

Analyzing the Impact of Major Events on US Airfares

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Introduction

- ❖ The airline industry is a vital sector in the US driving interstate and global connectivity and economic growth
- ❖ The industry dynamic and sensitive to many economic, political, and social events
- ❖ The 9/11 attacks marked a defining moment, reshaping airline security and operations, and caused some fears of air travel among consumers
- ❖ The Great Recession (2007-2009) had significant impacts on consumer behavior, affecting many industries including airlines
- ❖ The COVID-19 pandemic was an unprecedented global challenge leading to drastic changes in travel norms and airline strategies

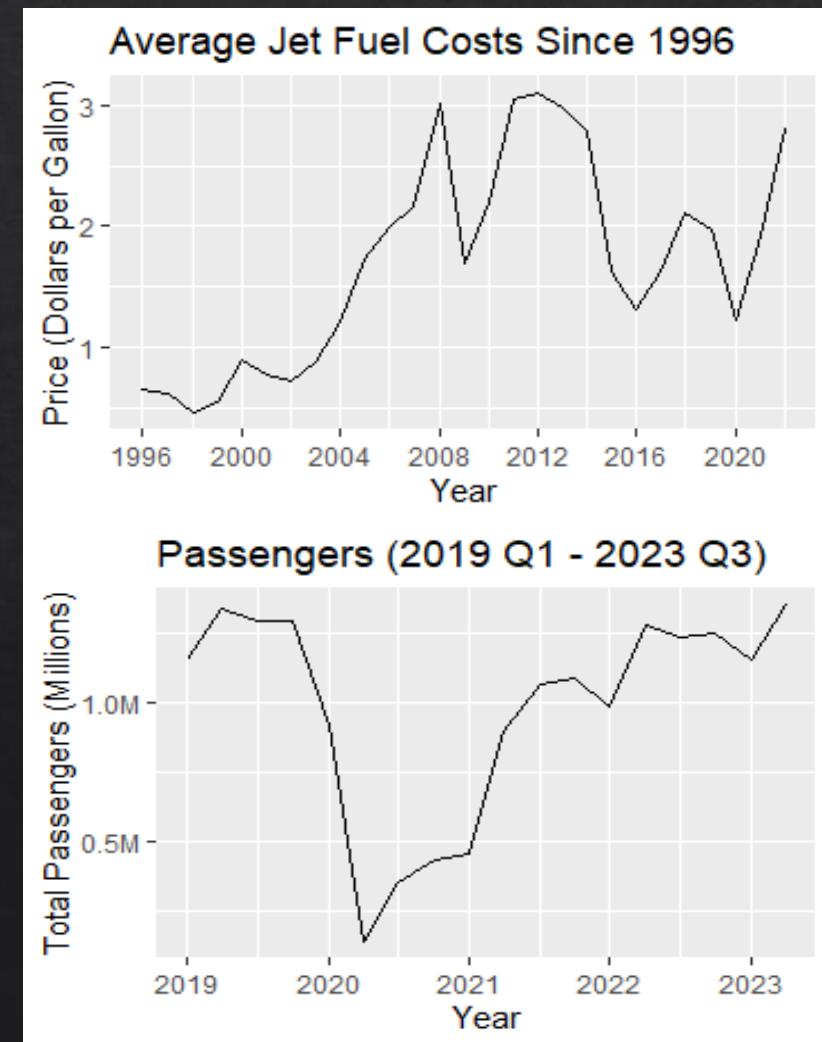
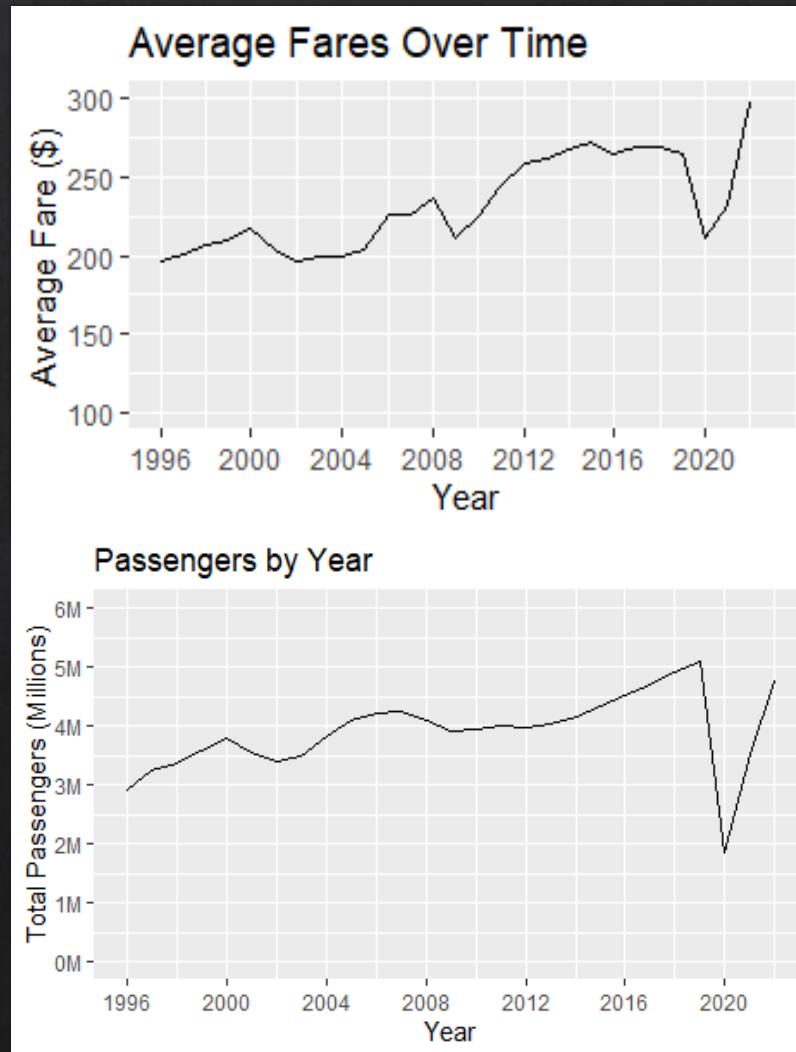
Research Question

- ❖ How have these recent historical events impacted domestic airfares in the United States?
- ❖ This project aims to explore how domestic airfares are impacted by external geopolitical and economic events

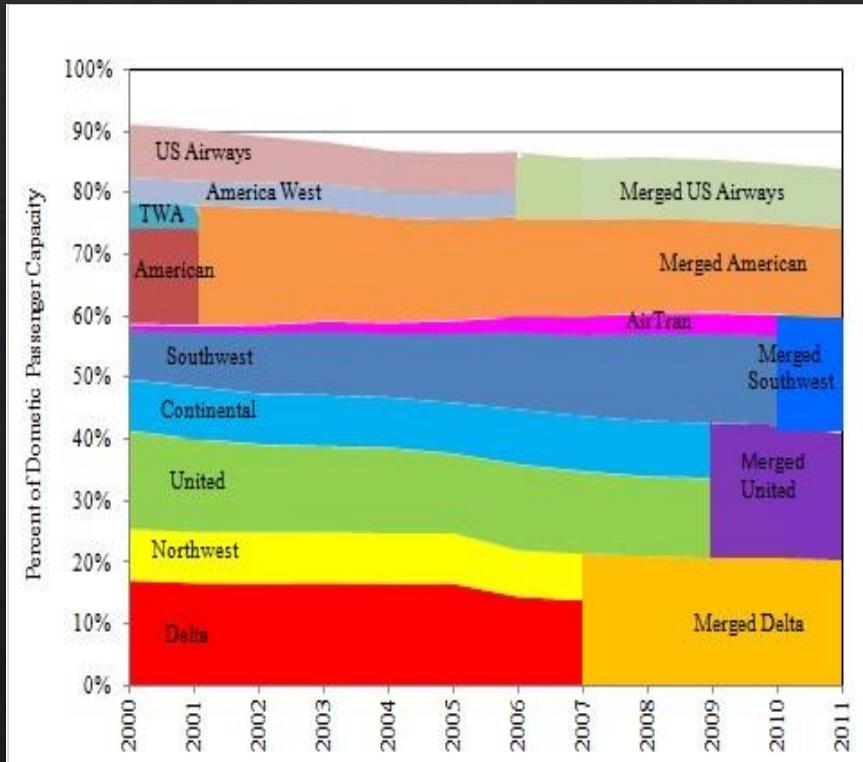
Data

- ❖ Consumer Airfare Report- Contiguous State City-Pair Markets That Average At Least 10 Passengers Per Day
 - ❖ Sourced from the US Department of Transportation
 - ❖ 599,280 observations of 9,615 unique city-pair markets
 - ❖ Data collected between 1996 and 2023
 - ❖ Data for city-pair markets are aggregated and directionless (averages are calculated without regard to origin and destination cities)
- ❖ U.S. Kerosene-Type Jet Fuel Retail Sales by Refiners
 - ❖ Sourced from the US Energy Information Administration
 - ❖ Average cost of jet fuel (dollars per gallon)
 - ❖ Monthly averages collected between 1975 and 2022

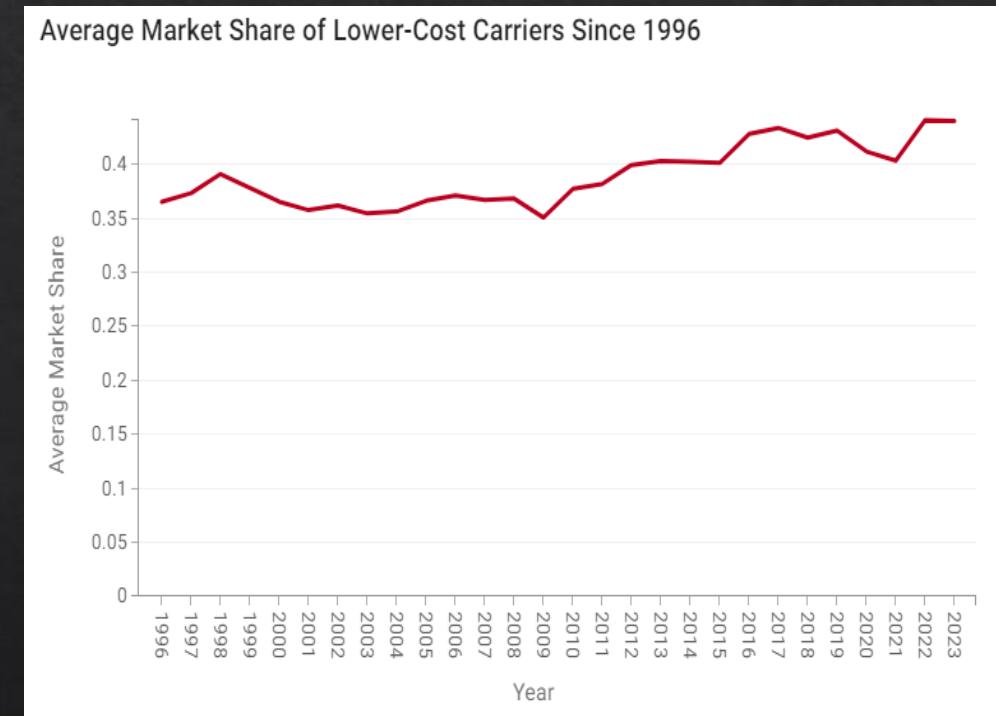
Data Visualized



Other Trends in the Industry



Source: Bureau of Transportation Statistics



Model

- ❖ $\log(\text{fare})_{it} = \beta_1 d911_{it} + \beta_2 grec_{it} + \beta_3 covid_{it} + \beta_4 \log(\text{passengers})_{it} + \beta_5 \text{lfms}_{it} + \beta_6 \log(\text{avgfuel})_{it} + \alpha_i + \varepsilon_{it}$
 - ❖ fare = the average overall fare in city-pair market i during time t
 - ❖ d911 = 1 if observation is between Q3 2001 and Q3 2002
 - ❖ grec = 1 if observation is between Q4 2007 and Q2 2009
 - ❖ covid = 1 if observation is between Q1 2020
 - ❖ passengers = number of passengers in city-pair market i during time t
 - ❖ lfms = market share of the lowest cost airline in city-pair market i during time t
 - ❖ avgfuel = average cost of jet fuel (dollars per gallon) in time t
 - ❖ α_i = unobserved, time-invariant error
 - ❖ ε_{it} = unobserved error

Results

	(1)
d9111	-0.088*** (0.001)
grec1	-0.100*** (0.001)
covid1	-0.172*** (0.001)
lpassengers	-0.175*** (0.001)
lf_ms	-0.012*** (0.001)
lavgfuel	0.149*** (0.000)
Num.Obs.	569289
R2	0.286
R2 Adj.	0.274
AIC	-424230.0
BIC	-424151.2
RMSE	0.17

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Clustered Standard Errors

	Estimate	Std. Error
d9111	-0.0876554	0.0013936
grec1	-0.1001902	0.0014648
covid1	-0.1715934	0.0026865
lpassengers	-0.1745882	0.0026735
lf_ms	-0.0118084	0.0026692
lavgfuel	0.1490085	0.0017010
	t value	Pr(> t)
d9111	-62.896	< 2.2e-16 ***
grec1	-68.400	< 2.2e-16 ***
covid1	-63.872	< 2.2e-16 ***
lpassengers	-65.303	< 2.2e-16 ***
lf_ms	-4.424	9.691e-06 ***
lavgfuel	87.600	< 2.2e-16 ***

Signif. codes:

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Interpretation

- ❖ On average, domestic airfares decreased by 8.8% during the two years following the 9/11 attacks
- ❖ On average, domestic airfares decreased by 10% during the Great Recession
- ❖ On average, domestic airfares decreased by about 17.2% during the COVID-19 pandemic

Why Is This Important?

- ❖ The airline industry is vulnerable to major geopolitical and economic events, and this demonstrates the need for resilient business strategies in the face of unexpected crises
 - ❖ Policy makers can also explore this topic to make informed decisions regarding airline industry support during times of crisis
- ❖ The data reveals how external events affect the travel behavior of consumers
- ❖ Can potentially encourage further analysis of long-term effects of such events on industry structure and competition

Challenges and Limitations

- ❖ Data issues
 - ❖ I faced challenges finding a granular but understandable dataset
 - ❖ I began the project using data that I later realized had some inherent sample selection bias, requiring me to find a more generalized dataset and start over with my analysis
- ❖ Choosing the right model
 - ❖ The fixed effects model allowed me to analyze time-varying factors but limited my ability to analyze other crucial fare determinants that varied between city-pair markets such as distance
- ❖ Statistical inference
 - ❖ Both the normal and clustered standard errors were suspiciously low and raise some suspicion about the validity of my estimates

Thank You!