



LAMBERT-ST. LOUIS
INTERNATIONAL AIRPORT®



ECONOMIC IMPACT

of Lambert-St. Louis International Airport

Prepared for St. Louis Airport Authority

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FINAL REPORT

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Table of Contents

EXECUTIVE SUMMARY	1
SECTION 1 - THE AIRPORT	7
Airport Authority	7
Air Carrier Service	7
Passenger Traffic	8
Air Cargo	9
Aircraft Operations	11
Other Services at the Airport	11
Ground Transportation	11
Concessions	12
General Aviation and Airline Support Services	12
Federal Government Agencies	12
Other Support Services	12
Capital Improvements	12
SECTION 2 - ST. LOUIS MSA	14
Population	15
Labor Market	15
Income	18
Regional Output	18
SECTION 3 – AIRPORT ECONOMIC IMPACT ON THE ST. LOUIS MSA	19
Economic Impact of Airport Services	21
Economic Impact of Visitor Spending	26
Economic Impact of Capital Outlay	28
Economic Impact by Industry Sector	30
Local Tax Revenue Impact	31
SECTION 4 – ECONOMIC IMPACT STUDY METHODOLOGY	32
Theoretical Framework	32
Sources of Airport Economic Impact	32
Economic Impact Measures	33
Data Collection	34
APPENDIX A – TECHNICAL OVERVIEW OF ECONOMIC IMPACT ANALYSIS AND RIMS II MULTIPLIERS	36
Economic Impact Analysis - Modeling Options	36
Macroeconomic and Input-Output Multipliers	37
Macroeconomic Multipliers	37
Input-Output Multipliers	38
RIMS II Multipliers	39
APPENDIX B – TENANT SURVEY QUESTIONNAIRE	43

List of Tables

Table 1. AIRLINES SERVING THE AIRPORT, CY 2012.....	8
Table 2. CAPITAL IMPROVEMENT PROGRAM, FY 2013.....	13
Table 3. ST. LOUIS MSA POPULATION, CY 2007 and 2011	15
Table 4. TOTAL ECONOMIC IMPACT BY SOURCE, CY 2011	19
Table 5. TOTAL ECONOMIC IMPACT BY COMPONENT, CY 2011	20
Table 6. TOTAL ECONOMIC IMPACT BY SOURCE AND BY COMPONENT, CY 2011	21
Table 7. AIRPORT SERVICES EMPLOYMENT IMPACT, CY 2011	22
Table 8. AIRPORT SERVICES EARNINGS IMPACT, CY 2011.....	23
Table 9. AIRPORT SERVICES OUTPUT IMPACT, CY 2011	24
Table 10. AIRPORT SERVICES VALUE-ADDED IMPACT.....	25
Table 11. LOCAL SPENDING OF VISITING PASSENGERS, CY 2011.....	26
Table 12. VISITOR SPENDING EMPLOYMENT IMPACT, CY 2011.....	27
Table 13. VISITOR SPENDING EARNINGS IMPACT, CY 2011.....	27
Table 14. VISITOR SPENDING OUTPUT IMPACT, CY 2011.....	27
Table 15. VISITOR SPENDING VALUE-ADDED IMPACT.....	28
Table 16. CAPITAL OUTLAY EMPLOYMENT IMPACT, FY 2012.....	29
Table 17. CAPITAL OUTLAY EARNINGS IMPACT, FY 2012.....	29
Table 18. CAPITAL OUTLAY OUTPUT IMPACT, FY 2012.....	29
Table 19. CAPITAL OUTLAY VALUE-ADDED IMPACT, FY 2012	29
Table 20. ECONOMIC IMPACT BY INDUSTRY SECTOR, CY 2011.....	30
Table 21. RIMS II TYPE I MULTIPLIERS FOR ST. LOUIS, MO-IL, MSA.....	41
Table 22. RIMS II TYPE II MULTIPLIERS FOR ST. LOUIS, MO-IL, MSA	42

List of Figures

Figure 1. LAMBERT-ST. LOUIS INTERNATIONAL AIRPORT ECONOMIC IMPACT ON ST. LOUIS MSA, CY 2011.....	2
Figure 2. SOURCES OF AIRPORT ECONOMIC IMPACT, CY 2011	3
Figure 3. COMPONENTS OF AIRPORT ECONOMIC IMPACT, CY 2011	4
Figure 4. STL O&D AND CONNECTING PASSENGERS, CY 2008-12.....	9
Figure 5. STL ENPLANED AND DEPLANED PASSENGERS, CY 2008-12	9
Figure 6. STL AIR CARGO (MAIL AND FREIGHT), CY 2008-12	10
Figure 7. STL OUTBOUND AND INBOUND AIR FREIGHT, CY 2008-12	10
Figure 8. STL AIRCRAFT OPERATIONS, CY 2008-12.....	11
Figure 9. ST. LOUIS METROPOLITAN AREA MAP	14
Figure 10. ST. LOUIS MSA LABOR FORCE, CY 2007-11.....	16
Figure 11. ST. LOUIS MSA AND U.S. UNEMPLOYMENT RATES, CY 2007-11	16
Figure 12. ST. LOUIS MSA AND U.S. NONFARM EMPLOYMENT BY INDUSTRY, CY 2011.....	17
Figure 13. ST. LOUIS MSA AND U.S. MEDIAN HOUSEHOLD INCOME AND PER CAPITA INCOME, CY 2011	18
Figure 14. ST. LOUIS MSA AND U.S. REAL GROSS DOMESTIC PRODUCT INDEX (2006=100), CY 2006-10.....	18
Figure 15. AIRPORT SERVICES ECONOMIC IMPACT, CY 2011 (Distribution by Source)	25
Figure 16. VISITOR SPENDING ECONOMIC IMPACT, CY 2011 (Distribution by Source Expenditure).....	28
Figure 17. CAPITAL OUTLAY ECONOMIC IMPACT, FY 2012	30
Figure 18. TOTAL ECONOMIC IMPACT.....	33
Figure 19. AIRPORT ECONOMIC IMPACT: SOURCES AND COMPONENTS	33

Executive Summary

The Lambert-St. Louis International Airport (STL or the Airport) is an important economic engine. Not only does the Airport facilitate business and commerce as the only major commercial airport providing scheduled air service in the St. Louis, MO-IL, Metropolitan Statistical Area (MSA), but it also generates business revenues, jobs, and incomes as an economic hub.

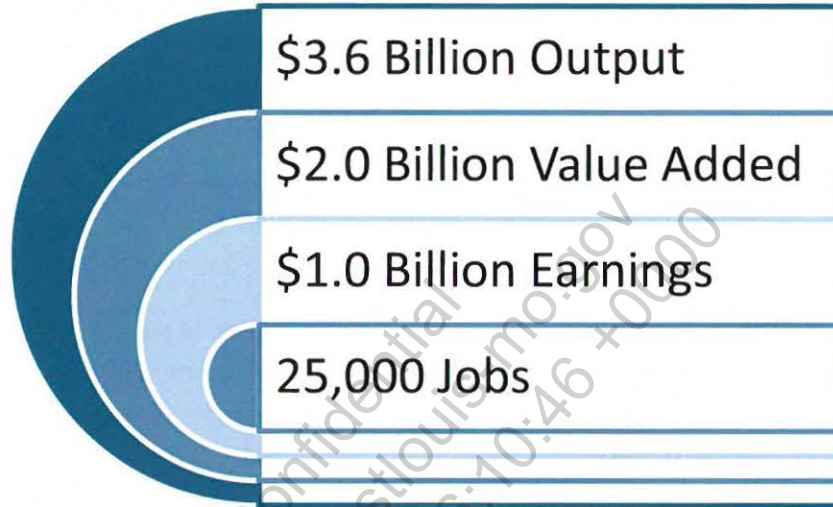
Serving 12.7 million passengers in calendar year (CY) 2012, the Airport was ranked as the 30th busiest airport nationwide in terms of total passengers by the Airports Council International-North America (ACI-NA). In CY 2012, the Airport also handled 152.6 million pounds of air cargo—the 48th largest annual volume of air cargo handled by U.S. airports according to ACI-NA rankings. In the previous year, CY 2011, the Airport served 12.5 million passengers, and handled 153.4 million pounds of air cargo.

This report estimates the Airport's annual economic contributions to the St. Louis MSA using four measures of economic activity: *output*, *value added*, *employment*, and *earnings*. Output, measured by gross revenue or sales, refers to the value of goods and services produced by an economic activity. It is the broadest measure of economic impact. This report introduces a new measure, value added, which includes wage income and corporate profit. Value added measures an economic activity's contribution to Gross Domestic Product (GDP). It measures the difference between an industry's output (gross revenue) and the cost of its intermediate inputs (utilities, supplies and services purchased from other firms).¹ Employment refers to jobs, and earnings refer to employee wages, benefits and other compensation.

¹ This definition comes from the U.S. Bureau of Economic Analysis (BEA). With the 2010 update of its Regional Input-Output Modeling System (RIMS II), the BEA began producing value-added multipliers—in addition to output, employment and earnings multipliers—permitting measurement of the change in local value added per dollar of final-demand change.

Based on STL's CY 2011 operations and its fiscal year² (FY) 2012 capital improvement outlay, the Airport generated \$3.6 billion in business revenues (*output*), of which approximately \$2.0 billion represents value added to the regional economy. This economic output supported approximately 25,000 jobs, collectively earning \$1.0 billion (Figure 1).

**Figure 1. LAMBERT-ST. LOUIS INTERNATIONAL AIRPORT
ECONOMIC IMPACT ON ST. LOUIS MSA, CY 2011**



² This refers to the Airport's fiscal year, which begins on July 1.

The Airport's economic impacts come from three sources: airport services, visitor spending and capital outlay. The business and government enterprises that provide aviation and related services at the Airport (airport services) contribute the largest share (53-67%) to the Airport's total economic impact (Figure 2). Non-resident passengers who purchase goods and services from local businesses (visitor spending) make the second largest contribution (29-42%). Airport capital improvement outlay accounts for the remaining share (5-6%).

Figure 2. SOURCES OF AIRPORT ECONOMIC IMPACT, CY 2011

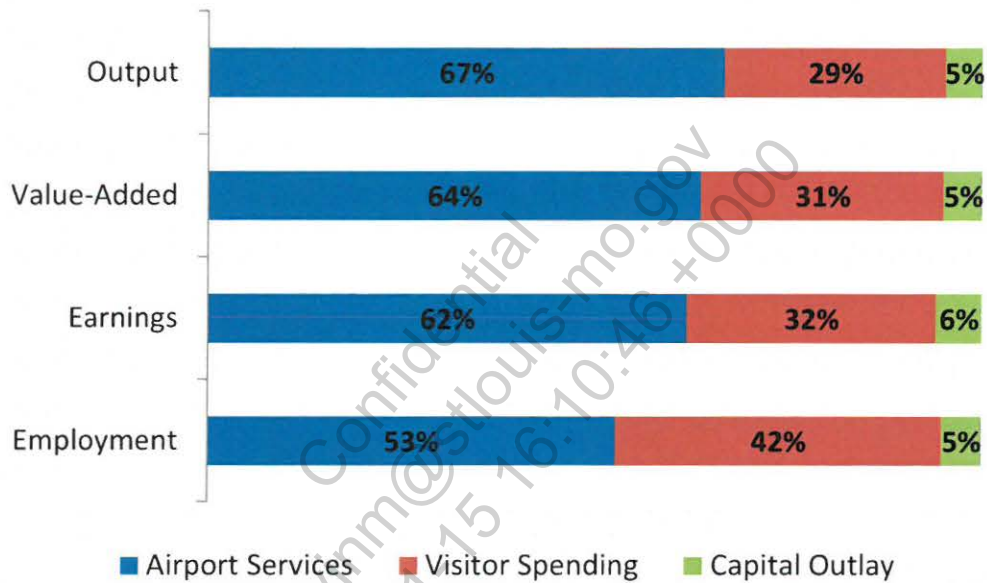
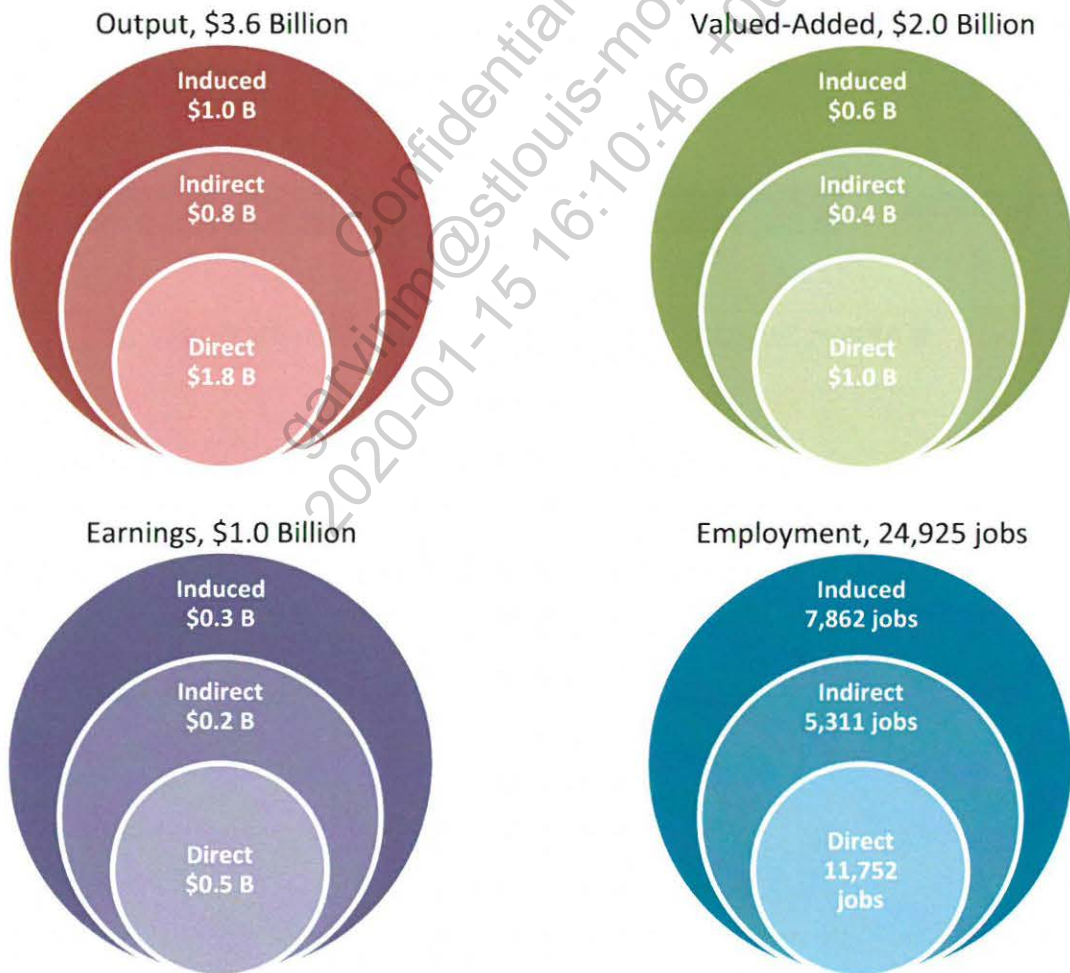


Figure 3 breaks down each measure of total economic impact into direct, indirect and induced impacts. Direct impact, refers to the business revenues, jobs, and employee earnings created when airport passengers, shippers and other users purchase airline and other services at the Airport. The Airport’s total economic impact extends beyond the Airport’s boundaries because the initial purchases for airline and other services at the Airport (*direct impact*) create multiplier effects from associated business purchases (*indirect impact*) and employee household spending (*induced impact*). Businesses make purchases from other businesses, and their employees spend their earnings on purchases from local businesses. Direct impact accounts for approximately one-half of the Airport’s total economic impact—measured in output, value added, earnings, or employment. Indirect and induced impacts account for the remaining half. For example, of the estimated total output impact of \$3.6 billion, \$1.8 billion is direct impact, \$0.8 billion is indirect impact, and \$1.0 billion is induced impact.

Figure 3. COMPONENTS OF AIRPORT ECONOMIC IMPACT, CY 2011



The Airport benefits the various industries in the St. Louis MSA. The transportation and warehousing sector accounts for the largest share of the STL's economic impact by any measure. The industry sectors with the top three shares of each measure are listed below:

- Output
 - Transportation and warehousing sector (32%)
 - Manufacturing (12%)
 - Real estate and rental & leasing (10%)
- Value added
 - Transportation and warehousing sector (27%)
 - Real estate and rental & leasing (13%)
 - Manufacturing (7%)
- Earnings
 - Transportation and warehousing sector (27%)
 - Professional, scientific, and technical services (9%)
 - Manufacturing (8%)
- Employment
 - Transportation and warehousing sector (20%)
 - Food services and drinking places (16%)
 - Arts, entertainment, and recreation (9%)

Finally, all of the economic activity arising from the operation and capital improvement of the Airport generates tax revenues that help fund local government services and public infrastructure. Taxes, however, represent a transfer of income from businesses and individuals to the government and do not represent additional economic impact. Based on the Airport's 2011 economic impact, we estimate a contribution of approximately \$32 million in local sales tax revenues to the County of St. Louis and all the other counties in the St. Louis MSA. St. Louis City residents and workers pay a 1% earnings tax, and St. Louis City employers pay a 0.5% payroll tax,³ contributing \$1.2 million in revenues to the City of St. Louis. None of the Illinois and Missouri counties in the St. Louis MSA impose these local income taxes.

The report presents the details of the Airport Economic Impact Study. Section 1 provides an overview of STL's operations. Section 2 describes the key economic characteristics of the St. Louis MSA—the Airport's air service area and the study's regional focus. Section 3 presents the resulting estimates of STL's total economic impact on the St. Louis MSA, based on the Airport's CY 2011 operations and its FY 2012 capital improvement outlay. Section 4 describes the methodology and terms used to estimate the Airport's economic impact. The study uses economic multipliers for the St. Louis MSA from the U.S. Bureau of Economic Analysis Regional Input-Output Modeling System (RIMS II). Input-output models account for the inter-industry relationships within regions. They are widely used for economic impact analysis

³ Source: St. Louis Regional Chamber & Growth Association.

because they provide details on how the impact of one sector spreads throughout other sectors in the economy. Appendix A provides a technical overview of economic impact analysis and the RIMS II multipliers. Appendix B contains copies of the survey questionnaire sent to various Airport tenants.

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Section 1 – The Airport

The Airport is located near the City of St. Louis in St. Louis County, approximately 15 miles northwest of the City’s central business district. The Airport was established by Major Albert Bond Lambert and other aviation pioneers on a 170-acre field in 1920. The City of St. Louis acquired it in 1929, named it Lambert-St. Louis Municipal Airport, and expanded it to more than 3,600 acres. In 1971, the Airport’s name changed to Lambert-St. Louis International Airport.

Accounting for less than 1% of total U.S. passengers, the Airport is classified as a “medium hub” by the Federal Aviation Administration (FAA). Serving 12.7 million passengers in CY 2012, the Airport was ranked as the 30th busiest airport nationwide in terms of total passengers by the ACI-NA. In CY 2011, the Airport served 12.5 million passengers.

Air cargo is also shipped through the Airport. In CY 2012, the Airport handled 152.6 million pounds of air cargo—the 48th largest annual volume of air cargo handled by U.S. airports according to ACI-NA rankings. In CY 2011, the Airport handled 153.4 million pounds of air cargo.

Airport Authority

The Airport is owned by the City of St. Louis and operated by the St. Louis Airport Authority, a department of the City. The Airport Authority consists of the Airport Commission, the Airport Authority’s Chief Executive Officer and Director of Airports, and other managers and personnel that operate the Airport. The Airport staff consists of the Senior Deputy Director of Airports, the Deputy Director of Finance and Administration, the Deputy Director of Planning and Development, and a total of 540 employees, which include 478 full-time employees and 62 City firefighters assigned to the Airport (budgeted as of FY 2013).

Air Carrier Service

The Airport’s core business is providing air transportation. In CY 2012, nine mainline passenger airlines, 20 regional passenger airlines, three all-cargo airlines, and a few charter airlines provided air transportation service at the Airport (Table 1). Many of the regional carriers operated as affiliates of the mainline carriers. In CY 2012, the mainline carriers transported 81% of all passengers, while the regional and charter carriers transported the remaining 19%. The airlines with the top three shares of CY 2012 passengers are: Southwest (47%); American and regional affiliates (16%); and Delta and regional affiliates (14%).

In CY 2012, all-cargo airlines carried 86% of total air cargo—with FedEx accounting for 51% and United Parcel Service (UPS) accounting for 28%. Passenger airlines carried the remaining 13% as belly cargo.

Table 1. AIRLINES SERVING THE AIRPORT, CY 2012

Mainline	Regional	All-Cargo
AirTran ¹	Air Canada Jazz	Capital Cargo
Alaska	Air Choice One	FedEx
American	Air Wisconsin	United Parcel Service
Delta	American Eagle	
Frontier	Atlantic Southeast	
Southwest	Cape Air	
United	Chautauqua	
US Airways	Comair	
USA 3000 ²	Compass	
	ExpressJet	
	GoJet	
	Mesa	
	Mesaba	
	Pinnacle	
	PSA	
	Republic	
	Shuttle America	
	SkyWest	
	Trans States	
	Vision Air	

¹ AirTran has merged into Southwest; however, the two airlines continued to operate independently during CY 2012.

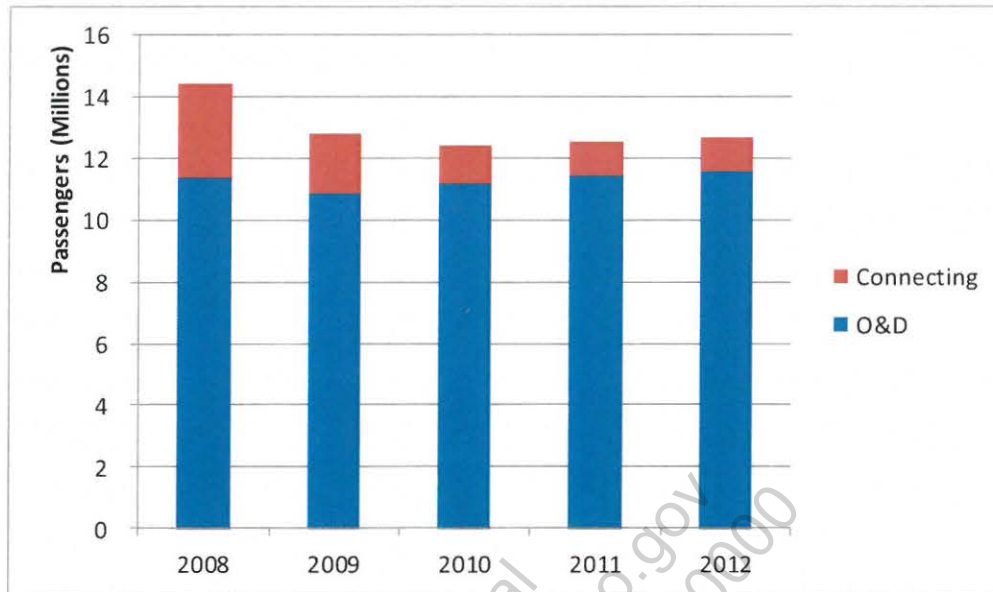
² USA 3000 operated in January 2012, before going out of business.

Source: Airport records.

Passenger Traffic

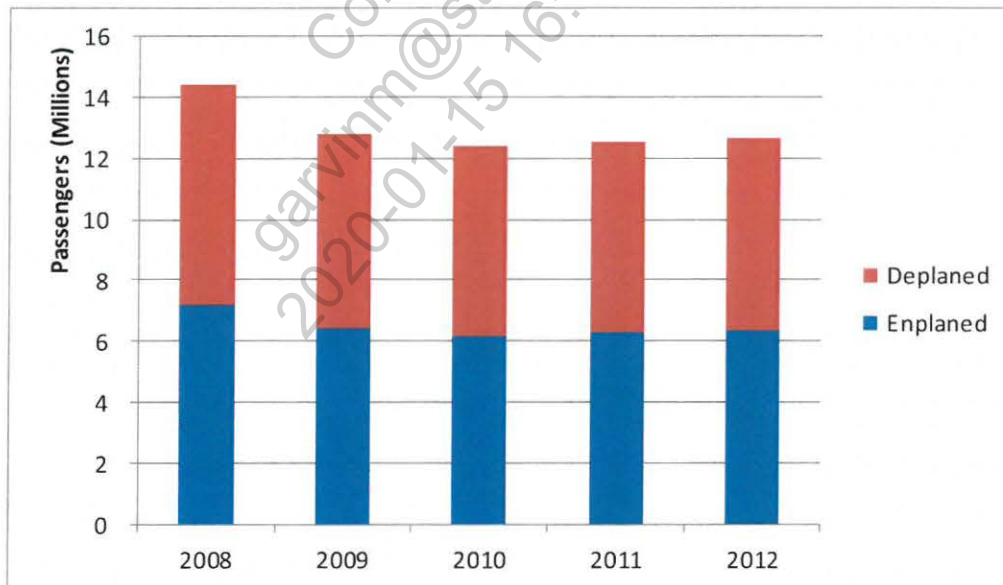
Passenger traffic levels were the highest at 14.4 million passengers in CY 2008 during the past five years. Passenger traffic levels declined during the U.S. economic recession, reaching their lowest in CY 2010 with 12.4 million passengers (Figure 4). Passenger traffic has since turned the corner at STL. In CY 2012, 12.7 million passengers used the Airport—91% either started or ended their flights at the Airport (Origin & Destination (O&D) Passengers) and 9% made flight connections at the Airport (Connecting Passengers). Enplaned and deplaned passengers make up equal portions of total passengers (Figure 5).

Figure 4. STL O&D AND CONNECTING PASSENGERS, CY 2008-12



Source: Airport records.

Figure 5. STL ENPLANED AND DEPLANED PASSENGERS, CY 2008-12



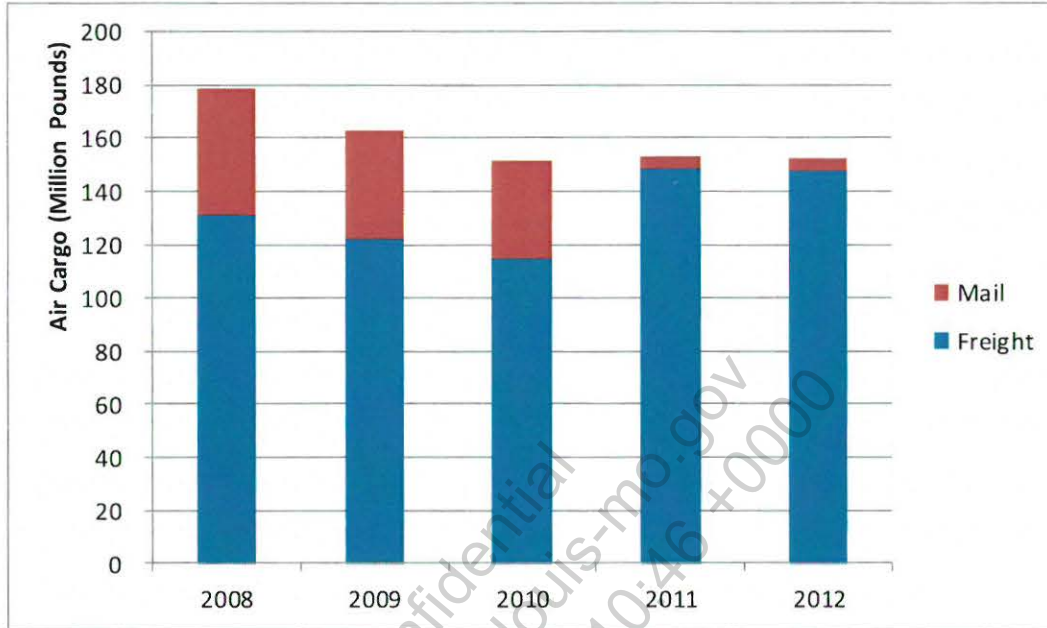
Source: Airport records.

Air Cargo

Figure 6 shows the total volume of cargo, including freight and mail, shipped through the Airport from CY 2008 to 2012. During this period, air cargo volume was the highest in CY 2008 with 178.6 million pounds and the lowest in CY 2010 with 151.4 million pounds. In CY 2012, freight

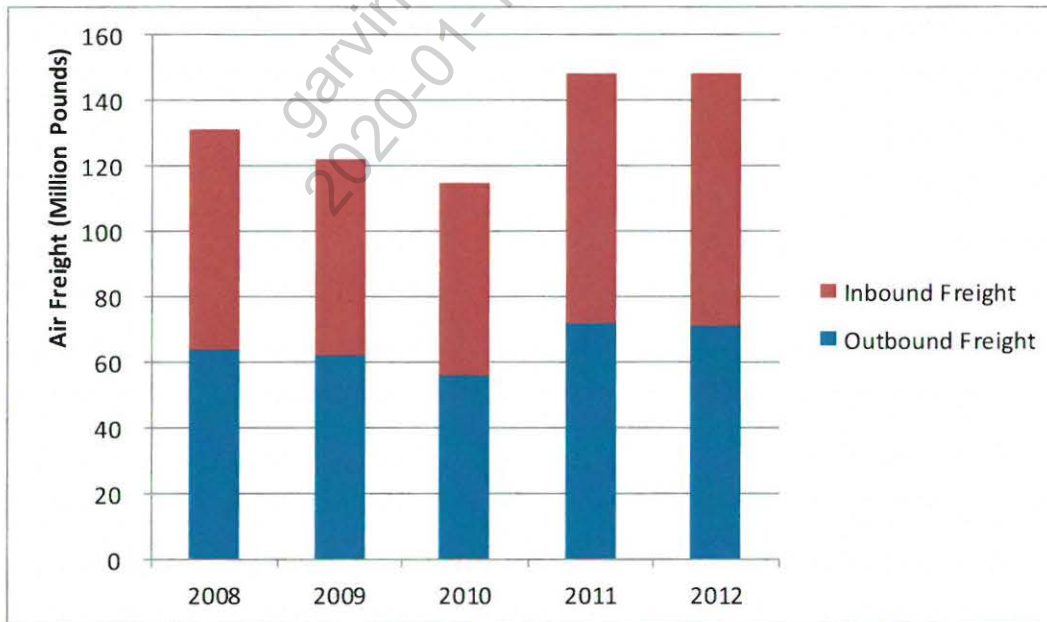
accounted for 97% of the 152.6 million pounds of air cargo shipped through the Airport that year. Outbound and inbound freight make up nearly equal proportions of total freight (Figure 7).

Figure 6. STL AIR CARGO (MAIL AND FREIGHT), CY 2008-12



Source: Airport records.

Figure 7. STL OUTBOUND AND INBOUND AIR FREIGHT, CY 2008-12

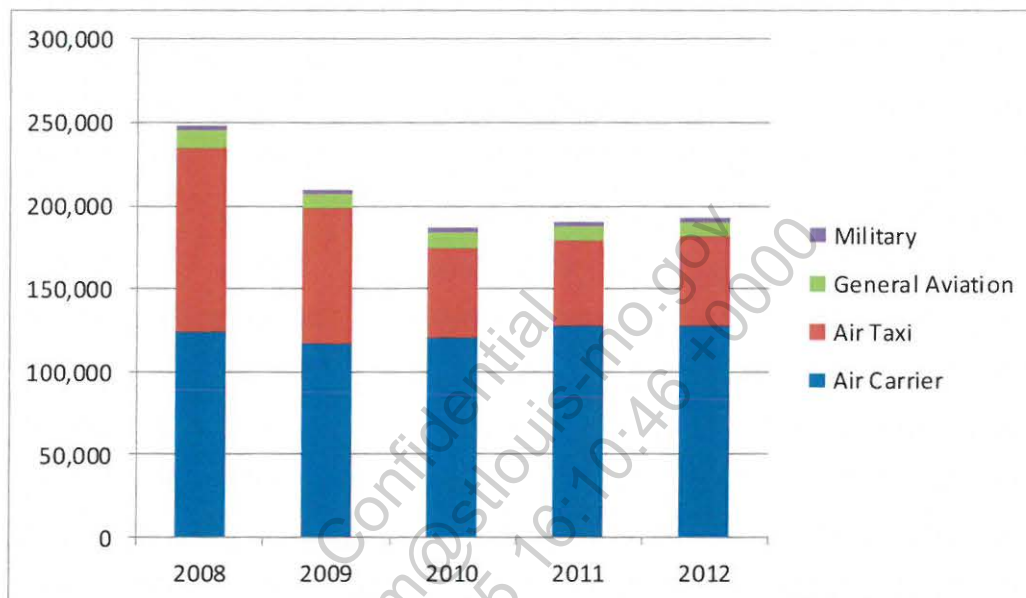


Source: Airport records.

Aircraft Operations

The trend in aircraft operations mirrors those of passenger and cargo traffic. Aircraft operations reached their highest level in CY 2008 and their lowest level in CY 2010 during the past five years (Figure 8). In 2011, the Airport handled more than 190,000 aircraft operations, consisting of: air carrier (66%), air taxi⁴ (28%), general aviation (5%), and military operations (1%).

Figure 8. STL AIRCRAFT OPERATIONS, CY 2008-12



Source: Federal Aviation Administration Air Traffic Activity System (ATADS).

Other Services at the Airport

A variety of business and government enterprises provide services at the Airport. Some provide services directly to passengers and other airport customers. Others provide support services to airlines and the Airport Authority.

Ground Transportation

Ground transportation services include parking, rental cars, shuttle, taxicabs, limousines, and public transit. ABM Parking operates on-Airport parking. A number of off-Airport parking facilities also serve Airport passengers. The following rental car brands operate at the Airport: Alamo, Avis, Budget, Dollar, Enterprise, Hertz, National, and Thrifty. Best Transportation provides shared van shuttle service (Go Best Express Airport Shuttle), and numerous business operators provide taxi and limousine services. Public transportation is available through MetroLink, MetroBus and Greyhound Bus Services.

⁴ The FAA Air Traffic Control Tower defines an air carrier as an aircraft with 60 or more seats and defines an air taxi as an aircraft with less than 60 seats.

Concessions

Retail concessionaires sell food, beverage, and merchandise. These include Host International, Paradies (through January 2013), Hudson (beginning in February 2013), Bookmark-InMotion, Airport Vending, LLC, and Rosetta Stone. Other concessionaires sell a variety of services, including:

- Advertising (Clear Channel Airports)
- ATM (American Airlines Federal Credit Union, Bank of America, Commerce Bank, and US Bank)
- Massage (XpressSpa)
- Shoeshine (Airport Shoeshine)
- WiFi (Concourse Communications)
- Luggage carts (Flight Services & Systems)

General Aviation and Airline Support Services

Signature Flight Support provides government & military flight support services and Fixed-Base Operator (FBO) services. ATS JetCenter and Servisair Fueling Services, LLC, sell jet fuel and provide other aircraft support services. A number of other businesses provide airline support services as well.

Federal Government Agencies

The Transportation Security Administration (TSA) conducts security screening, and the FAA provides air traffic control services.

Other Support Services

The Airport Authority engages vendors, contractors and consultants for airport maintenance, facility development, financial services, air service development, and legal matters.

Capital Improvements

The Airport Authority annually improves the facilities and operations of the Airport. The Airport's current Capital Improvement Program (CIP) consists largely of projects involving refurbishment and modernization of existing Airport facilities and infrastructure, with a total cost of \$101.3 million (Table 2).

The Airport Authority implements a Noise Compatibility Program. Through the end of FY 2012, the Noise Compatibility Program had spent and/or committed approximately \$383 million for noise mitigation measures. The Airport's noise land acquisition program was concluded in FY 2007. The Residential Sound Insulation Program (RSIP) will complete the acoustical treatment of homes in the second quarter of FY 2014. Thereafter, there will be a one-year warranty period on the construction, and the program will close at the end of the second quarter

of FY 2015. The City has allocated \$3 million to bring the RSIP to conclusion. The City will also commit \$1 million to procure an upgraded noise monitoring system in FY 2014.

Table 2. CAPITAL IMPROVEMENT PROGRAM, FY 2013

Project	FY 2013
Replace ceiling & curtain under C concourse bridge	\$ 200,000
Climate Control System Improvements - Phase 3	400,000
Climate Control System Improvements - Phase 4	603,000
Chill water bypass east plant	200,000
Glycol tank vent to sanitary	170,000
Install 480 volt three phase 1200 amp. Dist. Panel A-concourse	230,000
Emergency Generators (T1/T2/Conc/Cypress Parking Lot)	1,250,000
EDS-Long Term Baggage Screening	35,000,000
Spot slab removal & replacement	350,000
Baggage service elevator	350,000
Replace bathrooms	200,000
Master Plan Update-Phase II	250,000
Noise Monitoring System Upgrade	1,000,000
Airport Experience	10,554,500
Noise Mitigation Program	3,638,000
Loading Bridges	1,050,000
Non-load interrupting 5KV switches Conc. A/B/C	200,000
Taxiway D from TW-K to TW-J	3,696,000
Taxiway D from TW-K to TW-J	756,000
North Apron Reconstruction-Phase II	590,000
Replacement of Centerline Panels 12R-30L	17,600,000
Reconstruction of Taxiway E from TW-L to TW-J	3,500,000
Taxiway E Reconstruction from TW-P to TW-L	3,500,000
Cargo Ramp	4,500,000
Bridge Reconstruction Program	600,000
Terminal 1 Ductbank and Feeder	400,000
T1 Parking Garage Brown Level Reinforcement	300,000
Bag Claim Drive Reconstruction (Terminal 1)	9,000,000
Salt Storage Building	300,000
Pavement de-icer tanks, pumps, and system	510,000
Banshee Rd.-MO bottom to McDonnell Blvd.	438,000
Total	\$ 101,335,500

Source: Airport records.

Section 2 – St. Louis MSA

Section 2 describes the key economic attributes of the St. Louis MSA (Figure 9)—the Airport’s air service area and the economic impact study’s regional focus. As defined by the U.S. Office of Management and Budget (OMB) prior to February 2013, the St. Louis MSA consists of the City of St. Louis and the following counties:

Missouri Counties

- Crawford
- Franklin
- Jefferson
- Lincoln
- St. Charles
- St. Louis
- Warren
- Washington

Illinois Counties

- Bond
- Calhoun
- Clinton
- Jersey
- Macoupin
- Madison
- Monroe
- St. Clair

The Airport is the only major commercial airport in the St. Louis MSA.

Figure 9. ST. LOUIS METROPOLITAN AREA MAP



Source: St. Louis Regional Chamber & Growth Association. The map shows the St. Louis MSA as defined by the OMB prior to February 2013. According to the February 2013 OMB Bulletin No. 13-01, the St. Louis MSA no longer includes Washington County.

Population

The St. Louis MSA, with a population of 2.8 million in CY 2011, is the 19th largest metropolitan area in the United States. The region's population increased by 1.3% from CY 2007 to 2011 (Table 3). Seventy-five percent of the region's residents live in Missouri counties within the MSA, with 35% living in St. Louis County. The remaining 25% live in the Illinois counties within the MSA.

Table 3. ST. LOUIS MSA POPULATION, CY 2007 and 2011

	2007	2011
Missouri		
Franklin County	100,265	101,938
Jefferson County	214,948	219,480
Lincoln County	50,758	53,076
St. Charles County	345,395	365,151
St. Louis County	999,389	998,692
Warren County	31,152	32,515
Washington County	24,856	25,076
St. Louis City	317,959	318,069
Subtotal	2,084,722	2,113,997
Illinois		
Bond County	18,077	17,727
Calhoun County	5,160	5,048
Clinton County	37,160	37,956
Jersey County	22,838	22,916
Macoupin County	48,195	47,687
Madison County	267,382	268,459
Monroe County	32,139	33,306
St. Clair County	264,764	270,259
Subtotal	695,715	703,358
St. Louis MSA Total	2,780,437	2,817,355

Source: "County Population Estimates" U.S. Census Bureau, 2012.

Labor Market

The region's work force demonstrates above-average education and productivity. According to the American Community Survey, the percentage of residents with bachelor's degrees and master's degrees surpassed the national average. The proportion of scientists and engineers is more than twice the U.S. average. The proportion of professional managers is also significantly higher than the national average. A Census of Manufacturers' study also revealed that the

productivity level of St. Louis-area manufacturing workers is 18.7% higher than the U.S. average.

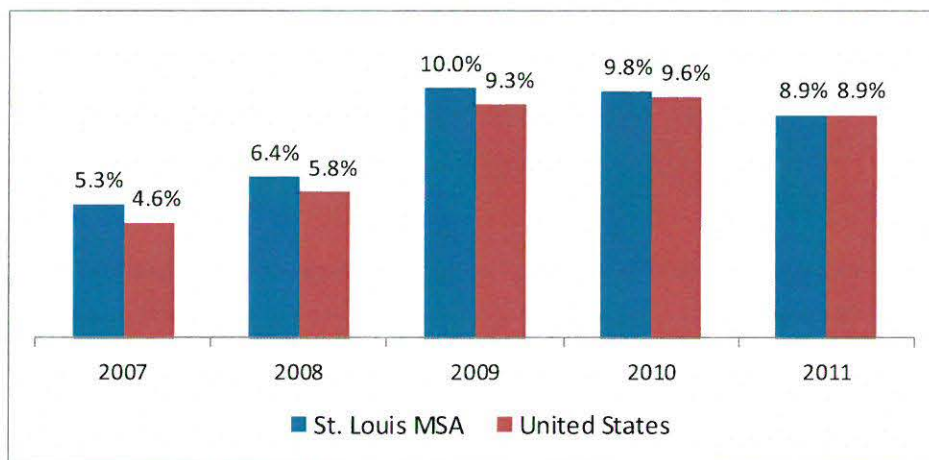
During the CY 2007-2011 period, the region’s work force held steady at about 1.4 million (Figure 10). Unemployment trends followed those of the nation—the unemployment rate increased during the 2008-2009 recession, and has since decreased gradually (Figure 11).

Figure 10. ST. LOUIS MSA LABOR FORCE, CY 2007-11



Source: U.S. Bureau of Labor Statistics.

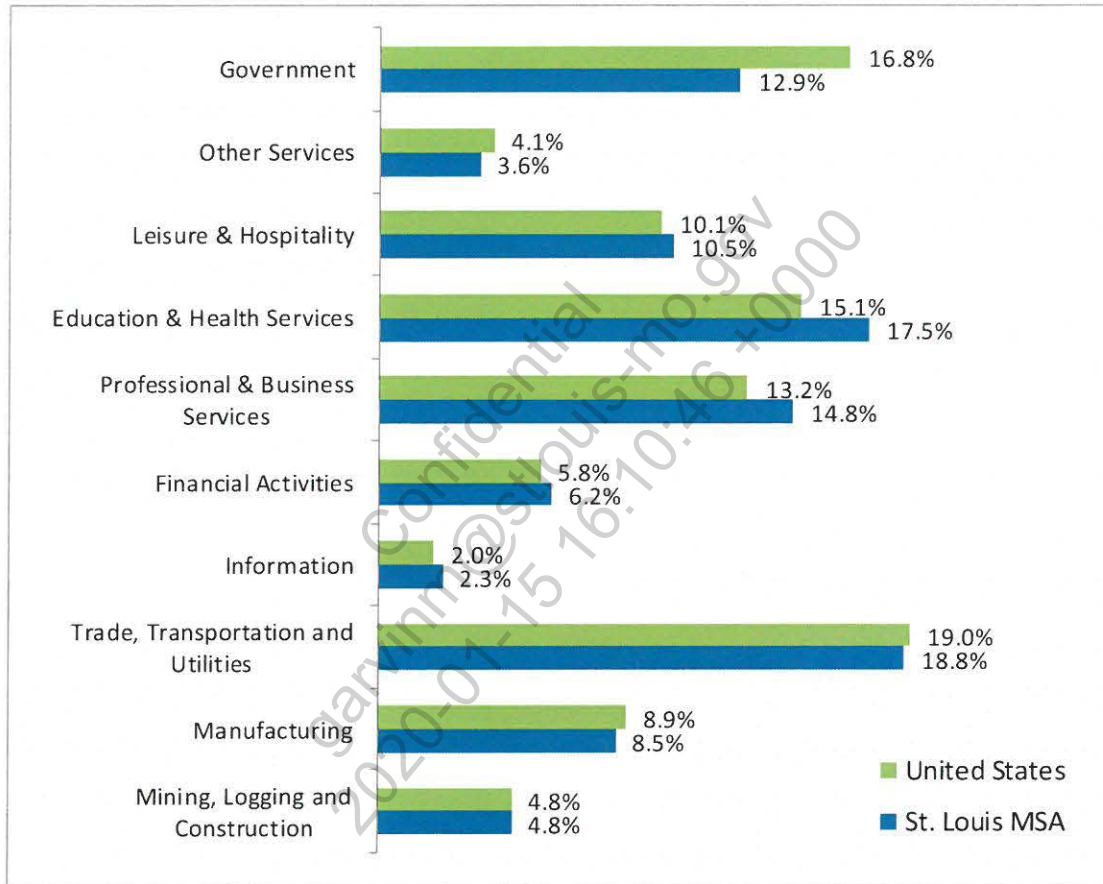
Figure 11. ST. LOUIS MSA AND U.S. UNEMPLOYMENT RATES, CY 2007-11



Source: U.S. Bureau of Labor Statistics.

Diverse industries make up the region’s economy, with no single industry employing more than 18.8% of the work force (Figure 12). The proportional distribution of the region’s jobs among the different industries parallels the U.S. distribution, indicating no particular industry concentration.

Figure 12. ST. LOUIS MSA AND U.S. NONFARM EMPLOYMENT BY INDUSTRY, CY 2011

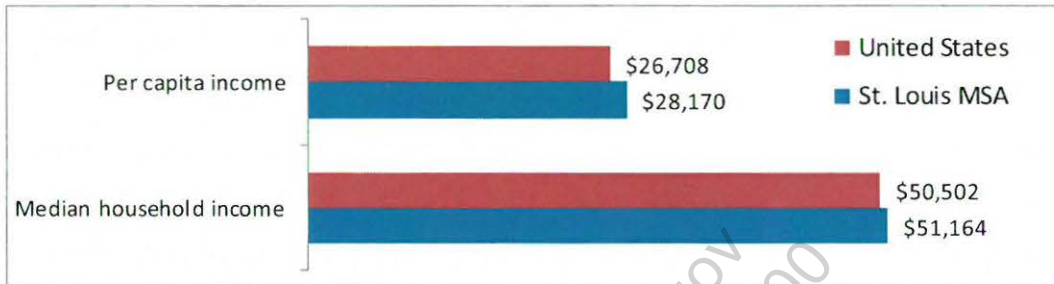


Source: U.S. Bureau of Labor Statistics.

Income

The region's residents earn above-average incomes, according to the 2011 American Community Survey (Figure 13).

Figure 13. ST. LOUIS MSA AND U.S. MEDIAN HOUSEHOLD INCOME AND PER CAPITA INCOME, CY 2011

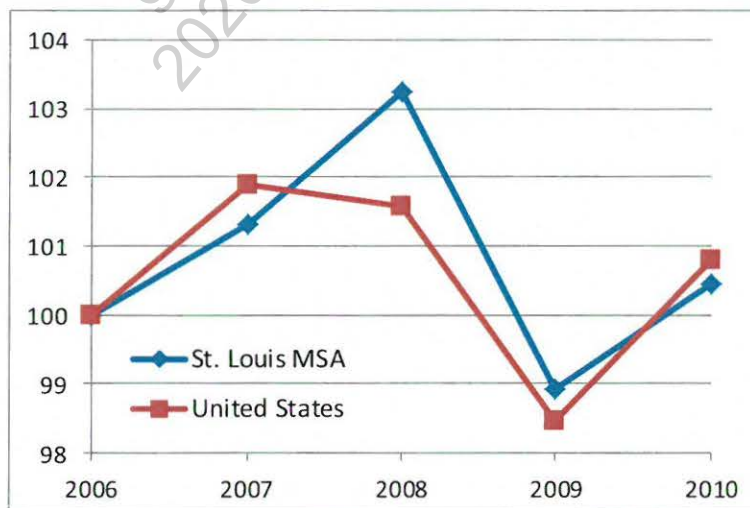


Source: U.S. Census Bureau, 2011 American Community Survey.

Regional Output

In CY 2010, the region produced \$115.6 billion in real GDP, accounting for approximately 1% of U.S. real GDP. Regional economic growth trends followed national trends (Figure 14). The region performed better than the nation in the beginning of the 2008-2009 recession. The region's real GDP continued to grow in CY 2008, as the U.S. real GDP began to decline.

Figure 14. ST. LOUIS MSA AND U.S. REAL GROSS DOMESTIC PRODUCT INDEX (2006=100), CY 2006-10



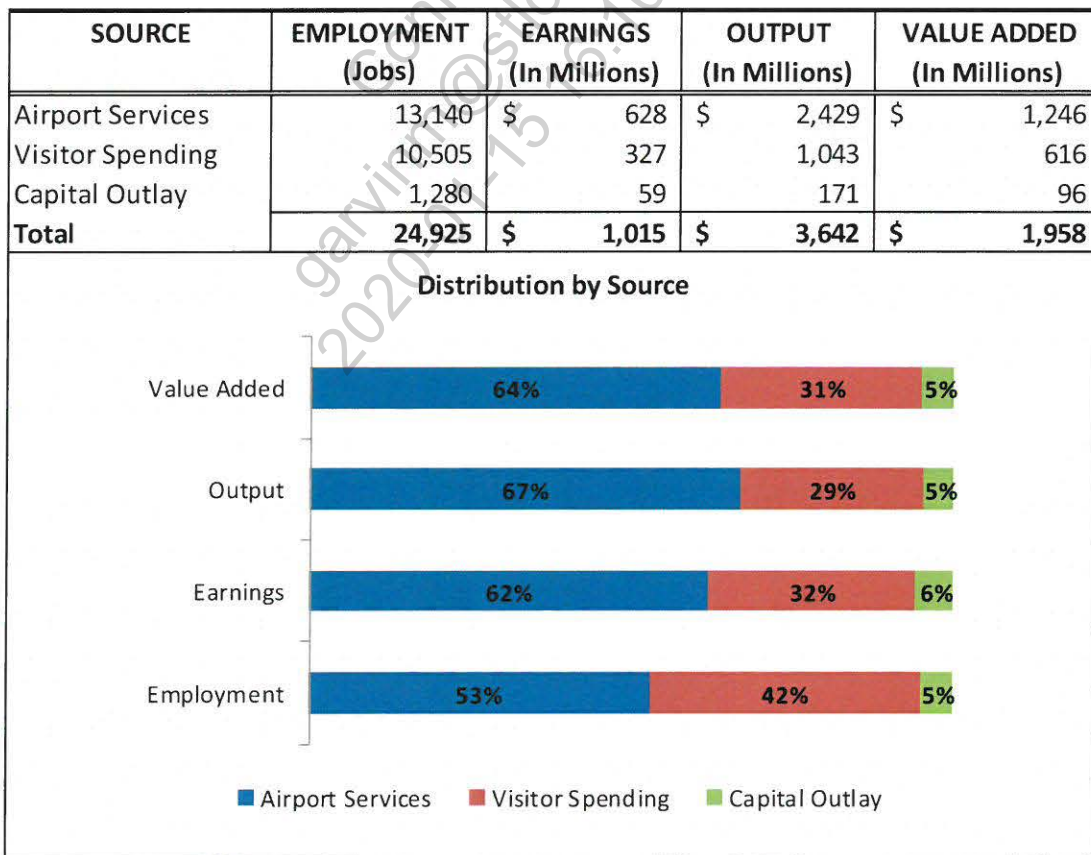
Source: Real GDP data from the U.S. Bureau of Economic Analysis.

Section 3 – Airport Economic Impact on the St. Louis MSA

Lambert-St. Louis International Airport is an important economic engine. The Airport generates economic activity inside and outside the Airport premises, supporting a variety of businesses and numerous jobs within the region. In CY 2011, the Airport contributed \$3.6 billion in economic output to the St. Louis MSA, of which approximately \$2.0 billion represents value added. This economic output supported approximately 25,000 jobs, collectively earning \$1.0 billion.

As shown in Table 4, Airport services—all the business and government entities that provide aviation and related services at the Airport—account for the largest share of the Airport’s total economic impact (53-67%). Visitor spending—purchases of nonresident passengers outside the Airport—accounts for the second largest share (29-42%). Airport capital improvements account for the remaining share (5-6%).

Table 4. TOTAL ECONOMIC IMPACT BY SOURCE, CY 2011



Rounded figures may not add exactly to total.

Economic Impact has three components: direct, indirect and induced impacts. Direct impact refers to the business revenues, jobs, and employee earnings created when airport passengers and other users purchase airline services and other services. These initial purchases create multiplier effects when businesses buy supplies and services from each other (indirect impact) and when their employees spend their earnings on various local purchases (induced impact). Table 5 summarizes the Airport’s Total Economic Impact by Component. Direct impact accounts for 46-48% of the Airport’s total economic impact.

Table 5. TOTAL ECONOMIC IMPACT BY COMPONENT, CY 2011

COMPONENT	EMPLOYMENT (Jobs ¹)	EARNINGS (In Millions)	OUTPUT (In Millions)	VALUE ADDED (In Millions)
Direct	11,752	\$ 471	\$ 1,766	\$ 947
Indirect	5,311	250	867	413
Induced	7,862	294	1,010	598
Total	24,925	\$ 1,015	\$ 3,642	\$ 1,958

Distribution by Component

Component	Direct (%)	Indirect (%)	Induced (%)
Value Added	48%	21%	31%
Output	48%	24%	28%
Earnings	46%	25%	29%
Employment	47%	21%	32%

Legend: Direct (Blue), Indirect (Red), Induced (Green)

Rounded figures may not add exactly to total.

Table 6 shows the sources and components of the Airport’s employment, earnings, output and value-added impacts.

Table 6. TOTAL ECONOMIC IMPACT BY SOURCE AND BY COMPONENT, CY 2011

MEASURE AND SOURCE	COMPONENTS			TOTAL
	DIRECT	INDIRECT	INDUCED	
Employment (Number of Jobs)				
Airport Services	4,574	3,718	4,848	13,140
Visitor Spending	6,580	1,374	2,551	10,505
Capital Outlay	598	219	463	1,280
Total	11,752	5,311	7,862	24,925
Earnings (In Millions)				
Airport Services	\$ 273	\$ 174	\$ 181	\$ 628
Visitor Spending	167	65	95	327
Capital Outlay	31	11	17	59
Total	\$ 471	\$ 250	\$ 294	\$ 1,015
Output (In Millions)				
Airport Services	\$ 1,193	\$ 612	\$ 623	\$ 2,429
Visitor Spending	498	218	327	1,043
Capital Outlay	75	36	59	171
Total	\$ 1,766	\$ 867	\$ 1,010	\$ 3,642
Value Added (In Millions)				
Airport Services	\$ 611	\$ 267	\$ 369	\$ 1,246
Visitor Spending	294	128	194	616
Capital Outlay	42	19	35	96
Total	\$ 947	\$ 413	\$ 598	\$ 1,958

Rounded figures may not add exactly to total.

Economic Impact of Airport Services

Airlines, concessionaires and other enterprises that provide services and sell goods to passengers and other end-users at the Airport are responsible for more than one-half of the Airport’s regional economic impact. These enterprises employ local residents and buy supplies and services from other local enterprises, setting the economic multiplier in motion. Based on their 2011 operations, these enterprises are responsible for approximately 13,140 jobs, \$628 million earnings, \$2.4 billion output, and \$1.2 billion value added in the regional economy. Table 7 through 10 track employment, earnings, output and value-added impact from the different categories of service providers.

Table 7. AIRPORT SERVICES EMPLOYMENT IMPACT, CY 2011

SOURCE	EMPLOYMENT (Number of Jobs)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Air transportation				
Passenger	2,549	2,812	3,301	8,662
All-cargo	225	248	292	765
General aviation	40	9	26	75
Subtotal	2,814	3,069	3,619	9,502
Ground transportation				
Parking	479	137	266	882
Rental car	429	253	458	1,140
Taxicabs and other	104	8	37	149
Subtotal	1,012	398	761	2,171
Retail concessions				
Food & beverage	264	41	75	380
Merchandise	30	57	(24)	63
Other concessions	15	7	13	35
Subtotal	309	105	64	478
Other services	439	146	404	989
Total	4,574	3,718	4,848	13,140

Table 8. AIRPORT SERVICES EARNINGS IMPACT, CY 2011

SOURCE	EARNINGS (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Air transportation				
Passenger	\$168.8	\$131.8	\$123.3	\$423.9
All-cargo	14.9	11.6	10.9	37.4
General aviation	2.0	0.4	1.0	3.3
Subtotal	\$185.7	\$143.8	\$135.2	\$464.7
Ground transportation				
Parking	\$17.9	\$6.3	\$9.9	\$34.1
Rental car	29.0	12.6	17.1	58.8
Taxicabs and other	2.9	0.4	1.4	4.7
Subtotal	\$49.9	\$19.3	\$28.4	\$97.6
Retail concessions				
Food & beverage	\$4.8	\$2.0	\$2.8	\$9.6
Merchandise	1.4	2.1	(0.7)	2.8
Other concessions	1.0	0.3	0.5	1.7
Subtotal	\$7.2	\$4.4	\$2.6	\$14.1
Other services	\$30.3	\$6.5	\$15.1	\$51.9
Total	\$273.0	\$174.0	\$181.2	\$628.3

Rounded figures may not add exactly to total.

Table 9. AIRPORT SERVICES OUTPUT IMPACT, CY 2011

SOURCE	OUTPUT (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Air transportation				
Passenger	\$869.0	\$473.8	\$423.8	\$1,766.6
All-cargo	76.7	41.8	37.4	156.0
General aviation	4.2	1.4	3.3	8.9
Subtotal	\$949.9	\$517.0	\$464.6	\$1,931.5
Ground transportation				
Parking	\$43.0	\$21.3	\$34.1	\$98.5
Rental car	106.5	40.3	58.8	205.6
Taxicabs and other	6.0	1.8	4.7	12.6
Subtotal	\$155.6	\$63.4	\$97.6	\$316.6
Retail concessions				
Food & beverage	\$15.3	\$7.2	\$9.6	\$32.1
Merchandise	7.8	3.2	(1.9)	9.1
Other concessions	2.2	0.8	1.7	4.8
Subtotal	\$25.3	\$11.3	\$9.4	\$46.0
Other services	\$62.4	\$20.3	\$51.9	\$134.5
Total	\$1,193.2	\$612.0	\$623.5	\$2,428.6

Rounded figures may not add exactly to total.

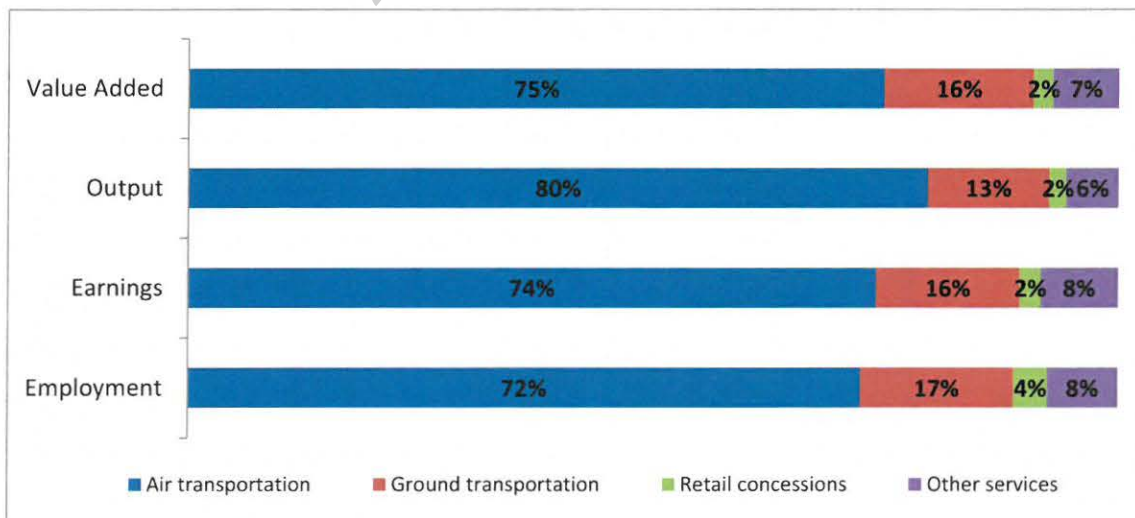
Table 10. AIRPORT SERVICES VALUE-ADDED IMPACT

SOURCE	VALUE ADDED (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Air transportation				
Passenger	\$418.8	\$181.6	\$251.0	\$851.3
All-cargo	37.0	16.0	22.2	75.2
General aviation	2.7	1.0	2.0	5.6
Subtotal	\$458.4	\$198.6	\$275.1	\$932.1
Ground transportation				
Parking	\$24.5	\$11.4	\$20.2	\$56.1
Rental car	70.9	31.1	34.8	136.8
Taxicabs and other	3.8	1.3	2.8	7.8
Subtotal	\$99.2	\$43.8	\$57.8	\$200.8
Retail concessions				
Food & beverage	\$8.5	\$3.7	\$5.7	\$17.9
Merchandise	2.5	4.0	(1.3)	5.2
Other concessions	1.4	0.6	1.0	3.0
Subtotal	\$12.4	\$8.3	\$5.4	\$26.1
Other services	\$40.5	\$16.2	\$30.7	\$87.4
Total	\$610.6	\$266.8	\$369.0	\$1,246.4

Rounded figures may not add exactly to total.

As Figure 15 shows, air transportation contributes the largest share of Airport services economic impact: employment (72%), earnings (74%), output (80%), and value added (75%).

Figure 15. AIRPORT SERVICES ECONOMIC IMPACT, CY 2011 (Distribution by Source)



Economic Impact of Visitor Spending

Visitors bring new money to the regional economy, supporting various local enterprises. They pay for ground transportation, stay at hotels, eat at restaurants, shop, and visit local attractions. According to the D.K. Shifflet/Global Insight City Tourism Study, 21.5 million visitors spent \$4.3 billion in St. Louis throughout 2010.

The Airport provides a gateway to visitors arriving by air. In CY 2011, the Airport enplaned 5.4 million commercial O&D passengers and approximately 9,000 general aviation passengers.⁵ We estimate that visitors account for 2.5 million commercial O&D enplanements and 4,239 general aviation enplanements. The average visiting passenger spends \$196 on various services and business establishments in the region.⁶ As shown in Table 11, Airport passengers visiting St. Louis spend approximately \$498 million on entertainment, shopping, lodging, food & beverage, and ground transportation services.

Table 11. LOCAL SPENDING OF VISITING PASSENGERS, CY 2011

EXPENSE CATEGORY	LOCAL SPENDING PER VISITOR		ESTIMATED AIRPORT VISITOR SPENDING (Millions)		
	PERCENT SHARE	MEAN SPENDING PER VISITOR	COMMERCIAL SERVICE	GENERAL AVIATION	TOTAL
Entertainment	22%	\$44	\$111.0	\$0.19	\$111.2
Shopping	19%	37	95.1	0.16	95.3
Lodging	15%	29	74.0	0.12	74.1
Food & beverage	28%	54	137.4	0.23	137.6
Ground transportation	16%	31	79.3	0.13	79.4
Total local spending	100%	\$196	\$496.8	\$0.84	\$497.6
STL O&D ENPLANEMENTS, 2011			COMMERCIAL SERVICE	GENERAL AVIATION	TOTAL
Total (in thousands)			5,398	9	5,407
Visitors (share)			47%	47%	47%

Rounded figures may not add exactly to total.

Sources: D.K. Shifflet/Global Insight City Tourism Impact Study, St. Louis Convention & Visitors Commission, Airport activity reports, 2006 Airport Experience Project Passenger Survey, and Federal Airport Administration.

Visitor spending by Airport passengers, including multiplier effects, contributes 10,500 jobs, \$327 million employee earnings, \$1 billion economic output, and \$616 million value added to

⁵ According to data in GRA, Inc., *Economic Values for FAA Investment and Regulatory Decisions*, 2007, a general aviation flight carries an average of 1.95 passengers. Multiplying 1.95 by the Airport's CY 2011 total itinerant general aviation operations (9,316) and then dividing by two provide an estimate of general aviation enplanements (9,083).

⁶ This estimate is based on visitor spending data in the D.K. Shifflet/Global Insight City Tourism Impact Study.

the St. Louis MSA. Table 12 through 15 track these economic impacts to the source visitor expenditures.

Table 12. VISITOR SPENDING EMPLOYMENT IMPACT, CY 2011

SOURCE	EMPLOYMENT (Number of Jobs)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Visitor spending				
Lodging	627	264	349	1,240
Food & beverage	2,378	367	674	3,419
Shopping	827	233	474	1,534
Entertainment	1,959	360	648	2,967
Ground transportation	789	150	406	1,345
Total	6,580	1,374	2,551	10,505

Table 13. VISITOR SPENDING EARNINGS IMPACT, CY 2011

SOURCE	EARNINGS (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Visitor spending				
Lodging	\$19.2	\$12.5	\$13.0	\$44.7
Food & beverage	43.2	18.1	25.1	86.5
Shopping	31.6	11.5	17.7	60.8
Entertainment	43.8	15.2	24.2	83.2
Ground transportation	29.2	7.8	15.2	52.1
Total	\$166.9	\$65.2	\$95.2	\$327.4

Rounded figures may not add exactly to total.

Table 14. VISITOR SPENDING OUTPUT IMPACT, CY 2011

SOURCE	OUTPUT (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Visitor spending				
Lodging	\$74.1	\$38.9	\$44.7	\$157.7
Food & beverage	137.6	65.0	86.4	289.1
Shopping	95.3	38.9	60.8	195.0
Entertainment	111.2	48.2	83.2	242.6
Ground transportation	79.4	27.1	52.1	158.7
Total	\$497.6	\$218.1	\$327.3	\$1,043.0

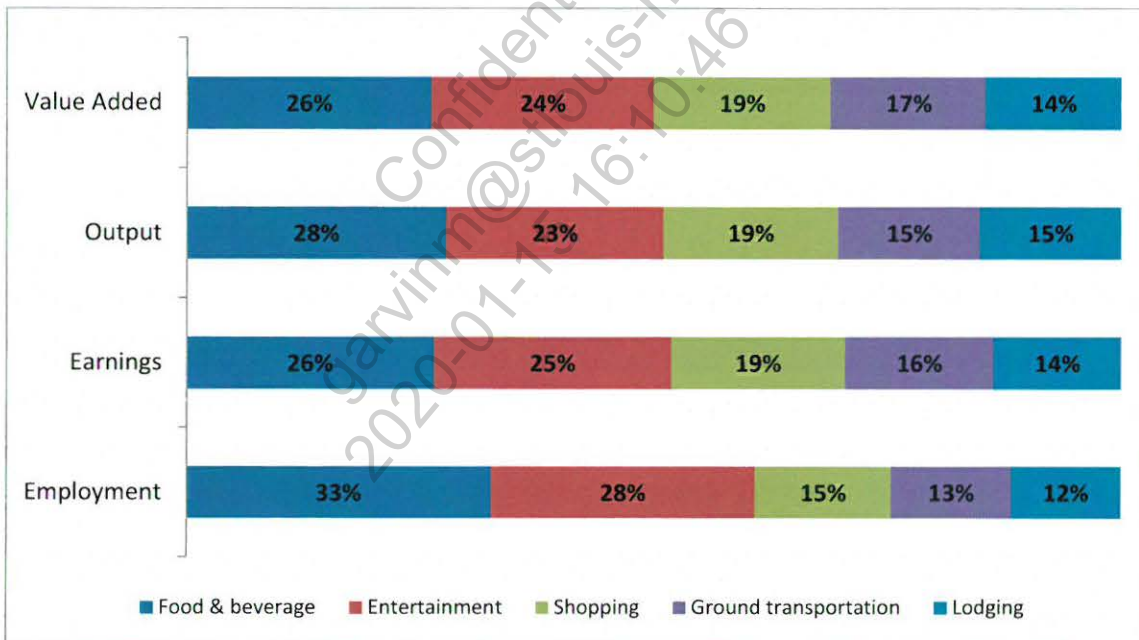
Rounded figures may not add exactly to total.

Table 15. VISITOR SPENDING VALUE-ADDED IMPACT

SOURCE	VALUE ADDED (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Visitor spending				
Lodging	\$41.9	\$20.8	\$26.5	\$89.2
Food & beverage	76.5	33.0	51.2	160.7
Shopping	57.1	23.6	36.0	116.6
Entertainment	67.2	30.0	49.3	146.6
Ground transportation	51.4	20.3	30.9	102.5
Total	\$294.1	\$127.7	\$193.9	\$615.7

Food & beverage and entertainment spending generate the largest economic impact (Figure 16).

**Figure 16. VISITOR SPENDING ECONOMIC IMPACT, CY 2011
(Distribution by Source Expenditure)**



Economic Impact of Capital Outlay

The Airport Authority routinely improves Airport facilities and operations. Expenditures for capital improvements also stimulate local economic activity and job creation.

Capital expenditures in FY 2012 had a total economic impact of 1,280 jobs, \$59 million employee earnings, \$171 million output, and \$96 million value added (Table 16 through 19).

Approximately 80% of capital expenditures originate from construction, and the remaining 20% from professional services (Figure 17).

Table 16. CAPITAL OUTLAY EMPLOYMENT IMPACT, FY 2012

SOURCE	EMPLOYMENT (Number of Jobs)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Capital Outlay				
Professional services	100	34	92	226
Construction	498	185	371	1,054
Total	598	219	463	1,280

Table 17. CAPITAL OUTLAY EARNINGS IMPACT, FY 2012

SOURCE	EARNINGS (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Capital Outlay				
Professional services	\$6.9	\$1.5	\$3.5	\$11.9
Construction	24.5	9.2	13.8	47.6
Total	\$31.5	\$10.7	\$17.3	\$59.4

Rounded figures may not add exactly to total.

Table 18. CAPITAL OUTLAY OUTPUT IMPACT, FY 2012

SOURCE	OUTPUT (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Capital Outlay				
Professional services	\$14.3	\$4.7	\$11.9	\$30.8
Construction	60.5	31.8	47.6	139.8
Total	\$74.8	\$36.4	\$59.4	\$170.6

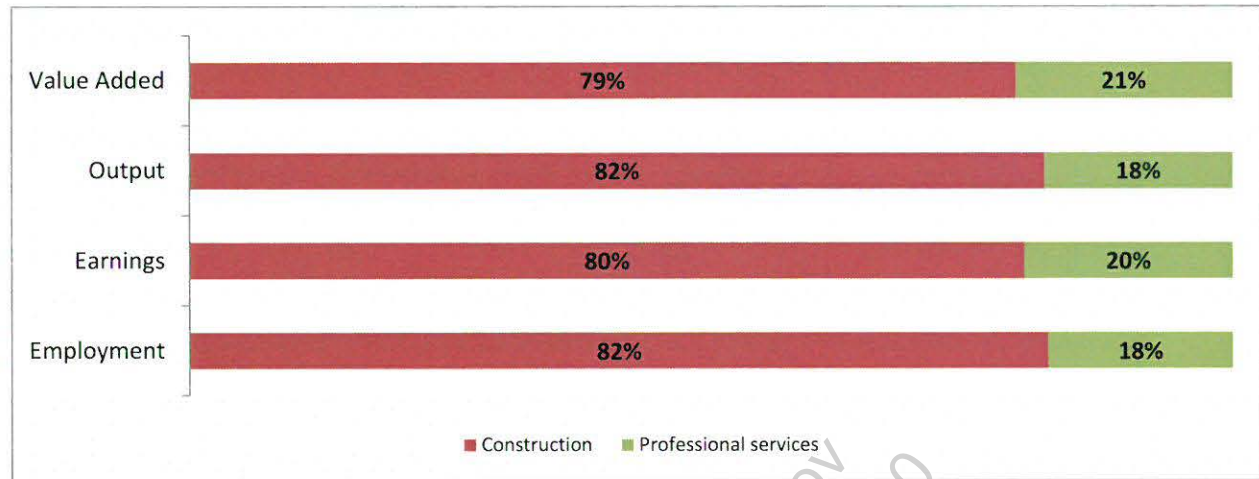
Rounded figures may not add exactly to total.

Table 19. CAPITAL OUTLAY VALUE-ADDED IMPACT, FY 2012

SOURCE	VALUE ADDED (Millions)			
	DIRECT	INDIRECT	INDUCED	TOTAL
Capital Outlay				
Professional Services	\$9.3	\$3.7	\$7.0	\$20.0
Construction	33.0	15.1	28.2	76.2
Total	\$42.2	\$18.8	\$35.2	\$96.2

Rounded figures may not add exactly to total.

Figure 17. CAPITAL OUTLAY ECONOMIC IMPACT, FY 2012



Economic Impact by Industry Sector

Table 20 provides the share of each regional industry sector of the Airport’s employment, earnings, output, and value-added impact. The shaded entries in Table 20 indicate the three industry sectors with the largest shares of each measure indicated by the column heading.

Table 20. ECONOMIC IMPACT BY INDUSTRY SECTOR, CY 2011

INDUSTRY SECTOR	EMPLOYMENT (Jobs)		EARNINGS (\$M)		OUTPUT (\$M)		VALUE ADDED (\$M)	
	TOTAL	SHARE	TOTAL	SHARE	TOTAL	SHARE	TOTAL	SHARE
Construction	627	2.5%	30.9	3.0%	76.2	2.1%	39.4	2.0%
Manufacturing	1,130	4.5%	79.4	7.8%	430.7	11.8%	139.4	7.1%
Wholesale trade	504	2.0%	35.4	3.5%	112.4	3.1%	72.8	3.7%
Retail trade	2,166	8.7%	56.0	5.5%	162.4	4.5%	107.6	5.5%
Transportation and warehousing	4,871	19.5%	269.8	26.6%	1,147.0	31.5%	534.2	27.3%
Information	266	1.1%	18.3	1.8%	93.9	2.6%	49.0	2.5%
Finance and insurance	796	3.2%	46.1	4.5%	193.5	5.3%	107.7	5.5%
Real estate and rental and leasing	1,535	6.2%	59.7	5.9%	362.4	9.9%	257.9	13.2%
Professional, scientific, and technical services	1,296	5.2%	89.4	8.8%	184.0	5.1%	131.3	6.7%
Administrative & waste management services	1,082	4.3%	27.3	2.7%	66.4	1.8%	43.2	2.2%
Health care and social assistance	1,519	6.1%	67.7	6.7%	144.0	4.0%	90.1	4.6%
Arts, entertainment, and recreation	2,340	9.4%	52.7	5.2%	133.1	3.7%	82.4	4.2%
Accommodation	711	2.9%	21.7	2.1%	84.0	2.3%	45.4	2.3%
Food services and drinking places	3,962	15.9%	72.0	7.1%	229.3	6.3%	124.0	6.3%
Other services (including government)	1,439	5.8%	53.8	5.3%	129.4	3.6%	72.2	3.7%
Other industry sectors	681	2.7%	34.7	3.4%	93.5	2.6%	61.5	3.1%
Total Economic Impact	24,925	100.0%	1,015.1	100.0%	3,642.3	100.0%	1,958.3	100.0%

Rounded figures may not add exactly to total.

The transportation and warehousing sector accounts for the largest share by any measure of economic impact. The industry sectors with the top three shares of each measure are listed below:

- Employment
 - Transportation and warehousing sector (20%)
 - Food services and drinking places (16%)
 - Arts, entertainment, and recreation (9%)
- Earnings
 - Transportation and warehousing sector (27%)
 - Professional, scientific, and technical services (9%)
 - Manufacturing (8%)
- Output
 - Transportation and warehousing sector (32%)
 - Manufacturing (12%)
 - Real estate and rental & leasing (10%)
- Value added
 - Transportation and warehousing sector (27%)
 - Real estate and rental & leasing (13%)
 - Manufacturing (7%)

Local Tax Revenue Impact

All of the economic activity arising from the operation and capital improvement of the Airport generates tax revenues that help fund local government services and public infrastructure. Taxes, however, represent a transfer of income from businesses and individuals to the government and do not represent additional economic impact.

Based on the Airport's CY 2011 output impact, we estimate a contribution of approximately \$32 million in local sales tax revenues to the County of St. Louis and all the other counties in the St. Louis MSA. St. Louis City residents and workers pay a 1% earnings tax, and St. Louis City employers pay a 0.5% payroll tax,⁷ contributing \$1.2 million in revenues to the City of St. Louis. None of the Illinois and Missouri counties in the St. Louis MSA impose these local income taxes.

⁷ Source: St. Louis Regional Chamber & Growth Association.

Section 4 – Economic Impact Study

Methodology

The Lambert-St. Louis International Airport is an important economic engine in the St. Louis MSA. Section 1 identified the different enterprises that do business and provide services at the Airport. Their activities generate economic impacts, typically measured in terms of business revenues (*output*) and associated jobs (*employment*) and incomes (*earnings*). This section describes the methodology used to estimate STL’s economic impacts. In addition, Appendix A provides a more technical discussion of economic impact analysis, models and multipliers.

Theoretical Framework

The Airport’s economic impacts are not limited to the business revenues, jobs and incomes generated within the Airport. Local businesses outside the Airport benefit from visiting passengers who purchase ground transportation, food, accommodation, entertainment, and other goods and services. Other local businesses earn revenue by supplying goods and services to the business and government entities that operate at the Airport and to off-Airport businesses that cater to visiting passengers. These business and government entities employ local residents, who spend their income on various services and support local businesses.

The business activities at the Airport create a multiplier effect in the regional economy so that the Airport’s total economic impact is much greater than what is produced within the Airport. Economic impact analysis estimates total economic impact—the *direct impact* from the sale of various services and merchandise to passengers, air shippers and other airport users; and the multiplier effects from associated business purchases (*indirect impact*) and employee household spending (*induced impact*) (Figure 18).

Sources of Airport Economic Impact

The Airport’s economic impact stems from the following sources: (1) aviation and related services at the airport (airport services), (2) local spending by airport passengers visiting the region (visitor spending), and (3) expenses associated with airport capital improvement projects (capital outlays). These sources produce the initial economic stimuli that create multiplier effects in the regional economy (Figure 19).

Figure 18. TOTAL ECONOMIC IMPACT

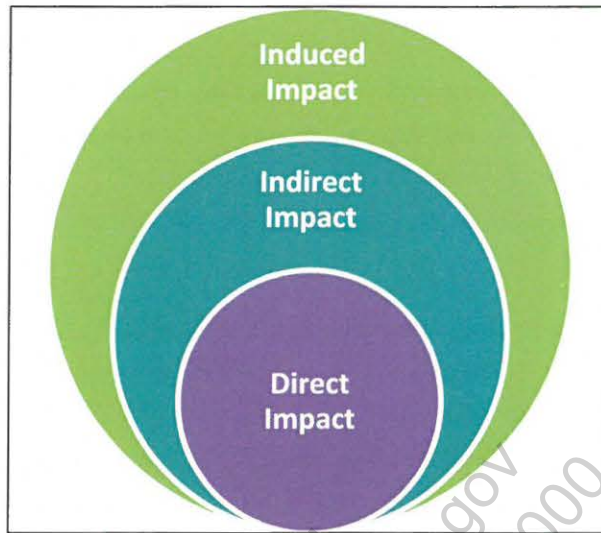
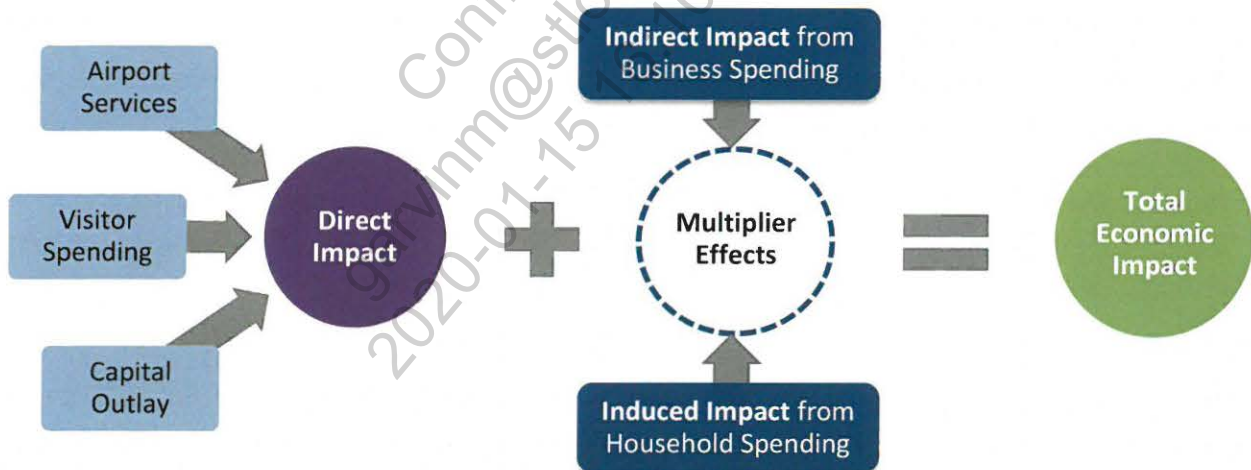


Figure 19. AIRPORT ECONOMIC IMPACT: SOURCES AND COMPONENTS



Economic Impact Measures

There are three common measures of economic impact: *output*, *employment*, and *earnings*. Output, measured by gross revenue, refers to the value of goods and services produced by an economic activity. Employment refers to jobs associated with direct, indirect and induced economic activity. Earnings refer to employee wages, benefits and other compensation. This report presents a fourth measure of economic impact, *value added*, which approximates contribution to the region's GDP. Value added, which includes wage income and corporate

profit, equals the difference between an industry's output (gross revenue) and the cost of its intermediate inputs (utilities, supplies and services purchased from other firms).⁸

Economic activity arising from the presence of an airport generates tax revenues that help fund public infrastructure and services. The study estimates tax revenue impacts from the Airport's economic activity. Taxes, however, represent an economic transfer from firms and consumers to government, and do not represent additional economic impact.

Data Collection

There are two key inputs to an economic impact analysis: (1) an estimate of the economic stimulus—the initial change in final demand; and (2) a model of the economy that produces estimates of the multiplier effects. For the latter, this study uses RIMS II input-output multipliers for the St. Louis MSA from the Regional Input-Output Modeling System maintained by the BEA and recommended by the FAA. Input-output models are widely used because they provide details on how the impact of one sector spreads throughout other sectors in the economy.⁹ They are based on an accounting framework called an I-O table, which shows the distribution of inputs purchased and outputs sold for each industry. See Appendix A for a technical overview of I-O models, a description of the RIMS II multipliers, and the tables containing the RIMS II multipliers for St. Louis MSA.

For the initial final demand changes, the study collected data from various sources to estimate the number of employees, annual payroll costs and annual gross business revenues of business and other enterprises that serve Airport passengers, cargo shippers and other users. Airport financial records, air traffic activity reports, and other operations data provided the required information for all the airlines, rental car companies, on-airport parking, airport shuttle service provider, and all other airport concessionaires.

In addition to collecting Airport data, we surveyed other airport service providers that were not covered by Airport reports:

- FBOs
- On-airport parking operator
- Off-airport parking operators
- Ground transportation operators
- Federal agencies and other non-business airport tenants

⁸ This definition comes from the BEA. With the 2010 update of its Regional Input-Output Modeling System (RIMS II), the BEA began producing value-added multipliers, in addition to employment and earnings multipliers, permitting measurement of the change in local value added per dollar of final-demand change.

⁹ The other two types of models used in economic impact analysis are economic base models and econometric models.

Appendix B provides copies of the survey questionnaire that was distributed to Airport tenants. The FBOs, the on-airport parking operator, the TSA, and the St. Louis Convention and Visitors Commission (CVC) all responded. The FAA provided data in a 2007 survey that we updated for the current analysis.

Thirty-three percent of the off-airport parking operators and 42% of the ground transportation operators responded, but did not provide viable data. Therefore, for these service providers, we supplemented the tenant survey with other research methods, including a telephone survey of taxi operators and internet research. We used data collected from these other research methods, as well as parking and ground transportation operations data from Airport records, to estimate airport-related revenues used in the economic impact analysis.

Other data sources included websites and online databases maintained by certain airlines, as well as the following agencies:

- U.S. Census Bureau
- U.S. Bureau of Economic Analysis
- U.S. Bureau of Labor Statistics
- U.S. Bureau of Transportation Statistics
- Federal Aviation Administration
- Airport Council International-North America
- St. Louis Convention & Visitor Commission
- Missouri Division of Tourism
- St. Louis Regional Chamber & Growth Association

Visitor spending—the nonresident passengers’ local spending on ground transportation, hotels, restaurants, shopping, and entertainment—is also a significant source of economic stimulus. To estimate visitor spending, we used data from the D.K. Shifflet/Global Insight City Tourism Study reported in the St. Louis CVC FY¹⁰ 2011 Annual Report.

¹⁰ Like the Airport’s fiscal year, the St. Louis CVC fiscal year also begins on July 1.

Appendix A – Technical Overview of Economic Impact Analysis and RIMS II Multipliers

Airport sponsors conduct economic impact studies to inform the public about the significant economic contributions of airport operations. Economic impact analysis is a methodology for determining how a change in regulation, policy, or industry affects regional income and other economic activities. It measures economic impacts in terms of employment (full- and part-time jobs), employee earnings, output (sales revenues), and value added (gross domestic product) generated by an economic activity.

Economic impact analysis estimates the economic repercussions of changes in final demand—purchases of goods and services by final users—arising from an economic activity via the concept of the multiplier. The multiplier accounts for the economic effects of subsequent rounds of spending resulting from an initial expenditure.

Economic Impact Analysis - Modeling Options

There are two key inputs to economic impact analysis: an estimate of the exogenous economic stimulus and a model of the economy that produces estimates of the multiplier effects. There are three basic categories of models used to derive regional multipliers for estimating total economic impact: (1) economic base models, (2) econometric models, and (3) input-output models.^{11 12 13} These models are described below:

- Economic base models divide local industries between export and service, and consider regional trade as the primary driver of growth.
- Econometric models involve estimating multiple-equation systems that attempt to describe the structure of a local economy and forecast aggregate variables such as income, employment, and output.

¹¹ DiPasquale, D., and K. Polenske, “Output, Income, and Employment Input-Output Multipliers,” in Pleeter, S. ed., *Economic Impact Analysis: Methodology and Applications, Studies in Applied Regional Science*, Vol. 19, Martinus Nijhoff Publishing, Boston, Mass., 1980, pages 85-113.

¹² Pleeter, S., “Methodologies of Economic Impact Analysis: An Overview,” in Pleeter, S. ed., *Economic Impact Analysis: Methodology and Applications, Studies in Applied Regional Science*, Vol. 19, Martinus Nijhoff Publishing, Boston, Mass., 1980, pages 7-31.

¹³ Richardson, H., *Input-Output and Regional Economics*, Redwood Press Limited, Trowbridge, Wiltshire, Great Britain, 1972.

- Input-output (I-O) models are based on an accounting framework called an I-O table, which shows the distribution of inputs purchased and outputs sold for each industry.

I-O models are widely used because they provide details on how the impact of one sector spreads throughout other sectors in the economy. I-O models account for the inter-industry relationships within regions; these relationships largely determine how regional economies are likely to respond to project and program changes.

Macroeconomic and Input-Output Multipliers

Regional multipliers are different from macroeconomic multipliers, but the concept is the same. A dollar spent in the economy creates multiple rounds of spending, resulting in total economic output that is greater than the initial dollar spent.

Macroeconomic Multipliers

Macroeconomic multipliers are based on the Keynesian macroeconomic model—hence, they are called Keynesian multipliers. In Keynesian macroeconomic model, total income (Y) equals the sum of consumption (C), business investment (I), government spending (G), and net exports (X):

$$Y = C + I + G + X, \quad (\text{A1})$$

In the context of this macroeconomic model, Y also represents total output, which equals total income.

Consumption (C) is a function of income (Y), as in the following linear functional specification:

$$C = a + bY, \quad (\text{A2})$$

where a represents exogenous consumption (i.e. the component of consumption that does not vary with income), b represents the marginal propensity to consume, and bY represents the component of consumption that changes proportionately with income.

For simplicity of exposition, we will treat business investment (I), government spending (G), and net exports (X) as exogenous. Substituting the consumption function (A2) into the income identity (A1) yields:

$$Y = (a + bY) + I + G + X, \quad (\text{A3})$$

Totally differentiating equation (A3) yields the following result:

$$dY = (da + dI + dG + dX) \times \left[\frac{1}{1-b} \right], \quad (\text{A4})$$

where the term $\left[\frac{1}{1-b} \right]$ represents the multiplier.

For example, a change in exogenous consumption (da) from visitor spending will increase total income or output by the amount of the change times the multiplier:

$$dY = (da) \times \left[\frac{1}{1-b} \right], \tag{A5}$$

Airport capital improvements (dG) will increase total income or output by the amount of the amount of the capital outlay times the multiplier:

$$dY = (dG) \times \left[\frac{1}{1-b} \right], \tag{A6}$$

Input-Output Multipliers¹⁴

The input-output (I-O) multipliers used in economic impact analysis are based on an I-O model that describes the relationship between different sectors of the economy. I-O models use an accounting framework that shows the goods and services produced by each industry and the use of these goods and services by industries and final users.

Consider a simple I-O table for a three-industry sector economy:

To \ From	Industry 1	Industry 2	Industry 3	Final Demand	Total Output
Industry 1	X_{11}	X_{12}	X_{13}	Y_1	X_1
Industry 2	X_{21}	X_{22}	X_{23}	Y_2	X_2
Industry 3	X_{31}	X_{32}	X_{33}	Y_3	X_3
Households	V_1	V_2	V_3		V
Total Outlay	X_1	X_2	X_3	Y	X

Data in the I-O table may be expressed in either physical or monetary units. The notation X_{ij} denotes the output of industry i purchased by industry j , where $i, j=1, 2$, and 3 . Summing across each row and re-arranging the terms result in an equation such as the following example for industry 1:

$$X_1 - X_{11} - X_{12} - X_{13} = Y_1. \tag{A7}$$

Assuming that all businesses in each industry use the same production process, and industries always use the same proportions of inputs to produce output, equation (A7) can be re-written as follows:

¹⁴ Sources:

Richardson, Harry W., *Input-Output and Regional Economics*. Great Britain: Redwood Press Limited, Trowbridge, Wiltshire, 1972.

U.S. Bureau of Economic Analysis, *RIMS II Users Guide*, Washington, D.C., 2012.

$$X_1 - a_{11}X_1 - a_{12}X_2 - a_{13}X_3 = Y_1, \quad (\text{A8})$$

$$\text{where } a_{11} = \frac{X_{11}}{X_1}; a_{12} = \frac{X_{12}}{X_2}; \text{ and } a_{13} = \frac{X_{13}}{X_3}.$$

The coefficients a_{11} , a_{12} and a_{13} are called direct input coefficients. They represent the direct requirements of the output of any industry per unit of output of any other purchasing industry. Equation (A7) assumes that the monetary value of an industry's output is a linear and homogeneous function of the output level of the purchasing sectors.

To illustrate how the direct input coefficients produce the I-O multipliers, we need to use matrix notation. Let \mathbf{X} and \mathbf{Y} denote the column vectors of gross output and final demand, respectively, and \mathbf{A} denote the $n \times n$ matrix of direct input coefficients, a_{ij} ,

$$\mathbf{X} - \mathbf{A}\mathbf{X} = \mathbf{Y}, \quad (\text{A9})$$

Using the identity matrix, \mathbf{I} ,

$$(\mathbf{I} - \mathbf{A})\mathbf{X} = \mathbf{Y}. \quad (\text{A10})$$

Conditional upon the existence of the inverse of $(\mathbf{I}-\mathbf{A})$, which will be met if vector \mathbf{Y} contains at least one non-zero element, equation (A10) can be expressed as follows:

$$\mathbf{X} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{Y}, \quad (\text{A11})$$

where $(\mathbf{I} - \mathbf{A})^{-1}$ is called the Leontief inverse matrix. Let $\mathbf{B} = (\mathbf{I} - \mathbf{A})^{-1}$, then

$$\mathbf{X} = \mathbf{B}\mathbf{Y}, \quad (\text{A12})$$

The \mathbf{B} matrix is called the total requirements coefficient matrix. We can multiply matrix \mathbf{B} by any exogenous change in final demand and obtain total output for each industry. This provides the basis for multiplier analysis. The different I-O multipliers can be derived using elements in matrix \mathbf{B} , matrix \mathbf{A} , and the I-O table.

RIMS II Multipliers¹⁵

The study uses multipliers from the U.S. BEA Regional Input-Output Modeling System (RIMS II). RIMS II uses the following two data sources: (1) BEA's national I-O table, which shows the input and output structure of nearly 500 U.S. industries; and (2) BEA's regional economic data, which are used to adjust the national I-O table to reflect a region's industrial structure and trading patterns.

¹⁵ Source: "Regional Multipliers from the Regional Input-Output Modeling System (RIMS II): A Brief Description" in the U.S. BEA website.

The RIMS II I-O framework is based on at least six important assumptions:

- Backward linkages—an increase in the demand for output increases the demand for inputs.
- Fixed-purchase patterns—industries do not change the relative mix of inputs used to produce output, and doubling output will require a doubling of input.
- Industry homogeneity—all businesses in an industry use the same production process.
- Unlimited supply—I-O models assume fixed prices so that businesses can use as many inputs without facing higher prices.
- No regional feedback—RIMS II is a single-region I-O model, ignoring any feedback that may exist among regions.
- No time dimension—RIMS II is a static model and does not consider the time it takes for economic impacts to be realized.

RIMS II multipliers are available for any region composed of one or more counties, and for any industry or group of industries in the United States. Each set of multipliers includes six types of multipliers—four final-demand multipliers and two direct-effect multipliers. The choice of multiplier to use depends upon what data is available to measure the initial change. Final-demand multipliers are applied to revenue estimates—the value of the output purchased by the final user (also known as *final-demand change*). Direct-effect multipliers are used when the initial change is measured in terms of earnings (payroll costs) or employment (number of jobs).¹⁶

The U.S. BEA RIMS II provides Type I and Type II multipliers for each region or industry. Type I multipliers account for the direct and indirect impacts based on the supply of goods and services in the region. Type II multipliers account for these same direct and indirect impacts, and for induced impacts associated with employee purchases. Indirect and induced impacts represent multiplier effects. Indirect impacts are multiplier effects resulting from inter-industry purchases of production inputs, and induced impacts are multiplier effects that result when employees spend their earnings.

Table 21 contains the RIMS II Type I multipliers for the St. Louis MSA, and Table 22 contains the RIMS II Type II multipliers. The Type II multipliers are used to estimate STL's total economic impact. The Type I multipliers are used to separate indirect and induced impacts.

¹⁶ *Ibid.*

Table 21. RIMS II TYPE I MULTIPLIERS FOR ST. LOUIS, MO-IL, MSA

Industry	Final-Demand				Direct-Effect	
	Output ¹ (dollars)	Earnings ² (dollars)	Employment ³ (no. of jobs)	Value-added ⁴ (dollars)	Earnings ⁵ (dollars)	Employment ⁶ (no. of jobs)
1 Crop and animal production	1.695	0.357	10.055	0.745	1.868	1.524
2 Forestry, fishing, and related activities	1.343	0.597	24.844	0.772	1.167	1.062
3 Oil and gas extraction	1.298	0.252	6.676	0.799	1.615	1.341
4 Mining, except oil and gas	1.357	0.289	4.913	0.771	1.536	1.596
5 Support activities for mining	1.649	0.470	10.743	0.759	1.715	1.521
6 Utilities*	1.140	0.227	2.748	0.772	1.241	1.453
7 Construction	1.526	0.558	11.658	0.794	1.375	1.371
8 Wood product manufacturing	1.440	0.418	11.040	0.577	1.473	1.317
9 Nonmetallic mineral product manufacturing	1.716	0.402	7.936	0.768	1.955	1.899
10 Primary metal manufacturing	1.719	0.336	8.452	0.527	2.183	1.815
11 Fabricated metal product manufacturing	1.640	0.422	8.243	0.730	1.652	1.730
12 Machinery manufacturing	1.484	0.435	7.159	0.691	1.446	1.573
13 Computer and electronic product manufacturing	1.220	0.347	6.550	0.831	1.257	1.239
14 Electrical equipment and appliance manufacturing	1.587	0.381	6.796	0.665	1.694	1.800
15 Motor vehicle, body, trailer, and parts manufacturing	1.481	0.278	6.259	0.373	1.833	1.604
16 Other transportation equipment manufacturing	1.531	0.313	5.518	0.599	2.062	2.068
17 Furniture and related product manufacturing	1.491	0.438	8.732	0.748	1.445	1.465
18 Miscellaneous manufacturing	1.423	0.447	7.126	0.800	1.375	1.485
19 Food, beverage, and tobacco product manufacturing	1.776	0.354	7.284	0.628	2.276	2.212
20 Textile and textile product mills	1.556	0.359	9.130	0.596	1.739	1.481
21 Apparel, leather, and allied product manufacturing	1.301	0.558	18.471	0.813	1.196	1.114
22 Paper manufacturing	1.431	0.319	5.668	0.566	1.636	1.679
23 Printing and related support activities	1.604	0.452	9.840	0.690	1.655	1.581
24 Petroleum and coal products manufacturing	1.158	0.189	2.217	0.329	1.220	1.298
25 Chemical manufacturing	1.748	0.345	4.842	0.706	2.144	2.557
26 Plastics and rubber products manufacturing	1.645	0.335	6.334	0.685	1.923	1.816
27 Wholesale trade	1.403	0.447	7.378	0.886	1.419	1.591
28 Retail trade	1.378	0.457	16.291	0.883	1.326	1.184
29 Air transportation	1.545	0.346	6.369	0.691	1.781	2.103
30 Rail transportation	1.697	0.385	6.278	0.782	2.078	2.703
31 Water transportation	1.438	0.276	5.020	0.630	1.847	2.056
32 Truck transportation	1.605	0.480	10.888	0.766	1.574	1.529
33 Transit and ground passenger transportation*	1.297	0.558	19.155	0.834	1.150	1.073
34 Pipeline transportation	1.351	0.582	7.361	0.807	1.243	1.501
35 Other transportation and support activities*	1.322	0.558	11.817	0.860	1.205	1.214
36 Warehousing and storage	1.308	0.534	13.394	0.917	1.217	1.207
37 Publishing industries, except Internet	1.552	0.420	8.427	0.795	1.746	1.896
38 Motion picture and sound recording industries	1.401	0.368	11.527	0.811	1.523	1.343
39 Broadcasting, except Internet	1.582	0.541	8.618	0.677	1.581	2.168
40 Telecommunications	1.437	0.282	4.881	0.821	1.819	2.086
41 Internet and other information services	1.558	0.362	6.382	0.807	1.924	2.531
42 Federal Reserve banks, credit intermediation and related services	1.561	0.354	6.701	0.881	1.889	2.148
43 Securities, commodity contracts, investments	1.741	0.526	11.114	0.781	1.726	1.729
44 Insurance carriers and related activities	1.423	0.427	7.176	0.911	1.435	1.521
45 Funds, trusts, and other financial vehicles	1.735	0.371	13.841	0.770	2.375	1.478
46 Real estate	1.419	0.169	6.970	0.940	2.694	1.524
47 Rental and leasing services and lessors of intangible assets	1.378	0.391	6.612	0.958	1.435	1.590
48 Professional, scientific, and technical services	1.326	0.590	9.679	0.910	1.215	1.332
49 Management of companies and enterprises	1.402	0.589	7.291	0.884	1.280	1.583
50 Administrative and support services	1.369	0.542	20.950	0.874	1.251	1.135
51 Waste management and remediation services	1.527	0.414	7.875	0.814	1.632	1.775
52 Educational services	1.380	0.588	17.886	0.879	1.205	1.153
53 Ambulatory health care services	1.335	0.623	11.389	0.886	1.205	1.262
54 Hospitals	1.505	0.546	11.030	0.838	1.332	1.399
55 Nursing and residential care facilities	1.325	0.572	20.168	0.869	1.191	1.122
56 Social assistance	1.389	0.588	28.480	0.862	1.233	1.104
57 Performing arts, spectator sports, museums, zoos, and parks	1.463	0.586	21.629	0.874	1.365	1.243
58 Amusements, gambling, and recreation	1.404	0.476	21.442	0.876	1.329	1.129
59 Accommodation	1.525	0.428	12.417	0.847	1.654	1.421
60 Food services and drinking places	1.473	0.445	20.591	0.796	1.419	1.155
61 Other services*	1.495	0.562	14.783	0.834	1.351	1.287

1. Each entry in column 1 represents the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

2. Each entry in column 2 represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

3. Each entry in column 3 represents the total change in number of jobs that occurs in all industries for each additional 1 million dollars of output delivered to final demand by the industry corresponding to the entry. Because the employment multipliers are based on regional data, the output delivered to final demand should be in regional year dollars.

4. Each entry in column 4 represents the total dollar change in value added that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

5. Each entry in column 5 represents the total dollar change in earnings of households employed by all industries for each additional dollar of earnings paid directly to households employed by the industry corresponding to the entry.

6. Each entry in column 6 represents the total change in number of jobs in all industries for each additional job in the industry corresponding to the entry.

Source: U.S. Bureau of Economic Analysis.

Table 22. RIMS II TYPE II MULTIPLIERS FOR ST. LOUIS, MO-IL, MSA

Industry	Final-Demand				Direct-Effect	
	Output ¹ (dollars)	Earnings ² (dollars)	Employment ³ (no. of jobs)	Value-added ⁴ (dollars)	Earnings ⁵ (dollars)	Employment ⁶ (no. of jobs)
1 Crop and animal production	2.198	0.503	14.100	1.043	2.634	2.137
2 Forestry, fishing, and related activities	2.185	0.842	31.617	1.271	1.645	1.351
3 Oil and gas extraction	1.654	0.356	9.539	1.010	2.277	1.916
4 Mining, except oil and gas	1.764	0.408	8.191	1.012	2.166	2.661
5 Support activities for mining	2.312	0.663	16.074	1.152	2.418	2.276
6 Utilities*	1.460	0.320	5.323	0.961	1.750	2.814
7 Construction	2.312	0.786	17.982	1.260	1.939	2.115
8 Wood product manufacturing	2.029	0.589	15.776	0.926	2.077	1.882
9 Nonmetallic mineral product manufacturing	2.283	0.567	12.496	1.103	2.757	2.990
10 Primary metal manufacturing	2.193	0.474	12.263	0.807	3.078	2.634
11 Fabricated metal product manufacturing	2.235	0.595	13.029	1.082	2.330	2.735
12 Machinery manufacturing	2.098	0.614	12.096	1.055	2.040	2.657
13 Computer and electronic product manufacturing	1.710	0.490	10.490	1.121	1.773	1.985
14 Electrical equipment and appliance manufacturing	2.123	0.537	11.114	0.983	2.388	2.944
15 Motor vehicle, body, trailer, and parts manufacturing	1.873	0.392	9.413	0.605	2.584	2.412
16 Other transportation equipment manufacturing	1.972	0.441	9.069	0.860	2.908	3.398
17 Furniture and related product manufacturing	2.109	0.618	13.702	1.114	2.038	2.300
18 Miscellaneous manufacturing	2.053	0.630	12.195	1.173	1.940	2.542
19 Food, beverage, and tobacco product manufacturing	2.275	0.499	11.298	0.924	3.209	3.430
20 Textile and textile product mills	2.063	0.507	13.206	0.896	2.453	2.142
21 Apparel, leather, and allied product manufacturing	2.087	0.787	24.797	1.279	1.687	1.496
22 Paper manufacturing	1.881	0.450	9.284	0.833	2.307	2.751
23 Printing and related support activities	2.241	0.637	14.966	1.068	2.334	2.405
24 Petroleum and coal products manufacturing	1.425	0.267	4.365	0.487	1.720	2.555
25 Chemical manufacturing	2.234	0.486	8.754	0.994	3.024	4.622
26 Plastics and rubber products manufacturing	2.117	0.473	10.135	0.965	2.712	2.906
27 Wholesale trade	2.033	0.631	12.452	1.260	2.001	2.686
28 Retail trade	2.022	0.645	21.476	1.265	1.870	1.560
29 Air transportation	2.033	0.488	10.292	0.980	2.511	3.398
30 Rail transportation	2.240	0.543	10.642	1.103	2.931	4.582
31 Water transportation	1.828	0.390	8.153	0.861	2.605	3.340
32 Truck transportation	2.282	0.678	16.337	1.168	2.220	2.294
33 Transit and ground passenger transportation*	2.083	0.787	25.483	1.300	1.621	1.427
34 Pipeline transportation	2.171	0.820	13.958	1.293	1.754	2.847
35 Other transportation and support activities*	2.109	0.787	18.148	1.326	1.699	1.864
36 Warehousing and storage	2.061	0.754	19.456	1.363	1.716	1.753
37 Publishing industries, except Internet	2.144	0.592	13.192	1.146	2.462	2.968
38 Motion picture and sound recording industries	1.920	0.519	15.698	1.119	2.148	1.829
39 Broadcasting, except Internet	2.345	0.764	14.759	1.129	2.230	3.713
40 Telecommunications	1.835	0.398	8.084	1.057	2.565	3.454
41 Internet and other information services	2.068	0.511	10.488	1.109	2.713	4.159
42 Federal Reserve banks, credit intermediation and related serv	2.059	0.499	10.710	1.176	2.664	3.433
43 Securities, commodity contracts, investments	2.482	0.742	17.082	1.220	2.434	2.657
44 Insurance carriers and related activities	2.025	0.602	12.020	1.267	2.024	2.548
45 Funds, trusts, and other financial vehicles	2.258	0.523	18.048	1.080	3.349	1.927
46 Real estate	1.658	0.239	8.892	1.081	3.799	1.944
47 Rental and leasing services and lessors of intangible assets	1.930	0.552	11.048	1.284	2.024	2.656
48 Professional, scientific, and technical services	2.158	0.832	16.371	1.402	1.713	2.252
49 Management of companies and enterprises	2.233	0.831	13.972	1.376	1.805	3.034
50 Administrative and support services	2.134	0.765	27.101	1.327	1.765	1.468
51 Waste management and remediation services	2.111	0.583	12.566	1.159	2.302	2.833
52 Educational services	2.209	0.829	24.552	1.369	1.699	1.583
53 Ambulatory health care services	2.213	0.878	18.453	1.406	1.699	2.045
54 Hospitals	2.275	0.771	17.227	1.294	1.879	2.185
55 Nursing and residential care facilities	2.131	0.806	26.651	1.346	1.679	1.483
56 Social assistance	2.218	0.829	35.148	1.353	1.739	1.363
57 Performing arts, spectator sports, museums, zoos, and parks	2.290	0.827	28.278	1.363	1.925	1.625
58 Amusements, gambling, and recreation	2.074	0.671	26.838	1.274	1.874	1.414
59 Accommodation	2.129	0.604	17.271	1.204	2.333	1.977
60 Food services and drinking places	2.100	0.628	25.643	1.168	2.001	1.438
61 Other services*	2.287	0.792	21.155	1.303	1.905	1.842
62 Households	1.410	0.410	11.343	0.835	0.000	0.000

1. Each entry in column 1 represents the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

2. Each entry in column 2 represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

3. Each entry in column 3 represents the total change in number of jobs that occurs in all industries for each additional 1 million dollars of output delivered to final demand by the industry corresponding to the entry. Because the employment multipliers are based on regional data, the output delivered to final demand should be in regional year dollars.

4. Each entry in column 4 represents the total dollar change in value added that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

5. Each entry in column 5 represents the total dollar change in earnings of households employed by all industries for each additional dollar of earnings paid directly to households employed by the industry corresponding to the entry.

6. Each entry in column 6 represents the total change in number of jobs in all industries for each additional job in the industry corresponding to the entry.

Source: U.S. Bureau of Economic Analysis.

Appendix B – Tenant Survey Questionnaire



LAMBERT-ST. LOUIS
INTERNATIONAL AIRPORT®

Rhonda Hamm-Niebruegge
Director



FRANKLIN COUNTY
MISSOURI
CITY OF ST. LOUIS

August 10, 2012

RE: Airport Economic Impact Study Tenant Survey

Dear Tenant:

Lambert-St. Louis International Airport (STL) has contracted with Unison Consulting, Inc. to conduct an Economic Impact Study of the Airport. This study will identify and quantify employment and other economic indicators. In addition, it will measure earnings and business revenues generated in the local economy due to the location and presence of the Airport.


The success of the study, and the usefulness of the findings, depends upon the important information you provide for this study. Please complete the attached questionnaire and return it to Unison Consulting, Inc., by August 17, 2012.

I assure you that your information will be treated with strict confidentiality. Your data will be combined with data from other respondents, and reported only in an aggregate format within the study.

If you have any questions about the questionnaire or the use of the data, please call Corey Campbell at Unison Consulting, Inc. at (312) 988-3376.

Thank you for your cooperation. I may also be reached at sdkopinski@flystl.com.

Sincerely,


Susan Kopinski
Airport Deputy Director
Finance and Administration

Enclosure



**LAMBERT-ST. LOUIS
INTERNATIONAL AIRPORT®**

**Rhonda Hamm-Niebruegge
Director**

Economic Impact Study - Tenant Survey



Francis G. Slay
Mayor
City of St. Louis

Please complete the following:

Name of Business/Organization: _____
Type of Business: _____
Contact Person: _____
Telephone: _____
E-mail Address: _____

Please complete the following regarding your operations at the Airport in calendar year 2011:

Average number of full-time employees	
Average number of part-time employees	
Annual payroll costs	\$
Annual gross revenues from STL operations	\$

The average number of employees during the year is calculated as the sum of the number of employees as of January 1, 2011 and the number of employees as of December 31, 2011, divided by 2. Please include all employees based on-airport and off-airport whose jobs are necessary for your operations at the Airport. **If the number of employees and payroll costs entered above serve clients other than the airport, please indicate the percentage of total employee time devoted to airport operations only: ____%.**

Return no later than August 17, 2012 to either:

By fax at (312) 988-3371
Attention: Korey Campbell
Unison Consulting, Inc.

By e-mail at:
koreycampbell@unison-ucg.com

Thank you for your participation in this survey. If you have any questions, please contact Korey Campbell at (312) 988-3376 or at koreycampbell@unison-ucg.com.

8-10-12 (Rev Version)

P.O. Box 10212 | St. Louis, MO 63145-0212 U.S.A. | City of St. Louis Airport Authority | Main Phone 314-426-8000 | Fax: 314-426-5733





LAMBERT-ST. LOUIS
INTERNATIONAL AIRPORT®

Rhonda Hamm-Niebruegge
Director



City of St. Louis
Missouri

Economic Impact Study - Tenant Survey

Please complete the following:

Name of Business/Organization: _____
Type of Business: _____
Contact Person: _____
Telephone: _____
E-mail Address: _____

Please complete the following regarding your operations at the Airport in calendar year 2011:

Average number of full-time employees	
Average number of part-time employees	
Annual payroll costs	\$
Annual operating budget for STL operations	\$

The average number of employees during the year is calculated as the sum of the number of employees as of January 1, 2011 and the number of employees as of December 31, 2011, divided by 2. Please include all employees based on-airport and off-airport whose jobs are necessary for your operations at the Airport. **If the number of employees and payroll costs entered above serve clients other than the airport, please indicate the percentage of total employee time devoted to airport operations only: ____%.**

Return no later than August 17, 2012 to either:

By fax at (312) 988-3371
Attention: Korey Campbell
Unison Consulting, Inc.

By e-mail at:
korevcampbell@unison-ucg.com

Thank you for your participation in this survey. If you have any questions, please contact Korey Campbell at (312) 988-3376 or at korevcampbell@unison-ucg.com.

8-10-12 (Non-Rev Version)

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