Air Transportation Economic Values for the Remaining Iowa Counties

Effects Summary by Kind and Category	Direct	Indirect	Induced	Total	Type II Multiplier
Industrial Output	109,610,120	32,262,226	34,130,439	176,002,785	1.61
Total Personal Income	37,339,980	10,354,215	11,846,957	59,541,152	1.59
Value Added	52,686,216	16,477,475	19,662,536	88,826,229	1.69
Jobs	1,274.0	412.5	563.7	2,250.2	1.77

Effects Summary by Category and Industry	Industrial Output	Total Personal Income	Value Added	Jobs
Agriculture	632,584	141,521	255,177	6.0
Mining	84,876	26,900	53,561	0.8
Construction	1,296,690	472,175	507,137	15.1
Manufacturing	10,281,004	1,944,285	2,897,434	48.3
Trans., Commun., & Public Util.	14,809,854	4,093,265	7,761,928	113.7
Air Transportation	110,359,296	37,595,196	53,046,324	1,282.7
Trade	10,188,338	4,353,799	7,068,453	254.3
Finance, Ins., & Real Estate	8,506,500	1,550,386	6,305,118	61.1
Services	18,668,360	8,443,736	9,886,213	437.5
Government	1,147,564	909,008	1,017,212	29.4
Other	27,720	10,882	27,673	1.5
Total	176,002,785	59,541,152	88,826,229	2,250.2

The remaining Iowa counties for which we could discern air transportation industry data produced an estimated $109.6 million in direct industrial output in 1999. This required $32.3 million in purchases from local suppliers (indirect industrial output). The air transportation industry in the remainder of the state paid $37.4 million in personal incomes, generated $52.7 million in direct value added, and accounted for 1,274 jobs. When these direct values and the demands for indirect goods and services worked their way through the remaining county economies, they supported $176.0 million in total industrial output, $59.5 million in total personal income, $88.8 million in value added, and 2,250 jobs. The Type II multipliers indicate how much the total economy is dependent on each unit of direct value. The industrial output multiplier of 1.61 means that for every dollar of direct output in the air transportation industry, $.61 of output is sustained in the remainder of the economy. The personal income multiplier of 1.59 means that for every $1.00 in personal income paid in the industry, $.59 in personal income is generated in the rest of the economy. The jobs multiplier of 1.7 means that for every job in air transportation industries in the county, 77/100^{ths} of a job is sustained in the rest of the economy.

Average earnings per job in the air transportation sector in these counties were $29,310. In the indirect sector, earnings averaged $25,101 and induced earnings averaged $21,020. Economic values by industry indicated that the service sector and the retail sector receive most of the income and job indirect and induced effects. In the service sector, 438 jobs were attributable to the air transportation industry, and 254 jobs in retail trade. The remaining estimated meaningful job effects are found in finance, insurance and real estate, 61 jobs; transportation, communications, and public utilities, 114 jobs; manufacturing, 48 jobs; government, 29.4 jobs; and construction, 15.1 jobs. The economic effects are allocated among the counties in the accompanying table in proportion to their direct values as determined in the I-O model.

Air Transportation Direct and Total Economic Effects for the Top 10 Level II and III Counties (Excluding Level I Counties)

	Direct Economic Effects				Total Economic Effects			
COUNTY	Industrial Output	Total Personal Income	Value Added	Jobs	Industrial Output	Total Personal Income	Value Added	Jobs
Scott	37,465,768	11,655,074	16,445,504	488	60,159,404	18,584,813	27,726,266	863
Story	16,601,593	5,913,292	8,343,495	181	26,657,452	9,429,149	14,066,700	320
Johnson	11,136,677	4,043,757	5,705,608	119	17,882,347	6,448,048	9,619,360	210
Mahaska	6,216,417	2,285,625	3,224,935	65	9,981,804	3,644,586	5,437,073	114
Union	4,260,254	1,679,943	2,370,305	39	6,840,760	2,678,784	3,996,211	69
Emmet	3,594,514	1,085,355	1,531,466	48	5,771,770	1,730,673	2,581,972	85
Guthrie	2,939,779	1,274,368	1,798,032	22	4,720,452	2,032,067	3,031,389	39
Marshall	2,656,240	1,095,123	1,545,146	22	4,265,169	1,746,249	2,605,036	39
Montgomery	2,185,048	899,650	1,269,346	18	3,508,567	1,434,553	2,140,052	32
Pottawattamie	2,076,670	683,758	964,780	25	3,334,543	1,090,299	1,626,570	44
All Other Level II & III Counties	20,477,161	6,724,034	9,487,600	247	32,880,517	10,721,932	15,995,601	437
Total Level II & III Counties	109,610,120	37,339,980	52,686,216	1,274	176,002,785	59,541,152	88,826,229	2,250

Among the remaining counties, Scott County has the largest air transportation sector. In 1999, its direct industrial output was $37.5 million. These air transportation sales exceed those in seven of the Level I counties. Only Polk, Linn, and Woodbury Counties posted greater air transportation sales than Scott County. At distant seconds and thirds among the Level II and III counties were Story County, $16.6 million in direct output, and Johnson County, $11.36 million. These top three counties account for 60 percent of the air transportation industrial output in the remaining Iowa counties. The top ten counties, which are listed in the table above, account for 81 percent of air transportation economic output among the Level II and III counties.

Readers are reminded that the multipliers in the summary table for all other counties have been applied to the direct values for these counties to obtain the total economic effects by county. These multipliers are, essentially, weighted averages considering counties that range in size from Iowa's smallest to two metropolitan areas. These multipliers are biased, therefore, towards the larger counties (Johnson, Story, and Scott) as these counties account for a very large fraction of the remaining air transportation economic values and they generally have more developed regional economies. As a result, the economic effects of air transportation for the smaller counties may have slightly smaller multipliers.

State of Iowa Air Transportation Economic Values

Effects Summary by Kind and Category	Direct	Indirect	Induced	Total	Type II Multiplier
Industrial Output	528,230,608	133,202,568	172,660,726	834,093,899	1.58
Total Personal Income	188,369,729	43,235,434	64,568,150	296,173,314	1.57
Value Added	265,784,533	71,738,409	104,389,974	441,912,924	1.66
Jobs	5,753.3	1,500.1	2,611.9	9,865.2	1.71

Effects Summary by Category and Industry	Industrial Output	Total Personal Income	Value Added	Jobs
Agriculture	1,625,807	420,882	744,195	18.7
Mining	224,065	75,962	145,072	1.8
Construction	5,650,369	2,158,851	2,318,548	63.1
Manufacturing	41,081,196	8,413,792	12,495,888	194.9
TCPU	67,463,996	18,423,227	37,494,869	469.9
Air Transportation	532,141,892	189,765,597	267,754,072	5,795.8
Trade	55,314,753	23,622,688	38,576,853	1,190.1
FIRE	48,103,254	11,815,390	34,669,654	359.3
Services	78,215,622	38,122,912	43,782,011	1,670.1
Government	4,100,523	3,295,222	3,759,106	94.8
Other	172,421	58,791	172,655	6.6
Total	834,093,899	296,173,314	441,912,924	9,865.2

The state of Iowa produced an estimated $528.2 million in industrial output in its air transportation industries in 1999. This required $133.2 million in purchases from state suppliers (indirect industrial output). The air transportation industry paid $188.4 million in personal incomes, generated $265.8 million in direct value added, and accounted for 5,753 jobs. When these direct values and the demands for indirect goods and services worked their way through the entire state economy, they supported $834.1 million in total industrial output, $296.2 million in total personal income, $441.9 million in value added, and 9,865 jobs. The Type II multipliers indicate how much the state economy is dependent on each unit of direct value. The industrial output multiplier of 1.58 means that for every dollar of direct output in the air transportation industry, $.58 of output is sustained in the remainder of the state economy. The personal income multiplier of 1.57 means that for every $1.00 in personal income paid in the industry, $.57 in personal income is generated in the rest of the economy. The jobs multiplier of 1.71 means that for every job in air transportation industries in the county, 71/100^{ths} of a job is sustained in the rest of the economy.

Average earnings per job in the air transportation sector were $32,725. In the indirect sector, earnings averaged $28,825 and induced earnings averaged $24,720. Economic values by industry indicated that the service sector and the retail sector receive most of the income and job indirect and induced effects. In the service sector, 1,670 jobs were attributable to the air transportation industry, and 1,190 jobs in retail trade. The remaining estimated meaningful job effects are found in finance, insurance and real estate, 359 jobs, transportation, communications, and public utilities, 470 jobs, manufacturing, 195 jobs, government, 95 jobs, and construction, 63 jobs.

Iowa Industrial Dependence on Air Transportation

The previous discussion focused on the overall economic effects of the air transportation industry in Iowa. We can look at the preceding table and isolate which industries are indirectly stimulated by air transportation transactions in the state. The following table, however, isolates the extent to which industries in Iowa purchase air transportation services as industrial inputs (or a tangible cost of production).

Industrial Air Transportation Demands in Iowa

	Air Transportation Industrial Inputs	Percent of Industrial
Agriculture	6,004,468	5.7%
Mining	69,892	0.1%
Construction	4,446,093	4.2%
Manufacturing	50,623,132	48.1%
TCPU	5,322,132	5.1%
Air Transportation	3,470,464	3.3%
Trade	10,089,710	9.6%
FIRE	4,405,192	4.2%
Services	16,654,670	15.8%
Government Enterprises	4,085,621	3.9%
Total Industrial	$ 105,171,374	100.0%

Manufacturing industries purchased 48 percent of industrial air transportation service inputs in Iowa, an estimated $50.6 million. Service industries purchased nearly 16 percent, at $16.7 million, and wholesale and retail trade purchased nearly 10 percent, at $10.1 million. These values represent actual purchases of passenger, freight, or other air transportation services by industries. They do not represent the margined value of air transportation (and delivery) services associated with the purchase of and the price paid for, for example, supplies or other industrial production goods. The remaining purchases for air transportation services are direct household spending for air transportation ($65.99 million) spending by federal, local, and state government general operations ($12.3 million) , direct purchases by nonresidents or outside industries ($147.5 million), and the margined value of all industrial, household, and institutional goods and services for which the purchase price of a good or service reflects some air transportation costs that were provided in Iowa ($195.5 million).

State Revenues Attributable to Air Transportation Economic Effects

Estimates of state government general receipts are estimated in the following table. These receipts are estimated from total personal income. In 1999, we estimate that the total economic values attributable to Iowa's air transportation industries supported $20.7 million in state government tax receipts. The personal income tax accounted for $10.35 million, 50 percent, sales taxes amounted to $6.03 million, 29 percent, corporation income taxes were $1.4 million, 7 percent, use taxes were just over $1.01 million, 5 percent, and all other taxes were $1.84 million, or just under 9 percent.

Total Iowa State Government General Tax Revenues Attributable to Air Transportation Economic Effects

		Amount	Percent of Total
Personal Income	$	10,346,30	50.1
Sales		6,029,59	29.2
Use		1,012,90	4.9
Corporation Income		1,424,77	6.9
All Other		1,844,14	8.9
Total Income, Sales, Use, & Other Taxes	$	20,657,72	100.0

Conclusions

Iowa's air transportation industries stimulated $834.1 million in total industrial output in the state and just a shade under 10,000 jobs in 1999. The ten counties housing the state's ten commercial, Level I, airports account for 79 percent of total estimated economic activity associated with Iowa air transportation industries. Polk County alone accounts for 36 percent of all air transportation activity in the state.

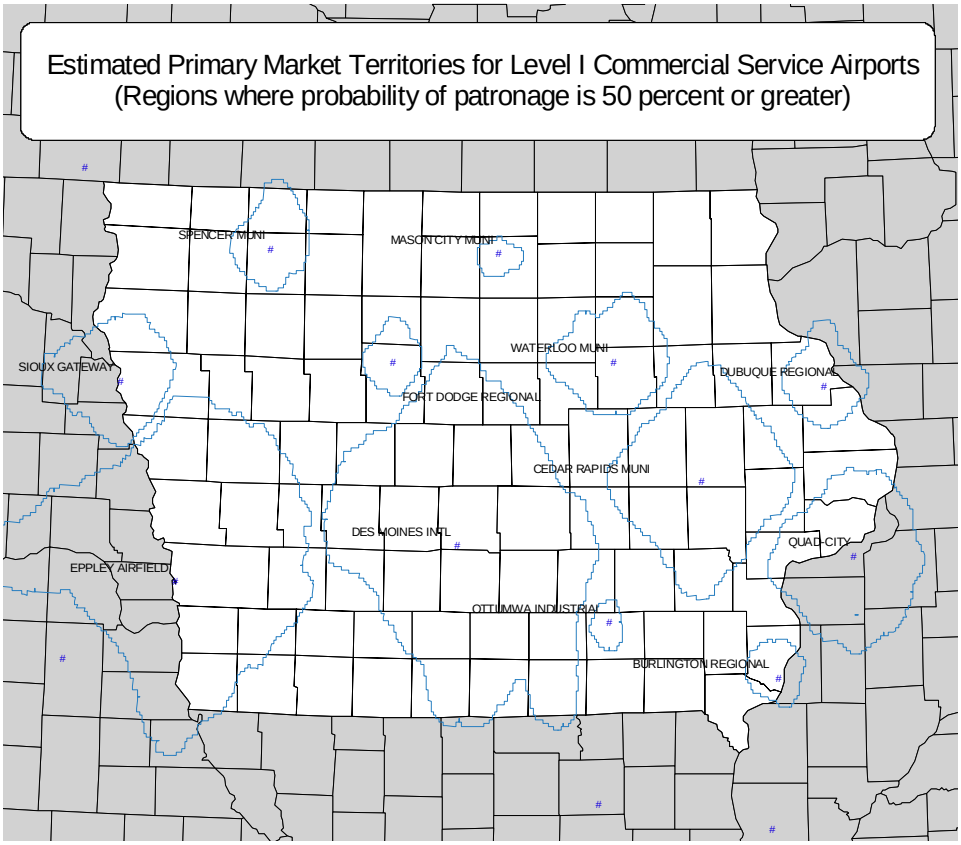
It is difficult to estimate true economic impacts for regional transportation facilities, like airports. Theories of urbanization demonstrate that larger places provide higher levels of goods and services that serve large territories. Regional air transportation capacities are, therefore, a function of the size of the host community and density of demand found in its surrounding territory. They serve a local demand and significant portions of air transportation demands by residents near the facility.

Most air transportation facilities in Iowa serve, primarily, local general aviation demand. For the commercial air transportation centers, a substantial portion of area demand comes from residents of surrounding counties. The following map displays estimated market territories for Iowa's ten Level I commercial facilities and for Omaha, Nebraska, and Moline, Illinois, two bordering airports that exert a strong influence on Iowans. The service territories are estimated using Geographic Information Service (GIS) software given aggregate demand for services at an airport (emplanements and itinerant services) and the spatial distribution of all commercial facilities in and around the state of Iowa.

The territories are estimated using a gravity model. This merely means that the likelihood of using a particular airport increases exponentially the closer the airport is to you (given the distribution of all other commercial airport choices available to you). In other words, price of airline fares notwithstanding, consumers explicitly factor in travel time and travel costs when choosing an airport.

The map delineates regions in which the probability of a resident using the central airport is expected to be 50 percent or more. Persons residing in portions of the state outside of a market territory may be equally drawn to two or more nearby airports. While it is generally conceded that regional centers like Omaha and Kansas City offer significantly lower fares than, for example, the Sioux City Gateway Airport or Des Moines International Airport, this map represents the expected service territories

given all recorded emplanements and itinerant services recorded by the FAA for this region considering the distribution of these facilities.



Appendix 1: Major Air Transportation Categories

SIC 4512 Air Transportation, Scheduled

Establishments primarily engaged in furnishing air transportation over regular routes and on regular schedules. This industry includes Alaskan carriers operating over regular or irregular routes.

- Air cargo carriers, scheduled
- Air passenger carriers, scheduled

SIC 4513 Air Courier Services

Establishments primarily engaged in furnishing air delivery of individually addressed letters, parcels, and packages (generally under 100 pounds), except by the U.S. Postal Service. While these establishments deliver letters, parcels, and packages by air, the initial pick-up and the final delivery are often made by other modes of transportation, such as by truck, bicycle, or motorcycle. Separate establishments of air courier companies engaged in providing pick-up and delivery only; "drop-off points"; or distribution centers are all classified in this industry. Establishments of the U.S. Postal Service are classified in Industry 4311; and establishments furnishing delivery of individually addressed letters, parcels, or packages (generally under 100 pounds) other than by air are classified in Industry 4215. Establishments primarily engaged in undertaking the transportation of goods from shippers to receivers for charges covering the entire transportation, but making use of other transportation establishments to effect the entire delivery, are classified in Industry 4731.

- Courier services, air
- Letter delivery, private: air
- Package delivery, private: air
- Parcel delivery, private: air

SIC 4522 Air Transportation, Nonscheduled

Establishments primarily engaged in furnishing nonscheduled air transportation. Also included in this industry are establishments primarily engaged in furnishing airplane sight-seeing services, air taxi services and helicopter passenger transportation services to, from, or between local airports, whether or not scheduled.

- Air cargo carriers, nonscheduled
- Air passenger carriers, nonscheduled
- Air taxi services
- Ambulance services, air
- Flying charter services
- Helicopter carriers

SIC 4581 Airports, Flying Fields, and Airport Terminal Services

Establishments primarily engaged in operating and maintaining airports and flying fields; in servicing, repairing (except on a factory basis), maintaining, and storing aircraft; and in furnishing coordinated handling services for airfreight or passengers at airports. This industry also includes private establishments primarily engaged in air traffic control operations. Government air traffic control operations are classified in Public Administration, Industry 9621. Aircraft modification centers and establishments primarily engaged in factory type overhaul of aircraft are classified in Manufacturing, Major Group 37, and flying fields maintained by aviation clubs are classified in Services, Industry 7997.

- Air traffic control, except government
- Aircraft cleaning and janitorial service
- Aircraft servicing and repairing, except on a factory basis
- Aircraft storage at airports
- Aircraft upholstery repair
- Airfreight handling at airports
- Airport hangar rental
- Airport leasing, if operating airport
- Airport terminal services
- Airports
- Flying fields, except those maintained by aviation clubs
- Hangar operation

Other operations that were excluded from this analysis

Commercial establishments with a physical presence at the airport are sometimes included in an analysis of airport operations versus the overall air transportation industry. Examples of these added firms or activities sometimes include

- Gift shops
- Fuel vendors
- Dining, drinking, and snack facilities
- Automobile rentals
- Parking & parking shuttles
- Advertising
- The Iowa Air National Guard
- All government air traffic control

None of these kinds of establishments, services, or activities are included in this study.

Appendix 2: Input-Output Modeling Methods and Limits to the Analysis

Economic effects studies are usually conducted with input-output (I-O) econometric models of a regional economy. I-O models are highly detailed accounts of inter-industrial transactions in a region. Any industry's output (its gross sales) requires employees, materials, capital investments, financing, maintenance, equipment, and service inputs. The probability that a firm purchases its inputs locally is estimated in the I-O model. These estimates are based on national and regional industrial surveys to identify the overall production "recipe" for the firm. Once we know the kinds of inputs that a firm requires and the availability of those inputs within the region that we are studying, we are able to identify the expected transactions that the firm has with the remainder of the economy in the area. When these industrial linkages are identified and the model is constructed, we can simulate how the region responds to or otherwise demonstrates dependence on the industry that we are studying.

There are up-front limitations to these studies that must be acknowledged. First and foremost, absent highly detailed and costly local industry surveys we normally rely on national and regional averages for determining major input categories and the likelihood of a local purchase of inputs for the industries that we are studying. The model that we employ contains detailed information for up to 537 industrial, governmental, and household sectors. This detail is regionally adjusted to reflect actual production and payroll characteristics in the county of study. The data are updated annually and rely on U.S. Bureau of Economic Analysis, County Business Patterns, and U.S. Department of Labor ES 202 data on quarterly employee withholdings to zero-in on characteristics of local production, wages, and industry types. The I-O program that we use, along with the annual data sets for the states and counties that we study, has a historically respectable research and production foundation along with an equally respectable client base nationwide[*]. Whenever possible, we modify the data in the model based on information that is provided to us by our clients or based on our own more detailed research of economic activity in a region.

[*] The system that we use for studying Iowa is called IMPLAN Pro, published by the Minnesota IMPLAN Group, Inc.

Other limits in these types of models include

- difficulties in capturing economies of scale (the current input values or production functions are, therefore, initially constant),
- an inability to identify input substitutes – especially new technologies,
- the models occasionally contain dated data on industrial performance and purchases (To this we can add an absence of detailed information on emerging industries, especially those associated with communications, software, and computer industries),
- in-state and out-of-state purchases of commodities are fixed (unless we manually adjust regional purchasing coefficients), and
- an implicit assumption that input commodity supply is infinite and perfectly elastic.

These considerations duly noted, carefully conducted I-O studies give us a good simulation of the current industrial inter-dependencies in the economy. I-O models are useful for simulating how an economy is currently performing rather than how an economy is expected to perform in the future. They help to define the relative linkages of an institution under study with the industries and households in the region at the present time. It is important to remember that these models give us localized or regionalized estimates of economic interactions, and that as the scope of analysis changes, i.e., statewide or nationwide, the kinds and extents of economic interactions change.