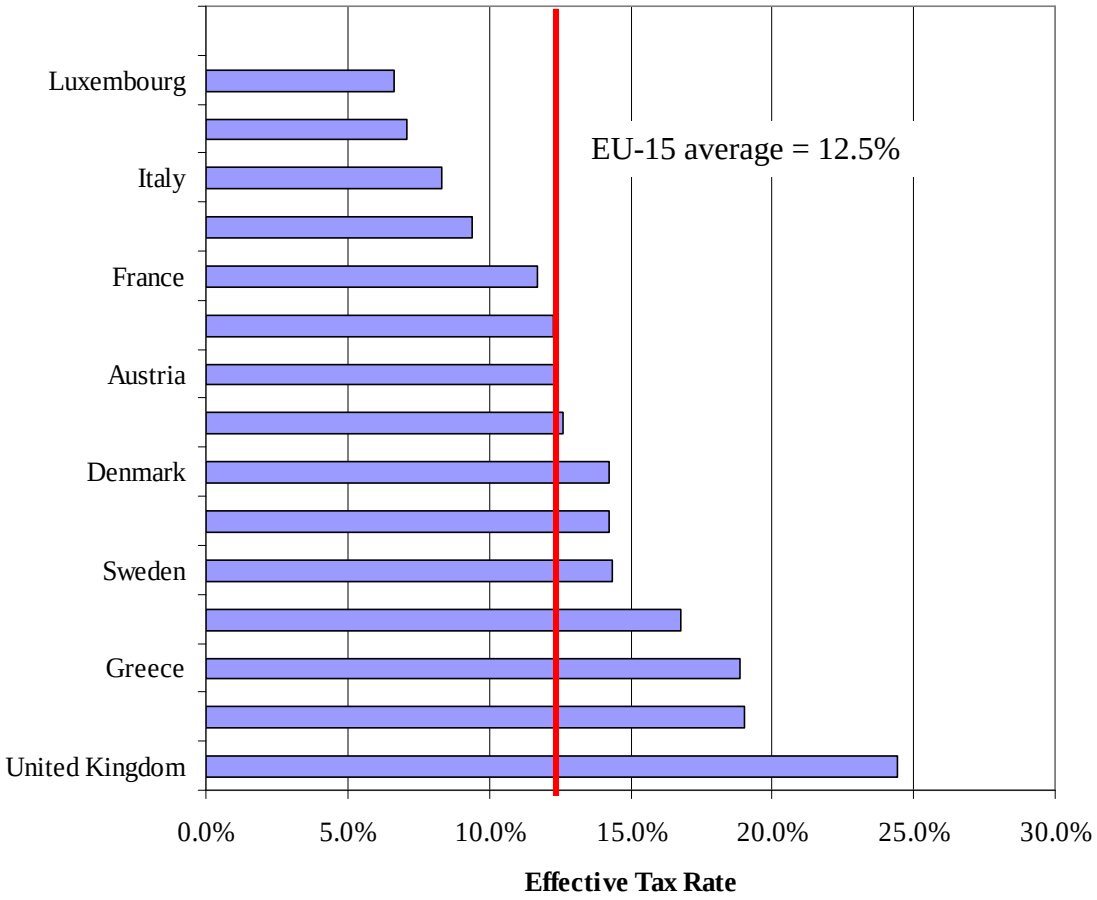

TABLE 9 The Average Effective Tax Rate for Different Ranges of the Base Fare

Base Fare Range (US$)	No. of Tickets in Sample	Base Fare (US$)	TTF (US$)	YQYR (in TTF) (US$)	ETR
BF ≤ 100	90,628	56.76	33.73	6.81	42.3%
100 < BF ≤ 250	117,760	165.21	42.10	8.74	19.2%
250 < BF ≤ 500	84,419	360.33	48.74	10.74	10.2%
500 < BF ≤ 1000	32,333	657.09	57.71	13.75	6.6%
1000 < BF ≤ 2000	9,407	1,260.64	61.33	15.53	3.6%
2000 < BF	235	2,305.16	65.28	18.35	2.0%
All	334,782	264.84	43.57	9.40	12.5%

3.4 A Preliminary Comparison with the Effective Tax Rate for Domestic U.S. Travel

As pointed out in Section 3.2, one major difference between the U.S. and European add-on taxes and fees is that the former fund ANS costs while the latter do not. Any comparison of the U.S. and EU-15 ETR values must take this difference into consideration, because ANS costs are substantial on both sides of the Atlantic. Unfortunately, there is no European data collection

mechanism comparable to U.S. carriers' monthly DOT Form 41 filings, which readily identifies the amounts paid by individual airlines for ANS.

The study team has collected detailed data from two of the largest European airlines, Lufthansa and SAS Group, on their ANS costs in 2004 for flights within the EU-15 nations. This information – independently provided by the two carriers and mutually consistent – indicates that ANS costs would add roughly 7% to the effective tax rate estimated in Section 3.3. Both Lufthansa and SAS have flights throughout Europe and are based in countries where the effective tax rate is close to the EU-15 average of 12.5% (for example, the ETR for Lufthansa is 13.6%). This suggests the *conjecture* that with ANS costs taken into account the effective tax rate in the EU-15 would be approximately 19-20% (i.e., 12.5% + 7%). This would be slightly higher than the 16.1% for domestic air travel in the U.S. in the second quarter of 2004. However, this is a very preliminary estimate, which serves primarily as a good launching point for future investigation. For example, this comparison does not take into account that a portion of U.S. air traffic control costs are subsidized by general tax revenues.

4. CONCLUSIONS

The analysis above presents aggregate and distributive estimates of the effective tax rate for domestic U.S. air travel and for domestic EU-15 and intra-EU air travel. The estimates for the U.S. are highly reliable statistically, as they are derived from databases containing millions of tickets. They also offer a historical perspective on the burden of add-on taxes and fees on the cost of air tickets. The estimates for the EU-15 nations are far less reliable, as they are based on a much smaller sample of tickets, which excludes tickets issued by several large low-cost carriers. Nonetheless, the estimates provide a good indication of the magnitude of the effective tax rate in the EU-15, as well as of the surprisingly large differences that seem to exist among individual EU-15 nations. Based on data from two major EU airlines, this study also includes a conjecture on how the EU-15 ETR would compare with that for the U.S. when accounting for ANS costs.

The study team is in the process of strengthening the EU analysis by incorporating a new, much larger sample of more than two million EU tickets. This is comparable in size to one quarter in the DB1A database. This sample contains tickets issued during 15 days evenly spread during 2004. Analysis of this expanded sample should result in more reliable estimates of the EU-15 ETR levels and allow exploration of additional issues.

The second area currently under investigation is an improved comparison of all the infrastructure-related costs that airlines must contend with on the two sides of the Atlantic. In addition to taxes, fees, and ANS costs, carriers must pay landing fees, fuel taxes, terminal ownership or lease costs, and, in the U.S., the TSA Air Carrier Security Fee.

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