# APPENDIX C. ECONOMIC RELIANCE OF WEST VIRGINIA BUSINESSES ON AVIATION

## C.1 INTRODUCTION

Beyond the economic contributions of airport operations in West Virginia, both airside and landside, and of airport-enabled visitor spending, West Virginia airports play an additional economic role in supporting business operations. West Virginia airports enable businesses in the state to transport commodities and finished goods both from suppliers and to customers located in both long-distance domestic and international markets. Without support provided by air cargo services, the markets available to West Virginia companies would be curtailed due to the increased time required for transportation. Additionally, West Virginia businesses rely on aviation to connect with their customers, other parts of their corporate network, and for access to specialized talent located outside the state.

The 2020 West Virginia Aviation Economic Impact Study (WV AEIS) report evaluates these impacts through two approaches:

1. Summarizing the results of the Aviation-Reliant Business and Business Aircraft Owner Survey in which businesses reported on how they utilize airports to support their operations; and

2. A quantitative analysis of freight and economic data to estimate the off-airport impact of air cargo services.

## C.2 BUSINESS RELIANCE SURVEY FINDINGS

### C.2.1 Profile of Businesses Surveyed

From the survey conducted of airport managers, businesses that use West Virginia airports in some way were identified. These businesses were surveyed and 33 responses were received, which represent 14 different industries. Combined, these businesses have over 16,000 full-time employees, with an additional 2,500 part-time workers (see **Table 1**). The median business respondent reported 48 employees, showing that the sample skews towards smaller businesses. Nineteen of the 33 (57 percent) responses were from firms with fewer than 100 employees.

**Table 1: Business Reliance Survey Respondents by Industry**

| Industry Sector | Number of Firms | Number of Full-Time Employees | Number of Part-Time Employees |
|---|---|---|---|
| **Accommodation** | 3 | 65 | 11 |
| **Agriculture** | 1 | 13 | 0 |
| **Arts, Entertainment, and Recreation** | 1 | 400 | 250 |
| **Construction** | 2 | 100 | 3 |
| **Educational Services** | 3 | 750 | 201 |
| **Finance and Insurance** | 2 | 196 | 0 |

| Industry Sector | Number of Firms | Number of Full-Time Employees | Number of Part-Time Employees |
|---|---|---|---|
| **Health Care** | 5 | 2,512 | 725 |
| **Manufacturing** | 5 | 9,937 | 1,011 |
| **Mining, Quarrying and Oil & Gas Extraction** | 1 | 1,500 | 300 |
| **Other Services (except Public Administration)** | 1 | 30 | 0 |
| **Professional, Scientific and Technical Services** | 1 | 2 | 2 |
| **Retail Trade** | 4 | 422 | 11 |
| **Transportation & Warehousing** | 2 | 26 | 6 |
| **Utilities** | 2 | 230 | 5 |
| **Total (14 Industries)** | **33** | **16,183** | **2,525** |

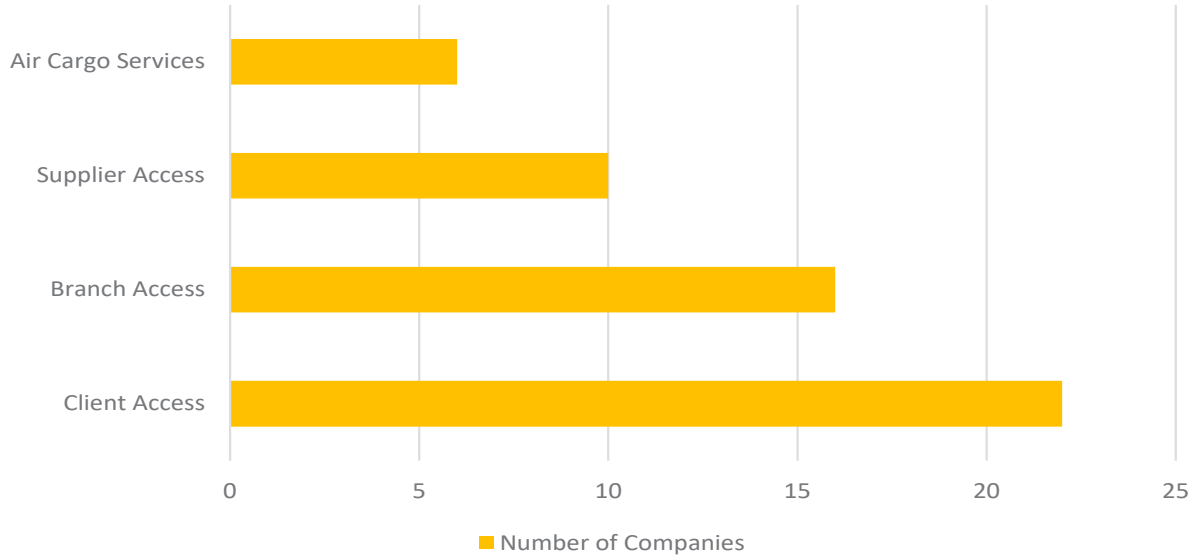
*Source: West Virginia Aviation-Reliant Business and Business Aircraft Owner Survey with calculations by EBP.*

### C.2.2 Reported Business Reliance

Each business surveyed reported the percentage of employees who interacted with the aviation system in the state of West Virginia. The average of these numbers was approximately 22 percent. Each business also estimated their proportional usage of commercial and general aviation (GA) services. Two thirds of responding companies (22 of 33) companies reported that they used GA more than commercial service for business purposes. Moreover, on average, the 33 responding companies reported that 70 percent of their interactions with local aviation services were with GA.

The most common purpose of aviation use for the companies surveyed was to reach clients (22 respondents), followed by branch access (16), then supplier access (10), and air cargo services (6), as shown in **Figure 1**.

**Figure 1: Utilization of Aviation by Reliant West Virginia Companies**




*Source: West Virginia Aviation-Reliant Business and Business Aircraft Owner Survey with calculations by EBP.*

Some businesses reported that they don't use aviation services themselves but are reliant on local airports to bring customers to them. For example, the Hampton Inn near the Wheeling Ohio County Airport (HLG) frequently lodges flight crews who operate out of that airport. Similarly, the Enterprise location near Morgantown Municipal - Walter L Bill Hart Field (MGW) supports 17 jobs due to air passengers renting vehicles when they come to town. The impacts of these visitors are calculated in other components of this study.

For other companies, aviation enables local businesses to fly in specialists from around the country to service the needs of the population of West Virginia. For example, Mountain State Oral & Facial Surgeons relies on GA airports to fly doctors from around the country to 11 in-state surgical centers. Without access to these GA facilities, they suspect that "our business would suffer and the residents of WV would have much fewer head and neck surgery options for high quality care."

The five manufacturing companies surveyed represented almost 11,000 employees. However, none of these companies reported shipping goods through West Virginia airports. A total of six out of the 33 survey respondents reported using air cargo services. These six firms represented the following industries:

- Health Care (2) – 419 employees (biomedical goods)
- Retail Trade – 24 employees (furniture)
- Mining, Quarrying, Oil and Gas Extraction – 1,800 employees (aircraft & machinery parts)
- Transportation and Warehousing – 15 employees (aircraft parts)
- Construction – 48 employees (aircraft parts)

The survey provided a snapshot of how some specific businesses utilize different components of West Virginia's aviation system. The next section focuses on utilizing freight and economic data to

get a broader view of how businesses across the state rely on air cargo services.

## C.3 AIR CARGO ECONOMIC IMPACT ANALYSIS

### C.3.1 Introduction

The air cargo economic impact analysis assesses the reliance of off-airport industries in West Virginia on cargo that is transported through West Virginia airports and calculates the economic contributions of this air cargo to off-airport businesses statewide and by region. This analysis does not include the impacts of on-airport air cargo jobs, which are covered by other components of the WV AEIS.

The analysis evaluates how air cargo services provided by West Virginia airports support local economic development through connectivity to distant markets, and is documented in the following sections:

- Data Sources
- Air Cargo Volume and Value
- Summary of the Off-Airport Economic Impact of West Virginia's Air Cargo
- Methodology for Calculating the Economic Impact of Air Cargo

### C.3.2 Data Sources

Three air cargo data sources were used to conduct the analysis of off-airport air cargo economic impacts:

- **WISERTrade** reports weights and values of each commodity shipped to or from international destinations that are collected by the U.S. Foreign Trade Division of the U.S. Census Bureau. These reports are specific to airports but are limited to international trade. Commodities are classified according to the Harmonized System.[1] The WISERTrade data provides data on international cargo handling at the Yeager Airport in Charleston (CRW) but does not include any other airports in the state of West Virginia.
- **The Freight Analysis Framework (FAF)**, produced by the Bureau of Transportation Statistics and the Federal Highway Administration, integrates data from a variety of sources to create a comprehensive picture of cargo movement between U.S. geographic zones, including major metropolitan areas and the remaining non-metropolitan areas of each state. Data for West Virginia were provided at the state level only. FAF provides data for all modes of transportation including aviation for commodities at the two-digit level of the Standard Classification of Transported Goods (SCTG) codes. The FAF is primarily based on the 2012 Commodity Flow Survey and was last updated in 2018.
- **The Air Carrier Statistics Database**, also known as T-100, refers to domestic and international airline market and segment data.[2] The data includes reports from certificated U.S. air carriers on monthly air carrier traffic information using Form T-100. These data can

*1 The Harmonized System is the predominant international commodity classification usage for international trade and is used by over 200 countries for assessing tariffs. EBP has developed a crosswalk between the two commodity codes for cohesive reporting and analysis.*

*2 Segment data counts the value for each leg of a trip, while market data only counts enplaned passengers/cargo once so long as they remain on the same aircraft. For these reasons, segment data often includes larger numbers than market data.*

be used to determine the total volume of cargo handled at specific airports. T-100 does not provide any detailed information about that cargo, such as the true origin and final destination of the goods, or commodities that are carried. Therefore, it cannot be used alone to determine how air cargo interacts with the local economy.

The T-100 data were used to determine a control or maximum total of tonnage for the domestic FAF data, and volumes of cargo were scaled down proportionately. The T-100 control total specifically excludes cargo being shipped through the FedEx hub at Huntington Tri-State/Milton J Ferguson Field (HTS), as much of this cargo does not interact with the West Virginia economy.[3] International air cargo volumes from WISERTrade were then combined with the scaled down domestic FAF data to form a comprehensive freight database for the state.

In addition to the above outlined air cargo data sources, the air cargo economic impact analysis also relies on economic data to relate the movement of goods to its role in the West Virginia economy. County-level economic business revenue data by industry sectors were assembled by IMPLAN from federal sources, primarily the U.S. Bureau of Economic Analysis (BEA). Data assembled by IMPLAN provide detail on the commodities used in the production of goods for each industry by county. These data also allow for the estimation of commodities produced by West Virginia industries and sold out of state. Freight data and economic impact models were linked to identify the portion of industry activity that is reliant on air cargo by overlaying commodity flows, economic geography, and industries' production processes, which provides an assessment of how air cargo affects the state economy outside of airports.

### C.3.3 Air Cargo Volume and Value

**Table 2** shows the total value (in 2019 dollars) and volume of air cargo (from 2018, the latest available information) moving in and out of West Virginia airports that interact with the local economy. These numbers exclude cargo that simply passes through local airports, and thus may be smaller than other tabulations of air cargo movements.

**Table 2: Air Cargo Volumes by Direction in 2018**

| Cargo Direction | Value (2019$) | Tonnage |
|---|---|---|
| **Inbound** | $38.1M | 785 |
| **Outbound** | $19.4M | 205 |

*Sources: Data from FAF, WISERTrade, scaled to match T-100 volumes, assembled and calculated by EBP.*

A very small volume of international cargo is flown directly to or from West Virginia. Of the $38 million of goods that are flown to and consumed within West Virginia, only a few thousand dollars of cargo originates internationally. More than 99.9 percent of international air cargo utilizes out of state airports in nearby cities like Washington, D.C. or Pittsburgh, Pennsylvania.

**Table 3** presents the distribution of commodities being shipped to and from West Virginia in terms of the top five inbound and outbound commodities in terms of value.

*3 To reiterate an earlier important statement, all jobs and economic activity associated with FedEx at this airport is captured through the airport's economic impact analysis.*

**Table 3: Volumes of Air Cargo used by West Virginia Industries: Top Five Domestic Air Commodities by Value of Inbound and Outbound Movements in 2018**

| Commodities Type | Tons | Value in (Millions of 2019$) | Percentage of Value |
|---|---|---|---|
| **Outbound Commodities** | | | |
| **Machinery** | 65 | 16.7 | 86.3% |
| **Transportation Equipment** | 77 | 0.8 | 4.2% |
| **Base Metals** | <1 | 0.2 | 1.0% |
| **Articles of Base Metals** | <1 | 0.1 | 0.5% |
| **Precision Instruments & Apparatus** | 4 | 0.1 | 0.5% |
| **Other** | 57 | 1.4 | 7.3% |
| **All Commodities** | **205** | **$19.4** | **100%** |
| **Inbound Commodities** | | | |
| **Motorized Vehicles** | 499 | 14.1 | 37.2% |
| **Precision Instruments & Apparatus** | 52 | 12.5 | 32.9% |
| **Pharmaceutical Products** | 23 | 5.1 | 13.6% |
| **Machinery** | 25 | 1.9 | 5.1% |
| **Electronics and Electrical Equipment** | 48 | 0.9 | 2.4% |
| **Other** | 138 | 3.3 | 8.6% |
| **All Commodities** | **785** | **$38.1** | **100%** |

*Sources: Data from FAF, WISERTrade, scaled to match T-100 volumes, assembled and calculated by EBP; Totals may not equal the sum of rows due to rounding.*

More than 90 percent of the value of outbound air cargo from West Virginia is comprised of Machinery or Transportation Equipment. No other commodities have a significant value.

Inbound air cargo is dominated by the domestic import of motorized vehicles and their parts, with almost $14 million being flown to West Virginia annually, accounting for more than one-third of the value of all inbound air cargo. Precision Instruments and Apparatus, which includes photographic and optical equipment, account for another one-third of the value of air cargo. West Virginia also receives significant amounts of pharmaceutical products via air.

### C.3.4 Off-Airport Economic Impact of West Virginia Air Cargo

The economic impact analysis revealed that air cargo services support hundreds of jobs off-airport and contribute over $70 million in business revenues statewide. **Table 4** includes the direct impact of air cargo services to off-airport activities. It also shows the two streams of multiplier effects: supplier sales and income re-spending in West Virginia. These multiplier effects

stem from both the benefit of business-to-business transactions and income earned by workers due to production and sales enabled by West Virginia airports' off-airport economic impact.

**Table 4: Statewide Air Cargo Dependency**

| Impact | Jobs | Payroll | Value Added | Business Revenues |
|---|---|---|---|---|
| **Direct** | 231 | $14,311,000 | $21,947,000 | $47,354,000 |
| **Supplier Sales** | 74 | $3,986,000 | $6,407,000 | $12,418,000 |
| **Income Re-spending** | 91 | $3,935,000 | $7,180,000 | $12,648,000 |
| **Total** | **396** | **$22,232,000** | **$35,534,000** | **$72,420,000** |

*Sources: Data from FAF, WISERTrade and IMPLAN assembled and calculated by EBP; Totals may not equal the sum of rows due to rounding.*

### C.3.5 Air Cargo Analysis Methodology

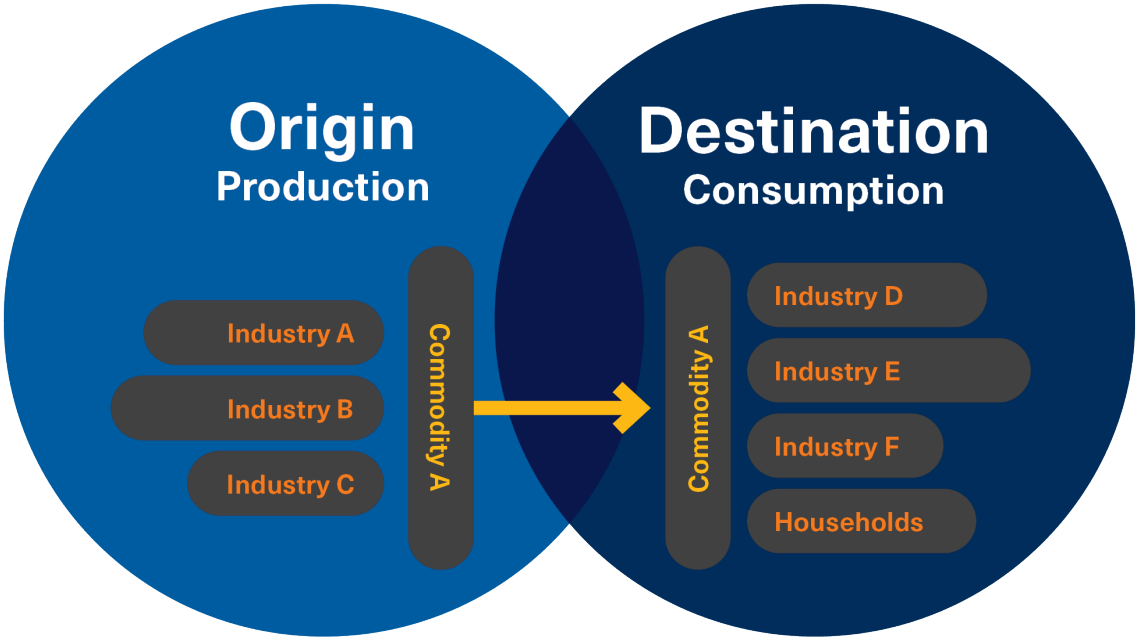
This section provides a brief overview of the methodology for calculating the off-airport economic impact of air cargo.

Commodities produced by industries are shipped to destinations, where they are consumed by industries as inputs to their production (referred to as "intermediate inputs") or as final demand by households. **Figure 2** illustrates the relationships between industries and commodities. These relationships are traced to track the importance of air cargo to West Virginia.

An example of an **intermediate input** may be a plate of steel produced in West Virginia and flown to Michigan where the steel is integrated into automotive production.

An example of a **product shipped for final demand** is a pharmaceutical product manufactured in West Virginia and flown to Florida (the product itself may be handled by wholesalers and retailers, but it is purchased directly by consumers at drug stores without further processing).

**Figure 2: Schematic Presentation of Inter-industry Commodity Flows (Cargo Flows) Between Regions**




*Source: Kimley-Horn, 2020; EBP, 2020*

This analysis considers inbound flows (air cargo deplaned or offloaded in West Virginia) and outbound flows (air cargo enplaned or loaded into planes in West Virginia) to provide a complete picture of the dependence of West Virginia's economy on air cargo. Commodities produced outside the state and flown into West Virginia may be used as intermediate inputs to industries in West Virginia or as final demand by consumer households, driving the economy. Commodities produced in West Virginia and flown out of the state represent income accumulating to the state's economy.

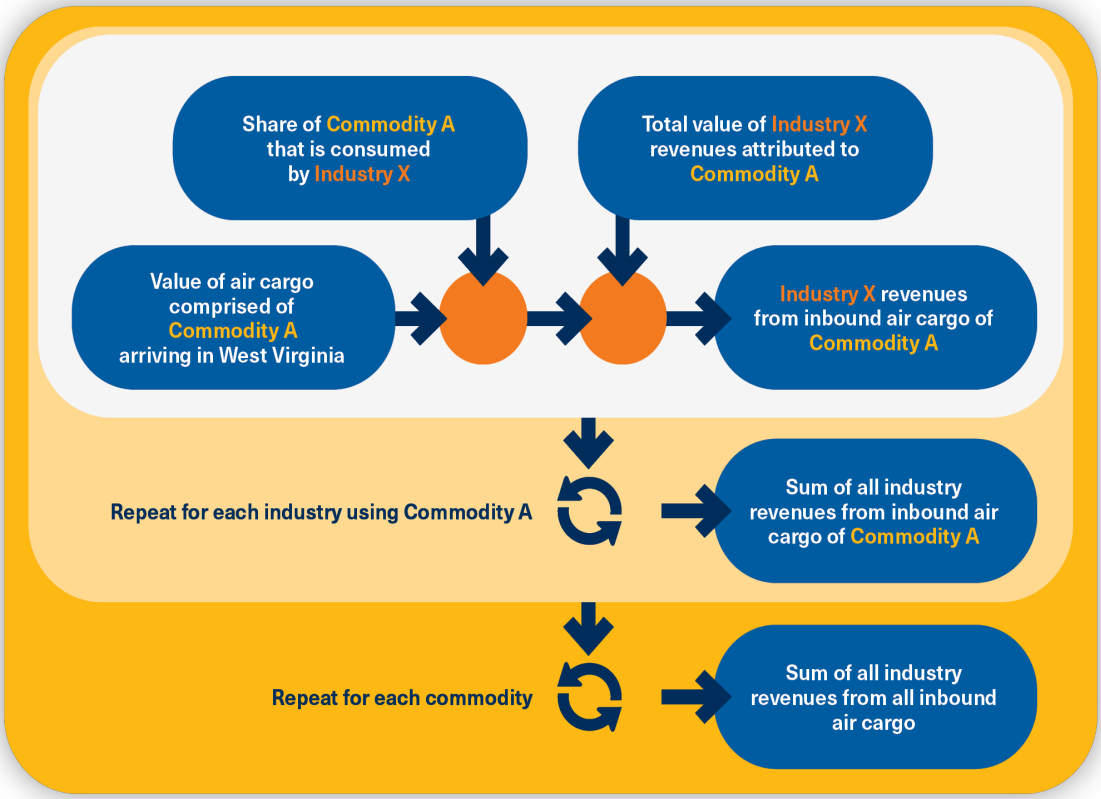
The analysis is based on economic data describing the relationship between industries and commodities (which does not consider how commodities are moved) and mode-specific trade data about the type of transport used for different commodities. A key step adjusts industry dependence on commodities by how much they rely on air travel to assess the dependence of West Virginia industries on air cargo.[4]

The analysis process is repeated for many commodities, each of which are consumed and produced by many industries. The data components of the inbound air cargo analysis and their relationship throughout the repetitions are shown in **Figure 3**. The flowchart concentrates on inbound air shipments of 'Commodity A.' In the lightest color box at the top, calculations for businesses in 'Industry X' are shown as an example. There are 14 major industry groups in which 544 industries considered by this analysis can be grouped. The flowchart shows how this analysis is repeated for each of the 13 other industry groups (in the example flowchart or 543 other

*4 Alternative freight modes to air cargo include truck, rail, or barge movements. The economy also depends on those modes. This analysis focuses only on air cargo's role.*

industries in the calculations) and their use of 'Commodity A'. The final darkest box represents repeating this analysis for each commodity type.

**Figure 3: Analysis Flow Chat for Inbound Air Shipments**




*Source: Kimley-Horn, 2020; EBP, 2020*

The impacts of outbound cargo flows are calculated using a methodology nearly identical to the process used to determine the impact of inbound air cargo (**Figure 3**). The only difference is the utilization of industry value added instead of total sales values. The inbound and outbound analyses are repeated for each commodity to represent the proportion of the West Virginia economy that is supported by air cargo services.