Modeling Airport Disruptions
JFK, LAX, and DFW

Regional Economic Models, Inc.

what does REMI say?sm

About Us

At REMI, we're inspired by a single goal: *improving public policies*.

Our models are built for any state, county, or combination of counties in the United States.

Our Representative Clients

Our model users and consulting clients use REMI software solutions
to perform rigorous economic analysis that critically influences policy.

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Background Info

- Recently, we have seen an increase in airport disruptions
- Back in March, an electrical fire at Heathrow airport in London caused a shutdown of parts of the airport
- Recently, the Newark Airport's air traffic control lost communications with airplanes due to an brief outage of their communications system
- With the airline industry being vulnerable to major shutdowns as a result of minor errors, it's important to look at the economic impacts of potential airport disruptions

Impacts of Airport Disruptions

Loss of Airfare

- A majority of airline revenue comes from airfare from consumers traveling
- To what extent would an airport disruption affect this revenue?

Loss of Shipping Revenue

- Along with airfare being lost to airport disruption, shipping companies will lose out on revenue
- How can we estimate the loss of shipping revenue?

Loss of Trade

- Billions of dollars worth of goods are flown through the air daily
- How would airport disruptions affect domestic trade, exports, and imports?

Methodology Overview – Loss of Airfare

In order to model the loss in airfare, the amount of people boarding airplanes and the average fare must be found.

The data for enplanements in 2023 was sourced from the FAA and the average fare was sourced from the Bureau of Transportation Statistics.

	DFW	LAX	JFK
Total Enplanements (Yearly)	39,246,212	40,956,673	30,804,355
Average Fare (Domestic)	$392.31	$385.79	$397.44
Fares Lost (Three Days)	$126,548,000	$129,867,000	$100,626,000
Fares Lost (One Day)	$42,182,000	$43,290,000	$33,542,000
Fares Lost (Half Day)	$21,091,000	$21,645,000	$16,771,000

Methodology Overview – Loss of Shipping Revenue

In order to estimate shipping revenue lost, we estimated shipping cost per pound and found the total freight and mail cargo going through each airport yearly

Shipping rates on UPS website ranged anywhere from $0.75 to $4.00 a pound, so we decided $1.75 was a good middle ground

Air Cargo data was found from the Bureau of Transportation Statistics

	DFW	LAX	JFK
Yearly Cargo (Freight + Mail) in pounds	527,092,000	1,191,504,000	467,906,000
Shipping Revenue (Three Days)	$7,581,000	$17,138,000	$6,730,000
Shipping Revenue (One Day)	$2,527,000	$5,713,000	$2,243,000
Shipping Revenue (Half Day)	$1,264,000	$2,856,000	$1,122,000

*Shipping costs estimated at $1.75/lb

Methodology Overview – Monetary Value of Air Cargo

Data was available for the monetary value of air cargo by type of shipping

We found the percentage of shipping volume by finding the percentage of the total air cargo that originated at each airport

After finding the total value of air cargo and the percentage of volume, we can estimate the monetary of air cargo moving through each airport yearly and on a weekly, three day, and one day interval

	Domestic Trade	Exports	Imports
US 2023 Total Value	$153 Billion	$228 Billion	$219 Billion
DFW % of Volume	1.74%	1.74%	1.74%
LAX % of Volume	3.92%	3.92%	3.92%
JFK % of Volume	1.54%	1.54%	1.54%
DFW Yearly Value of Air Cargo	$2.662 Billion	$3.967 Billion	$3.811 Billion
LAX Yearly Value of Air Cargo	$5.998 Billion	$8.938 Billion	$8.585 Billion
JFK Yearly Value of Air Cargo	$2.356 Billion	$3.511 Billion	$3.373 Billion

Simulation Inputs

Policy Variable Inputs

Active	Edit	Group
☑		Loss of Airfare

Active	View	Category	Detail
☑	🔍	Industry Sales (Exogenous Production)	Air transportation

Active	Edit	Group
☑		Loss of Shipping Revenue

Active	View	Category	Detail
☑	🔍	Industry Sales (Exogenous Production)	Air transportation

Active	Edit	Group
☑		Loss of Domestic Trade

Active	View	Category	Detail
☑	🔍	Industry Sales (Exogenous Production)	Details (2)

Active	Edit	Group
☑		Loss of Exports

Active	View	Category	Detail
☑	🔍	Industry Sales (International Exports)	Details (66)

Active	Edit	Group
☑		Loss of Imports

Active	View	Category	Detail
☑	🔍	Imports from Rest of World	Details (58)

Loss of Airfare is modeled as a decrease in sales to the air transportation industry

Loss of shipping revenue is modeled as a decrease in sales to the air transportation industry

Loss of domestic trade is modeled as a decrease in sales to the wholesale and retail trade industries

Loss of exports is modeled as a decrease in international exports in all industries

Loss of imports is modeled as a decrease in imports from Rest of World for all industries that can be imported

Employment and GDP Loss by Airport

Dallas-Fort Worth

One Day Shutdown

Category	Units	Difference
Employment	Individuals	-889
Gross Domestic Product	Millions of 2017 Dollars	-93.941

Half Day Shutdown

Category	Units	Difference
Employment	Individuals	-439
Gross Domestic Product	Millions of 2017 Dollars	-46.507

Los Angeles

One Day Shutdown

Category	Units	Difference
Employment	Individuals	-1005
Gross Domestic Product	Millions of 2017 Dollars	-107.867

Half Day Shutdown

Category	Units	Difference
Employment	Individuals	-502
Gross Domestic Product	Millions of 2017 Dollars	-53.932

New York City

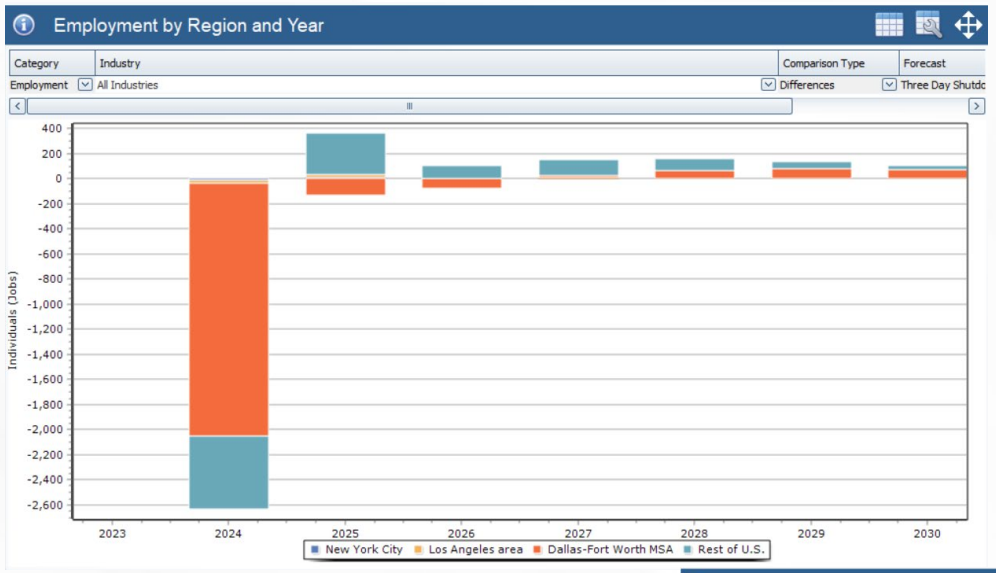
One Day Shutdown

Category	Units	Difference
Employment	Individuals	-577
Gross Domestic Product	Millions of 2017 Dollars	-70.413

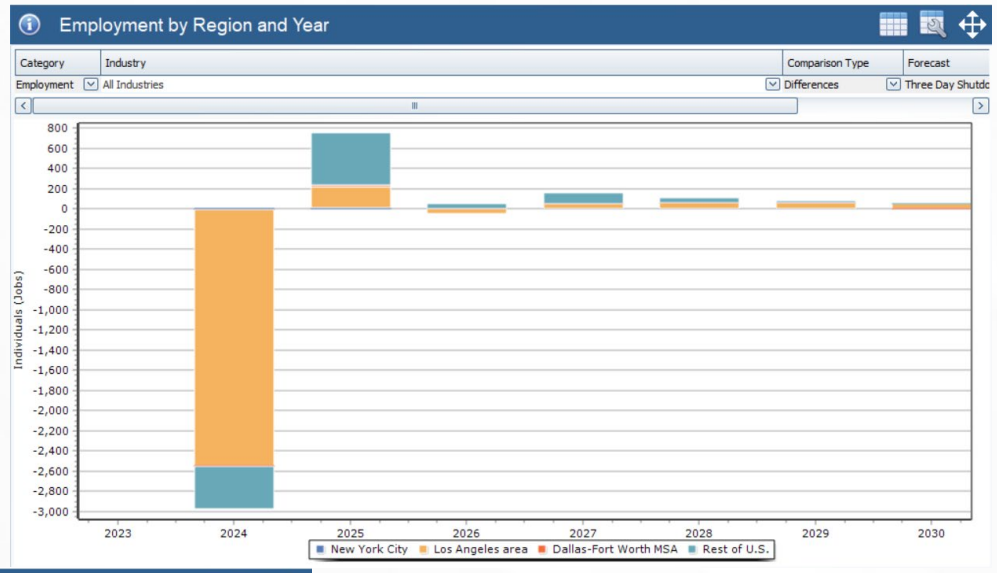
Half Day Shutdown

Category	Units	Difference
Employment	Individuals	-288
Gross Domestic Product	Millions of 2017 Dollars	-35.209

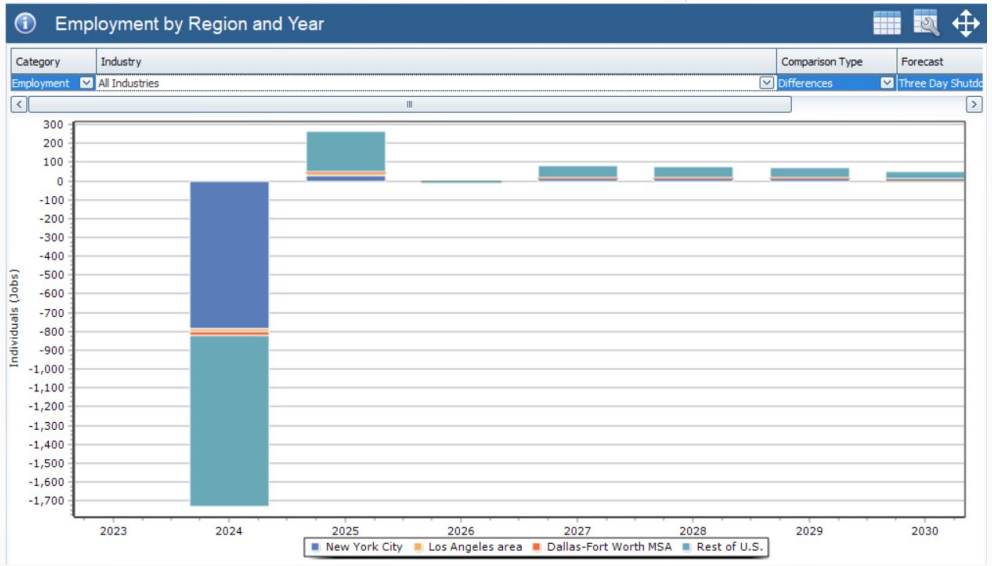
One Day Shutdown – Employment by Airport 2023-2030



DFW

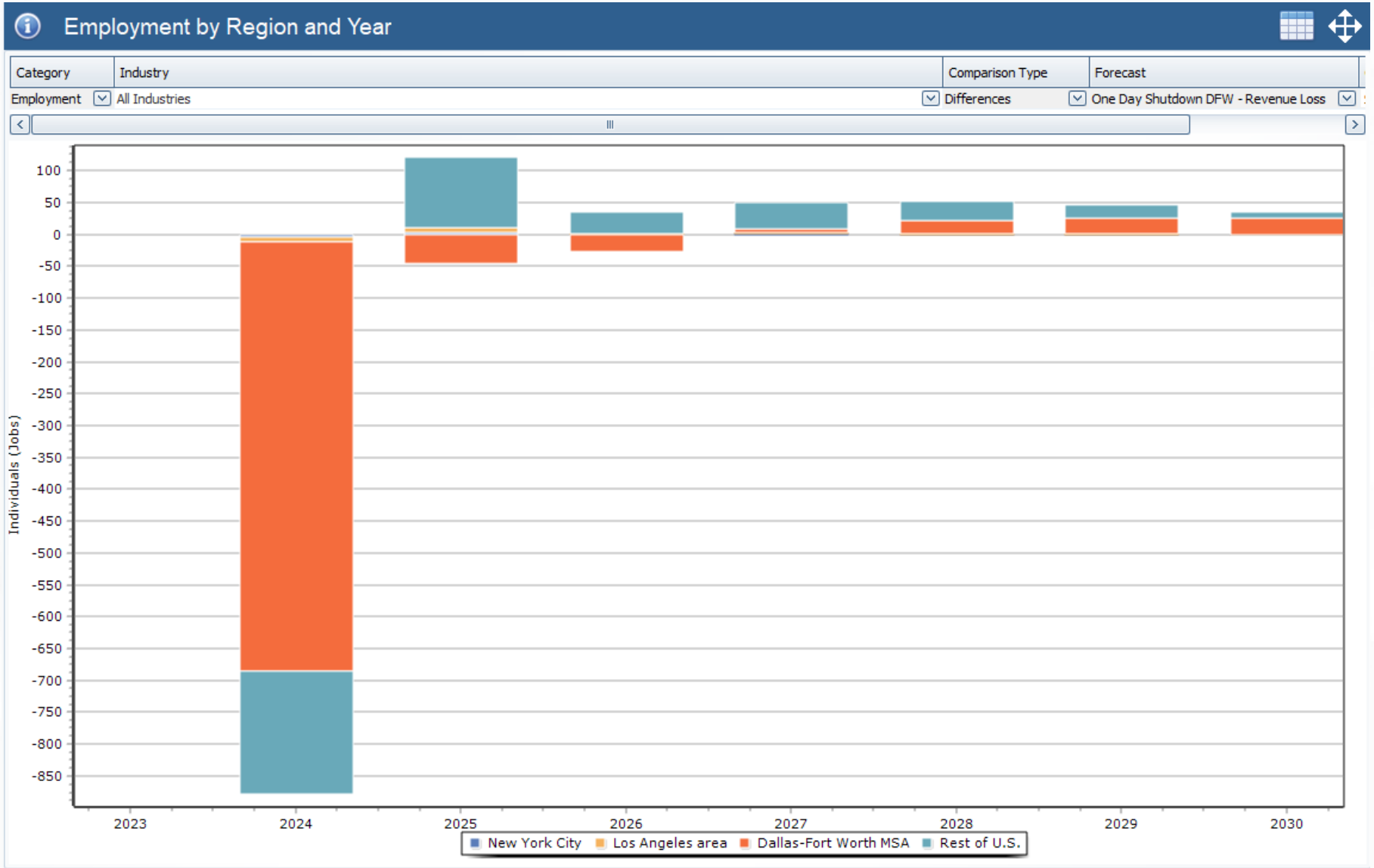


LAX

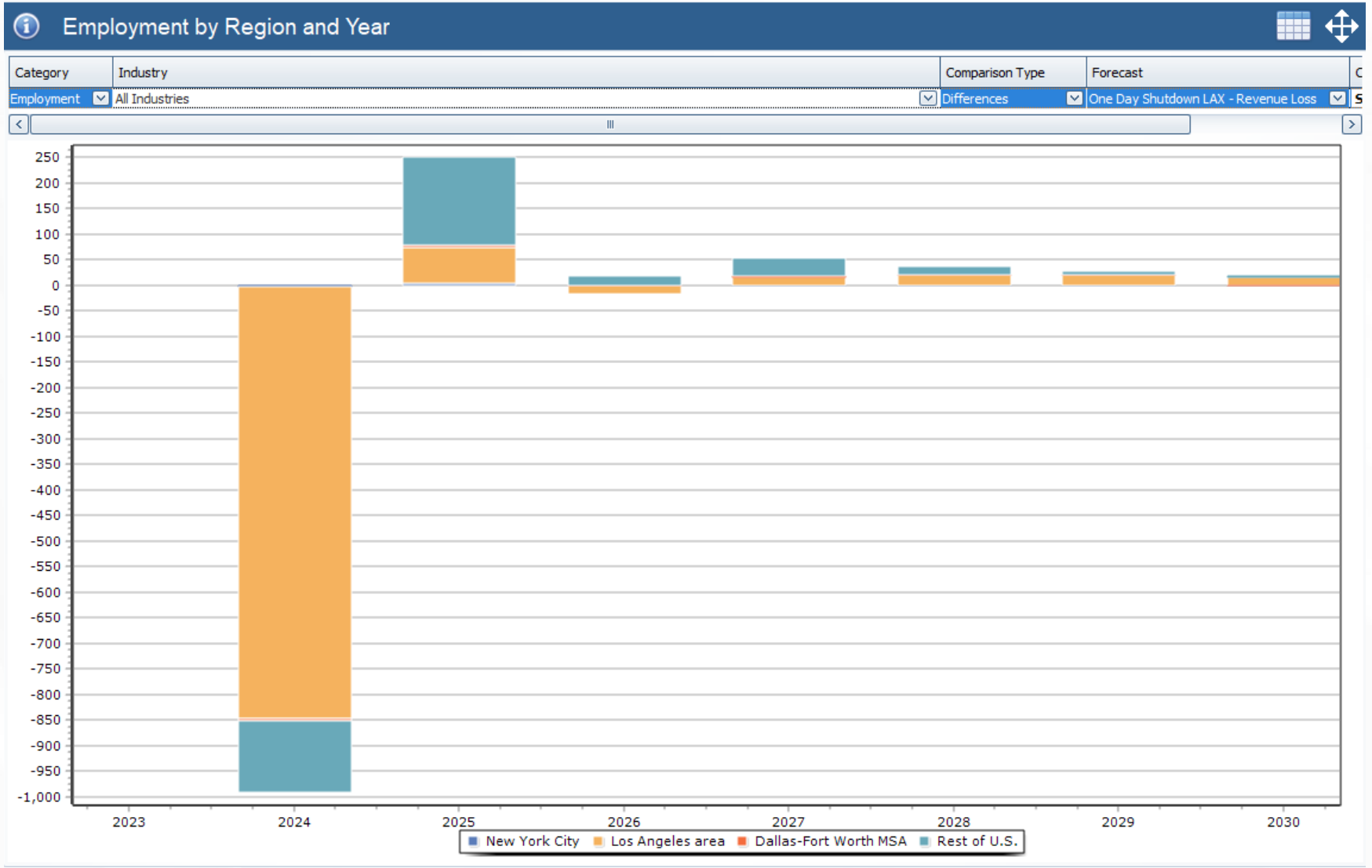


JFK

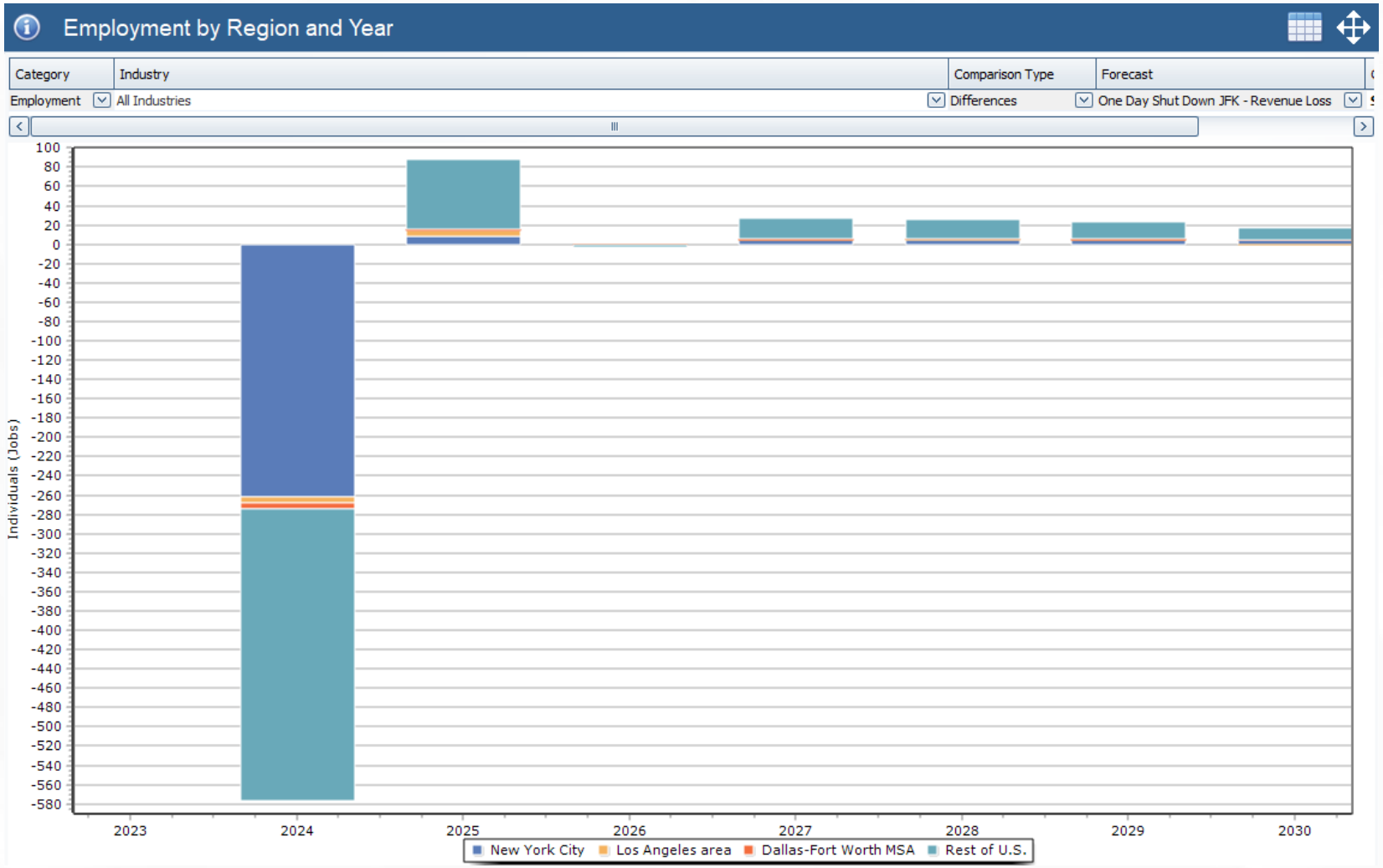
One Day DFW Shutdown – Employment



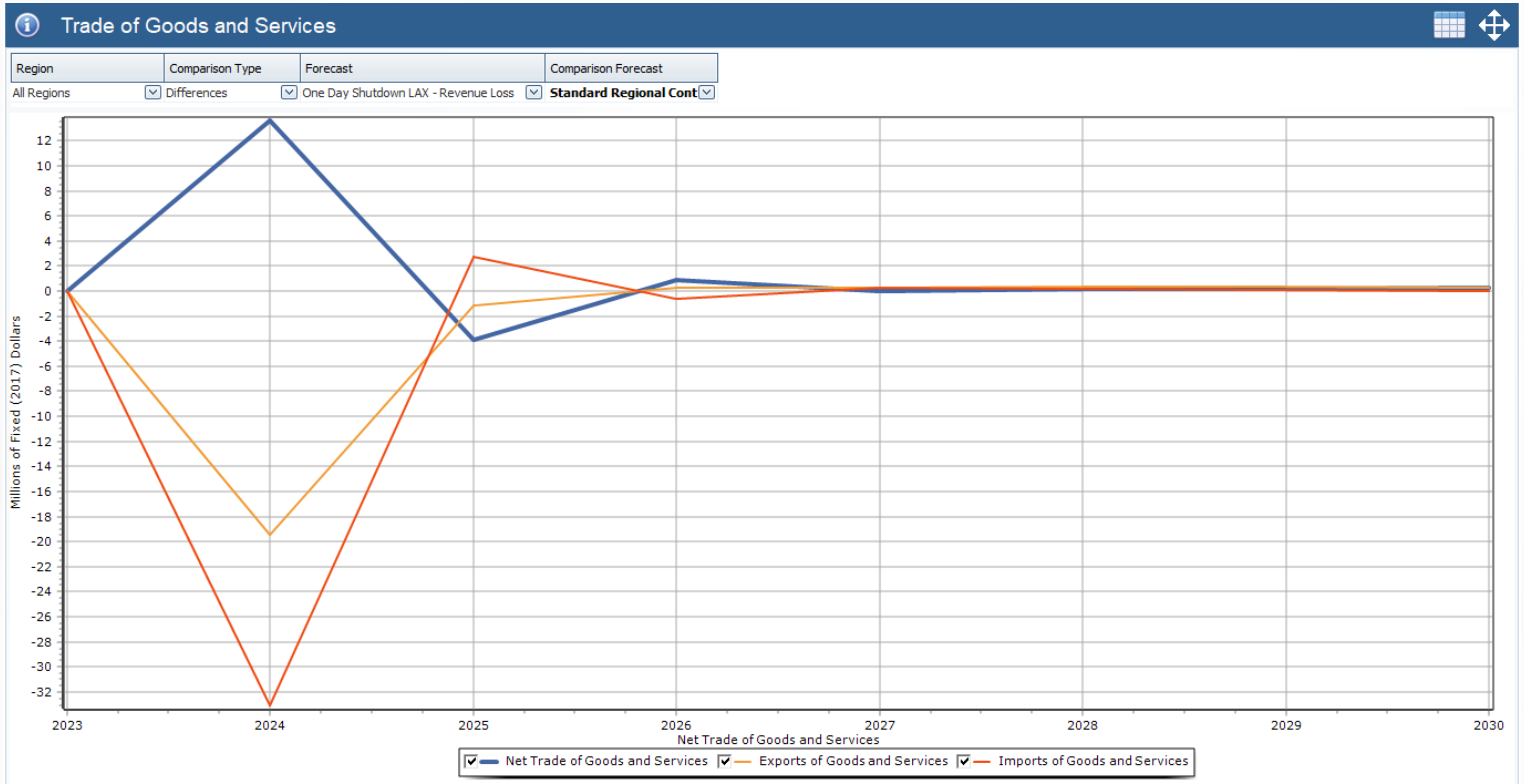
One Day LAX Shutdown – Employment



One Day JFK Shutdown – Employment



Effects on Trade – LAX One Day Shutdown



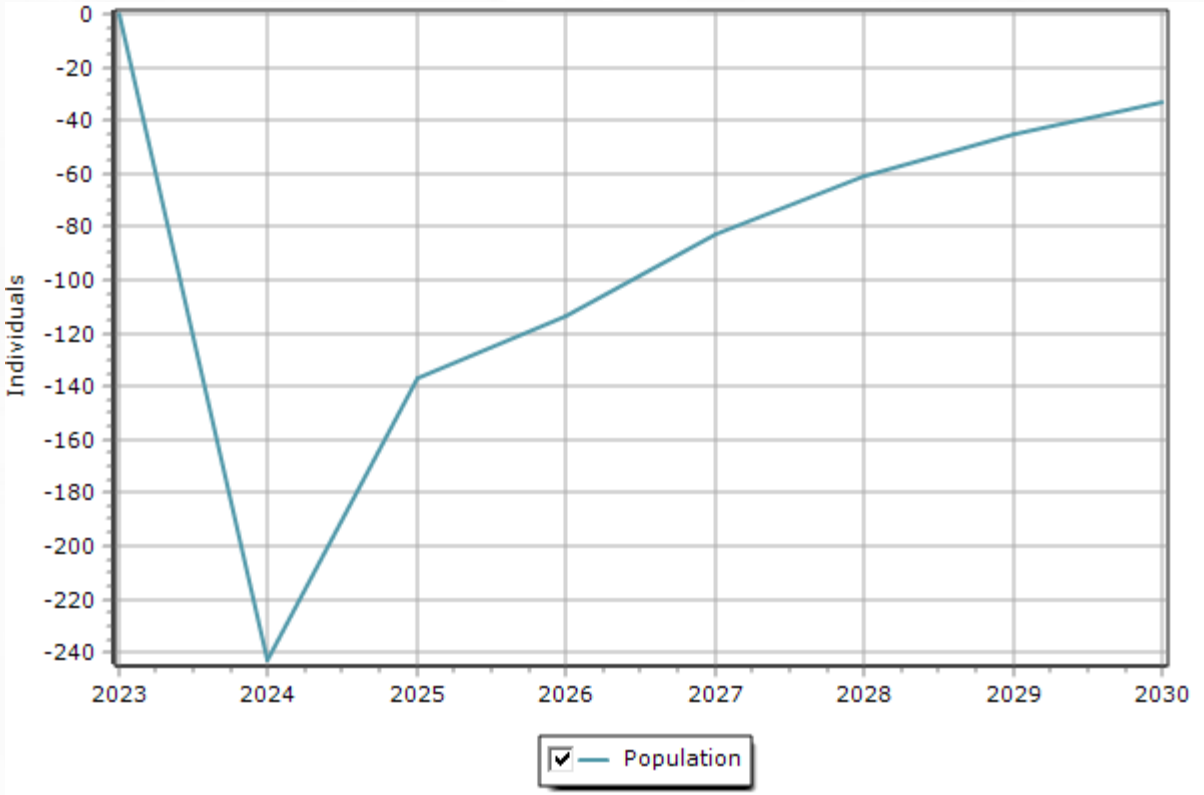
Category	Units	Difference
Net Trade	Millions of 2017 Dollars	+13.619
Exports	Millions of 2017 Dollars	-19.455
Imports	Millions of 2017 Dollars	-33.073

Net Trade

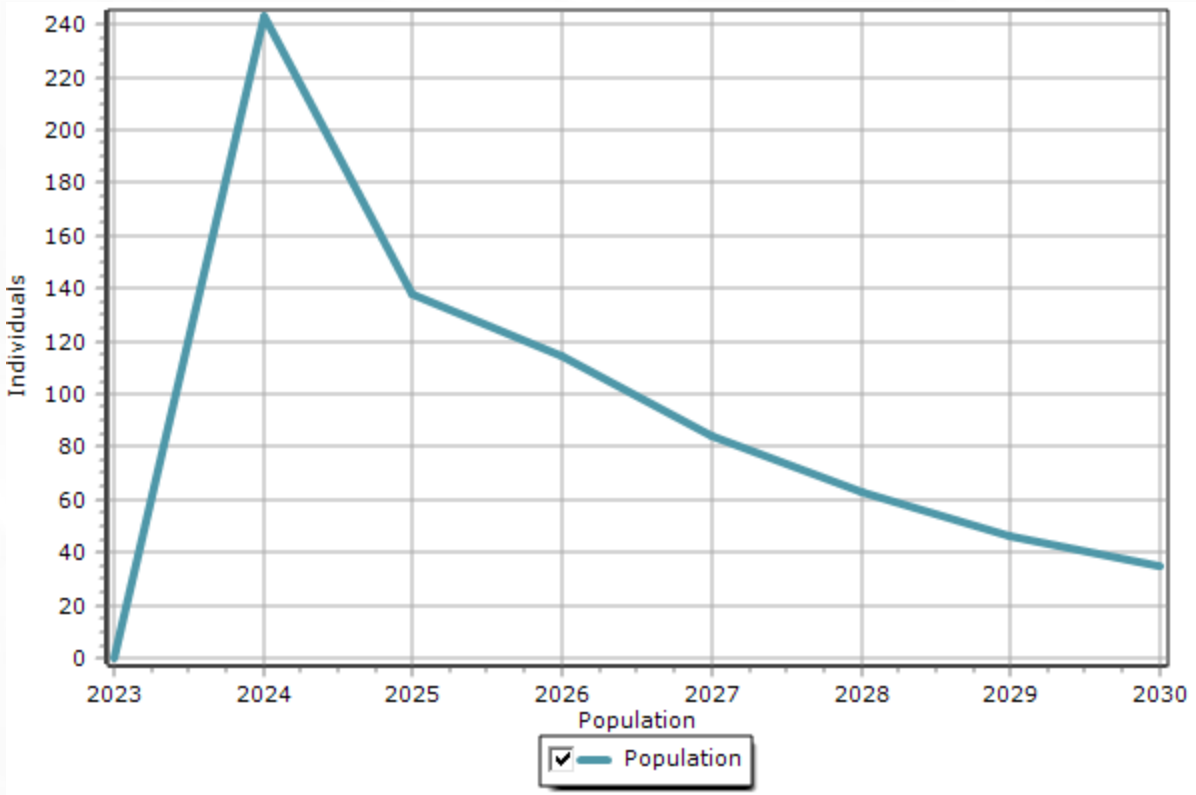
While there is a similar direct effect on imports and exports, the model predicts a bigger decrease in imports compared to exports

This leads to an increase in net trade as changes in imports outweigh changes in exports

Effects on Population – One Day LAX Shutdown



Los Angeles



Rest of United States

Employment Loss by Sector – One Day Shutdown

Dallas-Fort Worth

Industry	Job Loss (Individuals)
Air Transportation	-103
Construction	-101
Retail Trade	-81
Administrative and Support Services	-62
Food services and drinking places	-54

Los Angeles

Industry	Job Loss (Individuals)
Construction	-112
Retail Trade	-106
Administrative and Support Services	-79
Air Transportation	-78
Food services and drinking places	-58

New York City

Industry	Job Loss (Individuals)
Construction	-67
Air Transportation	-59
Retail Trade	-58
Administrative and Support Services	-43
Food services and drinking places	-31

Breakdown of Impact – One Day Shutdown

Dallas Fort-Worth

Category	Units	Total Impact	Region Affected	Rest of U.S.
Employment	Individuals	-878	-673	-205
Gross Domestic Product	Millions of 2017 Dollars	-93.013	-69.376	-23.637

Los Angeles

Category	Units	Total Impact	Region Affected	Rest of U.S.
Employment	Individuals	-991	-843	-148
Gross Domestic Product	Millions of 2017 Dollars	-106.598	-89.354	-17.244

New York City

Category	Units	Total Impact	Region Affected	Rest of U.S.
Employment	Individuals	-577	-261	-315
Gross Domestic Product	Millions of 2017 Dollars	-69.681	-38.346	-31.335

Alternative Scenario – Commodity Access Index

- In our methodology, we decided to model the airport disruption by removing the sales of airfare and shipping revenue, along with erasing trade that would've gone through the airport
- Instead of modeling the airport disruption as a loss of demand, we can model it as a loss of supply
- Since airplanes moves both goods and people around the world, a disruption would decrease the access people have to goods
- Our alternative scenario of modeling airport disruption is decreasing the commodity access index by 0.01

Commodity Access Decrease - Results

Dallas-Fort Worth

Category	Units	Difference
Employment	Individuals	-10,343
Gross Domestic Product	Millions of 2017 Dollars	-1,013.333
Personal Income	Millions of Current Dollars	-693.896
PCE-Price Index	2017 = 100	+0.133

Los Angeles

Category	Units	Difference
Employment	Individuals	-9100
Gross Domestic Product	Millions of 2017 Dollars	-710.544
Personal Income	Millions of Current Dollars	-543.950
PCE-Price Index	2017 = 100	+0.135

New York City

Category	Units	Difference
Employment	Individuals	-4881
Gross Domestic Product	Millions of 2017 Dollars	-755.210
Personal Income	Millions of Current Dollars	-537.316
PCE-Price Index	2017 = 100	+0.071

*Changes in Price Index are shown in the region where the airport is disrupted

Commodity Access Decrease – Effects on Trade

Category	Units	Dallas Fort-Worth	Los Angeles	New York City
Baseline Imports	Billions of Current Dollars	296.798	541.044	440.085
Baseline Exports	Billions of Current Dollars	353.917	651.985	941.663
Change in Imports	Millions of Current Dollars	-549.490	-1339.542	-829.263
Change in Exports	Millions of Current Dollars	+397.421	+591.811	+450.233

Conclusions and Notable Results

Who is Impacted?

- Something that was different between the different airports was where the impact occurred
- A disruption to JFK Airport would have a higher impact outside of the city compared to a disruption to LAX

Where are jobs lost?

- Looking at the employment lost by industry, we noticed some similarities
- Air transportation was one of the most affected industry, which makes sense
- Losses of employment in the food services industry might be explained by a loss of tourism

Long Term Losses

- In the employment graphs, we expect a loss in jobs in the first year
- We see a recovery in the following years, but not at the level as the first year losses

Differences in Impact

- In our simulations, each airport differed on impacts after disruption
- Los Angeles had the biggest total impact and New York City had the lowest impact
- This can be attributed to differences in shipping and travel volume

Thank you for attending!