
# ATC Costs, Slot Auctions and Efficiency

## June 21, 2004

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# Three Topics

The National Center of Excellence
NEXTOR
For Aviation Operations Research

1. ATS User Fees and Costs
2. Congestion Management Fees/Auctions and Airport Expansion
3. The Need for Price Caps on Government Services

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# 1. ATS User Fees

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# 1995 GRA Study on FAA Funding Options Shows Tax Receipts Due to Different Tax Regimes

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**NCARC: ESTIMATED 1995 TAX RECEIPTS VS 1995 BUDGET**
**($ Millions)**

| | Circa 1995 Taxes | | | | 1995 Traffic Circa 2003 Tax Rates | | | |
|---|---|---|---|---|---|---|---|---|
| | Passenger | Freight | Intnat'l | Totals | 7.5% + $3/enpl | New Int'l Tax | Freight | Totals |
| Domestic Jet | 4312 | 86 | 115 | 4513 | 4684 | 460 | 86 | 5230 |
| Non-US Carriers | 0 | 0 | 104 | 104 | 0 | 416 | 0 | 416 |
| Commuters | 418 | 1 | 2 | 421 | 437 | 9 | 1 | 447 |
| All Cargo Carriers | 0 | 275 | 0 | 275 | 0 | 0 | 275 | 275 |
| Charter Carriers | 0 | 0 | 12 | 12 | 0 | 47 | 0 | 47 |
| | | | | 5325 | | | | 6415 |

# *Different Tax Regimes Result in Different Cost Recovery Relative to "Ramsey Optimal" Allocations Circa 1995*

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**1995 COST RECOVERY UNDER DIFFERENT TAX REGIMES**
**($ Millions)**

| | 1995 Cost Allocation | | | | | | Percent Recovery | |
|---|---|---|---|---|---|---|---|---|
| | Incr. ATS | Airports | Other Direct | Adj ATS | Common/ Fixed | Total | Circa 1995 Taxes | Circa 2003 Tax Rates |
| Domestic Jet | 808 | 910 | 111 | 144 | 2,644 | 4,616 | 98% | 113% |
| Non-US Carriers | 67 | 89 | 26 | 16 | 328 | 526 | 20% | 79% |
| Commuters | 327 | 99 | 22 | 24 | 202 | 674 | 62% | 66% |
| All Cargo Carriers | 155 | 40 | 20 | 27 | 488 | 731 | 38% | 38% |
| Charter Carriers | 23 | 14 | 3 | 5 | 102 | 148 | 8% | 32% |
| | | | | | | 6,694 | 80% | 96% |

# Two Weight-Based ATS/Airport Fees Were Evaluated by GRA (1995)

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## FY 1995 Weight and Distance Fee No. 1

$$PerFlightFee = R_{di}\sqrt{\frac{W}{38.5}} + R_{ai}\sqrt{\frac{W}{38.5}} + R_e D\sqrt{\frac{W}{38.5}}$$

Where:

**Terminal Fees:**

| | | |
|---|---|---|
| $R_{d0}$ and $R_{a0}$ | = | $0.00 for no FAA Terminal Services |
| $R_{d1}$ and $R_{a1}$ | = | $19.15 for VFR or Contract Tower Stand Alone |
| $R_{d2}$ and $R_{a2}$ | = | $48.14 for VFR or Contract Tower with Low Activity TRACON or Radar Tower |
| $R_{d3}$ and $R_{a3}$ | = | $77.09 for VFR or Contract Tower with High Activity TRACON |
| $R_{d4}$ and $R_{a4}$ | = | $119.88 for Radar Tower or Limited Radar Tower and Low Activity TRACON |
| $R_{d5}$ and $R_{a5}$ | = | $147.71 for Limited Radar Tower and High Activity TRACON |

**En Route Fee:**

| | | |
|---|---|---|
| $R_e$ | = | $0.31 |
| W | = | Aircraft maximum takeoff weight in tons |
| D | = | Distance in statute miles |

## FY 1995 Weight and Distance Fee No. 2

$$PerFlightFee = R_{di}\sqrt{\frac{W}{38.5}} + R_{ai}\sqrt{\frac{W}{38.5}} + R_e\sqrt{\frac{WD}{38.5}}$$

Where:

**Terminal Fees:**

| | | |
|---|---|---|
| $R_{d0}$ and $R_{a0}$ | = | $0.00 for no FAA Terminal Services |
| $R_{d1}$ and $R_{a1}$ | = | $17.86 for VFR or Contract Tower Stand Alone |
| $R_{d2}$ and $R_{a2}$ | = | $44.93 for VFR or Contract Tower with Low Activity TRACON or Radar Tower |
| $R_{d3}$ and $R_{a3}$ | = | $71.96 for VFR or Contract Tower with High Activity TRACON |
| $R_{d4}$ and $R_{a4}$ | = | $111.89 for Radar Tower or Limited Radar Tower and Low Activity TRACON |
| $R_{d5}$ and $R_{a5}$ | = | $137.86 for Limited Radar Tower and High Activity TRACON |

**En Route Fee:**

| | | |
|---|---|---|
| $R_e$ | = | $9.52 |
| W | = | Aircraft maximum takeoff weight in tons |
| D | = | Distance in statute miles |

# *In the Aggregate, the Weight-Based Fees are Close to Ramsey Optimal and Have the Advantage of ICAO Precedents*

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## *Summary Comparison of Weight-Distance Fees and Ramsey Allocations for Air Traffic and Airport Costs FY 1995 ($millions)*

| User | Ramsey Allocation ATS/ARP | Weight-Distance Fee No. 1 | Weight-Distance Fee No. 2 |
|---|---|---|---|
| Domestic Jet | $4,133.6 | $4,105.6 | $4,097.3 |
| Charter | $129.9 | $128.0 | $123.9 |
| All-Cargo | $653.3 | $592.5 | $560.9 |
| International | $455.7 | $568.7 | $499.2 |
| Commuter | $620.9 | $559.6 | $673.1 |
| **Total** | **$5,993.4** | **$5,954.4** | **$5,954.4** |
| | En Route Fees | $2,847.0 | $2,977.3 |
| | Terminal Fees | $3,107.6 | $2,977.3 |
| | **Total** | **$5,954.7** | **$5,954.7** |

# *Except for #9, Weight-Based Fee No. 1 Was Closer to Ramsey for Major Carriers in 1995*

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## Comparison of Impacts on Passenger Major Air Carriers FY 1995 ($millions)

| Carrier | Modified Ramsey Allocation (ATS/ARP) | Weight-Distance Fee No. 1 | Weight-Distance Fee No. 2 | Fuel Tax $0.34 Gallon | Prior Aviation Taxes | Taxpayer Relief Act FY 2003 Rates |
|---|---|---|---|---|---|---|
| Major 1 | $137.3 | $128.3 | $127.5 | $102.7 | $118.4 | $139.4 |
| Major 2 | $779.9 | $742.8 | $695.9 | $753.8 | $825.2 | $944.8 |
| Major 3 | $388.5 | $352.7 | $348.7 | $334.9 | $322.3 | $369.3 |
| Major 4 | $669.7 | $683.8 | $684.4 | $700.3 | $785.3 | $891.1 |
| Major 5 | $425.8 | $423.0 | $411.1 | $468.2 | $448.0 | $515.6 |
| Major 6 | $367.6 | $369.0 | $409.3 | $218.3 | $224.9 | $317.5 |
| Major 7 | $227.2 | $214.8 | $211.5 | $222.9 | $195.9 | $219.1 |
| Major 8 | $631.4 | $638.2 | $586.5 | $750.4 | $731.8 | $827.5 |
| Major 9 | $524.0 | $442.2 | $462.9 | $328.7 | $509.7 | $569.1 |
| **Total** | **$4,151.4** | **$3,994.8** | **$3,937.8** | **$3,777.5** | **$4,161.5** | **$4,793.4** |

# The Weight-Based Fees Generally Over-Recover for Other Jet Carriers in 1995

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## Comparison of Impacts on Other Jet Air Carriers FY 1995 ($millions)

| Carrier | Modified Ramsey Allocation (ATS/ARP) | Weight-Distance Fee No. 1 | Weight-Distance Fee No. 2 | Fuel Tax $0.34 Gallon | Prior Aviation Taxes | Taxpayer Relief Act FY 2003 Rates |
|---|---|---|---|---|---|---|
| Other 1 | $71.9 | $74.7 | $77.9 | $77.5 | $77.9 | $91.8 |
| Other 2 | $14.4 | $22.1 | $26.9 | $13.1 | $16.3 | $27.7 |
| Other 3 | $29.8 | $34.3 | $30.5 | $53.4 | $40.7 | $47.8 |
| Other 4 | $17.8 | $15.1 | $13.7 | $18.8 | $15.2 | $15.6 |
| Other 5 | $17.3 | $23.1 | $23.4 | $24.0 | $24.5 | $33.0 |
| Other 6 | $22.4 | $19.3 | $19.6 | $17.5 | $17.2 | $17.3 |
| Other 7 | $25.8 | $28.1 | $30.7 | $21.5 | $20.0 | $27.2 |
| Other 8 | $33.2 | $29.0 | $31.8 | $21.5 | $20.8 | $26.7 |
| **Total** | **$232.6** | **$245.7** | **$254.5** | **$247.3** | **$232.6** | **$287.1** |

# The Second Weight-Based Fee Was Preferred for Commuters

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## Comparison of Impacts on Commuter Air Carriers FY 1995 ($millions)

| Carrier | Modified Ramsey Allocation (ATS/ARP) | Weight-Distance Fee No. 1 | Weight-Distance Fee No. 2 | Fuel Tax | Prior Aviation Taxes | Taxpayer Relief Act |
|---|---|---|---|---|---|---|
| Commuter 1 | $118.0 | $95.6 | $112.8 | $5.9 | $83.3 | $78.7 |
| Commuter 2 | $54.2 | $42.7 | $50.0 | $12.7 | $24.9 | $32.8 |
| Commuter 3 | $9.6 | $10.5 | $12.8 | $4.0 | $3.8 | $9.9 |
| Commuter 4 | $47.9 | $36.0 | $43.6 | $14.0 | $23.1 | $31.4 |
| Commuter 5 | $36.0 | $31.4 | $36.6 | $9.1 | $18.6 | $22.2 |
| Commuter 6 | $22.7 | $38.2 | $45.1 | $13.2 | $26.1 | $28.7 |
| Commuter 7 | $53.3 | $39.6 | $45.7 | $6.9 | $51.6 | $50.2 |
| Commuter 8 | $35.3 | $28.3 | $33.1 | $8.6 | $15.7 | $18.1 |
| Commuter 9 | $40.7 | $29.2 | $34.6 | $4.1 | $28.4 | $29.2 |
| Commuter 10 | $27.0 | $20.6 | $24.8 | $2.6 | $19.7 | $19.2 |
| Commuter 11 | $18.4 | $12.1 | $14.8 | $4.7 | $7.3 | $8.8 |
| Commuter 12 | $28.0 | $21.3 | $25.7 | $4.5 | N/A | $0.0 |
| Commuter 13 | $30.0 | $21.7 | $25.5 | $5.2 | $11.3 | $13.5 |
| Commuter 14 | $9.5 | $6.1 | $7.1 | $1.3 | $4.3 | $5.3 |
| Commuter 15 | $15.6 | $13.6 | $15.4 | $7.5 | $9.4 | $12.0 |
| Commuter 16 | $13.6 | $10.0 | $11.7 | $2.6 | $20.5 | $21.6 |
| Commuter 17 | $29.1 | $21.1 | $25.3 | $2.1 | $18.4 | $16.9 |
| Commuter 18 | $156.3 | $121.3 | $145.5 | $3.0 | $25.9 | $26.1 |
| **Total** | **$772.2** | **$619.9** | **$734.9** | **$114.6** | **$412.0** | **$443.8** |

# The Second Weight-Based Fee Was Also Preferred for All-Cargo and Non-U.S. Carriers

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## Comparison of Impacts on All-Cargo Air Carriers FY 1995 ($millions)

| Carrier | Modified Ramsey Allocation (ATS/ARP) | Weight-Distance Fee No. 1 | Weight-Distance Fee No. 2 | Fuel Tax $0.34 Gallon | Prior Aviation Taxes | Taxpayer Relief Act FY 2003 Rates |
|---|---|---|---|---|---|---|
| All-Cargo 1 | $58.7 | $48.3 | $47.5 | $62.0 | $43.6 | $43.6 |
| All-Cargo 2 | $25.7 | $29.7 | $27.0 | $22.3 | $7.7 | $7.7 |
| All-Cargo 3 | $13.2 | $13.0 | $13.0 | $16.4 | $15.9 | $15.9 |
| All-Cargo 4 | $34.9 | $38.7 | $35.4 | $43.9 | $12.2 | $12.2 |
| All-Cargo 5 | $122.3 | $145.1 | $133.1 | $157.4 | $123.7 | $123.7 |
| All-Cargo 6 | $108.8 | $125.0 | $116.1 | $121.0 | $55.0 | $55.0 |
| **Total** | **$363.6** | **$399.8** | **$372.1** | **$423.0** | **$258.1** | **$258.1** |

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# 2. Congestion Management Fees/Auctions and Airport Expansion

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# PHL CASE STUDY: LINKING CONGESTION PRICING WITH EXPANSION

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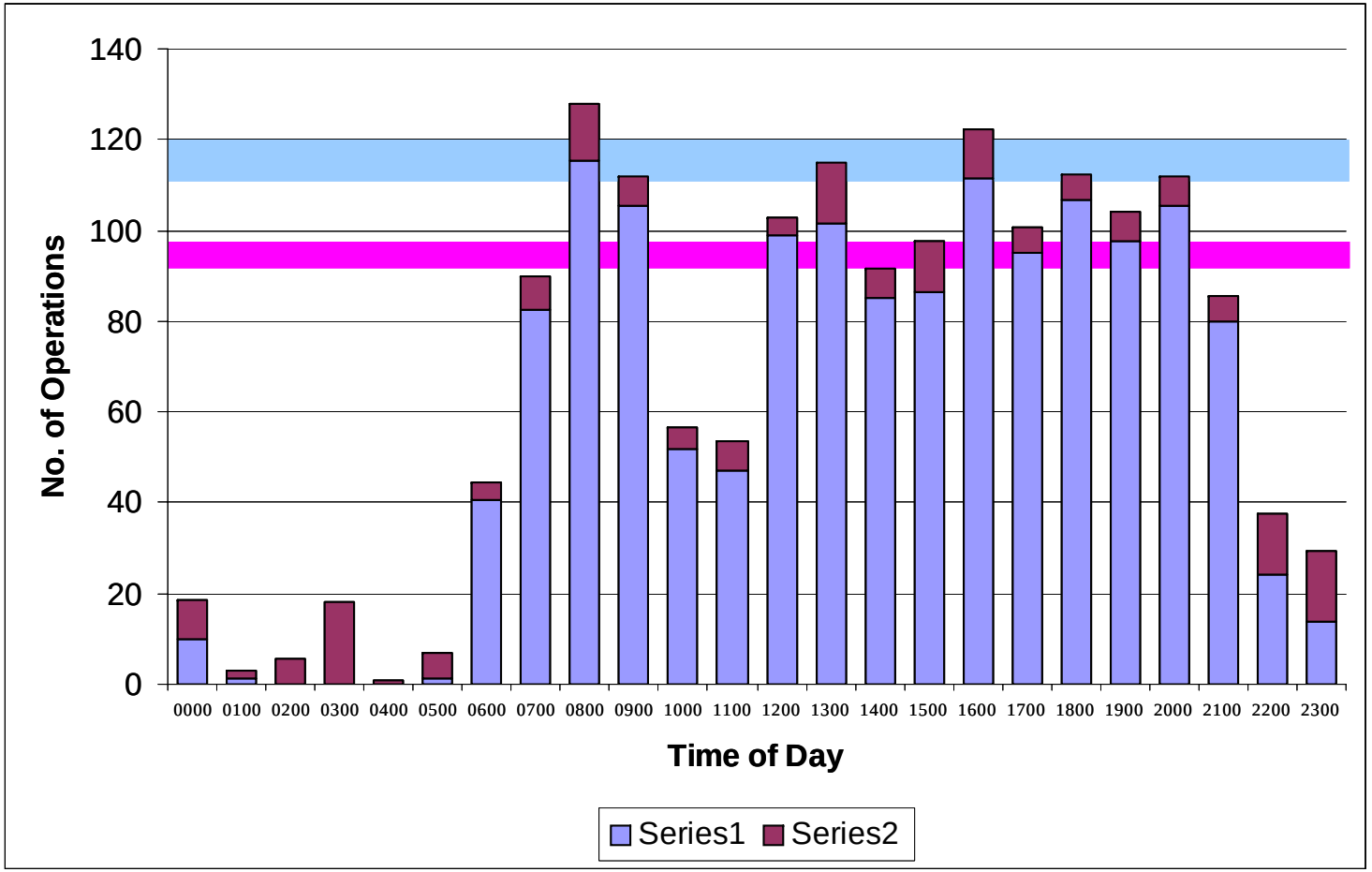
## PHL AAAW DELAYS PROJECTED TO BE 21 MINUTES BY 2010




Good weather capacity benchmarks (110 – 120)
Bad weather capacity benchmarks (91 – 96)

# Linking Congestion Pricing With Expansion

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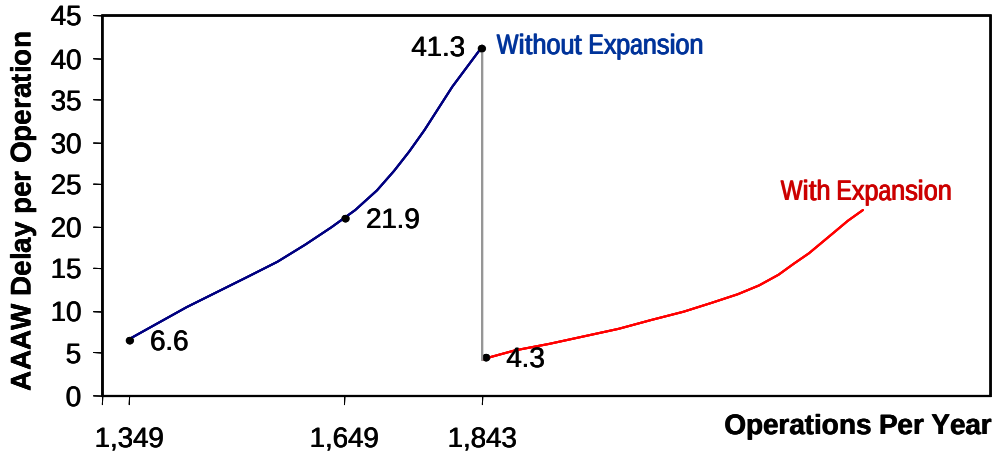
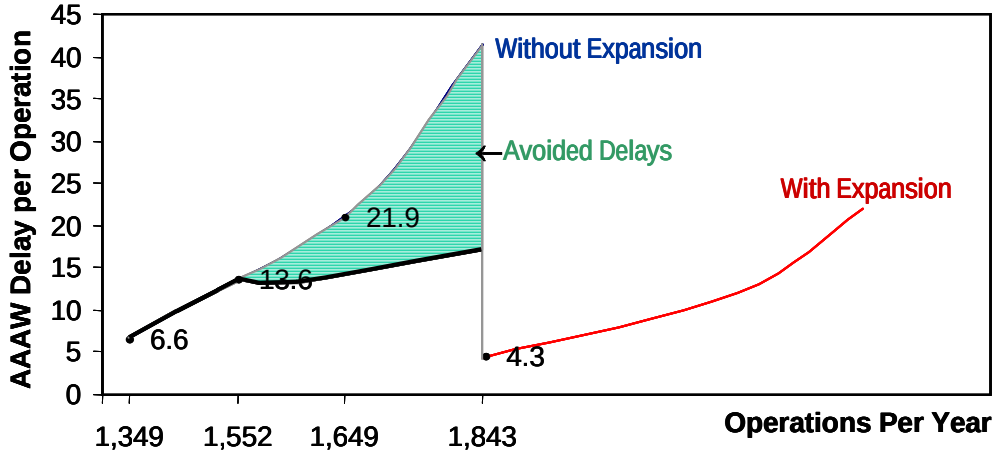
## Current and Expected Delays at PHL




## Current and Expected Delays at PHL with Peak Load Pricing



# PHL: Methodology

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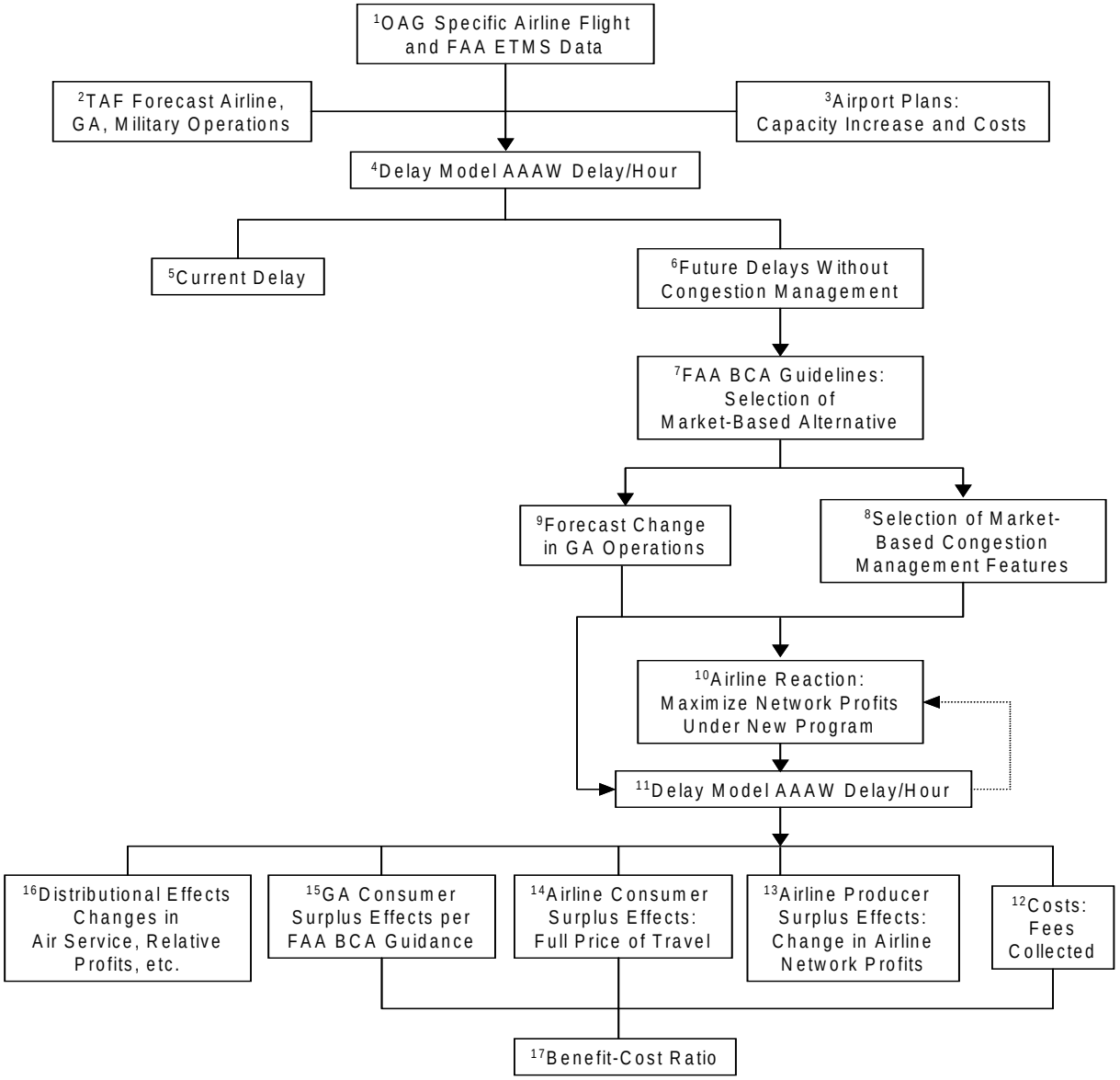

# PHL: Modeling Airline Behavior

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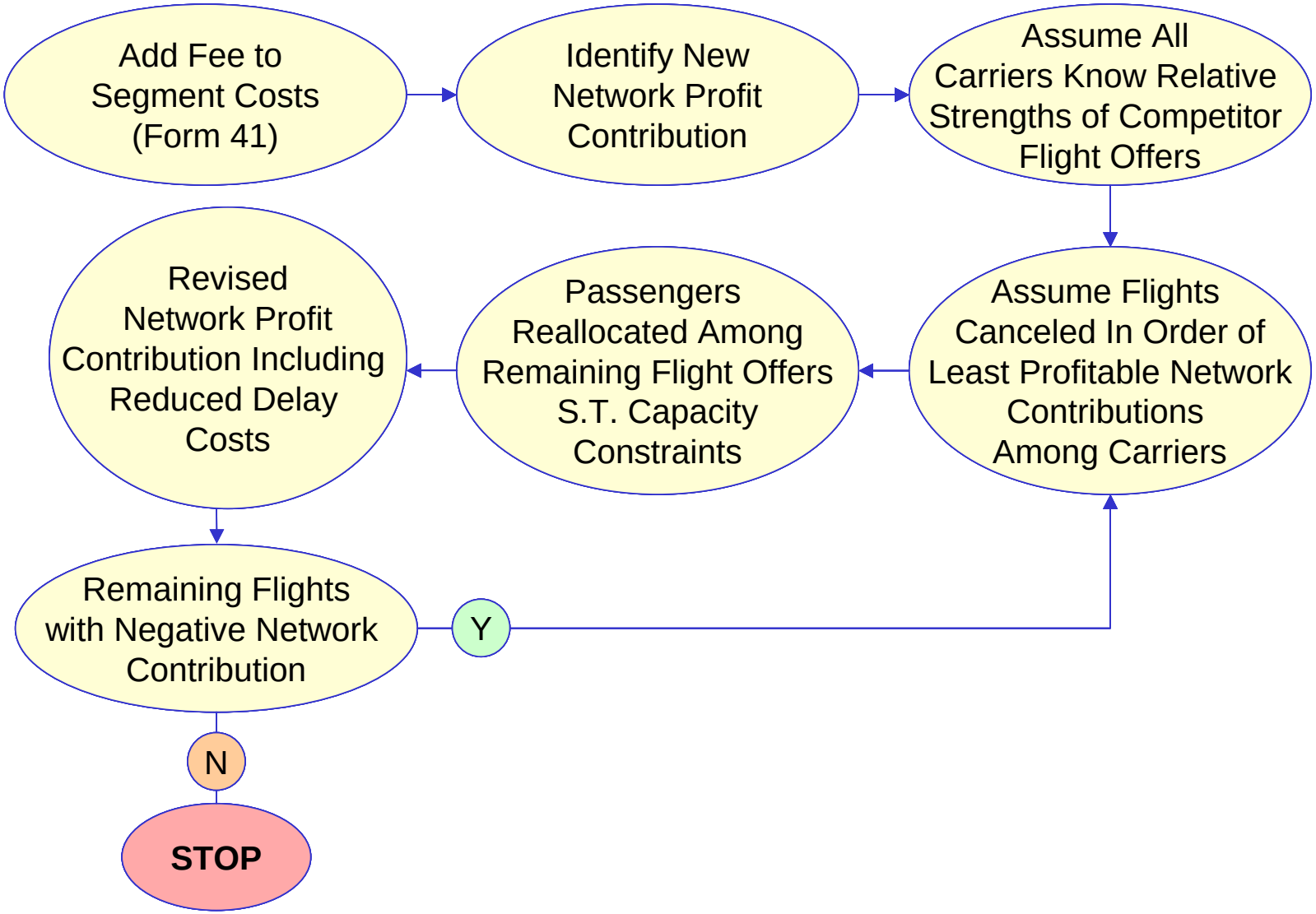

# PHL: Effects of Flat and Peak Revenue Positive Fees in 2010

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**FORECAST EFFECTS ON DELAYS AND OPERATIONS DUE TO MARKET BASED FEES AT PHL IN 2010**

| | BASE CASE | | FLAT $230 FEE PER OPERATION | | | PEAK FEE PER OPERATION | | |
|---|---|---|---|---|---|---|---|---|
| Hour | Operations | AAAW Delay | Fee per Op | Operations | AAAW Delay | Fee per Op | Operations | AAAW Delay |
| 0000 | 19 | 0.36 | $0 | 19 | 0.35 | $0 | 19 | 0.35 |
| 0100 | 3 | 0.14 | $0 | 3 | 0.14 | $0 | 3 | 0.14 |
| 0200 | 6 | 0.11 | $0 | 6 | 0.11 | $0 | 6 | 0.11 |
| 0300 | 18 | 0.14 | $0 | 18 | 0.14 | $0 | 18 | 0.14 |
| 0400 | 1 | 0.08 | $0 | 1 | 0.08 | $0 | 1 | 0.08 |
| 0500 | 7 | 0.09 | $0 | 7 | 0.09 | $0 | 7 | 0.09 |
| 0600 | 44 | 0.32 | $0 | 49 | 0.38 | $0 | 44 | 0.32 |
| 0700 | 90 | 2.49 | $230 | 83 | 2.09 | $230 | 88 | 2.34 |
| 0800 | 128 | 20.80 | $230 | 120 | 14.91 | $600 | 108 | 10.07 |
| 0900 | 112 | 28.66 | $230 | 108 | 22.26 | $600 | 98 | 13.37 |
| 1000 | 57 | 5.31 | $0 | 59 | 5.11 | $0 | 61 | 4.47 |
| 1100 | 54 | 2.68 | $0 | 57 | 2.89 | $0 | 57 | 2.68 |
| 1200 | 103 | 10.80 | $230 | 99 | 9.63 | $400 | 98 | 9.14 |
| 1300 | 115 | 25.85 | $230 | 109 | 20.04 | $600 | 98 | 13.61 |
| 1400 | 92 | 16.72 | $230 | 89 | 13.85 | $400 | 88 | 11.71 |
| 1500 | 98 | 18.54 | $230 | 95 | 15.54 | $400 | 92 | 12.77 |
| 1600 | 122 | 44.25 | $230 | 120 | 37.63 | $600 | 114 | 28.49 |
| 1700 | 101 | 28.90 | $230 | 99 | 25.73 | $600 | 98 | 21.90 |
| 1800 | 112 | 38.85 | $230 | 108 | 31.67 | $600 | 102 | 24.32 |
| 1900 | 104 | 32.28 | $230 | 103 | 28.15 | $600 | 101 | 23.89 |
| 2000 | 112 | 39.73 | $230 | 106 | 30.76 | $600 | 99 | 21.84 |
| 2100 | 86 | 16.93 | $0 | 86 | 15.32 | $0 | 86 | 13.43 |
| 2200 | 37 | 2.35 | $0 | 37 | 2.24 | $0 | 37 | 2.09 |
| 2300 | 29 | 0.83 | $0 | 29 | 0.81 | $0 | 29 | 0.79 |
| **Total Ops/Avg Delay** | **1649** | **21.85** | | **1610** | **17.87** | | **1552** | **13.65** |

**Fees Help Pay For CIP Program**

| Daily Impacts | Flat Fee | Peak Fee |
|---|---|---|
| Consumer Savings | 139,483 | 289,020 |
| Producer Surplus | 132,559 | 323,470 |
| Total Benefits | 272,042 | 612,490 |
| Fee Costs | 209,990 | 461,350 |
| Benefit/Cost Ratio | 1.30 | 1.32 |

# PHL: Lost Service in 2010 Due to Congestion Fees

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### Cities Where Some Airline Services Were Cancelled

**$230 Flat Fee at PHL**

| City | Cancellations | Base 2001 Operations | Pct. Deleted |
|---|---|---|---|
| Salisbury | 4 | 13 | 31% |
| Groton New London | 2 | 8 | 25% |
| Ithaca | 2 | 10 | 20% |
| Reading | 2 | 10 | 20% |
| Charleston | 1 | 8 | 13% |
| Harrisburg | 1 | 16 | 6% |
| Lebanon | 1 | 6 | 17% |
| New Haven | 1 | 10 | 10% |
| State College | 1 | 10 | 10% |
| Williamsport | 1 | 8 | 13% |
| All Other | 0 | 1053 | 0% |
| **Grand Total** | **16** | **1152** | **1.4%** |

### Cities Losing Some Service

**PHL Peak Fees**

| City | Deleted Operations | Total Operations | Pct. Of Total |
|---|---|---|---|
| Groton New London | 4 | 8 | 50% |
| Ithaca | 4 | 10 | 40% |
| Salisbury | 4 | 13 | 31% |
| Binghamton | 3 | 7 | 43% |
| Harrisburg | 3 | 16 | 19% |
| Lebanon | 3 | 6 | 50% |
| Reading | 3 | 10 | 30% |
| State College | 3 | 10 | 30% |
| Williamsport | 3 | 8 | 38% |
| Arlington | 2 | 19 | 11% |
| New Haven | 2 | 10 | 20% |
| White Plains | 2 | 11 | 18% |
| Wilkes-Barre/Scranton | 2 | 10 | 20% |
| Allentown | 1 | 11 | 9% |
| Atlantic City | 1 | 8 | 13% |
| Chantilly | 1 | 26 | 4% |
| Charleston | 1 | 8 | 13% |
| Charlottesville | 1 | 6 | 17% |
| Elmira/Corning | 1 | 8 | 13% |
| Knoxville | 1 | 3 | 33% |
| New York | 1 | 11 | 9% |
| Newburgh | 1 | 10 | 10% |
| Newport News | 1 | 10 | 10% |
| Orlando | 1 | 25 | 4% |
| Roanoke | 1 | 5 | 20% |
| Rochester | 1 | 17 | 6% |
| Syracuse | 1 | 11 | 9% |
| West Palm Beach | 1 | 6 | 17% |
| Worcester | 1 | 8 | 13% |
| All Other | 0 | 841 | 0% |
| **Grand Total** | **54** | **1152** | **5%** |

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# 3. The Need for Price Caps on Government Services

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# *Airline Industry Underperforms Its Value Chain Partners—1992 - 1996*

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| | Global Sales (Billions) | ROIC |
|---|---|---|
| Manufacturers | $57 | 16% |
| Lessors | $74 | 15% |
| Retail Distribution | $15 | 18% |
| Reservation Networks | $7 | 30% |
| Ground Handlers | $31 | 12% |
| Caterers | $10 | 11% |
| Airports | $25 | 10% |
| Airlines | $303 | 6% |

Much Worse Now

# Continuously Falling Real Airline Yields Result in Relentless Cost Pressure

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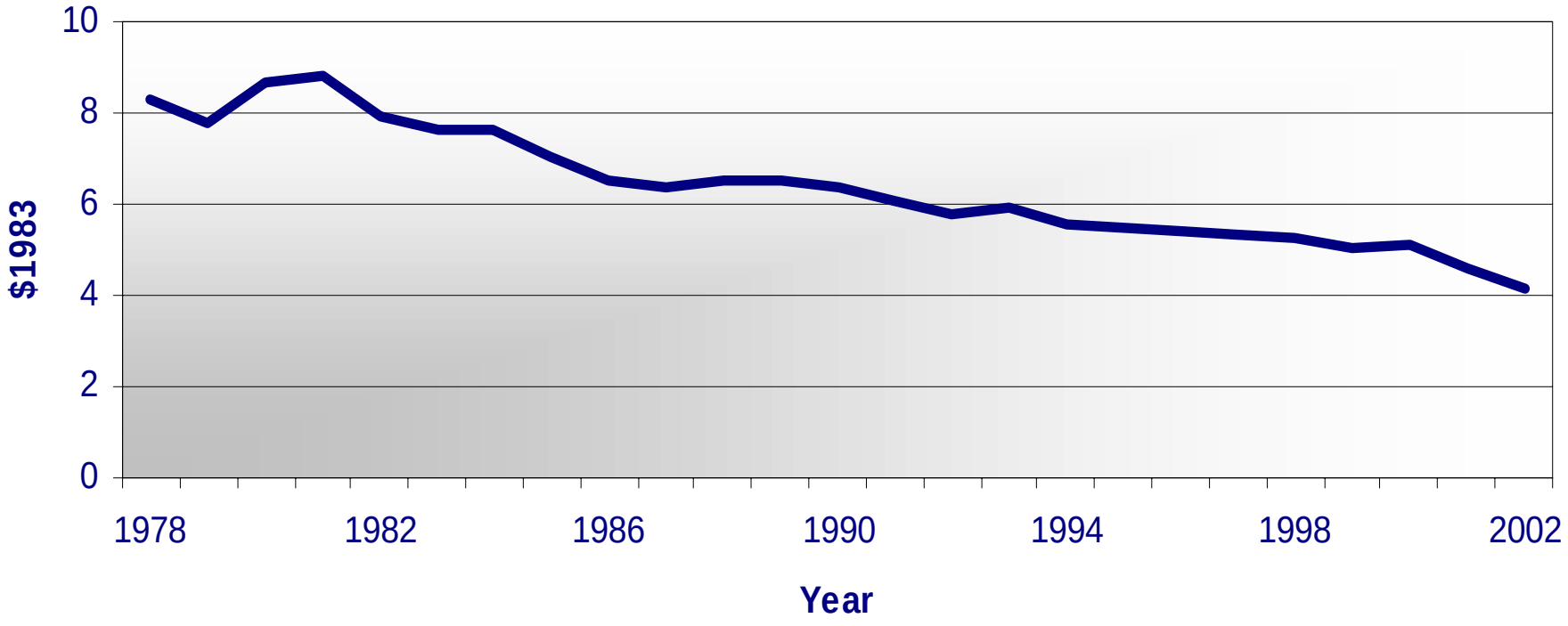
## (System Average Yield)




Source: ATA

# The CAGR In Government Aviation Related Taxes Exceeds the CAGR in Airline Receipts by 38%

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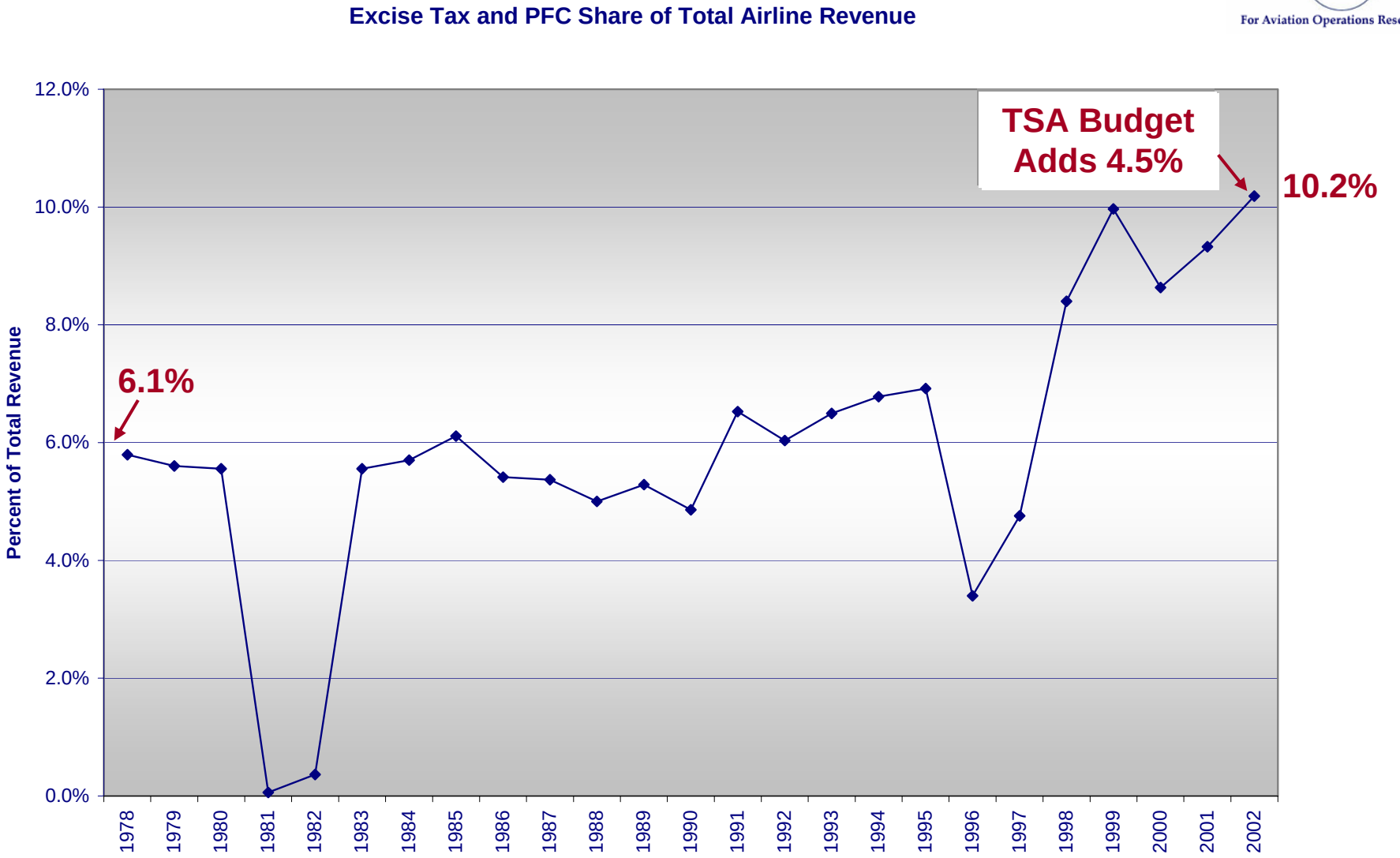

# Air Traffic Control As a Percent of Operating Costs of Airline Missions

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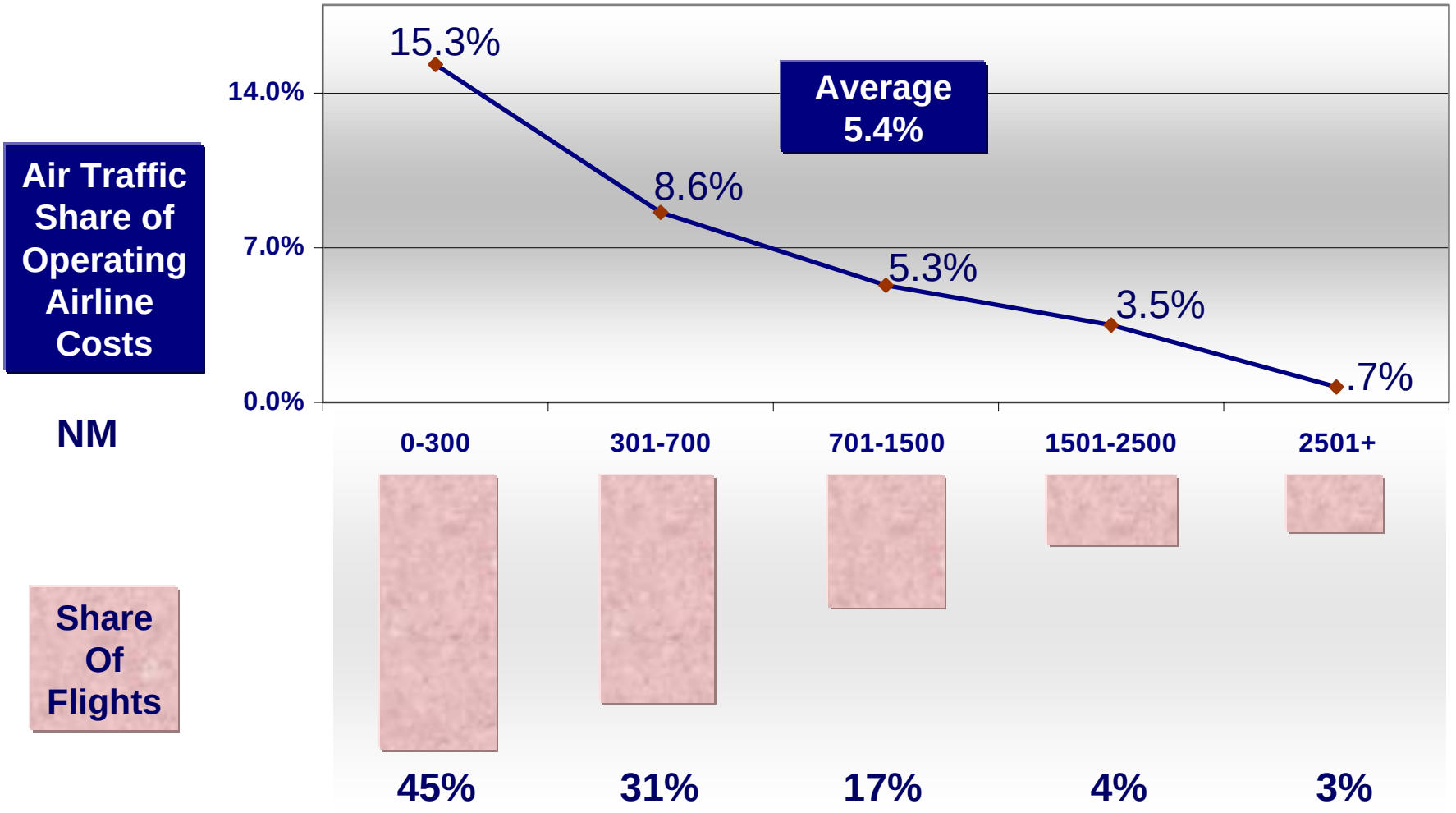


Source: GRA - Data are preliminary.

# TSA: Massive Cost of Retrofitting Baggage Systems

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## Signed LOI's for EDS-In-Line Systems

| Airport | Total EDS Cost |
|---|---|
| Atlanta | $125 Million |
| Boston Logan | $116 Million |
| Dallas-Fort Worth | $139 Million |
| Denver | $95 Million |
| Las Vegas | $125 Million |
| Los Angeles/Ontario | $342 Million |
| Phoenix | $122 Million |
| Seattle | $212 Million |
| **TOTAL LOI Airports** | **$1.276 Billion** |

## Costs of Other Planned EDS Systems

| Airport | Estimated EDS Installation |
|---|---|
| Baltimore | $65 Million |
| Chicago Midway/O'Hare | $90 Million |
| Detroit | $100 Million |
| Houston | $115 Million |
| Miami | $200 Million |
| Newark | $99 Million |
| New York LaGuardia | $98 Million |
| New York Kennedy | $250 Million |
| Orlando | $65 Million |
| Philadelphia | $65 Million |
| St. Louis | $90 Million |
| San Jose | $172 Million |
| San Juan, Puerto Rico | $130 Million |
| Tampa | $124 Million |
| Washington Dulles | $121 Million |
| **EDS Costs Including Other Airports Not Listed** | **$2.962 Billion** |

# Airline Excise Taxes – 2004

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| Effective January 1, 2004 | Rate | Unit of Taxation |
|---|---|---|
| **Passengers** | | |
| Federal Ticket Tax (1) | 7.50% | Domestic Airfare |
| Federal Flight Segmetn Tax (1) | $3.10 | Domestic Enplanement |
| Federal Security Surcharge (2) | $2.50 | Enplanement at U.S. Airport |
| Airport Passenger Facility Charge (3) | Up to $4.50 | Enplanement at Eligible U.S. Airport |
| International Departure Tax (1,4) | $13.70 | International Passenger Departure |
| International Arrival Tax (1,4) | $13.70 | International Passenger Arrival |
| INS User Fee (5) | $7.00 | International Passenger Arrival |
| Customs user Fee (6) | $5.00 | International Passenger Arrival |
| APHIS Passenger Fee (7) | $3.10 | International Passenger Arrival |
| **Shippers** | | |
| Cargo Waybill Tax (1) | 6.25% | Waybill for Domestic Freight |
| **Sales/Operations** | | |
| Frequent Flyer Tax (1,8) | 7.50% | Sale of Frequent Flyer Miles |
| APHIS Aircraft Fee (7) | $65.25 | International Aircraft Arrival |
| Jet Fuel Tax (1) | $4.3¢ | Domestic Gallon |
| LUST Fuel Tax (9) | 0.1¢ | Domestic Gallon |
| Air Carrier Security Fee (2) | Carrier-Confidential | CY2000 Screening Costs |

# The Six Percent Solution

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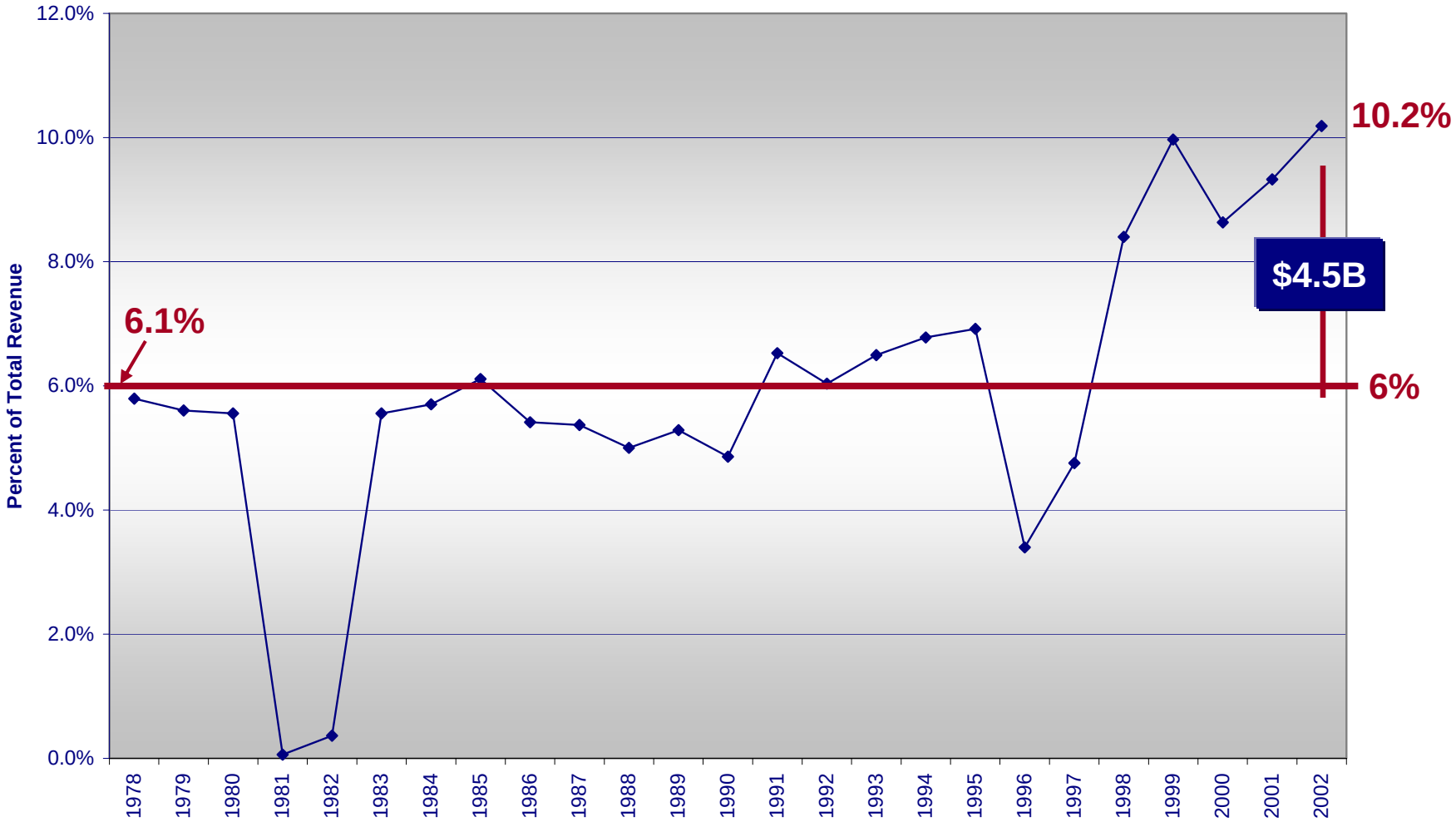
**Excise Tax and PFC Share of Total Airline Revenue**



# Regulate Government Service

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1. Independent Oversight
2. Unit Costs set by Formula:

   CPI-X
3. Quality of Service Explicitly Measured

   ✈ Tied to Compensation

↓

Enhance Quality

&

Moderate Costs to Users

↓

Take Politics Out of the Equation

# *Why Not Just Privatize Government Services With No Regulation?*

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**Airports and ATC are Monopolies**

**Unregulated Companies Would Extract Rents from Airlines Just Like Others in the Value Chain**

**+ No Private Sector**

**Company Could Stand-Up for the Potential Liabilities**

# The Potential for Savings Are Huge

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