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Economic Interrelationships and Impacts of the Aviation/ Aerospace Industry in the State of Florida using Input-Output Analysis

Kelly Whealan George
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**ECONOMIC INTERRELATIONSHIPS AND IMPACTS OF THE
AVIATION/AEROSPACE INDUSTRY IN THE STATE OF FLORIDA USING
INPUT-OUTPUT ANALYSIS**

by

Kelly Whealan George

A Dissertation Submitted to the College of Aviation
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy in Aviation

Embry-Riddle Aeronautical University
Daytona Beach, Florida
February 2015

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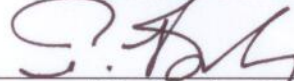
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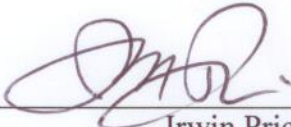
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This Dissertation was prepared under the direction of the candidate's Dissertation Committee Chair, Dr. Tim Brady, Professor, Daytona Beach Campus; and Dissertation Committee Members Dr. Irwin Price, Professor, Daytona Beach Campus; Dr. Ian McAndrew, Professor, Worldwide Campus; and Dr. Robert T. Clair, External Member, and has been approved by the Dissertation Committee. It was submitted to the College of Aviation in partial fulfillment of the requirements for the degree of
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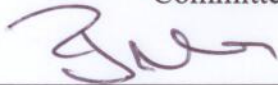
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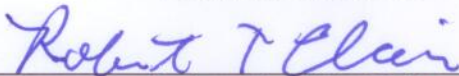
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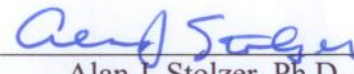
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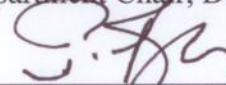
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ABSTRACT

Researcher: Kelly Whealan George

Title: ECONOMIC INTERRELATIONSHIPS AND IMPACTS OF THE AVIATION/ AEROSPACE INDUSTRY IN THE STATE OF FLORIDA USING INPUT-OUTPUT ANALYSIS

Institution: Embry-Riddle Aeronautical University

Degree: Doctor of Philosophy in Aviation

Year: 2015

The study provided a detailed description of the interrelatedness of the aviation and aerospace industry with principal industries in Florida and Volusia County (VC) using Input-Output (IO) analysis. Additionally, this research provided an economic impact analysis of the creation of a university research park in Daytona Beach (DB). The economic impact measures included not only direct economic output and industry employment descriptions but also described the multiplier effects in the form of indirect and induced impacts using data for 2012.

This research concluded the average labor income of the aviation and aerospace industry was higher than average labor income in Florida and VC. A substantive difference between the Florida and VC average labor income for the aviation and aerospace industry existed because VC's aerospace sector was only concentrated in the search, detection, and navigation instruments manufacturing sector. VC's transport by air sector was one-fifth the size of Florida's. Differences in the aviation and aerospace industry composition between Florida and VC are important because the economic impacts from a shock to the entire aviation and aerospace industry will be distributed differently.

Since the aviation and aerospace average labor income is higher than the average labor income in Florida and VC, it would be a positive move for Florida's economy to attract and grow the aviation and aerospace industry. It would be highly unlikely that the entirety of newly created jobs would be resourced from the local population.

Nonetheless, growing the aviation and aerospace industry jobs would have a positive influence on the region's economy and tax revenues. It would be a desirable course of action to spur the growth of this sector, as its direct effect would culminate with additional jobs in Florida that would bring higher wage jobs to the state.

The interdependencies of the aviation and aerospace industry in Florida and VC with other industries had a positive indirect and induced effect in the economy providing almost a two-fold indirect and induced effect. However, the benefits were not equal. Florida's average labor income of the most sensitive non-aviation and aerospace industry was 15% lower than the average Florida labor income. The average labor income in VC of the most sensitive non-aviation and aerospace industry was significantly higher than the average VC labor income. Industry interdependencies also presented risk. If the aviation and aerospace industry experiences a contraction, then through the interdependencies of the industries, the region would contract twice as much as the aviation and aerospace industry.

The overall impact of a university research park would benefit Florida's economy. Since the research park project is currently funded partially by public state money, 14 sectors of the economy experienced negative impacts. While the net result was an increase in additional labor income, the employment growth was characterized by gaining more lower-paying jobs while losing less higher-paying jobs. The most expected

outcome, an expansion of the aviation and aerospace industry, was not evidenced by the model results.

DEDICATION

I dedicate most everything I do, but more specifically, the last five years to Brent, Emmett, Kiernan, and Brennan. You are my North, South, East, and West. Whenever I am lost, all I need to do is to connect with you to navigate back to where I belong.

Thank you for your patience to see me through.

I told you I'd come back from mostly dead for you.

No more rhymes now, I mean it!

Anybody want a peanut?

I want to also include Emmett and Dorothy Whealan in my dedication. There is no way a few sentences can express the gratitude for everything you gave and continue to give to me. My task was to take what I inherited and earn it again to truly keep it. Between "beauty won't boil the pot" and "being too smart is weird", it is now mine.

ACKNOWLEDGEMENTS

I do have to thank my entire family, extended family, and circle of friends for staying with me during this five year journey. Especially, my Karma warriors as you always lifted me up when I was dragging. Drinks are on me.

I am grateful to the members of my committee. I appreciate Dr. Tim Brady for taking on my dissertation and guidance. I may make an economist out of you after all! I am especially thankful to Dr. Ian McAndrew for his humor, support, and advice that kept me focused on the end result. Dr. Irwin Price, for his technical advice and original comments that encouraged me to pursue my topic. And finally, more thanks than I can mention, long-time colleague, Dr. Robert Clair. Working with you easily shifts between productive and humorous which always makes our projects a pleasure. I'll never be able to pay your hourly rate.

Dr. Harvey Rosenblum, one of my greatest professors, sparked my interest in studying economics. There are countless faculty and staff at Embry-Riddle Aeronautical University that paved the way for this accomplishment. First and foremost, Dr. John Johnson, Dr. John Watret and Marty Smith, for providing me this opportunity. Dr. James Schultz, Dr. Tom Sieland, and Dr. Robert Materna – my work dads - have provided invaluable mentoring, many times having to muster extreme patience over the years. Dr. Mike Hickey, Rodney Cruise, and Lou Seno provided interesting perspectives and discussions during my research. Dr. Dick Roach for a great laugh when I needed a break. Kathy Markwith, Susie Bencsik, and Andrea Hooper - the women that would slice through any administrative red tape that I managed to tangle myself into. And finally, everyone else at this institution that strives to constantly improve for the benefit of the

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TABLE OF CONTENTS

	Page
Committee Signature Page	ii
Abstract	iii
Dedication	vi
Acknowledgements	vii
List of Tables	xii
List of Figures	xiv
Chapter I Introduction	1
Significance of the Study	4
Statement of the Problem	5
Purpose Statement	6
Research Questions	6
Delimitations	7
Limitations and Assumptions	9
Definition of Terms	10
List of Acronyms	12
Chapter II Review of the Relevant Literature	14
Industry Definitions	14
Industry Interrelatedness Studies	16
Input-Output Analysis	19
Economic Impact Studies	26

	Other Economic Impact Analysis Models	27
	University Research Parks	32
	ERAU’s Aerospace Technology and Research Park	35
	Summary	36
Chapter III	Methodology	38
	Research Approach	39
	Study Area	40
	Industry Composition and Interrelatedness	41
	Economic Impact	43
	Instrument Reliability	44
	Instrument Validity	45
	Assumptions of the Model and Limitations	46
	Implications for Output	47
	Summary	48
Chapter IV	Results	49
	Industry Sector Definitions	50
	Research Question One	53
	Research Question Two	57
	Research Question Three	72
	Results Summary	76
Chapter V	Discussion, Conclusions, and Recommendations	79
	Discussion	80
	Research Question One	80

Florida.....	80
Volusia County	80
Research Question Two	81
Research Question Three.....	85
Assumptions and Limitations of Results	87
Recommendations.....	88
Research Park Recommendations	90
Recommendations for Future Research	90
References.....	93
Appendices	
A North American Industry Classification Code (NAICS).....	107
B University Research Park Impact to Employment by Industry and Effect in Florida, 2012.....	176
C University Research Park Impact to Labor Income by Industry and Effect in Florida, 2012.....	180
D University Research Park Impact to Value Added by Industry and Effect in Florida, 2012.....	205

LIST OF TABLES

	Page
Table	
1 Aviation industries defined by NAICS code	15
2 Aerospace industries defined by NAICS code.....	16
3 Educational service industries defined by NAICS code.....	16
4 An example of an Input-Output matrix for a two-sector economy.....	23
5 Aviation industries defined by NAICS and Implan codes.....	52
6 Aerospace industries defined by NAICS and Implan codes.....	53
7 Composition of the aviation and aerospace industry in Florida	55
8 Composition of the aviation and aerospace industry in Volusia County, 2012 ...	56
9 Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.....	58
10 Total Impact Summary to a Change in final Demand in the Aviation and Aerospace industry in Florida, 2012.....	60
11 Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Value Added to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.....	63
12 Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Employment to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.....	63

13	Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Labor Income to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.....	64
14	Aviation and Aerospace Industry Sector’s Multipliers in Florida, 2012.....	64
15	Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012...	65
16	Total Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.....	66
17	Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Value Added to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.....	69
18	Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Employment to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.....	70
19	Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Labor Income to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.....	70
20	Aviation and Aerospace Industry Sector’s Multipliers in VC, 2012.....	71
21	Total Impact Summary in Florida, 2012.....	74
22	Tax Impacts by Category in Florida, 2012.....	76
23	Most Sensitive Non-Aviation and Aerospace Industries Ranked by Average Labor Income in FL, 2012.....	82
24	Most Sensitive Non-Aviation and Non-Aerospace Industries Ranked by Average Labor Income in VC, 2012.....	84

LIST OF FIGURES

	Page
Figure	
1 The Research Park Concept.....	34
2 Total Employment Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.....	60
3 Total Labor Income Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.....	61
4 Total Value Added Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.....	61
5 Total Intermediate Expenditures Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.....	62
6. Total Employment Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.....	67
7 Total Labor Income Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.....	67
8 Total Value Added Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.....	68
9 Total Intermediate Expenditures Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.....	68
10 Total Employment Impact Summary in Florida, 2012.....	74
11 Total Labor Income Impact Summary in Florida, 2012.....	75
12 Total Value Added Impact Summary in Florida, 2012.....	75

CHAPTER I

INTRODUCTION

The aviation and aerospace industry have always had a significant economic impact in the areas where they have been introduced. It has been argued these are both positive and negative impacts on individual standpoints (Enterprise Florida, 2013; Florida Space Day, 2013; Harrington, J., Lee, H., Tischner, C., Duch, D., March 2012; Whealan George, 2013). Any local expansion of these industries will naturally polarize views, and there are numerous examples where resistance has delayed and even stopped expansion (Arcieri, 2014; Dale, 2014; Hilkevitch, 2013). Justification for any economic influences is often one of those aspects of the industries' expansion that undergoes scrutiny at regional and national levels. Economic impact analysis can be used to mitigate this polarization if it can be demonstrated to show unbiased and real data for the economic impact. Input-Output (IO) analysis is an economic impact quantitative technique to assess how changes in a specified economy compound financially through local and regional economies (Blin & Murphy, 1973; Chiou-Shuang & Ames, 1965; Khandker, Koolwal, & Samad, 2010; Lang, 1983; Lynch, 2000). IO analysis is a widely accepted feasible method of economic impact analysis used to objectively quantify the total economic impact of an industry(s). Furthermore, IO analysis is an economic tool that can be used to review the interrelatedness with all other industries in a specified economy. This is not to say it can be a panacea for all analysis; rather, it can be applied with specific constraints to produce meaningful results that are robust.

This dissertation employed IO analysis that uses a matrix of a set of linear equations for all industries in the economy to depict intra-industry relationships within an

economy. Each row in the matrix was essentially an equation representing the output from one industry broken down into inputs to other industries' production or a final demand output value. The specified region studied was the State of Florida and Volusia County (VC) because of the geographic location of a proposed aviation and aerospace research park in Daytona Beach (DB) and its proximity to the desired expansion of the aviation and aerospace industry cluster within Florida and VC (Enterprise Florida, 2013). By reviewing a change in the final demand in specific industries related to a project, the resulting IO analysis output described the total induced changes in all the other industries from the initial economic event (Miller, R.E. & Blair, P.D., 2009). This research used the current, appropriate, and specific research and industry interrelatedness output accounts of economic activity.

The published economic contributions to the regional economy of the aviation and aerospace industry in Florida, as well as the creation of an aerospace research park in VC were incomplete and varied. Enterprise Florida (2013) stated that Florida employs over 87,000 aerospace and aviation workers across the state. Florida Space Day (2013) published that the total number of aerospace industry employees reported in Florida was in excess of 132,000 with combined total revenue of over 17 billion U.S. dollars. To foster an expansion of the aviation and aerospace industry in Florida, the Florida Legislature's approval for \$9M to build a wind tunnel at Embry-Riddle Aeronautical University (ERAU) was forecasted to spur the creation of additional engineering jobs (Embry-Riddle poised for success with research park,. 2013). The establishment of a university research park is viewed as a successful way to advance innovation and create economic growth (Battelle Technology Partnership Practice, 2013). Research parks are

emerging as strong sources of entrepreneurship, talent, and economic competitiveness for regions, states, and nations (Battelle Technology Partnership Practice, 2007). For example, ERAU partnering with an internationally renowned aircraft manufacturer is hoped to provide job opportunities and an economic boost for VC as well as the state of Florida (Embry-Riddle poised for success with research park, 2013).

There are numerous industry participants, associations, educational institutions, economic development organizations, and government entities that advocate the growth of a geographic cluster of industry dedicated to the aviation and aerospace industry within Florida and VC, *inter alia* (Association of University Research Parks, 2013b; Enterprise Florida, 2013; Florida Space Day, 2013; Harrington, J., Lee, H., Tischner, C., Duch, D., 2012; Pisano & Shih, 2009). The objective of any research park is the promise to provide the state, the park developer, and the surrounding region, with potential economic opportunities, an improved competitive climate, and growth of high-wage employment. Florida ranks in the top five states for aerospace industry employment and contributes a large amount of economic productive output to the Florida economy (Space Florida, 2014; The Commission on the Future of the U.S. Aerospace Industry, 2002). Florida also has significant aviation and aerospace infrastructure already in place as well as the related labor force and educational institutions to support this economic development effort (Enterprise Florida, 2013; Florida Space Day, 2013; Space Florida, 2014).

This dissertation provided a comprehensive description of the interrelatedness of the aviation and aerospace industry with all other industries in Florida and VC. In addition, this research offered an economic impact analysis of the creation of a university

research park in Daytona Beach (DB) that supports the expansion of an aviation and aerospace clustered industry within Florida. The measures of the economic impact included not only direct economic output and industry employment descriptions, but also described the multiplier effects from the addition of such a facility to the economy. As additional economic activity in one industry is not limited within that industry, the analysis described the additional economic activities in non-aviation and non-aerospace industry as a result of the economic impact.

Significance of the Study

Investment, whether public or private, attracts competing interests and will require anticipating what will be the economic importance of this project or activity. The results from this dissertation comprehensively described the additional production impact from the aviation and aerospace industry' importance on all the other non-aviation and non-aerospace industries within Florida and VC with respect to production and employment. The results also highlighted any economic impacts, positive or negative, from the creation of a university research park in DB. This analysis was structured to yield information about direct, indirect, and induced effects in the form of employment figures, labor income, and total economic output for specific industries in the region. Results can be used for economic comparisons, planning, resource allocation, and identification of industry clusters.

Statement of the Problem

A typical objective of regional economic policy is to diversify the economy and promote growth of beneficial industries, inter alia (Nobel Media, 2013). Potential economic policy options are often constrained by budgets requiring resources to be allocated in order to maximize their impact with respect to the desired economic result (Los, 2011). For example, the FAA evaluated and decided its investment in NextGen capabilities will result in increased air space capacity, safety enhancements, and lower fuel costs that will translate into better economic results and growth in the U.S. aviation industry. The promotion of the aerospace and aviation industries in Florida and VC have not been addressed in detail using current industry output data. The present situation has arisen from a desired expansion of the aviation and aerospace industry cluster within Florida and VC by industry and other related organizations. In addition, an economic impact analysis regarding the proposed creation of a university research park in DB has not been undertaken. Many of the existing studies are only partial analysis, do not include the multiplier affects, or are using data models that do not reflect the current economic relationships between industries (Association of University Research Parks, 2013b; Battelle Technology Partnership Practice, 2007; Embry-Riddle Aeronautical University, 2013b; Florida Space Day, 2013; Harrington, J., Lee, H., Tischner, C., Duch, D., 2012). The multiplier effects are critical as they encompass the industry interrelatedness within a specified economy. An economic analysis of Florida and VC that is based on a matrix of industry relationships identifying the aviation and aerospace industry's significance in the Florida economy was undertaken. Additionally, the

analysis can be used for decision making for future investments in regional economic growth based on a high significance of confidence.

Purpose Statement

The purpose of this quantitative descriptive study was to develop current, comprehensive estimates of the magnitude and importance of the aviation and aerospace industry to all other Florida industries. It presented a measure that can be used in policy analysis and in preparing other economic descriptive statistics. Additionally, the study provided an analysis of the impact of the creation of a university research park to the local economy. Given a principal objective to develop an aviation and aerospace industry's cluster in the state of Florida and VC, this study provided policy decision makers valid metrics as to the value of the industry and effects of changes on other industries with the region.

Research Questions

This dissertation answered descriptive research questions.

RQ 1: What is the composition of the aviation and aerospace industry in the Florida and VC economy in terms of employment and economic output?

RQ2: What are the interdependencies of the aviation and aerospace industry's economic relationships with other industries in Florida and VC?

RQ3: What would be the impacts on the regional economy of Florida and VC if a university research park was created in DB, Florida?

Delimitations

While the analysis of the results the research questions was comprehensive and can be applied to other economic events within the region, there are limitations to generalizing the specific conclusions to a region other than Florida and VC or to other industries interrelatedness measures. The relationships between the industries as represented in the IO analysis were unique to the region under study. It would be inappropriate to suggest that the interrelatedness of the aviation and aerospace industry in Florida is the same in other economic regions.

An industry's multiplier effect may be different based on its geographic region and size of region. Multiplier effects may also vary widely based on the type of industry within the region and other unique factors. If one industry procures more of its production within the region relative to another industry, that industry's multiplier will be larger than the others and will have a greater impact within the region's economy. A larger region under study will typically have fewer outflows from its economy into different regions, in part due to the larger region satisfying the additional spending from any one industry (Implan Group, 2004; Miller, 2011). Typical sources of outflows or leakages from a geographical economy are purchases from outside the region, tax payments, and the region's household savings characteristics. All these examples of leakage represent money that does not keep flowing through the region's economy and thus dampens multiplier effects (Implan Group, 2004; Miller, 2011). A clustered industry whereby businesses are in the same proximity to their suppliers, service providers, or associated institutions will have a higher multiplier effect within a region than an industry that transacts from many different regions. A good example of a

clustered industry is the computer technology industry located in Silicon Valley, California. Entrepreneurs, venture capitalists, technology service companies, engineers, and programmers are located around a geographic area and Stanford's Research Park and thus became a major industrial force in the region. Other examples of geographic clusters in the US are: the Research Triangle in North Carolina, the financial industry in Connecticut, the film industry in California, and the tourism industry in both central and south Florida (Porter, 2000). Industry clusters are not limited to the US as there are other examples such as ship building in Korea, Formula 1 in England, and the auto industry in Japan.

The IO data was specific to Florida and VC in terms of the economic interrelationships between industries that are present. Due to the unique characteristics of Florida, economic interrelationships with the aviation and aerospace industry may be different in another state or region. Items of significance to the aviation and aerospace industry in Florida and VC that are unique to the region are: their geographic proximity to other industries and related industry organizations, the Florida tax structure, the transportation infrastructure, and the concentration of industry-related laborers and academia.

Significant structural changes in the economy would decrease the validity of the estimation of the economic impacts as time progresses past the most current data represented in the IO model. The use of IO for forecasting economic behavior is dependent upon the stability of the economy reflected in the analysis. Use of IO for forecasting in a rapidly changing economic environment or over a long-term time horizon

requires additional conditions of forecasts of future technology and detailed final demand components (Dietzenbacher et al., 2013; Leontief, 1987).

Limitations and Assumptions

The estimates of this research were based on the assumption that the relationships defined in the current data are maintained or constant (Day, 2013). The research park spending estimates were derived from university projections for the research park. Changes to the types of industries in a region typically change slowly and seldom have an immediate impact. There have been exceptions; however, the structural changes expected in this research are expected to be minimal. If unanticipated changes occur, the research will need to be revised accordingly with updated data. However, the principles of this methodology were robust for expected natural variations. In order to have the maximum confidence of reflective outcomes, this research will be most representative for one year or until significant structural changes in the economy take place. Examples of significant changes that can quickly restructure part of the economy are energy price or availability shocks, environmental factors, and policy redirections.

Impact estimates based on a broader economic region are better than a narrowly-defined region because of the leaks in the system. An impact study can only track transactions as they are conducted within the region under study. If an area economically grows significantly or becomes more globalized, more leaks in the system occur as money moves out of the region under study and cannot be traced. Additionally, if an industry purchases most of its inputs from out of the region, the economic impact from an event is dampened.

Definitions of Terms

Aviation Industry	The aviation industry includes the air transportation sector providing air transportation of passengers and/or cargo using aircraft, such as airplanes and helicopters and aviation manufacturing industry comprising establishments primarily engaged in one or more of the following: (1) manufacturing or assembling complete aircraft; (2) developing and making aircraft prototypes; (3) aircraft conversion (i.e., major modifications to systems); and (4) complete aircraft overhaul and rebuilding (i.e., periodic restoration of aircraft to original design specifications) (U.S. Census Bureau, 2012).
Aerospace Industry	The aerospace industry includes guided missile and space vehicle manufacturing, guided missile and space vehicle propulsion unit and propulsion unit parts manufacturing, other guided missile and space vehicle parts and auxiliary equipment manufacturing (U.S. Census Bureau, 2012).
Input-Output Analysis	An analytical framework developed by Wassily Leontief for the study of the interdependence of industries in an economy as well as incorporating additional details of economic activity (Miller, R.E. & Blair, P.D., 2009).
Direct Effect	Direct effects are the economic activities resulting from business activity (Miller, R.E. & Blair, P.D., 2009)

Indirect Effect	Indirect effects are those caused by inter-industry changes in business (Miller, R.E. & Blair, P.D., 2009).
Induced Effect	Induced effects are those impacts created by the household sector spending of those employed by the direct and indirect altered industries (Miller, R.E. & Blair, P.D., 2009).
Intermediate Expenditures	Intermediate expenditures are the money values spent purchasing goods and services to create an industry's production (Day, 2013).
Shannon-Weaver Diversity Index	The Shannon-Weaver diversity index measures economic diversity on the basis of the number of industries in a region and the distribution of employment across the industries. Smaller values of the index suggest lower diverse economies. A value of zero indicates minimum diversity with economic activity concentrated in only one industry. A value of one indicates perfect diversity with economic activity equally and broadly distributed across all industries. The most diverse economy is one in which all industries exist and have an equal share of economic activity. If a region has 100 industries and each of those industry sectors had 10 employees, then the index would be the maximum of 1.0. (Day, 2013).

List of Acronyms

AAI	Aviation and aerospace industry
ATRP	Aerospace Technology and Research Park
AURP	Association of University Research Parks
B	Billion
BEA	Bureau of Economic Analysis
CBA	Cost Benefit Analysis
DAB	Daytona Beach International Airport
DB	Daytona Beach
ERAU	Embry-Riddle Aeronautical University
FL	Florida
GDP	Gross Domestic Product
GRP	Gross Regional Product
IO	Input-Output analysis
K	Thousand
M	Million
NAICS	National Accounting Industry Classification System
NANAI	Non-aviation and Non-aerospace Industries
OMB	Office of Management and Budget
RP	Research Park
SIC	Standard Industry Code
STEM	Science, Technology, Engineering, and Math

S-W	Shannon-Weaver Diversity Index
US	United States
VC	Volusia County

CHAPTER II

REVIEW OF THE RELEVANT LITERATURE

Critical to understanding a region's economy is the knowledge of how industries interact and thus how their economic events impact other industries. Reviewed literature includes the definition of industry sectors, alternatives to quantifying industry interrelationships and economic impacts, and university research park's impacts on a region's economy. Once a detailed description of the industry relationships is established, conducting 'what if' scenarios can estimate the effects of specific significant economic events on a specified economy. With research parks emerging as an engine for growth in a region, the creation of a research park specifically dedicated to aviation and aerospace in Florida can be viewed as an economic event. A research park is a substantial investment in which sponsors strive to bring together related private organizations, academia, and government resources to collaborate on developing and commercializing new technology (Anttiroiko, 2004; Clark, 2003a; Clark, 2003b; Leyden, Link, & Siegel, 2008). Fostering a research park not only creates new technology for the industry but it also creates additional long term economic activity in a region (App, 2006; Miller, 2011).

Industry Definitions

Productive activity, cataloged into various classes or sectors by industrial classifications, quantifies economic activity in an economy. Industry sectors are also the means or the paths through which impacts from an economic event may be traced. Industry classifications commonly divide economic activity according to similar functions. The most detailed regional IO matrix used in this research depicts economic

activity categorized into 440 industry sector codes that relate to the North American Industry Classification Strategy (NAICS) developed under guidance by the U.S. Office and Management and Budget (OMB) (Appendix A). The NAICS is the standard for use by Federal agencies in classifying business activities into industries within the U.S. economy. By organizing through the NAICS standard, economic data is uniform and can be used in economic analysis and presentation. Business activity is assigned a NAICS code based on its primary business activity. A primary business activity is determined by the relative share of production valued by either revenue or value of shipments (U.S. Census Bureau, 2012). Tables 1, 2, and 3 define the related NAICS categories for aviation, aerospace, and education industries.

Table 1. *Aviation industries defined by NAICS code* (U.S. Census Bureau, 2012).

NAICS code	Title
336411	Aircraft manufacturing
336412	Aircraft engine and engine parts manufacturing
336413	Other aircraft parts and auxiliary equipment manufacturing
481111	Scheduled passenger air transportation
481112	Scheduled freight air transportation
481211	Nonscheduled chartered passenger air transportation
481212	Nonscheduled chartered freight air transportation
481219	Other nonscheduled air transportation
324110	Petroleum refineries (aviation fuel)
488119	Other airport operations
611512	Flight training
713990	All other amusement and recreation industries
813319	Other social advocacy organizations
926120	Regulation and administration of transportation programs

Table 2. *Aerospace industries defined by NAICS code* (U.S. Census Bureau, 2012).

NAICS code	Title
336414	Guided missile and space vehicle manufacturing
336415	Guided missile and space vehicle propulsion unit and propulsion unit parts manufacturing
336419	Other guided missile and space vehicle parts and auxiliary equipment manufacturing
334511	Search, detection, navigation, guidance, aeronautical and nautical system and instrument manufacturing
334519	Other measuring and controlling device manufacturing
335991	Carbon and graphite product manufacturing

Table 3. *Educational service industries defined by NAICS code* (U.S. Census Bureau, 2012).

NAICS code	Title
611310	Colleges, Universities and Professional Schools
611512	Flight training

Industry Interrelatedness Studies

To study industry interrelatedness and get a sense of the impact or interdependence of one industry on all the others, economists turn to economic interrelatedness studies based on general equilibrium theory (Blaug, 1986). Leon Walras is considered by many as the father of general equilibrium theory (Sandmo, 2011). In *Elements of Pure Economics* (1884), Walras theorized that a system of simultaneous equations as a representation of the economy could represent all markets in the economy at equilibrium (Walras, 1877). General equilibrium systems are successful because they account for the interdependence of all economic agents in the model. Blin and Murphy (1973) categorized the IO system as a very special and rich class of general equilibrium

models (Blin & Murphy, 1973). The IO matrix of a region's economy operates as a general equilibrium model and a source for the economic interpretation of the industries' interrelatedness. The industry interrelatedness function becomes a useful measure in economic contexts and in the application of impact studies (Blin & Murphy, 1973; Chiou-Shauang & Ames, 1965).

More complex industry relationships can be modeled using econometric models. Hunt (1996) and Hunt (1997) evaluated rival regional econometric models but found there was little consistency across the results. The differences in conclusions, oftentimes in direct conflict with alternatives, typically were explained by detailed analysis of the models' underlying structures, source data sets, and treatment of data. Additionally, with the availability and consistency of data over a long time span as required in econometric models, IO analysis is an alternative option constructing a detailed snapshot of the industry linkages in a regional economy.

Harris and Cox (1988) used IO analysis at an aggregate level to study the relationship between non-traded service sector and the traded goods sectors. Momigliano and Sinniscalco (1982) used IO analysis to link employment growth and the degree of integration of service industries within the Italian economy. They detailed real effects apart from what they termed "illusion" effects that may suggest structural changes in inter-industry relationships from outsourcing of production by Italian manufacturing firms to specialized business services. Empirical analyses that deal with the interaction of strategic economic groups in using IO are few, other than those providing routine summaries of aggregate direct and indirect output or employment values (Jones, 1992).

Romanelli and Khessina (2005) define industries that are significant to the economic wealth of a region as dominant industry clusters. Porter (1998) concluded that the Italian footwear and fashion industry was a dominant industry not because of the number of producers in the region, but because of the interrelationships of the fashion producers with the other leather goods producers and with manufacturers of the required machinery and components. Romanelli and Khessina (2005) and Porter (1998) view the interrelatedness of industries through resource overlap rather than an input-output configuration. Porter (2000 and 2003), studying company strategy and competitiveness delineates industry clusters using co-location patterns in a region rather than IO analysis.

Saric (2012) notes that in the absence of data that indicates the extent to which industries are linked with each other, the construct of interrelatedness is used as a proxy to determine clusters. Interrelatedness is a complex concept reflected by multiple indicators (Saric, 2012). Rumelt (1974) and Montgomery (1982) classified firms by similarities of products, outputs, and technologies that closely resembled the Standard Industry Classification (SIC) codes. SIC codes were the predecessor of the NAISC. They were criticized because presenting interrelatedness just by grouping industry by classification has little explanatory power (Saric, 2012). Stimpert & Dunhaime (1997) and Pehrsson (2006) determined interrelatedness of industries by surveying large diversified firms to determine their perceptions of relatedness. Stimpert and Dunhaime (1997) and Pehrsson's (2006) work related industries by product market or resource market relationships, thus not fully capturing the information present in IO links.

Saric¹ (2012) points out that IO tables are commonly used as an initial step in determining clusters. Regional data can be limited. Outside the US, the use of IO tables for regional analysis is not readily available. Researchers, then, are restricted to qualitative methodologies such as survey methods or deduction of regional IO tables (Hewings & Jensen, 2000; Kratke, 2002). However, in this study, the regional data is available and valid thus allowing the use of IO analysis for full description of the interrelatedness of industries.

Input-Output Analysis

“And perhaps this art alone can show the links and chains by which one business hangs upon another and the dependence which all our dealings have upon each other” Charles Davenant 1699 (Davenant, 1699)

IO analysis, developed by Wassily Leontief in the 1930s, was a new method of analyzing the interdependence of industries within an economy. For this work, Leontief was awarded the Nobel Prize in Economic Sciences in 1973 (Miller, R.E. & Blair, P.D., 2009; Nobel Media AB, 2014). Work as early as 1759 by Quesnay described the circular flow of goods (Quesnay, 1759). Leontief’s work began in 1920 evolving from the circular flow of goods as a need to develop a quantitative method for grappling with the enormous amounts of empirical data involved in all real economic situations and general equilibrium theory (Leontief, 1966). Leontief claimed the following:

Input-Output analysis is a practical extension of the classical theory of general interdependence which views the whole economy of a region, a country, and even of the entire world as a single system and sets out to describe and to interpret its

¹ *ibid* p. 15

operation in terms of directly observable basic structural relationships (Leontief, 1987, p. 860).

Leontief's 1936 article, "Quantitative Input and Output Relations in the Economic System of the United States" and his 1937 article "Interrelation of Prices, Output, Savings and Investment" are recognized as the beginning of a major branch of quantitative economics (Aroche, 2009; Rose & Miernyk, 1989).

The inputs of one industry are sourced from the outputs of another industry enabling the IO matrix tables users to trace where each industry uses the product of another industry. The IO matrix also allows users to discover how a change in final demand in as little as one industry can impact each other industry's output. Economic interdependencies can be described through the industry product flow accounts and relationships. Furthermore, industry interrelationships can be determined by analyzing an economy's IO matrix (Leontief, 1949). In short, the IO model can be referred to as an impact model, enabling the researcher to trace specified changes in industry activities as a result of a change in final demand.

IO transactions tables are created by rows and columns of data that produce a matrix of linear equations to facilitate the recognition of the inter-industry demand relationships. Each row or equation in the matrix generally represents one industry or sector of the economy. The equation for each row describes the total value of that industry's output as the sum of all the values of that industry's output sold as final demand; the value of the industry's output used in its own production process; and the value of the industry's output that is sold as an input to other industries. The row's equation is a summation where x is the total output from industry i , z is the intermediate

output used as inputs required from industry for that industry in all other industries 1 through n, and f_i is the final demand of i 's output (see Equation 1).

$$x_i = z_{i1} + \dots + z_{in} + f_i \quad (1)$$

Final demand columns are included in the matrix that detail which sectors of final demand the industry output terminates. These final demand sectors are the major Gross Domestic Product (GDP) accounts: personal consumption, gross private domestic investment, government purchases, and net exports (exports minus imports). An example of two-industry economy is discussed and presented later using Table 4.

Within the IO matrix, the columns also represent inter-industry supply relationships. Each column of the matrix represents what inputs are required from all the other industries in the economy to produce each industry's output. The equation for each column represents the total value of an industry's required inputs as the sum of all the inputs that are needed from each industry, inputs needed from its own industry, and value added inputs to total production. The column's equation is a summation where x is the total value of inputs needed from industries 1 through n for that industry plus value-added for that industry (see Equation 2). Value added includes labor, wages and profits, depreciation of capital, and taxes (George & Taylor, 1995; Miller, R.E. & Blair, P.D., 2009).

$$x_i = z_{1i} + \dots + z_{ni} + va_i \quad (2)$$

National income and product accounting rules are internationally accepted as a measure of a nation's economic activity (Arnold, 2011). Using these national income and product accounting rules, the value of gross national income (va_i) less the final demand (f_i) is equal to the intermediate consumption or production (x_i). This relationship provides the core of the mathematical depiction of the interrelatedness of the industries in the economy. The matrix of simultaneous equations (Equation 3) represents the total accounting for production in the economy for one year (Miller, R.E. & Blair, P.D., 2009). In Equation 3, x and f represent the column vectors of industries one through i while Z reflects the matrix of intermediate outputs from industry one thru i to each industry.

$$x = Z_i + f \quad (3)$$

Table 4 is an example of an input-output matrix of a two-sector economy. The only two sectors in this economy are manufacturing and services. Each row's equation represents the total value of that industry's output as the sum of all the values of that industry's output sold as final demand, the value of the industry's output used in its own production process, and the value of the industry's output that is sold as an input to other industries. The manufacturing sector uses \$10 of its own production; it sells \$40 to the service sector; and sells \$50 as final demand for a total output of \$100. Each column's amount represents the total value of an industry's required inputs as the sum of all the inputs that are needed from each industry, inputs needed from its own industry, and value added inputs to total production. The services sector requires \$30 from the manufacturing sector and \$25 from its own sector as inputs as well as \$85 of value-added inputs to show a total outlay of \$140. Value added represents employee compensation, government services paid for by taxes, interest payments, rental payments, and profit. It

is possible to expand this economy internationally by adding a column for outputs destined for export and a row for inputs from imports (Miller, R.E. & Blair, P.D., 2009).

Table 4. *An example of an Input-Output matrix for a two-sector economy.*

Sector	Manufacturing	Services	Final Demand	Total Output
Manufacturing	10	40	50	100
Services	30	25	85	140
Value Added	60	75	135	
Total Output	100	140		240

A region's IO table can be used to assess industry production requirements inputs by simulating a change in one or more industries. Simulating such a change is typically represented as a change to final industry demand(s) and allows inspection on the expected impacts in all the other industries (George & Taylor, 1995). This manipulation is essentially solving a matrix algebraic problem of the number of industries or sectors by one vector representing the changed final demand(s) using numerical analysis software and noting the resulting vector representing the change in output for each industry. Changes in one industry affect other industries and are allowed to feed back on the original industry until the disequilibrium from the shock significantly dampens (Min Tam, 2008; Pereira & Polenske, 1996; Polenske, Robinson, K. Hong, Moore, & Stedman, 1992).

With a full IO matrix table, the Leontief inverse (L) can be constructed (Equation 4).

$$L = (I-A)^{-1} \quad (4)$$

Leontief's inverse is the most influential tool in IO analysis because it captures all the indirect effects in the region's economy. The Leontief inverse is also known as the total requirements matrix (Miller, R.E. & Blair, P.D., 2009). The total requirements matrix represents the dependence of each industry's output on the values of the economy's final demand. Matrix A is an industry by industry square matrix showing the intermediate use of goods by all industries. Using an identity matrix (I), we can determine the requirements from each industry (x) to satisfy the total outputs for each industry (y) (Equation 5). Equation 5 explicitly is displayed to capture the interdependence of the region's industries as the output of each industry sector is dependent upon each industry sector's final demand and output (Miller, R.E. & Blair, P.D., 2009).

$$x = (I-A)^{-1} y \quad (5)$$

IO analysis accommodates or accounts for three principal types of effects or impacts in the economy: direct, indirect, and induced. Direct impacts are those effects from business activity. Indirect impacts are those caused by inter-industry changes in business. Induced effects are those impacts created by the household sector spending of those employed by the direct and indirect altered industries (Miller, R.E. & Blair, P.D., 2009). Since the IO approach accounts for changes of inputs to industries based on changing outputs of industries, it is possible to achieve a more precise calculation of the impacts of a given or potential change in the economy. "Input-output analysis can be thought of as documenting and exploring the precise systems of inter-industry exchange

through which different components of regional product become different components of regional income” (Bendavid-Val, 1972, pp.87-88).

From IO analysis, a comprehensive description of the inter-industry structure of an economy with strategic industries and opportunities for income and/or employment impacts can be analyzed (Day, 2013; Implan Group, 2004; Lynch, 2000; Miller, R.E. & Blair, P.D., 2009). The Leontief inverse is the basis of the multiplier effect referred to in IO analysis. This multiplier is the source of impact analysis that is widely accepted in policy design (Baumol & Wolff, 1994).

IO analysis is accepted as a reliable method for descriptive analysis, forecasting, and assessing policy impact scenarios (Dietzenbacher & Lahr, 2008), inter alia. An IO model’s usefulness is in the ability to estimate the indirect impacts of a final demand change by detailing the interdependency of the economy’s industry. Isard, et al. (1989) maintain that because of IO’s interdependency of industry capabilities, it is an indispensable part of economic impact research. IO models produce a multiplier index that is useful in measuring the total impact of a change in final demand on inter-industry demand that can be used for forecasting, and by extended application, employment impacts (Stimson, Stough, & Roberts, 2002).

IO analysis has been used before for a wide range of economic impact studies, as well as to compile the economic impact analysis for a university research park within a region. When IO analysis is not used, survey studies, case studies, cost benefit analysis, or econometric models are employed; however, that is not a function of this research. The researchers for all seven economic impact studies published by the Association of

University Research Parks (AURP) used IO analysis as the tool for projecting the impact on the region (Association of University Research Parks, 2013b).

IO analysis is not without its weaknesses. In doing an IO analysis, the researcher must assume there are no substitutions of inputs within the production process. For example, a change in final demand that would lead to a shortage of inputs in certain sectors of the economy would most likely induce higher market prices for those inputs, and some processes might try to adopt a change in the input mix of production. IO matrices are based on transactions over the period of one year, and any irregularities or short term trends can either be exacerbated or lost in the analysis (Bendavid-Val, 1972). IO models assume a linear relationship between a change in demand and a change in inputs and outputs that minimizes the impacts of externalities and changes in returns to scale. IO does not directly capture natural resource externalities that are not traded in the markets such as pollution and, does not answer the more subjective question of whether a society has qualitatively improved, or more efficient allocation of resources (Letson, 2002).

Economic Impact Studies

“Like in an ant colony, little decisions on a micro level can have a big impact on a macro level.” (Ted Talks, 2008)

There is typically a need to evaluate the economic impact of major initiatives within an economy to facilitate decision making by policy makers and investors. Economic impact is defined as any type of event that results in an addition or loss of spending in an economy. An economic impact study seeks to describe the cumulative effects of any significant change or shock within an economy, to include direct, indirect,

and induced effects (Day, 2013). Examples of economic impacts are the opening or closing of a military base, building a sports stadium or convention facility, or recovery from natural disasters. For this research, the creation and operation of a university research park in Daytona Beach, Florida is the economic impact event to be analyzed.

Other Economic Impact Analysis Models

There are other methods of regional economic impact analysis, specifically, econometric modeling, *inter alia* (Isard, Azis, Drennan, Miller, Salzman, & Thorbecke, 1998a). Econometrics is the building of a mathematical model grounded in economic theory and statistically tested to determine if the model sufficiently describes the underlying phenomenon. Techniques such as time dependent, cross-sectional, and dummy variables can be included in an econometric model. Such models are used to test the validity of a theory, forecast values of dependent variables, or predict the results of a policy decision.

Leontief and other followers critiqued studying economic impacts alternatively by way of econometric modeling. The main critique was of contemporary economists spending more time building sophisticated statistical models on data with possible validity issues (Pressman, 1999). Econometrics modeling creates models that either abstractly or theoretically describe relationships that Leontief argued were essentially built-in rather than discovered. Econometric models used for impact or forecasting typically take three forms: autoregressive models, reduced-form models, and large scale structural models (Lang, 1983). Model builders create assumptions and then create

models that use these assumptions. The model works if the assumptions are true (Friedman, 1953; Pressman, 1999; Samuelson, 1958).

Bergmann, Kehoe, and Levine (1982) endorsed general equilibrium models over econometric models as tools for policy analysis. General equilibrium models like IO analysis do not have a time component that allows for infinite feedback loops to reach equilibrium. Econometric models often have an artificial truncation to a finite time horizon that can cause the calculated equilibrium to be rather sensitive to the truncation. They note that Samuelson (1958) even admitted that as a model's time period continues to be lengthened; it not only supplies more information but also introduces more unknowns into a model (Bergman, Jorgenson, & Zalai, 1990; Samuelson, 1958).

Lucas (1976) was a strong advocate of solving problems through the application of economic tools to real-world data. He critiqued economic modeling because many assumptions embodied within models were unrealistic; however, if the model behaved statistically well, it could have been considered a good model. The Lucas critique went even further by saying that once policy was changed, the econometric model used in forecasts was invalid (Lang, 1983; Lucas, 1976).

Friedman (1953) argued that a theory's validity should be based on its predictive accuracy rather than consideration of realistic assumptions. Focusing on the predictive validity of models negates or shadows understanding the underlying relationships in the economy when making policy and predictive statements. With IO analysis, the focus is not on the statistical predictive accuracy but the true state of the underlying industry interrelationships.

Econometric testing assumes economic relationships are stable over time and can shadow any weaknesses in the data (Chow, 1960; Pressman, 1999). Because economic relationships are dependent on individual interactions, it is unrealistic to assume the structure of their relationships does not change over time causing econometric models to weaken. Chow echoes Lucas's and Friedman's critique of econometric models. Rather than estimating values and theoretical models, Leontief believed that economists should investigate the empirical data and the relationships within them to then determine how to solve economic problems.

IO became popular after World War II as governments began to work on comprehensive economic development projects because this tool would allow a policy maker to project the consequences of changes in economic policy. Since Leontief derived IO analysis from early Soviet economic planning methods, Hungarian economists and other countries adopted this method as a Socialist tool. IO analysis quickly became a casualty of the political environment in the US (Bockman, 2011). The U.S. Bureau of Labor Statistics (BLS) constructed a 50-sector matrix of inter-industry transactions modeled on the 1947 U.S. economy and projected the U.S. economy in 1950 (Cornfield, Evans, & Hoffenberg, 1950). Some industry leaders including, General Motors Incorporated and U.S. Steel executives viewed this approach as “push button” planning that subverts private enterprise (Kye's K.O's input-output studies, 1953). By 1953, public funding to U.S. departments supporting the construction of U.S. IO tables was terminated thus ending the public research initiative (The Netherlands Economic Institute, 1953). Research on IO analysis continued through U.S. universities with foundation funds and economists from approximately 40 other countries (The

Netherlands Economic Institute, 1953). In the 1970s, the economic environment moved from government planning and directed changes toward more of a market-directed form of economic development (Pressman, 1999). Interest in IO analysis waned as economists turned more to modeling (Pressman, 1999). In addition, the government resources for the data collection piece of IO tables and the computer modeling requirements for IO analysis were tremendous. It was in the 1960s that computers were used to calculate the matrices and required much more time than using today's computing power (Lal, 2000). Furthermore, the data collected and used for policy analysis would be considerably out of date when released for publication. For example, the U.S. Bureau of Economic Analysis (BEA) updates a benchmark IO table every five years and publishes a yearly higher level aggregated IO table for use.

Despite the fact that IO analysis was downgraded by U.S. politics, it is still used overwhelmingly and internationally (Kye's K.O's input-output studies, 1953; Bockman, 2011). *Economics Systems Research* is a peer-reviewed journal of the International Input-Output Association (IIOA). Implan Incorporated, a company born from its academic roots at the United States Forest Service and University of Minnesota, compiles IO data for all states and publishes in a useful timeframe, typically between one and two years' time lag. Murray and Wood (2010) present the academic and expanding social significance of IO analysis for the most reliable analytical method for enumerating economic transactions by industry sector. IO analysis proves useful for not only economic analysis but can be applied to environmental, sustainability, and social well-being studies (Wiedmann, 2010).

Another method of studying economic impacts is to use a simple economic base model where only basic and non-basic sectors are detailed (Dinc & Haynes, 1999; Haig, 1928; Quintero, 2007). Any economic impacts can be traced through multiplier effects, commonly referred to as ripple effects, that only analyze at the basic and non-basic sector levels, and gross changes are aggregated to those levels. Inter-industry transactions and financial flows are not included. Typically, economic base analysis assumes broad multipliers are applied to the sectors and the entire economy. Despite the usefulness of the economic base models, Galambos and Schreiber (1978) recommend IO analysis to obtain a more complete, detailed picture of the economic relationships than what is available in economic base models. Here again, the assumptions of exports as a sole source of economic growth, that one industry's exports does not affect another's, and no feedback among industries within a region weaken its conclusions (Davis, 1990). Drennan (1997) published a paper that said the assumptions embodied within the economic base model "are just silly and wrong".

Cost benefit analysis (CBA) is another form of economic impact analysis sometimes used when policies are evaluated. During the first month of the Reagan administration, President Reagan issued Executive Order 12291 that called for a CBA of all proposed regulations (Cowen, 1998). CBA compares the gross benefits of a policy or change with the opportunity costs of that change. If the benefits are greater than the costs, then typically the policy is considered positive or economically viable. CBA formats vary greatly as some seek to include estimates of social benefits or costs, environmental impacts, efficiency estimates, and price impacts (Mishan & Quah, 2007). As with the value of any model, the information depends on the accuracy of the

individual costs and benefit estimates. Usually the outcome of a CBA is a generation of an individual value that is used for justification or feasibility decisions rather than a description of the impacts within the economy. IO analysis deals strictly with transactions and provides more intra-industry information for a full description of impacts from any project.

University Research Parks

The AURP defines a university research park as a property-based venue that is specifically designed for research and commercialization, to create partnerships between universities and research organizations, to encourage new corporate growth, translate technology, and drive technology-led economic development (Association of University Research Parks, 2013b; Hong, Li, & Zho, 2014). The university research park is a vehicle that brings stakeholders in innovation together, the so-called triple helix (Jongwanich, Kohpaiboon, & Yang, 2014). Typically, a research park will capitalize on a region's unique strengths and clustering of like-industry participants. AURP reports that there are over 700 research, science, and technology parks in various stages of development and operation globally, of which 170 are in North America.

Research parks constitute an important mechanism for technology transfer from a university to strategic development of a region's economy (Anttiroiko, 2004; Clark, 2003a; Clark, 2003b; Leyden et al., 2008). Research parks' economic impacts include investment spending, which is a one-time impact that multiplies through the economy and then subsides, and daily operations that continue with the park's operation. University research parks provide a best practice of focusing on innovation and thus,

regional economic growth and competitiveness. This concept is depicted in Figure 1 (Battelle Technology Partnership Practice, 2013). Pisano and Shih (2009) found that firms within an industry benefit from geographic clusters or being co-located at a research park. Cumming & Sofia (2013) identified the factors affecting the success of a research park that will foster economic growth. Further, Pisano and Shih (2009) coined the phrase “industrial commons” for the phenomenon that occurs as an established research park cycles and feeds economic growth.

Research park success breeds new investments and an influx of organizations that, in turn, spawns economic growth, and breeds additional investment. Siemiatycki (2013) presented that urban planning and policy agenda literature yielded universities’ research activities special power to spur regional economic growth. Literature has traced the rise of the entrepreneurial university where the university role expands past research and teaching to include explicit local economic development (Slaughter & Leslie, 1999; Srinivas & Viljamaa, 2006). This cycle is exactly what the IO analysis intends to describe (Adventus Research Inc., 2010; Lester, 2005). University research parks that have won the outstanding Research Science Park Award from AURP for recognition of bringing technology from the laboratory to viable businesses and promoting the growth of business, jobs, and public revenue include the University of Oklahoma Research Campus (2013), Buffalo Niagara Medical Campus (2012), Research Park at the University of Illinois at Urbana-Champaign (2011), and Virginia Tech Corporate Research Center (2010) (Association of University Research Parks, 2013a).

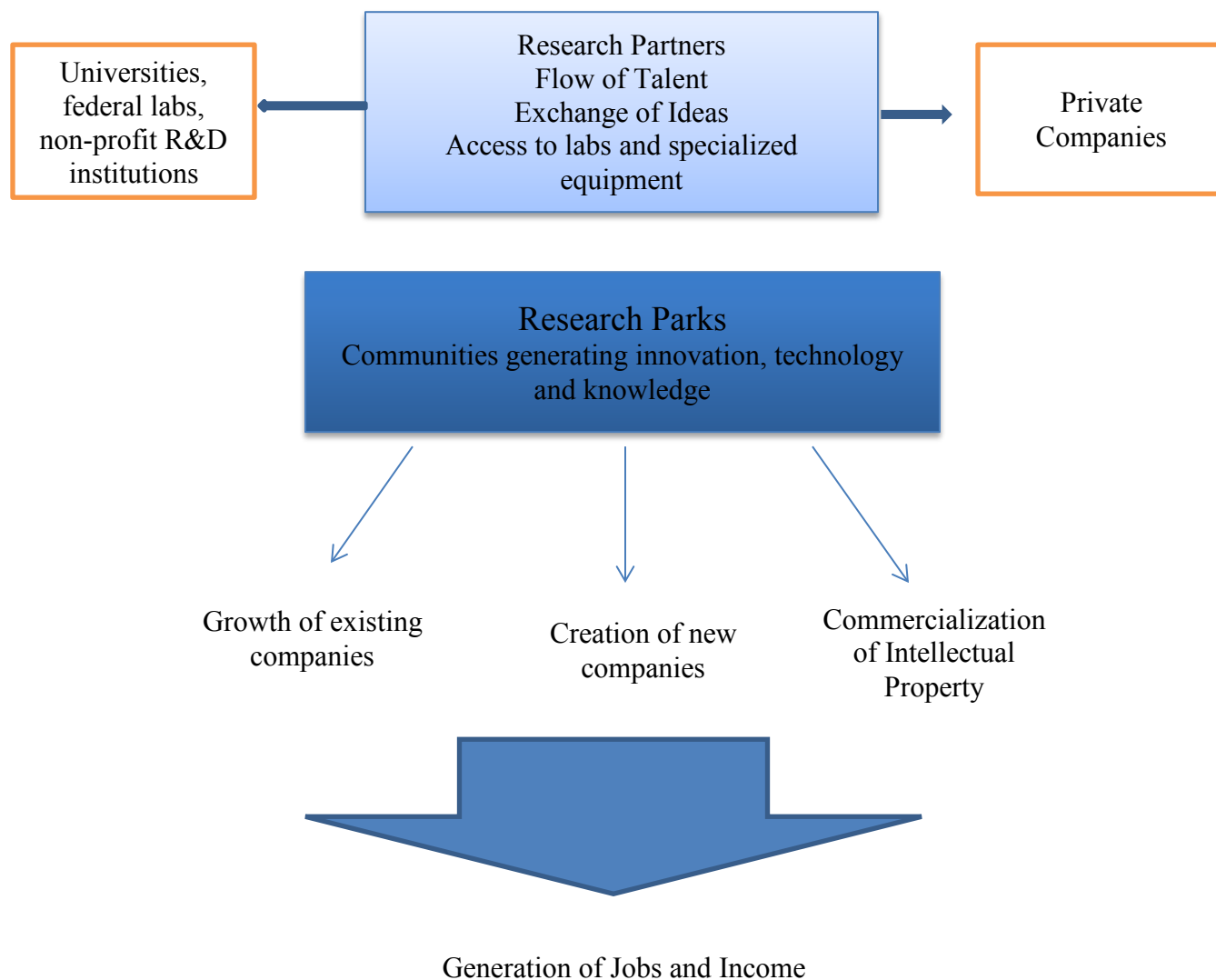


Figure 1. The Research Park Concept (Source: Battelle Report). University research parks provide a best practice of focusing on innovation and thus, regional economic growth and competitiveness.

There are some critics of the premise that university and university research parks play a strong role in regional economic growth. Mayer's (2007) study of growing high-technology regions dismissed the necessity of a university research park. Gertler (2010) concluded that universities are a supporting rather than a causal role of economic growth. Levine (2009) noted there is not enough empirical research to conclude that academic

commercialization sponsored by a university research park will grow a local economy. The establishment of a university research park does not guarantee regional economic growth. The characteristics of a university research park such as the location of highly skilled labor market, the local economic climate, and competition from other research parks have significant effect on the translation of research activity into economic growth (Link & Siegel, 2007; Link & Link, 2009; Siemiatycki, 2013).

ERAU's Aerospace Technology and Research Park

ERAU is the only accredited aviation and aerospace oriented university in the world (Embry-Riddle Aeronautical University, 2013b). A university research park can facilitate the further expansion of a clustering of industry expertise in Florida (Wolfe & Gerler, 2004). ERAU owns 140 acres adjacent to its main residential campus in DB and Daytona Beach International Airport (DAB). A plan to develop an Aerospace Technology and Research Park (ATRP) is beginning to gain momentum and is a significant initiative in ERAU's strategic plan.

In-house or one organization innovation is not enough to survive and thrive in a global competitive environment (Tapscott & Williams, 2006). Innovation and collaboration is the most important factor for long-term economic growth (Acemoglu, 2008). Collaboration for the purposes of innovations happens when organizations come together to solve problems that individually are not addressable (Venkatesh, August 27, 2010). Obtaining knowledge from outside firms is an efficient way to improve organizational innovation (Cavusgil, Calantone, & Zhao, 2003). Research parks can be a

nexus for innovation and technological transfer throughout industry needed to grow the economy.

ERAU's ATRP is representative of key characteristics of a science technology and math (STEM)-related park (Battelle Technology Partnership Practice, 2007; Embry-Riddle Aeronautical University, 2013a). It has plans to have a physical component with expansion opportunities that host labs as well as support and administrative infrastructure. Collaborative laboratories and a 10,000 square foot hanger are planned for advanced research and testing. Direct airport access is planned. Research projects that can be accommodated include experimental aerodynamics, engine tests, materials composites, flight research, air traffic management, and other core aerospace research. Organizations at the ATRP will have access to faculty who are subject matter experts as well as students to partner in research (Embry-Riddle Aeronautical University, 2013a).

Summary

Current measures of industry composition and interrelatedness are essential to describe a region's economy adequately. IO matrix tables are not only a common method of quantitatively describing the composition of a region's economic activity but one that provides rich detail. Although there are other methods of regional economic impact analysis such as econometric modeling, economic base models, or CBA, IO analysis is internationally recognized as a useful, robust methodology. Using this representation of a region's economy, researchers can conduct "what if" scenarios to estimate the effect of specific significant economic events. There has been a need to evaluate the economic impact of major initiatives within an economy to facilitate

decision making by policy makers and investors. The establishment of a university's research park is an example of a significant economic event that can be used as a catalyst for expanded economic activity in a region for the future.

CHAPTER III

METHODOLOGY

This research was encouraged from the theory from the literature introduced in chapter two and combined with the research aims of chapter one. The research included the specific focus of the general concept of economic analysis and expanded into the concepts of the application of the model. First, the composition of the economy by industry in Florida and VC was described and related to the aviation and aerospace industry, in particular, the implications, influences, and applications to the region. Subsequently, industry interrelationships with the aviation and aerospace industry with Florida and VC were explained comprehensively. A detailed description of the industry relationships was established; this research conducted a sensitivity analysis to estimate the effects of specific significant economic events, the establishment of a university research park on the specified economy. In order to conduct an economic-impact analysis for Florida and VC, IO analysis was used to examine the current structure and interactions of industries within the region to determine the full economic impact of the creation of a university research park dedicated to the aviation and aerospace industry in DB. With research parks emerging as engines for growth in a region, a research park specifically dedicated to aviation and aerospace in Florida can be viewed as a significant change in the economy and its economic impacts were evaluated (Battelle Technology Partnership Practice, 2007; Battelle Technology Partnership Practice, 2013).

Research Approach

The discussion of literature in the previous chapter suggests IO analysis was theoretically appropriate and practical to study industry interrelatedness so as to evaluate the estimate of the impact or interdependence of one industry on all the others (Miller, R.E. & Blair, P.D., 2009). As with any research technique, there were limitations and one approach does not fit all applications. Research techniques were fully reviewed and the principal aspects highlighted accordingly for the research in this work. Furthermore, IO analysis was exceptional in describing industry interrelationships instead of just categorizing industry into product or resource markets or using qualitative survey methods to deduce dependencies (Hewings & Jensen, 2000; Kratke, 2002). The IO matrix of a region's economy and the industry interrelatedness function was an accepted measure in economic contexts and the application of impact studies (Blin & Murphy, 1973; Chiou-Shuang & Ames, 1965). The power of IO analysis was in the linking of the product of one industry like agriculture to the purchases of another industry like the food or machinery industry (Oosterhaven & Hewings, 2014).

The building and operation of a research park was considered a two-step, net analysis derived from actual funding plans. One step included an exogenous variable and the second step was an endogenous variable within an economic impact study using IO analysis. An exogenous variable is one that represents an external factor affecting an economic model or system (Yap, 2004). An endogenous variable is one that represents an internal factor affecting an economic model or system. Half of the investment was treated as new capital flows into the region. The other half of the investment had to be deducted from other current economic activities because its' source was from the state

government. In an economic impact analysis, treating the investment as totally new capital that enters the economic system could overestimate any resulting economic impacts. With half of the investment for a research park coming from the state government, there would be economic trade-offs. For example, if the project was funded by local government, then the funding likely came from a combination of reduced funding to other projects and/or an increase in the local tax burden. These offsetting negative impacts on other areas of the state economy would better reflect the overall benefit of the project in VC. If the funding for such a project was to come solely from national sources, the economic impact estimations would be more positive. However, regardless of the source of funding, impacts on other industries, either positive or negative, was preserved.

Study Area

The study area chosen for this research was county and state level; more specifically, VC and Florida. Choosing VC instead of a narrower region like DB or a zip code was more appropriate because VC was considered the functional economy of ERAU. ERAU is the university devoted to the education of professionals for the aviation and aerospace industry. ERAU estimates that 87% of its workforce at all DB locations lives within VC (B. Young, personal communication, February 24, 2014). The functional economy was defined as the area where people in the industries and the economic event resided (Fox & Kumar, 2005; Implan Group, 2004). To conduct an IO analysis, it was important to choose the area of analysis where the work force lives. IO analysis was used to track economic transactions within the study area. If a worker lived outside the

functional economy or study area, those transactions were not included in the analysis and may have caused the impacts to be underestimated. Choosing the correct study area enabled the model to capture the true effects of the economic impact and interrelatedness of the industry. One of the key characteristics of university research parks was that they incorporate the facilities, faculty, industry, and students already regionally in place and accessible (Battelle Technology Partnership Practice, 2007).

Industry Composition and Interrelatedness

This research used archival data to describe the current industry composition and interrelatedness in Florida and VC. The most current economic archival data typically had a time lag in availability from the calendar year. The archival data used for this research was the most up to date and complete data set available and was the gold standard for IO analysis (Sargento, 2009). Economic output and employment was presented broken down by industry sectors based on the BEA 2012 benchmark industry sectors. Data for the basis of this study was the data files provided by Implan, Inc. These data files contained a full IO matrix table for states and counties for the year 2012. At the level of a regional economy, many data sets were time delayed due to collection and verification activities by the BEA. The IO matrix provided the framework for the economic relationships within the region where changes in economic activity for the impact analysis were traced and measured. This IO matrix was considered as a record in time of the economic relationships in Florida and VC.

For Florida and VC, economic output as defined by Gross Regional Product (GRP) and labor income for each industry sector was presented. Employment values for

each industry sector were obtained for use in the economic impact analysis. Since it was actual raw data and defines actual economic relationships that were of interest in this research no transformation of the data was necessary or appropriate (Implan Group, 2004). Descriptive measures for each industry's GRP, employment, and labor income were calculated as a real value and a percentage of total value in an effort to fully describe the economic make-up of Florida and VC. By representing each industry as a percentage of the total, the most important industries to Florida and VC economies was easily identifiable. Statistical descriptors of the data such as measures of central tendencies indicated how the industries within the region's economy are concentrated. If the data was symmetrical, the standard deviation of these measures informed the region's distribution of industries in the economy, or a proxy for the how the economy is diversified.

Industry interrelatedness was represented by the multiplier effect factor calculated using the Leontief inverse. Leontief's output multipliers measured the combined effects of direct and indirect repercussions of a change in final demand (Miller, R.E. & Blair, P.D., 2009) *inter alia*. Essentially, multipliers were used to measure the total change in the entire economy from a unit change in one sector. This multiplier is the basis of impact analysis that was widely accepted in policy design (Baumol & Wolff, 1994). This multiplier was based upon a theoretical impact within the aviation and aerospace industry. The output multiplier, defined as M , for a particular industry was calculated as the total change in output from all sectors divided by the theoretical impact from the original industry (Equation 6). The output and changes in industry final demand was represented in U.S. dollars.

$$M = (\sum \Delta \text{ output each sector}) / \Delta \text{ industry final demand} \quad (6)$$

Examining the size of the changes within each industry as a result of the change in a different industry determined which industries are most sensitive to changes within a different industry. A 10% exogenous shock was used as the proxy for the change in final demand in the aviation and aerospace industry. The results were scalable, and a 10% shock was enough to illuminate the results based on the economic relationships presented (George & Taylor, 1995). After a change in industry final demand vector was calculated, statistical descriptors of the change in final demand such as measures of central tendencies indicated which industries were most sensitive or reactive to changes in the aviation and aerospace industry.

Economic Impact

An impact simulation supported by actual empirical data to model the effects of creating a university research park in DB was the second part of this research. This simulation was used to understand the economic system reaction as a whole.

Data for the economic impact in the IO analysis was represented by a change in final demand vector. This change in final demand vector essentially represented the initial shock or change in an economy that would ripple through the economy. The total change in spending was divided down into a single vector which distributed the spending into each industry sector and reflected in the change in the final demand of both Florida and VC. The spending estimates were derived from university projections for the research park.

Mathematically, the resulting change vector (X) from the simulation of an impact was calculated with Equation 6.

$$X = (I-A)^{-1} Y \quad (6)$$

X = change of industry output required from a change in final demand

I = identity matrix

A = direct requirements matrix

Y = change in final demand vector

The total requirements matrix created a series of equations that detail the dependence of each of the gross industry outputs to the values in each of the industry final demands. Y was the change vector that indicates the additional growth in the industry sectors. Required change in output as a result of the new investment in a university research park was isolated by comparing the output prior to change to the output after the simulation of the university research park investment.

Statistical descriptors of the change in output variable such as the mean and median measures of central tendencies indicated how sensitive some industries are to the creation of a university research park. If the data was symmetrical, the standard deviation of these measures also described the breadth of the region's industries that experienced an impact.

Instrument reliability

Detailed economic data tables compiled by official statistical agencies provided an ideal basis for an IO model analysis. The model depended on how well the data is collected and how well it reflects the real-world economy. IO analysis was considered

accurate but not precise because of the possibility of data irregularities. Data files were exclusively created and provided by Implan, Inc. Implan constructed its database using data from a large variety of the same sources used by the BEA. Implan converted the data to a consistent format and estimated any missing pieces while controlling against other data sources to maintain accuracy. Implan reviewed any data irregularities and rebalanced the IO matrices to assure the matrix sums to the row and column vectors. Rebalancing was done by calculating the difference between the old and new row and column differences iteratively until the difference drops to zero (Implan, 2014).

Jensen (1980) validated that the use of IO analysis and the employment of the Implan model and data was holistically accurate. Holistic accuracy meant the main description and features of the economy are accurately portrayed while acknowledging each cell of the table need not be precise. When Jensen (1980) compared the output of Implan's data to other models on a specific industry in his region of study, multipliers varied by at most 5%. Jensen (1980) therefore concluded that the IO model was holistically accurate.

Instrument validity

Data for the IO model was collected by Implan from a variety of reliable sources. In construction of the IO tables, Implan received data in published series, sets of relationships, and estimates and converted it all to a consistent usable format while maintaining accuracy. Data used in the construction of the IO tables from Implan included the BEA's benchmark tables, annual industry accounts, annual survey of manufacturers, and annual survey of governments. Data was also compiled from the

Bureau of Labor Statistics (BLS) employment and wages data; the Census Bureau's county business patterns data and annual census of retail trade; and the Department of Commerce import and export trade. For validation, the data was processed through a program that calculated ratios on every value in the database. Any outliers were examined and either documented or fixed if a program or data bug was the cause (Implan Group, 2004). Data received from various government data publishing agencies were considered accurate and were exposed to numerous validity tests and checks before they were published (Bureau of Economic Analysis, 2011; United States Department of the Labor, 2011; U.S. Department of Commerce, 2011; U.S. Department of Transportation, 2011).

Assumptions of the Model and Limitations

While IO analysis was a means of examining economic relationships within an economy, there were underlying model assumptions that should be incorporated into any discussion or implications of the results. IO analysis has been designed to assume constant returns to scale or where the same amount of inputs are required to produce each unit of output without any attention to the level of production. However, depending on the industry's level of production with respect to capacity, this may not be reality, and multiplier affects can be over- or underestimated. For instance, if economies of scale develop within an industry, that industry's multiplier would be exaggerated in the IO analysis. Additionally, inputs were not assumed to vary in the production of product. Any type of substitution or technological alteration of the production process would require an updating of the data to accurately reflect the underlying economic structure of

the economy. The assumption built into IO analysis was there were no supply restrictions or constraints to raw materials or labor that were inputs to industry production, theoretically allowing unlimited product. All assumptions and any effects on the interpretation of the results were addressed in the discussion chapter.

Implications for Output

The estimates of this research were based on the assumption that the relationships defined in the current data were maintained or constant (Day, 2013). Changes to the types of industries in a region typically changed slowly. If there are any major structural changes in the regional economy, the estimates will not be representative as the underlying relationship will be holistically inaccurate. If unanticipated changes occur, the research would need to be revised accordingly with updated data. However, the principles of this methodology were robust for expected natural variations. The time period will be fixed relating to this research plus one year in order to have the maximum confidence of reflective outcomes.

Impact estimates based on a broader economic region were better than a narrowly-defined region because of the leaks in the system. System leaks could take the form of purchases from outside the region, tax payments, and an increase in the region's household savings characteristics. An impact study can only track transactions as they were conducted within the region under study. If an area economically grew significantly or became more globalized, more leaks in the system occurred as money moves out of the region under study and cannot be traced. Additionally, if an industry purchased most of its inputs from out of the region, the economic impact from an event is dampened.

Summary

By selecting IO analysis for research, this study provided the means for a comprehensive description of the interrelatedness of the aviation and aerospace industry with all other industries in Florida and VC. In addition, this research provided an economic impact analysis of the creation of a university research park in DB that affects the expansion of an aviation and aerospace clustered industry within Florida. Data for the IO model was collected by Implan from a variety of reliable sources. The measures of the economic impact included not only direct economic output and industry employment descriptions, but also described the multiplier effects from the addition of a research park to the economy. As additional economic activity in one industry was not limited within that industry, the analysis described the additional economic activities in non-aviation and non-aerospace industry as a result of the economic impact.

CHAPTER IV

RESULTS

The purpose of this quantitative descriptive study was to develop current, comprehensive estimates of the magnitude and importance of the aviation and aerospace industry to all other Florida industries. It produced results that can be used in policy analysis and in preparing other economic descriptive statistics. Additionally, the study provided an analysis of the impact of the creation of a university research park to the local economy.

The IO models for Florida and VC generated were a comprehensive representation of the economic relationships represented in the respective regions in 2012. Three types of economic measures by industries were reported in the model: value added, employment, and labor income. Measurements of value added and employment were used to research industry economic makeup of the region, interdependencies, and economic impacts. Labor income was constructive as a secondary indicator of the impact from the building of a research park in VC because it had substantial practical implications about the economic benefits from the change.

Value added was a broad measure of economic activity which includes the combination of labor income, other property type income, and indirect business taxes. Gross Value Added also could be called Gross Regional Product, the regional expression of Gross Domestic Product. Employment included full and part-time jobs for both employees and self-employed workers. Labor income was composed of two components: employee compensation and proprietor income, which represented a complete picture of income paid to the labor force within the region selected.

This dissertation answered the following descriptive research questions.

RQ 1: What is the composition of the aviation and aerospace industry in the Florida and VC economy in terms of employment and economic output?

RQ2: What are the interdependencies of the aviation and aerospace industry's economic relationships with other industries in Florida and VC?

RQ3: What would be the impacts on the regional economy of Florida and VC if a university research park was created in DB, Florida?

Industry Sector Definitions

The most detailed regional IO matrix used in this research depicted economic activity categorized into 440 industry sector codes from Implan Inc. The 440 industry sector codes were generated from the NAICS developed under guidance by the U.S. OMB (Appendix A). By organizing through the NAICS standard, economic data is uniform and can be used in economic analysis and presentation. Business activity is assigned a NAICS code based on its primary business activity. A primary business activity is determined by the relative share of production valued by either revenue or value of shipments (U.S. Census Bureau, 2012).

For purposes of this research, the complete description of the aviation and aerospace sub-industries presented in Tables 1 and 2 were narrowed further to reflect pure aviation and aerospace sub-industries. Tables 5 and 6 present translation from NAICS to the Implan industry codes. The categories petroleum refineries; flight training; other social advocacy organizations; all other amusement and recreation industries; regulation and administration of transportation programs; and other measuring and

controlling device manufacturing were omitted from the final aviation and aerospace industry category because in the data, they either included other activity that was not directly connected to the aviation and aerospace industry or could not be narrowed that granularly. For example, NAICS category 813319, other social advocacy organizations, not only included aviation advocacy organization but also 18 other advocacy organizations that did not involve aviation. Including this category in the research would overstate results.

Table 5. *Aviation industries defined by NAICS and Implan codes* (U.S. Census Bureau, 2012; Day, 2013).

NAICS code	NAICS Title	Implan Code	Implan Title
336411	Aircraft manufacturing	284	Aircraft manufacturing
336412	Aircraft engine and engine parts manufacturing	285	Aircraft engine and engine parts manufacturing
336413	Other aircraft parts and auxiliary equipment manufacturing	286	Other aircraft parts and auxiliary equipment manufacturing
481111	Scheduled passenger air transportation	332	Air transportation
481112	Scheduled freight air transportation	332	Air transportation
481211	Nonscheduled chartered passenger air transportation	332	Air transportation
481212	Nonscheduled chartered freight air transportation	332	Air transportation
481219	Other nonscheduled air transportation	332	Air transportation
324110	Petroleum refineries (aviation fuel)	n/a	
488119	Other airport operations	338	Scenic and sightseeing transportation and support activities for transportation
611512	Flight training	n/a	
713990	All other amusement and recreation industries (recreational flying clubs)	n/a	
813319	Other social advocacy organizations	n/a	
926120	Regulation and administration of transportation programs	n/a	

Table 6. *Aerospace industries defined by NAICS and Implan codes* (U.S. Census Bureau, 2012; Day, 2013).

NAICS code	NAICS Title	Implan code	Implan Title
336414	Guided missile and space vehicle manufacturing	287	Guided missile and space vehicle manufacturing
336415	Guided missile and space vehicle propulsion unit and propulsion unit parts manufacturing	288	Propulsion units and parts for space vehicles and guided missiles
336419	Other guided missile and space vehicle parts and auxiliary equipment manufacturing	288	Propulsion units and parts for space vehicles and guided missiles
334511	Search, detection, navigation, guidance, aeronautical and nautical system and instrument manufacturing	249	Search, detection, and navigation instruments manufacturing
334519	Other measuring and controlling device manufacturing	n/a	
335991	Carbon and graphite product manufacturing	274	Carbon and graphite product manufacturing

Research Question One

Using the 2012 IO matrix of the Florida and VC economy, the economic structures of the regions were explored to provide an overall description of the economies as well as providing information as to the composition of the aviation and aerospace industry in the Florida and VC economies.

The GRP for Florida was \$793B, and there were a total of 10.1M jobs in the state in 2012. Four hundred and thirty of the 440 industries available in the database were represented in Florida. There were 7.8M households, and the average household income was \$99.7K. Household income included income from all sources: employment wages or labor income, investment income, inheritance, and transfer payments from the government. The average labor income per worker for Florida was \$61.4K across all industries. The Shannon-Weaver (S-W) Diversity Index measured economic diversity on the basis of the number of industries in a region, and the distribution of employment across the regions was 0.73 indicating a fairly balanced economy (Leefers, 2007). A S-W Diversity Index of 1.0 represents a region's economic activity was totally diversified with all industries contributing equally to the region's employment (Attaran, 1986; Implan Group, 2004; Shannon & Weaver, 1949) The aviation and aerospace industry in Florida accounted for \$12.4B of output or 1.6% of total Florida output. The aviation and aerospace industry also accounted for 127K jobs or 1.26% of total Florida employment (Table 7), and the average labor income per worker in aviation and aerospace industry for Florida was \$93K.

Table 7. *Composition of the aviation and aerospace industry in Florida, 2012 (Implan Group, 2013).*

Industry	Total Value Added (\$000's)	Employment
Aircraft manufacturing	782,764	4,763
Aircraft engine and engine parts manufacturing	762,412	3,984
Other aircraft parts and auxiliary equipment manufacturing	442,060	3,873
Air transportation	4,879,240	36,189
Scenic and sightseeing transportation and support activities for transportation	3,293,306	61,181
Guided missile and space vehicle manufacturing	918,645	6,413
Propulsion units and parts for space vehicles and guided missiles	151,718	1,134
Search, detection, and navigation instruments manufacturing	1,165,838	8,818
Carbon and graphite product manufacturing	2,570	8
Total	12,398,553	127,364

The GRP for VC was \$13.6B, and there were a total of 198.7K jobs in the county in 2012. Of the 440 different industries in the data set, 273 were represented in VC. There were 215.8K households, and the average household income is \$77.9K. The average labor income per worker for VC was \$29.1K across all industries. The S-W Diversity Index was 0.69 representing a slightly less diversified economic region than compared to Florida. The aviation and aerospace industry in VC accounted for \$149M or 1.10% of total VC GRP. The aviation and aerospace industry in VC accounted for 1,964 jobs or 1.0% of total VC employment (Table 8), and the average labor income per worker in the aviation and aerospace industry for VC was \$46.5K. The VC average labor

income for the aviation and aerospace industry is about half of the Florida value because of the absence of the three highest average labor income sectors in VC: guided missile and space vehicle manufacturing, propulsion units and parts for space vehicles and guided missiles manufacturing, and carbon and graphite product manufacturing.

Table 8. *Composition of the Aviation and aerospace industry in Volusia County, 2012 (Implan Group, 2013).*

Industry	Total Value Added (\$000's)	Employment
Aircraft manufacturing	1,876	15
Aircraft engine and engine parts manufacturing	5,484	43
Other aircraft parts and auxiliary equipment manufacturing	1,974	23
Air transportation	9,215	95
Scenic and sightseeing transportation and support activities for transportation	55,326	1,033
Guided missile and space vehicle manufacturing	-	-
Propulsion units and parts for space vehicles and guided missiles	-	-
Search, detection, and navigation instruments manufacturing	75,088	754
Carbon and graphite product manufacturing	-	-
Total	148,962	1,964

Quantitatively, the aviation and aerospace industry, comprised of nine sub industries, was a small portion of the Florida economy. Aviation and aerospace accounted for less than 2% of the entire Florida economy, in terms of employment and

value added. In VC, aviation and aerospace represented approximately 1% of the economy, in terms of employment and value added. There was a large difference between the Florida and VC average labor income for the aviation and aerospace industry because VC's aerospace sector was only concentrated in the search, detection, and navigation instruments manufacturing sector. In addition, VC's transport by air sector was one-fifth the size of Florida's. These differences in the aviation and aerospace industry composition between Florida and VC are important because as the estimations from a shock to the entire aviation and aerospace industry will be distributed differently, the regions have different concentration of industries.

Research Question Two

The interdependencies of the aviation and aerospace industry's economic relationships with other industries in Florida and VC were estimated. IO analysis was exceptionally valuable in describing industry interrelationships with other industries in Florida and VC. The power of the IO matrix of a region's economy was in the linking of the product of one industry to the purchases of another industry.

To discover the interdependencies of the aviation and aerospace industry's economic relationships with other industries in Florida and VC, a 10% exogenous shock was used as the proxy for the change in final demand in the aviation and aerospace industry. The purpose of this shock is not to show a specific size of growth, but a vehicle to identify the inter-industry relationships. Table 9 represents the exogenous change in demand used as a proxy for a change in the aviation and aerospace industry's final demand. After a change in industry final demand vector was calculated, statistical

descriptors of the change in final demand such as measures of central tendencies indicated what industries were most sensitive or reactive to changes in the aviation and aerospace industry. A 10% change in final demand of aviation and aerospace industry only represented a 0.16% of the total Florida gross regional product.

Table 9. *Change in Final Demand in the Aviation and aerospace industry in Florida, 2012.*

Industry	Change in Final Demand
Aircraft manufacturing	78,276,428
Aircraft engine and engine parts manufacturing	76,241,165
Other aircraft parts and auxiliary equipment manufacturing	44,206,001
Air transportation	487,924,011
Scenic and sightseeing transportation and support activities for transportation	329,330,553
Guided missile and space vehicle manufacturing	91,864,519
Propulsion units and parts for space vehicles and guided missiles	15,171,815
Search, detection, and navigation instruments manufacturing	116,583,830
Carbon and graphite product manufacturing	256,970
Total	1,239,855,289

A 10% or \$1.2B shock to the aviation and aerospace industry was projected to increase Florida's GRP by \$1.2B, or a growth of 0.14%. Intermediate expenditures increased by \$1.1B. Therefore, the total impact to economic activity in Florida from a \$1.2B shock to the aviation and aerospace industry was projected to be \$2.2B. The number of jobs was projected to increase by 13.4K or a growth of 0.13%. Florida labor

income was projected to increase by \$770M or a growth of 0.16%. Table 10 and Figures 2 through 5 detail the breakdown of the types of effects in each measure: employment, labor income, GRP, and intermediate expenditures. There are some differences in the ranking of each category of the top ten most sensitive industries in Figures 2 through 5, mostly due to the sector composition. For example, ball and roller bearing industry was the fifth most sensitive when ranked by employment, but not even on the list of top ten ranking by labor income indicating that other industries' increased in income far outweighed the employment gain of the ball and roller bearing industry. It would be incorrect to automatically conclude that the ball and roller bearing industry pays lower wages because labor income includes employment earnings and proprietor income.

This analysis was also structured to yield information about direct, indirect, and induced effects. Direct effects are the economic activities resulting from business activity such as additional demand from an industry. Indirect effects are those caused by inter-industry changes in business such as additional orders for raw materials from other industries as a result of an increase in demand. Induced effects are those impacts created by the household sector spending of those employed by the direct and indirect altered industries. Presumably, as an increase in demand and labor income occurs in the direct and indirect industries, those workers will expend additional earnings in the regional economy.

Table 10. *Total Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.*

Impact Type	Employment	Labor Income (\$000's)	Value Added (\$000's)	Intermediate Expenditures (\$000's)
Direct Effect	5,639	400,117	534,755	705,104
Indirect Effect	3,614	186,933	270,663	193,450
Induced Effect	4,120	182,962	321,611	201,239
Total	13,372	770,011	1,127,029	1,099,789

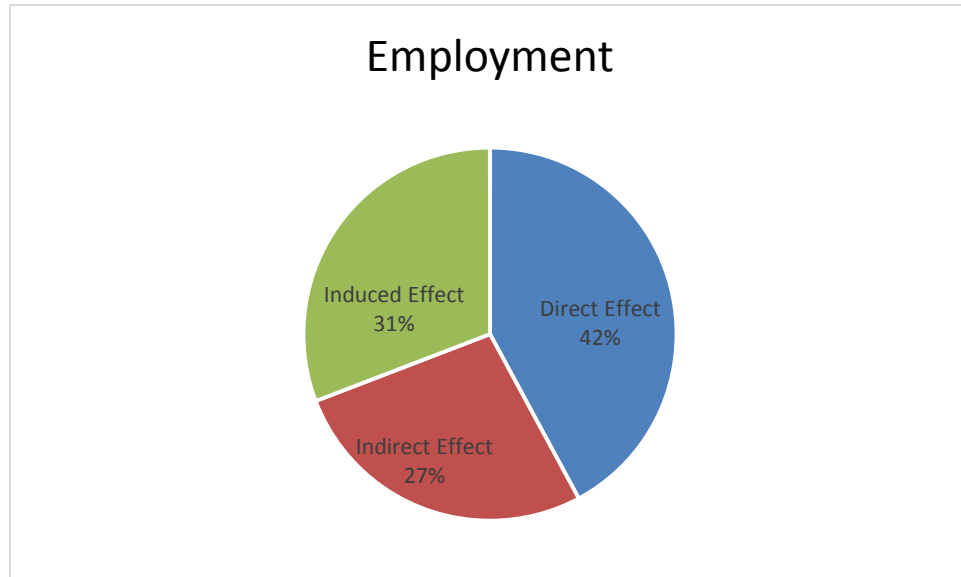


Figure 2. *Total Employment Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.*

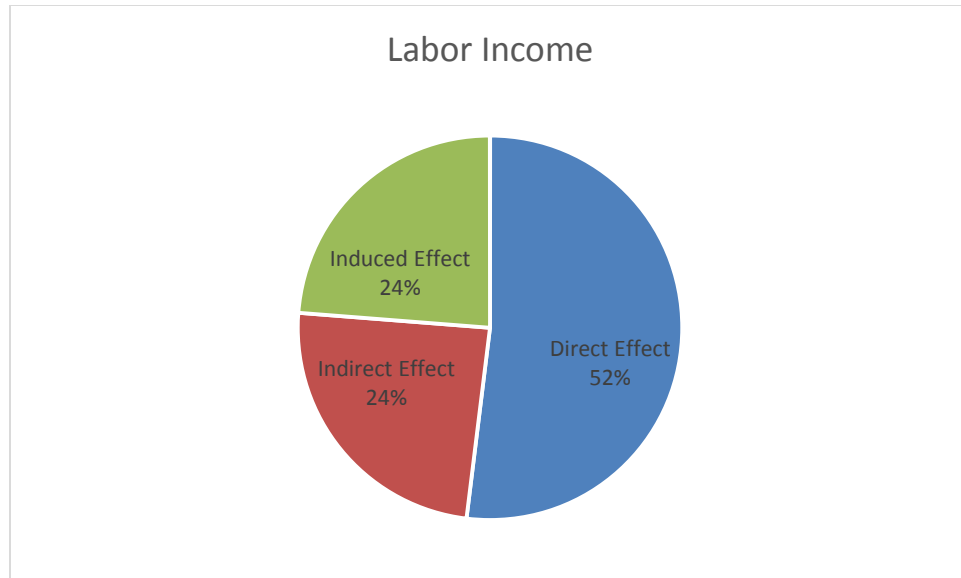


Figure 3. Total Labor Income Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.

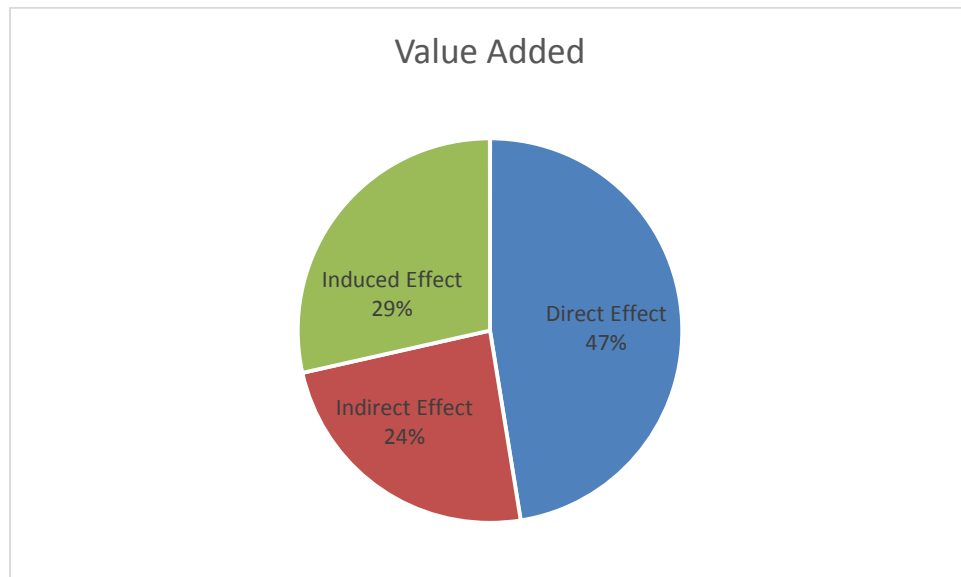


Figure 4. Total Value Added Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.

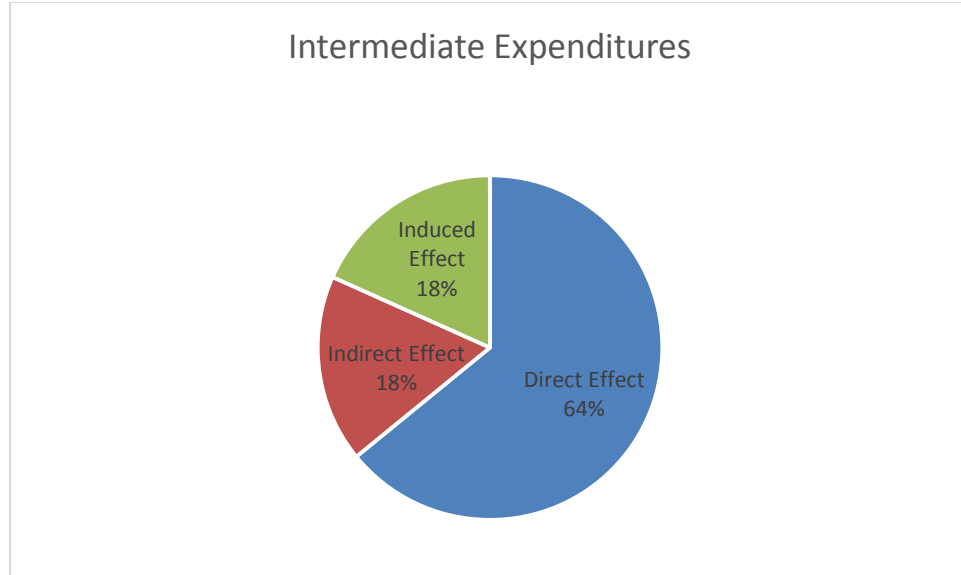


Figure 5. Total Intermediate Expenditures Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.

The average total impact to non-aviation and aerospace industry was 0.05%. The top ten most affected non-aviation and aerospace industries in terms of each sector's GRP are shown in Table 11. The average impacts were not normally distributed. One hundred and eighty six industries' average impact for value added was above the mean with 232 average impact below the mean. Tables 12 and 13 show the top ten most affected non-aviation and aerospace industries in terms of employment and labor income.

Table 11. *Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Value Added to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.*

Industry	Change (%)
All other forging, stamping, and sintering	0.67
Specialized design services	0.49
Commercial and industrial machinery and equipment rental and leasing	0.46
Couriers and messengers	0.42
U.S. postal service	0.33
Warehousing and storage	0.26
Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals	0.25
Dry-cleaning and laundry services	0.25
Petroleum refineries	0.23
Management of companies and enterprises	0.21

Table 12. *Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Employment to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.*

Industry	Change (%)
All other forging, stamping, and sintering	0.70
Specialized design services	0.47
Commercial and industrial machinery and equipment rental and leasing	0.44
Couriers and messengers	0.41
Ball and roller bearing manufacturing	0.32
U.S. postal service	0.33
Petroleum refineries	0.26
Warehousing and storage	0.25
Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals	0.24
Dry-cleaning and laundry services	0.24

Table 13. *Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Labor Income to a Change in Final Demand in the Aviation and Aerospace Industry in Florida, 2012.*

Industry	Change (%)
All other forging, stamping, and sintering	0.67
Specialized design services	0.49
Commercial and industrial machinery and equipment rental and leasing	0.46
Couriers and messengers	0.42
U.S. postal service	0.33
Warehousing and storage	0.26
Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals	0.25
Dry-cleaning and laundry services	0.24
Petroleum refineries	0.23
Management of companies and enterprises	0.21

The ranking of the multipliers of all the aviation and aerospace sub-industries is shown in Table 14. The multiplier is a prediction on how the state's economy will respond to a change in that sector's final demand. Essentially, by multiplying the change in final demand of a sector by the multiplier, one sees which sector affects the region's economy the most.

Table 14. *Aviation and Aerospace Industry Sector's Multipliers in Florida, 2012.*

Industry	Multiplier
Scenic and sightseeing transportation and support activities for transportation	2.08
Guided missile and space vehicle manufacturing	2.00
Search, detection, and navigation instruments manufacturing	1.91
Propulsion units and parts for space vehicles and guided missiles manufacturing	1.87
Other aircraft parts and auxiliary equipment manufacturing	1.76
Aircraft engine and engine parts manufacturing	1.66
Transport by air	1.61
Carbon and graphite product manufacturing	1.55
Aircraft manufacturing	1.50

Examining the changes within each industry in VC as a result of a change in a different industry determined which industries were most sensitive to changes within the aviation and aerospace industry. A 10% exogenous shock was used as the proxy for the change in final demand in the aviation and aerospace industry. A 10% change in final demand of aviation and aerospace industry is 0.11% of the total VC gross regional product. Table 15 represents the exogenous change in demand used as a proxy for a change in the aviation and aerospace industry's final demand.

Table 15. *Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.*

Industry	Total Value Added (\$000's)
Aircraft manufacturing	187
Aircraft engine and engine parts manufacturing	548
Other aircraft parts and auxiliary equipment manufacturing	197
Air transportation	921
Scenic and sightseeing transportation and support activities for transportation	5,532
Guided missile and space vehicle manufacturing	-
Propulsion units and parts for space vehicles and guided missiles	-
Search, detection, and navigation instruments manufacturing	7,508
Carbon and graphite product manufacturing	-
Total	14,893

A 10% or \$14.9M shock to the aviation and aerospace industry was projected to increase VC's GRP by \$14.1M, or a growth of 0.07% of GRP. Intermediate expenditures

increased by \$12.1M. Therefore, the total impact to economic activity in VC from a \$14.9M shock to the aviation and aerospace industry was projected to be \$22.6M. The number of jobs was projected to increase by 149 jobs or a growth of 0.08%. VC's labor income was projected to increase by \$7.3M, or a growth of 0.09%. Table 16 and Figures 6 through 9 detail the breakdown of the types of effects in each measure: employment, labor income, GRP, and intermediate expenditures.

Table 16. *Total Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.*

Impact Type	Employment	Labor Income (\$)	Value Added (\$)	Intermediate Expenditures (\$)
Direct Effect	79.5	4,508,844	14,893,000	9,138,287
Indirect Effect	35.3	1,567,669	3,935,314	1,614,985
Induced Effect	33.7	1,268,227	3,758,230	1,395,883
Total	148.5	7,344,740	22,586,544	12,149,155

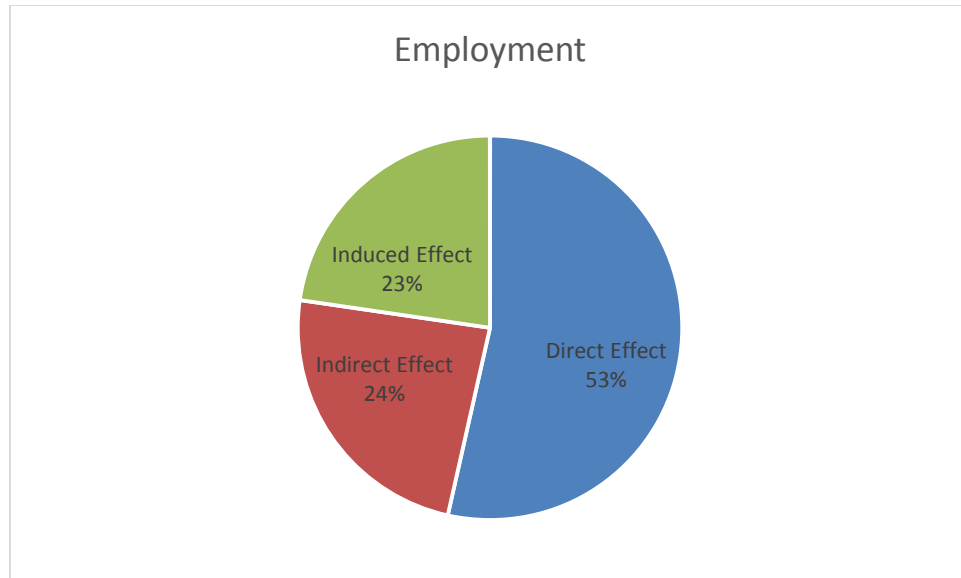


Figure 6. Total Employment Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.

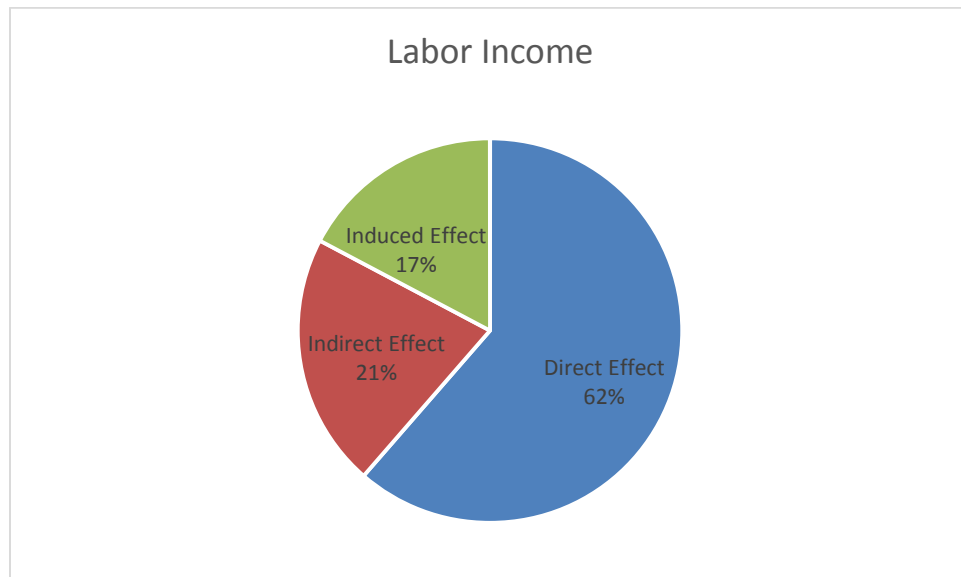


Figure 7. Total Labor Income Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.

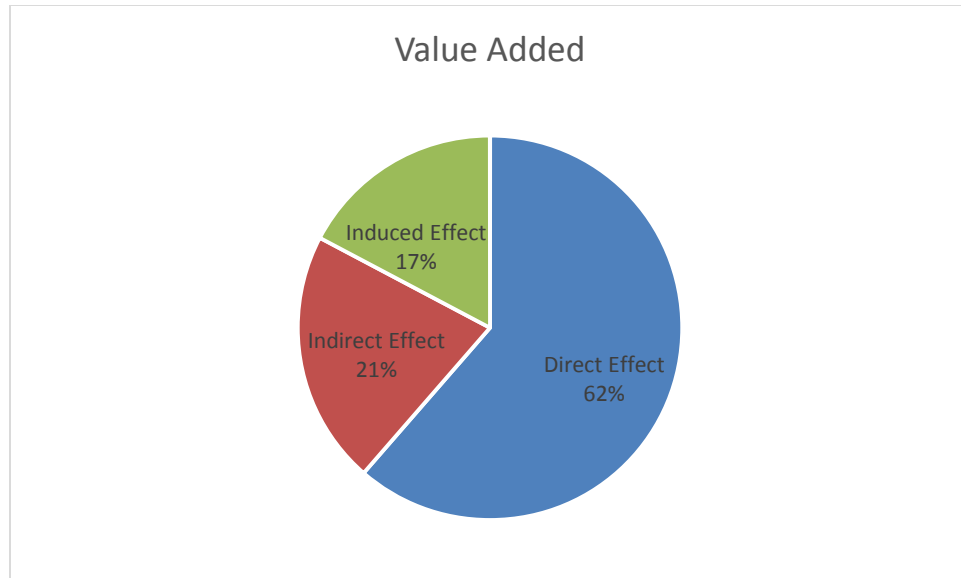


Figure 8. Total Value Added Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.

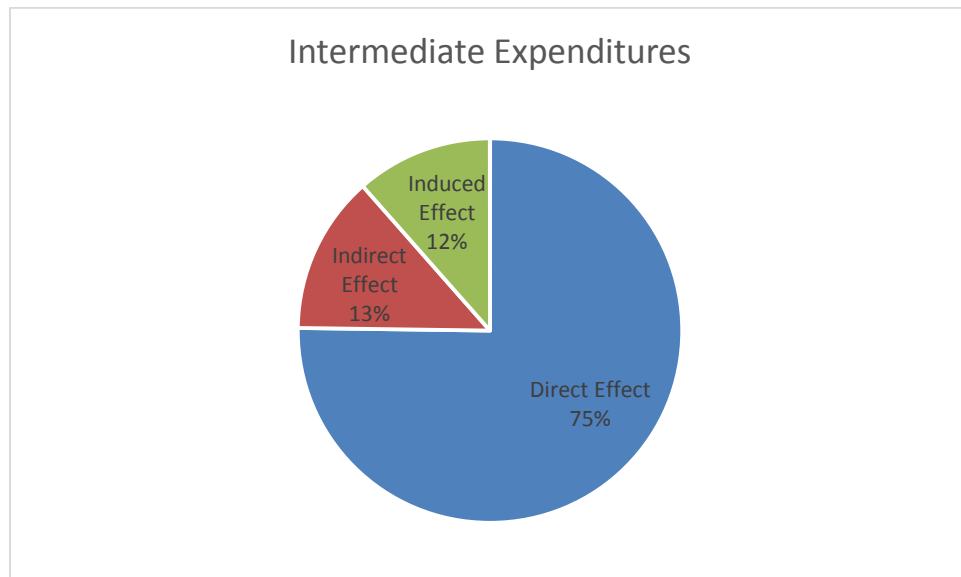


Figure 9. Total Intermediate Expenditures Impact Summary to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.

The average total impact to non-aviation and aerospace industries was 0.11% GRP. The distribution of average impacts was not normal. There were 23 above the

mean and 246 below the mean for value added indicating that in addition to the aviation and aerospace industry, the impact from the shock was concentrated in a fairly small group of industries. The top ten most affected non-aviation and aerospace industries in terms of each industry's GRP are shown in Table 17. Tables 18 and 19 show the top 10 non-aviation and non-aerospace industries most affected in terms of each industry's employment and labor income.

Table 17. *Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Value Added to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.*

Industry	Change (%)
Couriers and messengers	0.38
Specialized design services	0.31
Scientific research and development services	0.28
U.S. postal service	0.24
Warehousing and storage	0.22
Management of companies and enterprises	0.20
Computer systems design services	0.17
Watch, clock, and other measuring and controlling device manufacturing	0.17
Support activities for oil and gas operations	0.15
Employment services	0.15

Table 18. *Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Employment to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.*

Industry	Change (%)
Couriers and messengers	0.36
Specialized design services	0.34
Scientific research and development services	0.29
Warehousing and storage	0.25
U.S. postal service	0.22
Management of companies and enterprises	0.20
Computer systems design services	0.17
Employment services	0.14
Commercial and industrial machinery and equipment rental and leasing	0.14
Dry-cleaning and laundry services	0.13

Table 19. *Top Ten Most Sensitive Non-Aviation and Non-Aerospace Industries by Labor Income to a Change in Final Demand in the Aviation and Aerospace Industry in VC, 2012.*

Industry	Change (%)
Couriers and messengers	0.38
Specialized design services	0.31
Scientific research and development services	0.28
U.S. postal service	0.24
Warehousing and storage	0.22
Management of companies and enterprises	0.20
Computer systems design services	0.17
Watch, clock, and other measuring and controlling device manufacturing	0.17
Support activities for oil and gas operations	0.15
Employment services	0.15

Of all the aviation and aerospace sub-industries, the ranking of their multipliers is shown in Table 20. The multiplier is a prediction on how the region's economy will respond to a change in that sector's final demand. Essentially, by multiplying the change in final demand of a sector by the multiplier, one sees which sector affects the region's economy the most.

Table 20. *Aviation and Aerospace Industry Sector's Multipliers in VC, 2012.*

Industry	Multiplier
Scenic and sightseeing transportation and support activities for transportation	1.67
Search, detection, and navigation instruments manufacturing	1.44
Transport by air	1.37
Other aircraft parts and auxiliary equipment manufacturing	1.36
Aircraft engine and engine parts manufacturing	1.22
Aircraft manufacturing	1.17

To determine how interrelated the aviation and aerospace industry was to non-aviation and aerospace industries in Florida and VC, a 10% exogenous shock to final demand was used to model the region's economic changes. This \$1.2M increase in only the aviation and aerospace industry was projected to increase Florida's economy by 0.14% and 13.4K jobs. Roughly half of effects were indirect and induced effects. Narrowing the scope of the analysis to VC, the results were a bit lower than the statewide experience. In VC, a \$14.9M increase in VC's aviation and aerospace industry was projected to increase the region's value added by 0.08% and 149 jobs. The direct effects outweighed the indirect and induced effects indicating that within VC, the non-aviation and aerospace industry was less impacted by shocks to the aviation and aerospace industry than in Florida.

Comparing regional results from a shock to the aviation and aerospace industry with Florida and VC, there were some differences in the non-aviation and aerospace industries most affected. Primarily, the composition and concentration of industries created differences. For example, petroleum refineries have limited representation in VC yet were present in Florida.

Research Question Three

The impacts on the regional economy of Florida and VC if a university research park was created in DB, Florida was investigated. By understanding the composition of the aviation and aerospace industry in Florida and its interrelationship with other industries in the state, IO analysis was used to estimate whether a university research park dedicated to aviation and aerospace technology would encourage strong regional economic growth.

An impact simulation of creating a university research park in DB yielded the projected change in the Florida economy from direct, indirect, and induced effects. The simulation took the form of a net impact analysis, where the economic impact of the creation of the research park as well as the costs associated with the project were incorporated. Any analysis that fails to incorporate and consider the state and local expenditures would be incomplete and inaccurate. Instead of measuring gross impacts, the result would be a net analysis of the full picture.

The change in the final demand vector was an endogenous shock derived from actual budget information. The research park was an \$18M project funded by a private four-year college using the NASIC 611310. This research park received \$9M from the state of Florida, provided the University matched the grant. The change vector showed an \$18M investment for the private college sector combined with a decrease of \$9M of institutional spending from the products and services of state and local government enterprise sector. This decrease was required because presumably if the state government was funding this research park, there was \$9M less available to spend in other projects unless new taxes are raised. By selecting the product and services of state and local

government enterprise sector, the decreases in spending were assumed to be reduced proportionally across a broad array of spending.

An \$18M university research park was projected to increase Florida's GRP by \$11.6M. The number of jobs was projected to increase by 269. The multiplier for the private junior colleges, colleges, universities, and other professional schools sector was 2.02. The multiplier for other state and local government enterprises was 1.99. Florida's labor income was projected to increase by \$8.8M. Table 21 and Figures 8 through 10 detail the breakdown of the types of effects in each measure: employment, labor income, and GRP as well as the net change in tax revenue by category.

Overall, the projection from the simulation indicated that for every three direct impact jobs created in the university research park, one additional job would be created from indirect or induced effects. However, the ratio between direct and indirect or induced effects was less when calculated using labor income or value added. Table 20 represents the direct, indirect, and induced effects from the creation of a research park simulation in Florida. The table shows the total changes in employment, labor income, value added, and intermediate expenditures.

On a more detailed breakdown of changes, 127 industries experienced a change in employment; 113 grew, and 14 contracted (Appendix B). The industries with the largest employment changes were: private junior colleges; colleges, universities and professional schools; real estate establishments; food services and drinking places; healthcare services; and building services.

Table 21. *Total Impact Summary in Florida, 2012.*

Impact Type	Employment	Labor Income (\$)	Value Added (\$)	Intermediate Expenditures (\$)
Direct Effect	202.0	5,839,352	5,237,472	4,048,306
Indirect Effect	20.1	889,567	2,733,589	1,276,186
Induced Effect	47.1	2,087,722	3,669,389	2,296,315
Total	269.1	8,816,641	11,640,450	7,620,806

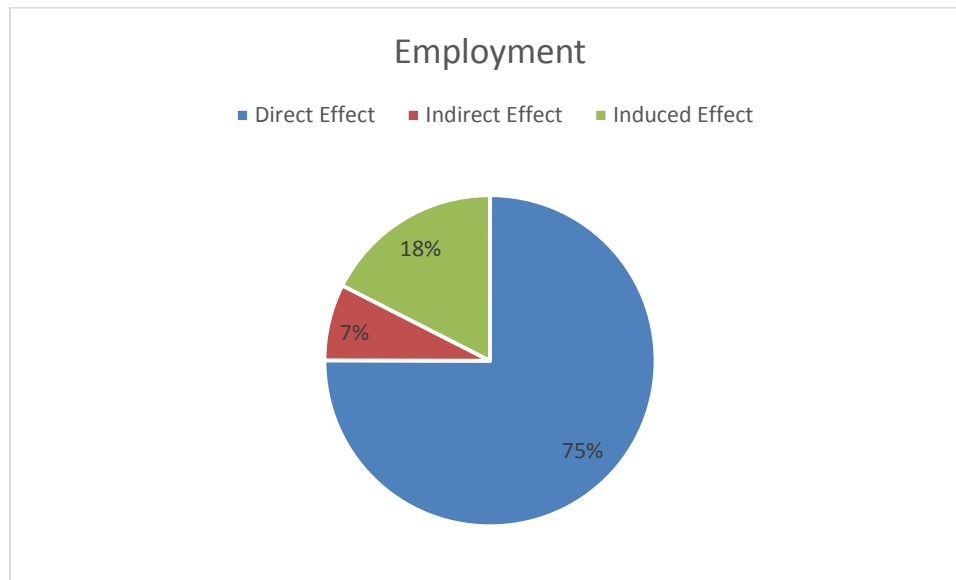


Figure 10. Total Employment Impact Summary in Florida, 2012.

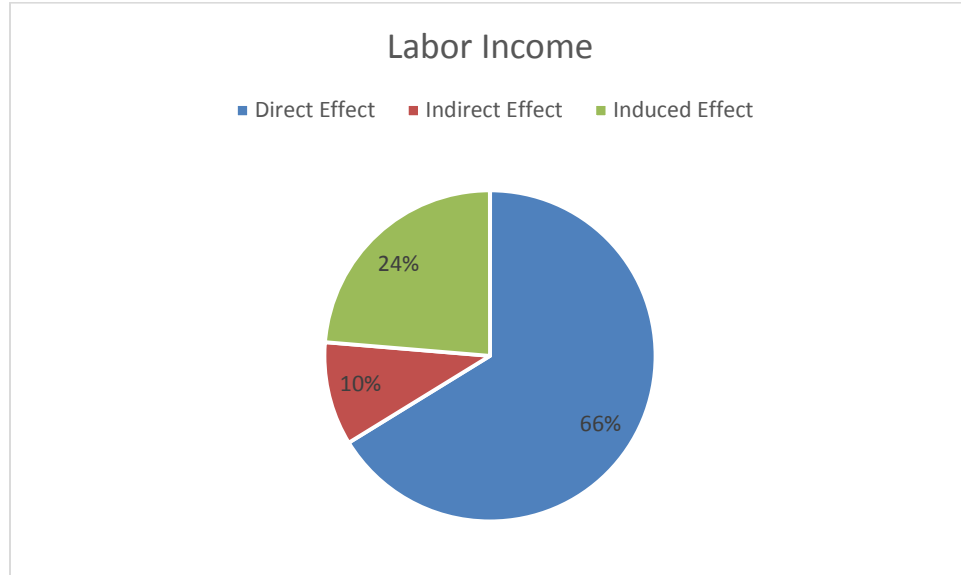


Figure 11. Total Labor Income Impact Summary in Florida, 2012.

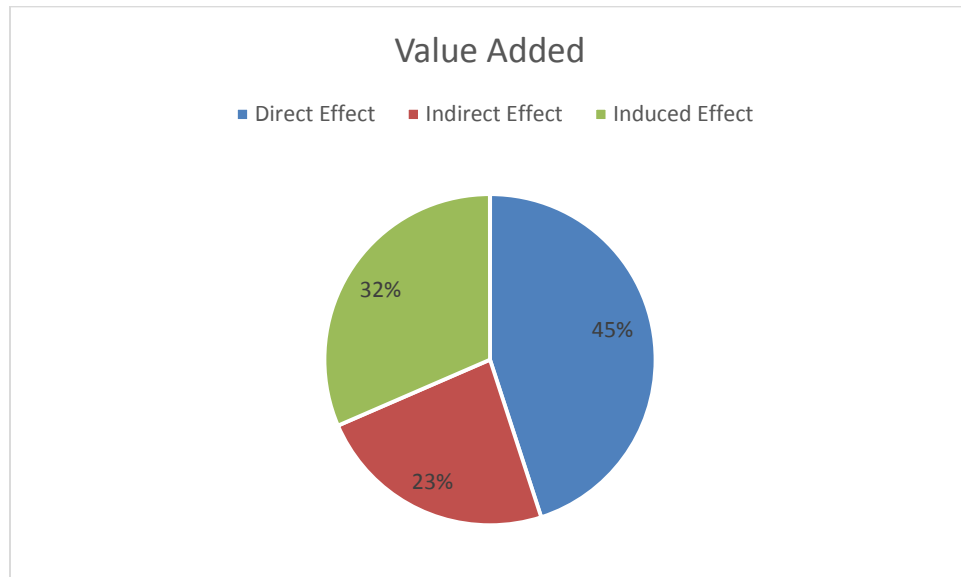


Figure 12. Total Labor Income Impact Summary in Florida, 2012.

The industries that would experience the largest contractions in employment were: state and government enterprises; maintenance and repair construction of nonresidential structures; architectural, engineering and related services; and water, sewage, and other treatment and delivery options. Ranking by changes in labor income and value added produced a similar result. Three hundred and six industries experienced a positive change in labor income and 105 industries experienced a negative change (Appendix C). Three hundred and five industries experienced a positive increase in value added while 109 experienced a contraction in value added (Appendix D). Also, since this simulation includes a diversion of state spending to the creation of the research park, Table 22 contains a breakdown of the categories of the additional \$1.9M tax revenue generated as a result.

Table 22. *Tax Impacts by Category in Florida, 2012.*

Category	Employee Compensation	Tax on Production and Imports	Households	Corporations
Total State and Local Tax	\$17,446	\$1,767,257	\$56,745	\$6,805

Results Summary

The purpose of this quantitative descriptive study was to develop current, comprehensive estimates of the magnitude and importance of the aviation and aerospace industry to all other Florida industries. Additionally, the study provided an analysis of the impact of the creation of a university research park to the local economy.

Quantitatively, the aviation and aerospace industry, comprised of 12 sub industries, was a small portion of the Florida economy. Aviation and aerospace accounted for approximately 2% of the entire Florida economy in terms of employment and value added. In terms of employment and value added to VC, the aviation and aerospace industry was smaller than Florida's share, representing approximately 1.0% of the economy.

To determine how interrelated the aviation and aerospace industry was to non-aviation and aerospace industry in Florida and VC, a 10% exogenous shock to final demand was used to model the region's economic changes. This \$1.2B increase in only the aviation and aerospace industry was projected to increase Florida's economy by 0.14% and 13.4K jobs. Roughly half of the effects were indirect and induced effects. Narrowing the scope of the analysis to VC, the results were a bit lower than the statewide experience. In VC, a \$14.9M increase in VC's aviation and aerospace industry was projected to increase the region's value added by 0.07% and 149 jobs. The direct effects outweighed the indirect and induced effects indicating that within VC, the non-aviation and aerospace industry was less impacted by changes to the aviation and aerospace industry than in Florida.

A net IO analysis simulated the creation of a university research park in DB with half of its funding as an endogenous source, the state government. Even though the research park specialized in aviation and aerospace-related research, the change in final demand was experienced through the NASIC category for private four-year universities. An \$18M university research park was projected to increase Florida's GRP by \$11.6M. The number of jobs was projected to increase by 269. Florida's labor income was

projected to increase by \$8.8M. Sixty-seven percent of the employment and labor income effects in Florida's economy were categorized as direct effects with the indirect and induced effects comprising the remainder of effects.

CHAPTER V

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this quantitative descriptive study was to develop current, comprehensive estimates of the magnitude and importance of the aviation and aerospace industry in Florida and VC to all other industries. Results could be used in policy analysis and in preparing other economic descriptive statistics. Additionally, the study provided an analysis of the impact of the creation of a university research park on the local economy.

The IO models generated for Florida and VC were a comprehensive representation of the economic relationships represented in Florida and VC in 2012. Three types of economic measures by industries were reported in the model: value added, employment, and labor income. Value added, a broad measure of economic activity, includes the combination of labor income, other property type income, and indirect business taxes. Value added is equivalent to GRP, the regional expression of GNP. Employment included full and part-time jobs for both employees and self-employed workers. Labor income was composed of two components: employee compensation and proprietor income, thus representing a complete picture of income paid to the labor force within the region selected.

Measurements of value added and employment were used to research industry economic makeup of the region, interdependencies, and economic impacts. Labor income was useful as a secondary indicator of the impact from the building of a research park in VC because it had substantial practical implications about the economic benefits resulting from the change.

Discussion

Research Question One

Florida

Even though the definition of the aviation and aerospace industry used in this research was a combination of nine sub-industries in the data (Tables 5 and 6), it represented a small portion of the Florida economy at 1.6%. By aggregating all the aviation and aerospace sub-industries' employment, the aviation and aerospace industry was the 16th largest industry in Florida. The S-W diversity index of 0.73 indicates that the Florida economy was diversified through a fairly large number of industries sharing the state's economic activity. The aggregate services and trade industries represented the largest sectors of the Florida economy. The Florida aviation and aerospace industry's average labor income was 51% higher than the average Florida industry labor income average. The Florida aviation and aerospace industry's average labor income was only 12% lower than the U.S. average of \$104.4K using the same aviation and aerospace industry definition. Because of the higher labor income generated by the aviation and aerospace industry per worker, the aviation and aerospace industry was a positive asset to the Florida economy.

Volusia County

The same characteristics of the aviation and aerospace industry in Florida were evident in VC. With the aggregate of the nine sub-industries that comprise the aviation and aerospace industry (Tables 5 and 6), it was still a small portion of the VC economy at 1.10%. By aggregating all the aviation and aerospace sub-industries' employment, the

aviation and aerospace industry was the 26th largest industry in VC. The Shannon-Weaver index of 0.69 indicates that the VC economy was slightly less diversified than the Florida economy with respect to the number of industries sharing the state's economic activity. The food services and drinking places, real estate establishments, and health care services were the largest employers of the VC economy. The VC aviation and aerospace industry's average labor income was 60% higher than the average VC industry labor income average. However, the aviation and aerospace industry's average labor income in VC was lower than the Florida average and 55% lower than the U.S. average.

The aviation and aerospace industry's employment contribution was a positive asset to the VC economy because of the higher labor income generated by the aviation and aerospace industry per worker. Stimulating this industry's economic development and growth would be beneficial to the local and state economy because the aviation and aerospace industry's higher wage rates are higher than the average VC and Florida wage rates. However, the form of the economic stimulation would be important as not all shocks are exogenous and without negative tradeoffs.

Research Question Two

Industry multipliers derived from a 10% exogenous shock to the aviation and aerospace industry allowed for a description of the most interrelated or sensitive industries to the aviation and aerospace industry. In Florida, the average employment change from the exogenous shock to the aviation and aerospace industry for all non-aviation and non-aerospace industries was 0.05%. Many impact studies measure effects

of economic impacts by total employment, labor income, and gross regional product as was presented in the data for research question two. However, a much more descriptive measure would also include the types of jobs created from a positive shock to the aviation and aerospace industry. To give policy makers more information, it would be more complete to look at the average labor income per employee of the top non-aviation and non-aerospace industries affected by the shock. Table 23 shows the average labor income per employee in Florida for the top most sensitive non-aviation and aerospace industries in terms of employment and value added changes to a shock in the aviation and aerospace industry. The average labor income per employee of \$68K for these industries was 11% higher than the average of \$61K for the state of Florida.

Table 23. *Most Sensitive Non-Aviation and Aerospace Industries Ranked by Average Labor Income in FL, 2012.*

Industry	Average Labor Income (\$)
Transport by pipeline	111,173
Management of companies and enterprises	107,181
U.S. postal service	93,628
Petroleum refineries	88,400
Ball and roller bearing manufacturing	79,565
Commercial and industrial machinery and equipment rental and leasing	75,725
Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals	55,868
All other forging, stamping, and sintering	47,881
Warehousing and storage	40,946
Specialized design services	39,360
Dry-cleaning and laundry services	38,288
Couriers and messengers	36,902

Combining the information in Table 23 with the higher than average wages presented for the aviation and aerospace sector from the results of research question one, the Florida economy would benefit from an exogenous expansion of the aviation and aerospace industry in terms of employment. An expanded aviation and aerospace industry in Florida would carry jobs that would have higher labor income and would generate higher tax revenues for the state and local governments.

In VC, the average employment change from an exogenous shock to the aviation and aerospace industry for all non-aviation and non-aerospace industries was 232 jobs or 0.06%. Here again, a more descriptive measure of the impact was to include the types of jobs created from a positive shock to the aviation and aerospace industry. To give policy makers more information, it would be more complete to look at the average labor income per employee of the top non-aviation and aerospace industries affected by the shock. Table 24 shows the average labor income per employee in VC for the top most sensitive non-aviation and aerospace industries in terms of employment and value added changes to a shock in the aviation and aerospace industry. The total average labor income per employee of \$55.7K for these industries was 91% more than the average labor income of \$29.1K for VC. An exogenous expansion of the aviation and aerospace industry in VC would have a significant impact on the labor income profile of VC.

Table 24. *Most Sensitive Non-Aviation and Non-Aerospace Industries Ranked by Average Labor Income in VC, 2012.*

Industry	Average Labor Income (\$)
Management of companies and enterprises	127,900
U.S. postal service	91,788
Commercial and industrial machinery and equipment rental and leasing	73,377
Support activities for oil and gas operations	66,059
Watch, clock, and other measuring and controlling device manufacturing	60,235
Scientific research and development services	50,200
Computer systems design services	36,217
Couriers and messengers	34,558
Specialized design services	28,278
Warehousing and storage	23,053
Employment services	21,454

Combining the information in Table 24 with the higher than average wages presented for the aviation and aerospace sector from the results of research question one in VC, the VC economy would benefit from an exogenous expansion of the aviation and aerospace industry in terms of employment. This expansion would also benefit the local government as the new jobs created in the aviation and aerospace industry would have higher labor income than the average VC labor income and would generate higher tax revenues for the state and local governments. In addition, the new jobs created by the indirect and induced effects of a shock in the aviation and aerospace industry in the most sensitive industries to changes in the aviation and aerospace industry also had a higher average labor income than the average VC labor income. VC's labor income would experience a larger benefit from the growth in the aviation and aerospace industry than statewide.

Research Question Three

The impact simulation of creating a university research park in DB was generated using actual empirical data. The simulation conducted a net analysis whereby the effects of an \$18M dollar university research park was created using \$9M of pledged state funds. Any analysis that failed to incorporate and consider the effects of pledging state and local expenditures would be incomplete and inaccurate. Instead of measuring gross impacts, a net analysis was conducted for a more representative projection. To complete a net analysis, first the change in the final demand vector was calculated as an exogenous shock representing the creation of the university research park. Then, an endogenous shock to the final demand vector was calculated representing a decrease in funds allocated by state and local governments.

The overall impact from the net analysis was a positive boost to the economy of 269 additional jobs, \$8.8M additional labor income, and \$11.6M additional value added in the state of Florida. The full additional value added is less than the direct investment of \$18M because of the amount of decreased economic activity funded by the state government. It would be inaccurate to attempt to specify the impacts on VC alone because of the \$9M in state funds used for the research park because it was unknown how much of those funds would have been spent in VC. The average labor income of the additional jobs created in Florida was \$51.8K. The average labor income of the jobs lost in Florida was \$69K. While the net result was an increase in additional labor income, the employment growth was characterized by losing higher-paying jobs and gaining more lower-paying jobs. The increase in labor income could be explained by its definitional inclusion of proprietor income.

Most of the employment impact was across a broad spectrum of industries represented in Florida. The aviation and aerospace industry in this scenario was impacted the least, growing by only one job. The analysis was conducted on statewide data which possibly accounted for this surprising fact. In a statewide analysis, the funds for the research part are spread across all the economic interrelationships of all universities with other industries instead of just the one university dedicated to aviation and aeronautical sciences. If the net analysis could be conducted on VC where there are fewer universities represented in the sector data, one may expect a more pronounced effect on the aviation and aerospace industry. However, while the results can be measureable with more data, this research does not directly support the solid conclusion that building a university research park in VC creates a more attractive environment for the expansion of the aviation and aerospace industry. If the planned research park spurs the expansion of the aviation and aerospace industry, the multiplier effect would create indirect and induced effects in the economy.

One key element in IO analysis is the temporal effect of the jobs and income created by the \$18M expenditure on a university research park. The jobs supported by this expenditure were not expected to continue in perpetuity. Increased production that is annually sustainable will have different implications for a region as the results would be viewed as more than a one-time shock and would provide long-term, sustainable, economic growth.

Assumptions and Limitations of Results

The data in Table 22 suggested that 269 additional jobs with \$8.8M labor income would result from the creation of a university research park in VC using 50% matching state funds. However, this figure may have overstated the results somewhat.

Employment included full and part-time jobs for both employees and self-employed workers. Labor income was also composed of two components: employee compensation and proprietor income. And finally, actual results assume that the creation of the university research park would bring about the hiring of the model's predicted requirements for such an expenditure. If the university chooses to create fewer jobs than the model's projections, the expected indirect and induced positive effects results would be lessened, thus lowering the overall total positive impact and the return on investment of the state's expenditures.

An assumption of IO analysis is that no supply or resource constraints exist. If the excess resources for the creation of a university research park were unused and available in the regional economy to meet the requirements of the university research park, then the results would be accurate. However, if there is any limited supply of resources, then the economy could experience wage and/or price increases, or a move to fulfill the resources by importing the needed inputs. Imports are considered a leakage to the Florida economy and would dampen the expected results.

Making a direct connection between a university research park to increased jobs and income in the aviation and aerospace industry was not directly supported by this research. Because the direct economic impacts flowed through the private junior colleges, colleges, university, and other professional schools sector, and the research park

was a proposed new activity, the existing economic relationships were unlikely to show a direct link. However, given that the focus of the university research park is the aviation and aerospace industry, it is logical and likely that the aviation and aerospace industry in Florida would expand. This research cannot estimate any quantification of the extent of the expansion and resulting additional jobs and labor income.

Recommendations

Looking forward, there could be a desire by policymakers to shift the types of jobs in Florida to more attractive jobs for Florida's residents. This research indicated the average labor income of the aviation and aerospace industry is higher than average labor income in Florida and VC. Attracting and growing the aviation and aerospace industry would be a positive move for Florida's economy. It would be unlikely that the entirety of newly created aviation and aerospace industry jobs would be resourced from the local population as there could be specialized training and skills required. Nonetheless, growing these types of jobs has a positive influence on the region's economy and tax revenues. The local government could work towards a home grown long term solution to any scarcity of potential employees for a growing aviation and aerospace community. One such program might be a scholarship program that requires the recipient to locate within the region's industry for a specified amount of time. Thus, it would be a desirable course of action to spur the growth of this sector, as its direct effect would culminate with additional jobs in Florida that would bring higher wage jobs to the state.

Both the average labor income for the aviation and aerospace industry in Florida and VC were below the U.S. average labor income for the aviation and aerospace

industry. Given this characteristic, government entities, trade associations, and organizations like the Chamber of Commerce may employ this information in pursuing aviation and aerospace companies and organizations to expand and locate in Florida and VC.

The aviation and aerospace industry in Florida and VC also had positive indirect and induced effects in the economy. The interdependencies of the aviation and aerospace industry with other industries in Florida and VC provided almost a two-fold indirect and induced effect. As the aviation and aerospace industry expands, so do other industries. The average labor income in Florida of the most sensitive non-aviation and aerospace industry was \$52K, which is 15% lower than the average Florida labor income. The average labor income in VC of the most sensitive non-aviation and aerospace industry was \$55K, significantly higher than the average VC labor income. The indirect and induced benefits of the aviation and aerospace industry would further contribute to jobs for Florida residents; however, the jobs were associated with a lower labor income in Florida. Interestingly, if these jobs were located in VC, the additional income would be very positive.

It is important to note that these industry interdependencies also presented risk in an aviation and aerospace industry contraction. If the aviation and aerospace industry experiences a contraction, then through the interdependencies of the industries, the region would contract twice as much.

Research Park Recommendations

The overall impact of a university research park would benefit Florida's economy. As the project is currently structured, funded partially by public state money, it had negative impacts on 14 sectors of the economy. The two industries with the largest negative impact were the maintenance and repair construction of nonresidential structures and other state and local government enterprises because state funding was diverted to the research park. On balance, however, the economic impact of a university research park was positive.

The most expected outcome, an expansion of the aviation and aerospace industry, did not materialize in the model results. It is important to note that the model included the entire state of Florida instead of just VC. If the state's public funding portion of the university research park could have been narrowed to indicate how much institutional spending came from the products and services of state and government enterprises within VC, the results may have been different considering the university research park's focus is aviation and aerospace technology. Also, if more funding for the university research park came from exogenous sources instead of endogenous sources that divert state and local government funds from other projects, then the positive growth impacts on the Florida and VC economies would be more pronounced.

Recommendations for Future Research

This research has indicated how the aviation and aerospace industry supports the Florida and VC economies. This research has also indicated how a university research park would impact the Florida and VC economies. Future research could further

investigate the connection between the university sector and the Florida and VC economies and determine any of the variables or practices that would support such a connection.

Future research could study the impacts of the aviation and aerospace industry or a university research park on surrounding areas outside of Florida. If strong economic and aviation and aerospace industry connections to regions outside of the study region of VC and Florida are established, a multi-regional model could be built with additional, but available data, to investigate impacts on neighboring counties and other states.

Additional research could investigate how much of the state's production is exported to other states or to foreign purchases as an indication of possible growth markets or areas that may foster the creation of industry clusters.

Any economic impact scenario results can also be further categorized by household income. Many times public projects are funded as a tool to lift households out of poverty. Future results for this and other impact studies can explore whether specific targeted groups of households by income would experience the intended results.

One assumption of the model used in this research was that all purchases of final demand were local. With the continuing globalization of work processes, it eventually may not be appropriate to assume that all final demand purchases are local. If there is expanded capability of the research park's activities that includes other regions, the model can apply a local purchase percentage value to the change in final demand to estimate impacts. Given the results, policy makers may want to consider locally produced materials and labor requirements or preferences when expending tax dollars that are intended to grow and develop a region's economy.

With IO analysis, as budgets change or project expenditures expand or contract, variations on an impact study can be undertaken.

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APPENDIX A

North American Industry Classification Code (NAICS) (U.S. Census Bureau, 2012)

NAICS code	Title
11	Agriculture, Forestry, Fishing and Hunting
111	Crop Production
1111	Oilseed and Grain Farming
11111	Soybean Farming
111110	Soybean Farming
11112	Oilseed (except Soybean) Farming
111120	Oilseed (except Soybean) Farming
11113	Dry Pea and Bean Farming
111130	Dry Pea and Bean Farming
11114	Wheat Farming
111140	Wheat Farming
11115	Corn Farming
111150	Corn Farming
11116	Rice Farming
111160	Rice Farming
11119	Other Grain Farming
111191	Oilseed and Grain Combination Farming
111199	All Other Grain Farming
1112	Vegetable and Melon Farming
11121	Vegetable and Melon Farming
111211	Potato Farming
111219	Other Vegetable (except Potato) and Melon Farming
1113	Fruit and Tree Nut Farming
11131	Orange Groves
111310	Orange Groves
11132	Citrus (except Orange) Groves
111320	Citrus (except Orange) Groves
11133	Noncitrus Fruit and Tree Nut Farming
111331	Apple Orchards
111332	Grape Vineyards
111333	Strawberry Farming
111334	Berry (except Strawberry) Farming

111335	Tree Nut Farming
111336	Fruit and Tree Nut Combination Farming
111339	Other Noncitrus Fruit Farming
1114	Greenhouse, Nursery, and Floriculture Production
11141	Food Crops Grown Under Cover
111411	Mushroom Production
111419	Other Food Crops Grown Under Cover
11142	Nursery and Floriculture Production
111421	Nursery and Tree Production
111422	Floriculture Production
1119	Other Crop Farming
11191	Tobacco Farming
111910	Tobacco Farming
11192	Cotton Farming
111920	Cotton Farming
11193	Sugarcane Farming
111930	Sugarcane Farming
11194	Hay Farming
111940	Hay Farming
11199	All Other Crop Farming
111991	Sugar Beet Farming
111992	Peanut Farming
111998	All Other Miscellaneous Crop Farming
112	Animal Production and Aquaculture
1121	Cattle Ranching and Farming
11211	Beef Cattle Ranching and Farming, including Feedlots
112111	Beef Cattle Ranching and Farming
112112	Cattle Feedlots
11212	Dairy Cattle and Milk Production
112120	Dairy Cattle and Milk Production
11213	Dual-Purpose Cattle Ranching and Farming
112130	Dual-Purpose Cattle Ranching and Farming
1122	Hog and Pig Farming
11221	Hog and Pig Farming
112210	Hog and Pig Farming

1123	Poultry and Egg Production
11231	Chicken Egg Production
112310	Chicken Egg Production
11232	Broilers and Other Meat Type Chicken Production
112320	Broilers and Other Meat Type Chicken Production
11233	Turkey Production
112330	Turkey Production
11234	Poultry Hatcheries
112340	Poultry Hatcheries
11239	Other Poultry Production
112390	Other Poultry Production
1124	Sheep and Goat Farming
11241	Sheep Farming
112410	Sheep Farming
11242	Goat Farming
112420	Goat Farming
1125	Aquaculture
11251	Aquaculture
112511	Finfish Farming and Fish Hatcheries
112512	Shellfish Farming
112519	Other Aquaculture
1129	Other Animal Production
11291	Apiculture
112910	Apiculture
11292	Horses and Other Equine Production
112920	Horses and Other Equine Production
11293	Fur-Bearing Animal and Rabbit Production
112930	Fur-Bearing Animal and Rabbit Production
11299	All Other Animal Production
112990	All Other Animal Production
113	Forestry and Logging
1131	Timber Tract Operations
11311	Timber Tract Operations
113110	Timber Tract Operations
1132	Forest Nurseries and Gathering of Forest Products

11321	Forest Nurseries and Gathering of Forest Products
113210	Forest Nurseries and Gathering of Forest Products
1133	Logging
11331	Logging
113310	Logging
114	Fishing, Hunting and Trapping
1141	Fishing
11411	Fishing
114111	Finfish Fishing
114112	Shellfish Fishing
114119	Other Marine Fishing
1142	Hunting and Trapping
11421	Hunting and Trapping
114210	Hunting and Trapping
115	Support Activities for Agriculture and Forestry
1151	Support Activities for Crop Production
11511	Support Activities for Crop Production
115111	Cotton Ginning
115112	Soil Preparation, Planting, and Cultivating
115113	Crop Harvesting, Primarily by Machine
115114	Postharvest Crop Activities (except Cotton Ginning)
115115	Farm Labor Contractors and Crew Leaders
115116	Farm Management Services
1152	Support Activities for Animal Production
11521	Support Activities for Animal Production
115210	Support Activities for Animal Production
1153	Support Activities for Forestry
11531	Support Activities for Forestry
115310	Support Activities for Forestry
21	Mining, Quarrying, and Oil and Gas Extraction
211	Oil and Gas Extraction
2111	Oil and Gas Extraction
21111	Oil and Gas Extraction

211111	Crude Petroleum and Natural Gas Extraction
211112	Natural Gas Liquid Extraction
212	Mining (except Oil and Gas)
2121	Coal Mining
21211	Coal Mining
212111	Bituminous Coal and Lignite Surface Mining
212112	Bituminous Coal Underground Mining
212113	Anthracite Mining
2122	Metal Ore Mining
21221	Iron Ore Mining
212210	Iron Ore Mining
21222	Gold Ore and Silver Ore Mining
212221	Gold Ore Mining
212222	Silver Ore Mining
21223	Copper, Nickel, Lead, and Zinc Mining
212231	Lead Ore and Zinc Ore Mining
212234	Copper Ore and Nickel Ore Mining
21229	Other Metal Ore Mining
212291	Uranium-Radium-Vanadium Ore Mining
212299	All Other Metal Ore Mining
2123	Nonmetallic Mineral Mining and Quarrying
21231	Stone Mining and Quarrying
212311	Dimension Stone Mining and Quarrying
212312	Crushed and Broken Limestone Mining and Quarrying
212313	Crushed and Broken Granite Mining and Quarrying
212319	Other Crushed and Broken Stone Mining and Quarrying
21232	Sand, Gravel, Clay, and Ceramic and Refractory Minerals Mining and Quarrying
212321	Construction Sand and Gravel Mining
212322	Industrial Sand Mining
212324	Kaolin and Ball Clay Mining
212325	Clay and Ceramic and Refractory Minerals Mining
21239	Other Nonmetallic Mineral Mining and Quarrying
212391	Potash, Soda, and Borate Mineral Mining
212392	Phosphate Rock Mining

212393	Other Chemical and Fertilizer Mineral Mining
212399	All Other Nonmetallic Mineral Mining
213	Support Activities for Mining
2131	Support Activities for Mining
21311	Support Activities for Mining
213111	Drilling Oil and Gas Wells
213112	Support Activities for Oil and Gas Operations
213113	Support Activities for Coal Mining
213114	Support Activities for Metal Mining
213115	Support Activities for Nonmetallic Minerals (except Fuels) Mining
22	Utilities
221	Utilities
2211	Electric Power Generation, Transmission and Distribution
22111	Electric Power Generation
221111	Hydroelectric Power Generation
221112	Fossil Fuel Electric Power Generation
221113	Nuclear Electric Power Generation
221114	Solar Electric Power Generation
221115	Wind Electric Power Generation
221116	Geothermal Electric Power Generation
221117	Biomass Electric Power Generation
221118	Other Electric Power Generation
22112	Electric Power Transmission, Control, and Distribution
221121	Electric Bulk Power Transmission and Control
221122	Electric Power Distribution
2212	Natural Gas Distribution
22121	Natural Gas Distribution
221210	Natural Gas Distribution
2213	Water, Sewage and Other Systems
22131	Water Supply and Irrigation Systems
221310	Water Supply and Irrigation Systems
22132	Sewage Treatment Facilities
221320	Sewage Treatment Facilities
22133	Steam and Air-Conditioning Supply

221330	Steam and Air-Conditioning Supply
23	Construction
236	Construction of Buildings
2361	Residential Building Construction
23611	Residential Building Construction
236115	New Single-Family Housing Construction (except For-Sale Builders)
236116	New Multifamily Housing Construction (except For-Sale Builders)
236117	New Housing For-Sale Builders
236118	Residential Remodelers
2362	Nonresidential Building Construction
23621	Industrial Building Construction
236210	Industrial Building Construction
23622	Commercial and Institutional Building Construction
236220	Commercial and Institutional Building Construction
237	Heavy and Civil Engineering Construction
2371	Utility System Construction
23711	Water and Sewer Line and Related Structures Construction
237110	Water and Sewer Line and Related Structures Construction
23712	Oil and Gas Pipeline and Related Structures Construction
237120	Oil and Gas Pipeline and Related Structures Construction
23713	Power and Communication Line and Related Structures Construction
237130	Power and Communication Line and Related Structures Construction
2372	Land Subdivision
23721	Land Subdivision
237210	Land Subdivision
2373	Highway, Street, and Bridge Construction
23731	Highway, Street, and Bridge Construction
237310	Highway, Street, and Bridge Construction
2379	Other Heavy and Civil Engineering Construction
23799	Other Heavy and Civil Engineering Construction
237990	Other Heavy and Civil Engineering Construction
238	Specialty Trade Contractors
2381	Foundation, Structure, and Building Exterior Contractors

23811	Poured Concrete Foundation and Structure Contractors
238110	Poured Concrete Foundation and Structure Contractors
23812	Structural Steel and Precast Concrete Contractors
238120	Structural Steel and Precast Concrete Contractors
23813	Framing Contractors
238130	Framing Contractors
23814	Masonry Contractors
238140	Masonry Contractors
23815	Glass and Glazing Contractors
238150	Glass and Glazing Contractors
23816	Roofing Contractors
238160	Roofing Contractors
23817	Siding Contractors
238170	Siding Contractors
23819	Other Foundation, Structure, and Building Exterior Contractors
238190	Other Foundation, Structure, and Building Exterior Contractors
2382	Building Equipment Contractors
23821	Electrical Contractors and Other Wiring Installation Contractors
238210	Electrical Contractors and Other Wiring Installation Contractors
23822	Plumbing, Heating, and Air-Conditioning Contractors
238220	Plumbing, Heating, and Air-Conditioning Contractors
23829	Other Building Equipment Contractors
238290	Other Building Equipment Contractors
2383	Building Finishing Contractors
23831	Drywall and Insulation Contractors
238310	Drywall and Insulation Contractors
23832	Painting and Wall Covering Contractors
238320	Painting and Wall Covering Contractors
23833	Flooring Contractors
238330	Flooring Contractors
23834	Tile and Terrazzo Contractors
238340	Tile and Terrazzo Contractors
23835	Finish Carpentry Contractors

238350	Finish Carpentry Contractors
23839	Other Building Finishing Contractors
238390	Other Building Finishing Contractors
2389	Other Specialty Trade Contractors
23891	Site Preparation Contractors
238910	Site Preparation Contractors
23899	All Other Specialty Trade Contractors
238990	All Other Specialty Trade Contractors
31-33	Manufacturing
311	Food Manufacturing
3111	Animal Food Manufacturing
31111	Animal Food Manufacturing
311111	Dog and Cat Food Manufacturing
311119	Other Animal Food Manufacturing
3112	Grain and Oilseed Milling
31121	Flour Milling and Malt Manufacturing
311211	Flour Milling
311212	Rice Milling
311213	Malt Manufacturing
31122	Starch and Vegetable Fats and Oils Manufacturing
311221	Wet Corn Milling
311224	Soybean and Other Oilseed Processing
311225	Fats and Oils Refining and Blending
31123	Breakfast Cereal Manufacturing
311230	Breakfast Cereal Manufacturing
3113	Sugar and Confectionery Product Manufacturing
31131	Sugar Manufacturing
311313	Beet Sugar Manufacturing
311314	Cane Sugar Manufacturing
31134	Nonchocolate Confectionery Manufacturing
311340	Nonchocolate Confectionery Manufacturing
31135	Chocolate and Confectionery Manufacturing
311351	Chocolate and Confectionery Manufacturing from Cacao Beans
311352	Confectionery Manufacturing from Purchased Chocolate
3114	Fruit and Vegetable Preserving and Specialty Food

Manufacturing

31141	Frozen Food Manufacturing
311411	Frozen Fruit, Juice, and Vegetable Manufacturing
311412	Frozen Specialty Food Manufacturing
31142	Fruit and Vegetable Canning, Pickling, and Drying
311421	Fruit and Vegetable Canning
311422	Specialty Canning
311423	Dried and Dehydrated Food Manufacturing
3115	Dairy Product Manufacturing
31151	Dairy Product (except Frozen) Manufacturing
311511	Fluid Milk Manufacturing
311512	Creamery Butter Manufacturing
311513	Cheese Manufacturing
311514	Dry, Condensed, and Evaporated Dairy Product Manufacturing
31152	Ice Cream and Frozen Dessert Manufacturing
311520	Ice Cream and Frozen Dessert Manufacturing
3116	Animal Slaughtering and Processing
31161	Animal Slaughtering and Processing
311611	Animal (except Poultry) Slaughtering
311612	Meat Processed from Carcasses
311613	Rendering and Meat Byproduct Processing
311615	Poultry Processing
3117	Seafood Product Preparation and Packaging
31171	Seafood Product Preparation and Packaging
311710	Seafood Product Preparation and Packaging
3118	Bakeries and Tortilla Manufacturing
31181	Bread and Bakery Product Manufacturing
311811	Retail Bakeries
311812	Commercial Bakeries
311813	Frozen Cakes, Pies, and Other Pastries Manufacturing
31182	Cookie, Cracker, and Pasta Manufacturing
311821	Cookie and Cracker Manufacturing
311824	Dry Pasta, Dough, and Flour Mixes Manufacturing from Purchased Flour
31183	Tortilla Manufacturing

311830	Tortilla Manufacturing
3119	Other Food Manufacturing
31191	Snack Food Manufacturing
311911	Roasted Nuts and Peanut Butter Manufacturing
311919	Other Snack Food Manufacturing
31192	Coffee and Tea Manufacturing
311920	Coffee and Tea Manufacturing
31193	Flavoring Syrup and Concentrate Manufacturing
311930	Flavoring Syrup and Concentrate Manufacturing
31194	Seasoning and Dressing Manufacturing
311941	Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing
311942	Spice and Extract Manufacturing
31199	All Other Food Manufacturing
311991	Perishable Prepared Food Manufacturing
311999	All Other Miscellaneous Food Manufacturing
312	Beverage and Tobacco Product Manufacturing
3121	Beverage Manufacturing
31211	Soft Drink and Ice Manufacturing
312111	Soft Drink Manufacturing
312112	Bottled Water Manufacturing
312113	Ice Manufacturing
31212	Breweries
312120	Breweries
31213	Wineries
312130	Wineries
31214	Distilleries
312140	Distilleries
3122	Tobacco Manufacturing
31223	Tobacco Manufacturing
312230	Tobacco Manufacturing
313	Textile Mills
3131	Fiber, Yarn, and Thread Mills
31311	Fiber, Yarn, and Thread Mills
313110	Fiber, Yarn, and Thread Mills
3132	Fabric Mills

31321	Broadwoven Fabric Mills
313210	Broadwoven Fabric Mills
31322	Narrow Fabric Mills and Schiffli Machine Embroidery
313220	Narrow Fabric Mills and Schiffli Machine Embroidery
31323	Nonwoven Fabric Mills
313230	Nonwoven Fabric Mills
31324	Knit Fabric Mills
313240	Knit Fabric Mills
3133	Textile and Fabric Finishing and Fabric Coating Mills
31331	Textile and Fabric Finishing Mills
313310	Textile and Fabric Finishing Mills
31332	Fabric Coating Mills
313320	Fabric Coating Mills
314	Textile Product Mills
3141	Textile Furnishings Mills
31411	Carpet and Rug Mills
314110	Carpet and Rug Mills
31412	Curtain and Linen Mills
314120	Curtain and Linen Mills
3149	Other Textile Product Mills
31491	Textile Bag and Canvas Mills
314910	Textile Bag and Canvas Mills
31499	All Other Textile Product Mills
314994	Rope, Cordage, Twine, Tire Cord, and Tire Fabric Mills
314999	All Other Miscellaneous Textile Product Mills
315	Apparel Manufacturing
3151	Apparel Knitting Mills
31511	Hosiery and Sock Mills
315110	Hosiery and Sock Mills
31519	Other Apparel Knitting Mills
315190	Other Apparel Knitting Mills
3152	Cut and Sew Apparel Manufacturing
31521	Cut and Sew Apparel Contractors
315210	Cut and Sew Apparel Contractors
31522	Men's and Boys' Cut and Sew Apparel Manufacturing

315220	Men's and Boys' Cut and Sew Apparel Manufacturing
31524	Women's, Girls', and Infants' Cut and Sew Apparel Manufacturing
315240	Women's, Girls', and Infants' Cut and Sew Apparel Manufacturing
31528	Other Cut and Sew Apparel Manufacturing
315280	Other Cut and Sew Apparel Manufacturing
3159	Apparel Accessories and Other Apparel Manufacturing
31599	Apparel Accessories and Other Apparel Manufacturing
315990	Apparel Accessories and Other Apparel Manufacturing
316	Leather and Allied Product Manufacturing
3161	Leather and Hide Tanning and Finishing
31611	Leather and Hide Tanning and Finishing
316110	Leather and Hide Tanning and Finishing
3162	Footwear Manufacturing
31621	Footwear Manufacturing
316210	Footwear Manufacturing
3169	Other Leather and Allied Product Manufacturing
31699	Other Leather and Allied Product Manufacturing
316992	Women's Handbag and Purse Manufacturing
316998	All Other Leather Good and Allied Product Manufacturing
321	Wood Product Manufacturing
3211	Sawmills and Wood Preservation
32111	Sawmills and Wood Preservation
321113	Sawmills
321114	Wood Preservation
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing
32121	Veneer, Plywood, and Engineered Wood Product Manufacturing
321211	Hardwood Veneer and Plywood Manufacturing
321212	Softwood Veneer and Plywood Manufacturing
321213	Engineered Wood Member (except Truss) Manufacturing
321214	Truss Manufacturing
321219	Reconstituted Wood Product Manufacturing
3219	Other Wood Product Manufacturing
32191	Millwork

321911	Wood Window and Door Manufacturing
321912	Cut Stock, Resawing Lumber, and Planning
321918	Other Millwork (including Flooring)
32192	Wood Container and Pallet Manufacturing
321920	Wood Container and Pallet Manufacturing
32199	All Other Wood Product Manufacturing
321991	Manufactured Home (Mobile Home) Manufacturing
321992	Prefabricated Wood Building Manufacturing
321999	All Other Miscellaneous Wood Product Manufacturing
322	Paper Manufacturing
3221	Pulp, Paper, and Paperboard Mills
32211	Pulp Mills
322110	Pulp Mills
32212	Paper Mills
322121	Paper (except Newsprint) Mills
322122	Newsprint Mills
32213	Paperboard Mills
322130	Paperboard Mills
3222	Converted Paper Product Manufacturing
32221	Paperboard Container Manufacturing
322211	Corrugated and Solid Fiber Box Manufacturing
322212	Folding Paperboard Box Manufacturing
322219	Other Paperboard Container Manufacturing
32222	Paper Bag and Coated and Treated Paper Manufacturing
322220	Paper Bag and Coated and Treated Paper Manufacturing
32223	Stationery Product Manufacturing
322230	Stationery Product Manufacturing
32229	Other Converted Paper Product Manufacturing
322291	Sanitary Paper Product Manufacturing
322299	All Other Converted Paper Product Manufacturing
323	Printing and Related Support Activities
3231	Printing and Related Support Activities
32311	Printing
323111	Commercial Printing (except Screen and Books)
323113	Commercial Screen Printing

323117	Books Printing
32312	Support Activities for Printing
323120	Support Activities for Printing
324	Petroleum and Coal Products Manufacturing
3241	Petroleum and Coal Products Manufacturing
32411	Petroleum Refineries
324110	Petroleum Refineries
32412	Asphalt Paving, Roofing, and Saturated Materials Manufacturing
324121	Asphalt Paving Mixture and Block Manufacturing
324122	Asphalt Shingle and Coating Materials Manufacturing
32419	Other Petroleum and Coal Products Manufacturing
324191	Petroleum Lubricating Oil and Grease Manufacturing
324199	All Other Petroleum and Coal Products Manufacturing
325	Chemical Manufacturing
3251	Basic Chemical Manufacturing
32511	Petrochemical Manufacturing
325110	Petrochemical Manufacturing
32512	Industrial Gas Manufacturing
325120	Industrial Gas Manufacturing
32513	Synthetic Dye and Pigment Manufacturing
325130	Synthetic Dye and Pigment Manufacturing
32518	Other Basic Inorganic Chemical Manufacturing
325180	Other Basic Inorganic Chemical Manufacturing
32519	Other Basic Organic Chemical Manufacturing
325193	Ethyl Alcohol Manufacturing
325194	Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing
325199	All Other Basic Organic Chemical Manufacturing
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing
32521	Resin and Synthetic Rubber Manufacturing
325211	Plastics Material and Resin Manufacturing
325212	Synthetic Rubber Manufacturing
32522	Artificial and Synthetic Fibers and Filaments Manufacturing
325220	Artificial and Synthetic Fibers and Filaments Manufacturing

3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing
32531	Fertilizer Manufacturing
325311	Nitrogenous Fertilizer Manufacturing
325312	Phosphatic Fertilizer Manufacturing
325314	Fertilizer (Mixing Only) Manufacturing
32532	Pesticide and Other Agricultural Chemical Manufacturing
325320	Pesticide and Other Agricultural Chemical Manufacturing
3254	Pharmaceutical and Medicine Manufacturing
32541	Pharmaceutical and Medicine Manufacturing
325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
3255	Paint, Coating, and Adhesive Manufacturing
32551	Paint and Coating Manufacturing
325510	Paint and Coating Manufacturing
32552	Adhesive Manufacturing
325520	Adhesive Manufacturing
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing
32561	Soap and Cleaning Compound Manufacturing
325611	Soap and Other Detergent Manufacturing
325612	Polish and Other Sanitation Good Manufacturing
325613	Surface Active Agent Manufacturing
32562	Toilet Preparation Manufacturing
325620	Toilet Preparation Manufacturing
3259	Other Chemical Product and Preparation Manufacturing
32591	Printing Ink Manufacturing
325910	Printing Ink Manufacturing
32592	Explosives Manufacturing
325920	Explosives Manufacturing
32599	All Other Chemical Product and Preparation Manufacturing
325991	Custom Compounding of Purchased Resins
325992	Photographic Film, Paper, Plate, and Chemical

	Manufacturing
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing
326	Plastics and Rubber Products Manufacturing
3261	Plastics Product Manufacturing
32611	Plastics Packaging Materials and Unlaminated Film and Sheet Manufacturing
326111	Plastics Bag and Pouch Manufacturing
326112	Plastics Packaging Film and Sheet (including Laminated) Manufacturing
326113	Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing
32612	Plastics Pipe, Pipe Fitting, and Unlaminated Profile Shape Manufacturing
326121	Unlaminated Plastics Profile Shape Manufacturing
326122	Plastics Pipe and Pipe Fitting Manufacturing
32613	Laminated Plastics Plate, Sheet (except Packaging), and Shape Manufacturing
326130	Laminated Plastics Plate, Sheet (except Packaging), and Shape Manufacturing
32614	Polystyrene Foam Product Manufacturing
326140	Polystyrene Foam Product Manufacturing
32615	Urethane and Other Foam Product (except Polystyrene) Manufacturing
326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing
32616	Plastics Bottle Manufacturing
326160	Plastics Bottle Manufacturing
32619	Other Plastics Product Manufacturing
326191	Plastics Plumbing Fixture Manufacturing
326199	All Other Plastics Product Manufacturing
3262	Rubber Product Manufacturing
32621	Tire Manufacturing
326211	Tire Manufacturing (except Retreading)
326212	Tire Retreading
32622	Rubber and Plastics Hoses and Belting Manufacturing
326220	Rubber and Plastics Hoses and Belting Manufacturing

32629	Other Rubber Product Manufacturing
326291	Rubber Product Manufacturing for Mechanical Use
326299	All Other Rubber Product Manufacturing
327	Nonmetallic Mineral Product Manufacturing
3271	Clay Product and Refractory Manufacturing
32711	Pottery, Ceramics, and Plumbing Fixture Manufacturing
327110	Pottery, Ceramics, and Plumbing Fixture Manufacturing
32712	Clay Building Material and Refractories Manufacturing
327120	Clay Building Material and Refractories Manufacturing
3272	Glass and Glass Product Manufacturing
32721	Glass and Glass Product Manufacturing
327211	Flat Glass Manufacturing
327212	Other Pressed and Blown Glass and Glassware Manufacturing
327213	Glass Container Manufacturing
327215	Glass Product Manufacturing Made of Purchased Glass
3273	Cement and Concrete Product Manufacturing
32731	Cement Manufacturing
327310	Cement Manufacturing
32732	Ready-Mix Concrete Manufacturing
327320	Ready-Mix Concrete Manufacturing
32733	Concrete Pipe, Brick, and Block Manufacturing
327331	Concrete Block and Brick Manufacturing
327332	Concrete Pipe Manufacturing
32739	Other Concrete Product Manufacturing
327390	Other Concrete Product Manufacturing
3274	Lime and Gypsum Product Manufacturing
32741	Lime Manufacturing
327410	Lime Manufacturing
32742	Gypsum Product Manufacturing
327420	Gypsum Product Manufacturing
3279	Other Nonmetallic Mineral Product Manufacturing
32791	Abrasive Product Manufacturing
327910	Abrasive Product Manufacturing
32799	All Other Nonmetallic Mineral Product Manufacturing
327991	Cut Stone and Stone Product Manufacturing

327992	Ground or Treated Mineral and Earth Manufacturing
327993	Mineral Wool Manufacturing
327999	All Other Miscellaneous Nonmetallic Mineral Product Manufacturing
331	Primary Metal Manufacturing
3311	Iron and Steel Mills and Ferroalloy Manufacturing
33111	Iron and Steel Mills and Ferroalloy Manufacturing
331110	Iron and Steel Mills and Ferroalloy Manufacturing
3312	Steel Product Manufacturing from Purchased Steel
33121	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel
331210	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel
33122	Rolling and Drawing of Purchased Steel
331221	Rolled Steel Shape Manufacturing
331222	Steel Wire Drawing
3313	Alumina and Aluminum Production and Processing
33131	Alumina and Aluminum Production and Processing
331313	Alumina Refining and Primary Aluminum Production
331314	Secondary Smelting and Alloying of Aluminum
331315	Aluminum Sheet, Plate, and Foil Manufacturing
331318	Other Aluminum Rolling, Drawing, and Extruding
3314	Nonferrous Metal (except Aluminum) Production and Processing
33141	Nonferrous Metal (except Aluminum) Smelting and Refining
331410	Nonferrous Metal (except Aluminum) Smelting and Refining
33142	Copper Rolling, Drawing, Extruding, and Alloying
331420	Copper Rolling, Drawing, Extruding, and Alloying
33149	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, Extruding, and Alloying
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)
3315	Foundries
33151	Ferrous Metal Foundries
331511	Iron Foundries

331512	Steel Investment Foundries
331513	Steel Foundries (except Investment)
33152	Nonferrous Metal Foundries
331523	Nonferrous Metal Die-Casting Foundries
331524	Aluminum Foundries (except Die-Casting)
331529	Other Nonferrous Metal Foundries (except Die-Casting)
332	Fabricated Metal Product Manufacturing
3321	Forging and Stamping
33211	Forging and Stamping
332111	Iron and Steel Forging
332112	Nonferrous Forging
332114	Custom Roll Forming
332117	Powder Metallurgy Part Manufacturing
332119	Metal Crown, Closure, and Other Metal Stamping (except Automotive)
3322	Cutlery and Handtool Manufacturing
33221	Cutlery and Handtool Manufacturing
332215	Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing
332216	Saw Blade and Handtool Manufacturing
3323	Architectural and Structural Metals Manufacturing
33231	Plate Work and Fabricated Structural Product Manufacturing
332311	Prefabricated Metal Building and Component Manufacturing
332312	Fabricated Structural Metal Manufacturing
332313	Plate Work Manufacturing
33232	Ornamental and Architectural Metal Products Manufacturing
332321	Metal Window and Door Manufacturing
332322	Sheet Metal Work Manufacturing
332323	Ornamental and Architectural Metal Work Manufacturing
3324	Boiler, Tank, and Shipping Container Manufacturing
33241	Power Boiler and Heat Exchanger Manufacturing
332410	Power Boiler and Heat Exchanger Manufacturing
33242	Metal Tank (Heavy Gauge) Manufacturing
332420	Metal Tank (Heavy Gauge) Manufacturing

33243	Metal Can, Box, and Other Metal Container (Light Gauge) Manufacturing
332431	Metal Can Manufacturing
332439	Other Metal Container Manufacturing
3325	Hardware Manufacturing
33251	Hardware Manufacturing
332510	Hardware Manufacturing
3326	Spring and Wire Product Manufacturing
33261	Spring and Wire Product Manufacturing
332613	Spring Manufacturing
332618	Other Fabricated Wire Product Manufacturing
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
33271	Machine Shops
332710	Machine Shops
33272	Turned Product and Screw, Nut, and Bolt Manufacturing
332721	Precision Turned Product Manufacturing
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing
3328	Coating, Engraving, Heat Treating, and Allied Activities
33281	Coating, Engraving, Heat Treating, and Allied Activities
332811	Metal Heat Treating
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring
3329	Other Fabricated Metal Product Manufacturing
33291	Metal Valve Manufacturing
332911	Industrial Valve Manufacturing
332912	Fluid Power Valve and Hose Fitting Manufacturing
332913	Plumbing Fixture Fitting and Trim Manufacturing
332919	Other Metal Valve and Pipe Fitting Manufacturing
33299	All Other Fabricated Metal Product Manufacturing
332991	Ball and Roller Bearing Manufacturing
332992	Small Arms Ammunition Manufacturing
332993	Ammunition (except Small Arms) Manufacturing
332994	Small Arms, Ordnance, and Ordnance Accessories Manufacturing

332996	Fabricated Pipe and Pipe Fitting Manufacturing
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing
333	Machinery Manufacturing
3331	Agriculture, Construction, and Mining Machinery Manufacturing
33311	Agricultural Implement Manufacturing
333111	Farm Machinery and Equipment Manufacturing
333112	Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing
33312	Construction Machinery Manufacturing
333120	Construction Machinery Manufacturing
33313	Mining and Oil and Gas Field Machinery Manufacturing
333131	Mining Machinery and Equipment Manufacturing
333132	Oil and Gas Field Machinery and Equipment Manufacturing
3332	Industrial Machinery Manufacturing
33324	Industrial Machinery Manufacturing
333241	Food Product Machinery Manufacturing
333242	Semiconductor Machinery Manufacturing
333243	Sawmill, Woodworking, and Paper Machinery Manufacturing
333244	Printing Machinery and Equipment Manufacturing
333249	Other Industrial Machinery Manufacturing
3333	Commercial and Service Industry Machinery Manufacturing
33331	Commercial and Service Industry Machinery Manufacturing
333314	Optical Instrument and Lens Manufacturing
333316	Photographic and Photocopying Equipment Manufacturing
333318	Other Commercial and Service Industry Machinery Manufacturing
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing
33341	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing
333413	Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment

	Manufacturing
3335	Metalworking Machinery Manufacturing
33351	Metalworking Machinery Manufacturing
333511	Industrial Mold Manufacturing
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing
333515	Cutting Tool and Machine Tool Accessory Manufacturing
333517	Machine Tool Manufacturing
333519	Rolling Mill and Other Metalworking Machinery Manufacturing
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing
33361	Engine, Turbine, and Power Transmission Equipment Manufacturing
333611	Turbine and Turbine Generator Set Units Manufacturing
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing
333613	Mechanical Power Transmission Equipment Manufacturing
333618	Other Engine Equipment Manufacturing
3339	Other General Purpose Machinery Manufacturing
33391	Pump and Compressor Manufacturing
333911	Pump and Pumping Equipment Manufacturing
333912	Air and Gas Compressor Manufacturing
333913	Measuring and Dispensing Pump Manufacturing
33392	Material Handling Equipment Manufacturing
333921	Elevator and Moving Stairway Manufacturing
333922	Conveyor and Conveying Equipment Manufacturing
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing
33399	All Other General Purpose Machinery Manufacturing
333991	Power-Driven Handtool Manufacturing
333992	Welding and Soldering Equipment Manufacturing
333993	Packaging Machinery Manufacturing
333994	Industrial Process Furnace and Oven Manufacturing
333995	Fluid Power Cylinder and Actuator Manufacturing
333996	Fluid Power Pump and Motor Manufacturing

333997	Scale and Balance Manufacturing
333999	All Other Miscellaneous General Purpose Machinery Manufacturing
334	Computer and Electronic Product Manufacturing
3341	Computer and Peripheral Equipment Manufacturing
33411	Computer and Peripheral Equipment Manufacturing
334111	Electronic Computer Manufacturing
334112	Computer Storage Device Manufacturing
334118	Computer Terminal and Other Computer Peripheral Equipment Manufacturing
3342	Communications Equipment Manufacturing
33421	Telephone Apparatus Manufacturing
334210	Telephone Apparatus Manufacturing
33422	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
33429	Other Communications Equipment Manufacturing
334290	Other Communications Equipment Manufacturing
3343	Audio and Video Equipment Manufacturing
33431	Audio and Video Equipment Manufacturing
334310	Audio and Video Equipment Manufacturing
3344	Semiconductor and Other Electronic Component Manufacturing
33441	Semiconductor and Other Electronic Component Manufacturing
334412	Bare Printed Circuit Board Manufacturing
334413	Semiconductor and Related Device Manufacturing
334416	Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing
334417	Electronic Connector Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
334419	Other Electronic Component Manufacturing
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
33451	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing

334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
334514	Totalizing Fluid Meter and Counting Device Manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
3346	Manufacturing and Reproducing Magnetic and Optical Media
33461	Manufacturing and Reproducing Magnetic and Optical Media
334613	Blank Magnetic and Optical Recording Media Manufacturing
334614	Software and Other Prerecorded Compact Disc, Tape, and Record Reproducing
335	Electrical Equipment, Appliance, and Component Manufacturing
3351	Electric Lighting Equipment Manufacturing
33511	Electric Lamp Bulb and Part Manufacturing
335110	Electric Lamp Bulb and Part Manufacturing
33512	Lighting Fixture Manufacturing
335121	Residential Electric Lighting Fixture Manufacturing
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing
335129	Other Lighting Equipment Manufacturing
3352	Household Appliance Manufacturing
33521	Small Electrical Appliance Manufacturing
335210	Small Electrical Appliance Manufacturing
33522	Major Appliance Manufacturing
335221	Household Cooking Appliance Manufacturing
335222	Household Refrigerator and Home Freezer Manufacturing

335224	Household Laundry Equipment Manufacturing
335228	Other Major Household Appliance Manufacturing
3353	Electrical Equipment Manufacturing
33531	Electrical Equipment Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing
335312	Motor and Generator Manufacturing
335313	Switchgear and Switchboard Apparatus Manufacturing
335314	Relay and Industrial Control Manufacturing
3359	Other Electrical Equipment and Component Manufacturing
33591	Battery Manufacturing
335911	Storage Battery Manufacturing
335912	Primary Battery Manufacturing
33592	Communication and Energy Wire and Cable Manufacturing
335921	Fiber Optic Cable Manufacturing
335929	Other Communication and Energy Wire Manufacturing
33593	Wiring Device Manufacturing
335931	Current-Carrying Wiring Device Manufacturing
335932	Noncurrent-Carrying Wiring Device Manufacturing
33599	All Other Electrical Equipment and Component Manufacturing
335991	Carbon and Graphite Product Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing
336	Transportation Equipment Manufacturing
3361	Motor Vehicle Manufacturing
33611	Automobile and Light Duty Motor Vehicle Manufacturing
336111	Automobile Manufacturing
336112	Light Truck and Utility Vehicle Manufacturing
33612	Heavy Duty Truck Manufacturing
336120	Heavy Duty Truck Manufacturing
3362	Motor Vehicle Body and Trailer Manufacturing
33621	Motor Vehicle Body and Trailer Manufacturing
336211	Motor Vehicle Body Manufacturing
336212	Truck Trailer Manufacturing
336213	Motor Home Manufacturing

336214	Travel Trailer and Camper Manufacturing
3363	Motor Vehicle Parts Manufacturing
33631	Motor Vehicle Gasoline Engine and Engine Parts Manufacturing
336310	Motor Vehicle Gasoline Engine and Engine Parts Manufacturing
33632	Motor Vehicle Electrical and Electronic Equipment Manufacturing
336320	Motor Vehicle Electrical and Electronic Equipment Manufacturing
33633	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
33634	Motor Vehicle Brake System Manufacturing
336340	Motor Vehicle Brake System Manufacturing
33635	Motor Vehicle Transmission and Power Train Parts Manufacturing
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing
33636	Motor Vehicle Seating and Interior Trim Manufacturing
336360	Motor Vehicle Seating and Interior Trim Manufacturing
33637	Motor Vehicle Metal Stamping
336370	Motor Vehicle Metal Stamping
33639	Other Motor Vehicle Parts Manufacturing
336390	Other Motor Vehicle Parts Manufacturing
3364	Aerospace Product and Parts Manufacturing
33641	Aerospace Product and Parts Manufacturing
336411	Aircraft Manufacturing
336412	Aircraft Engine and Engine Parts Manufacturing
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing
336414	Guided Missile and Space Vehicle Manufacturing
336415	Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing
3365	Railroad Rolling Stock Manufacturing
33651	Railroad Rolling Stock Manufacturing
336510	Railroad Rolling Stock Manufacturing

3366	Ship and Boat Building
33661	Ship and Boat Building
336611	Ship Building and Repairing
336612	Boat Building
3369	Other Transportation Equipment Manufacturing
33699	Other Transportation Equipment Manufacturing
336991	Motorcycle, Bicycle, and Parts Manufacturing
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing
336999	All Other Transportation Equipment Manufacturing
337	Furniture and Related Product Manufacturing
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing
33711	Wood Kitchen Cabinet and Countertop Manufacturing
337110	Wood Kitchen Cabinet and Countertop Manufacturing
33712	Household and Institutional Furniture Manufacturing
337121	Upholstered Household Furniture Manufacturing
337122	Nonupholstered Wood Household Furniture Manufacturing
337124	Metal Household Furniture Manufacturing
337125	Household Furniture (except Wood and Metal) Manufacturing
337127	Institutional Furniture Manufacturing
3372	Office Furniture (including Fixtures) Manufacturing
33721	Office Furniture (including Fixtures) Manufacturing
337211	Wood Office Furniture Manufacturing
337212	Custom Architectural Woodwork and Millwork Manufacturing
337214	Office Furniture (except Wood) Manufacturing
337215	Showcase, Partition, Shelving, and Locker Manufacturing
3379	Other Furniture Related Product Manufacturing
33791	Mattress Manufacturing
337910	Mattress Manufacturing
33792	Blind and Shade Manufacturing
337920	Blind and Shade Manufacturing
339	Miscellaneous Manufacturing
3391	Medical Equipment and Supplies Manufacturing
33911	Medical Equipment and Supplies Manufacturing

339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339114	Dental Equipment and Supplies Manufacturing
339115	Ophthalmic Goods Manufacturing
339116	Dental Laboratories
3399	Other Miscellaneous Manufacturing
33991	Jewelry and Silverware Manufacturing
339910	Jewelry and Silverware Manufacturing
33992	Sporting and Athletic Goods Manufacturing
339920	Sporting and Athletic Goods Manufacturing
33993	Doll, Toy, and Game Manufacturing
339930	Doll, Toy, and Game Manufacturing
33994	Office Supplies (except Paper) Manufacturing
339940	Office Supplies (except Paper) Manufacturing
33995	Sign Manufacturing
339950	Sign Manufacturing
33999	All Other Miscellaneous Manufacturing
339991	Gasket, Packing, and Sealing Device Manufacturing
339992	Musical Instrument Manufacturing
339993	Fastener, Button, Needle, and Pin Manufacturing
339994	Broom, Brush, and Mop Manufacturing
339995	Burial Casket Manufacturing
339999	All Other Miscellaneous Manufacturing
42	Wholesale Trade
423	Merchant Wholesalers, Durable Goods
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers
42311	Automobile and Other Motor Vehicle Merchant Wholesalers
423110	Automobile and Other Motor Vehicle Merchant Wholesalers
42312	Motor Vehicle Supplies and New Parts Merchant Wholesalers
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers
42313	Tire and Tube Merchant Wholesalers
423130	Tire and Tube Merchant Wholesalers
42314	Motor Vehicle Parts (Used) Merchant Wholesalers

423140	Motor Vehicle Parts (Used) Merchant Wholesalers
4232	Furniture and Home Furnishing Merchant Wholesalers
42321	Furniture Merchant Wholesalers
423210	Furniture Merchant Wholesalers
42322	Home Furnishing Merchant Wholesalers
423220	Home Furnishing Merchant Wholesalers
4233	Lumber and Other Construction Materials Merchant Wholesalers
42331	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers
42332	Brick, Stone, and Related Construction Material Merchant Wholesalers
423320	Brick, Stone, and Related Construction Material Merchant Wholesalers
42333	Roofing, Siding, and Insulation Material Merchant Wholesalers
423330	Roofing, Siding, and Insulation Material Merchant Wholesalers
42339	Other Construction Material Merchant Wholesalers
423390	Other Construction Material Merchant Wholesalers
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers
42341	Photographic Equipment and Supplies Merchant Wholesalers
423410	Photographic Equipment and Supplies Merchant Wholesalers
42342	Office Equipment Merchant Wholesalers
423420	Office Equipment Merchant Wholesalers
42343	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers
42344	Other Commercial Equipment Merchant Wholesalers
423440	Other Commercial Equipment Merchant Wholesalers
42345	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
42346	Ophthalmic Goods Merchant Wholesalers

423460	Ophthalmic Goods Merchant Wholesalers
42349	Other Professional Equipment and Supplies Merchant Wholesalers
423490	Other Professional Equipment and Supplies Merchant Wholesalers
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers
42351	Metal Service Centers and Other Metal Merchant Wholesalers
423510	Metal Service Centers and Other Metal Merchant Wholesalers
42352	Coal and Other Mineral and Ore Merchant Wholesalers
423520	Coal and Other Mineral and Ore Merchant Wholesalers
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers
42361	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers
42362	Household Appliances, Electric Housewares, and Consumer Electronics Merchant Wholesalers
423620	Household Appliances, Electric Housewares, and Consumer Electronics Merchant Wholesalers
42369	Other Electronic Parts and Equipment Merchant Wholesalers
423690	Other Electronic Parts and Equipment Merchant Wholesalers
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers
42371	Hardware Merchant Wholesalers
423710	Hardware Merchant Wholesalers
42372	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers
42373	Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers
423730	Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers
42374	Refrigeration Equipment and Supplies Merchant Wholesalers
423740	Refrigeration Equipment and Supplies Merchant Wholesalers
4238	Machinery, Equipment, and Supplies Merchant

Wholesalers

42381	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers
42382	Farm and Garden Machinery and Equipment Merchant Wholesalers
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers
42383	Industrial Machinery and Equipment Merchant Wholesalers
423830	Industrial Machinery and Equipment Merchant Wholesalers
42384	Industrial Supplies Merchant Wholesalers
423840	Industrial Supplies Merchant Wholesalers
42385	Service Establishment Equipment and Supplies Merchant Wholesalers
423850	Service Establishment Equipment and Supplies Merchant Wholesalers
42386	Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers
423860	Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers
4239	Miscellaneous Durable Goods Merchant Wholesalers
42391	Sporting and Recreational Goods and Supplies Merchant Wholesalers
423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers
42392	Toy and Hobby Goods and Supplies Merchant Wholesalers
423920	Toy and Hobby Goods and Supplies Merchant Wholesalers
42393	Recyclable Material Merchant Wholesalers
423930	Recyclable Material Merchant Wholesalers
42394	Jewelry, Watch, Precious Stone, and Precious Metal Merchant Wholesalers
423940	Jewelry, Watch, Precious Stone, and Precious Metal Merchant Wholesalers
42399	Other Miscellaneous Durable Goods Merchant Wholesalers
423990	Other Miscellaneous Durable Goods Merchant Wholesalers
424	Merchant Wholesalers, Nondurable Goods
4241	Paper and Paper Product Merchant Wholesalers
42411	Printing and Writing Paper Merchant Wholesalers
424110	Printing and Writing Paper Merchant Wholesalers

42412	Stationery and Office Supplies Merchant Wholesalers
424120	Stationery and Office Supplies Merchant Wholesalers
42413	Industrial and Personal Service Paper Merchant Wholesalers
424130	Industrial and Personal Service Paper Merchant Wholesalers
4242	Drugs and Druggists' Sundries Merchant Wholesalers
42421	Drugs and Druggists' Sundries Merchant Wholesalers
424210	Drugs and Druggists' Sundries Merchant Wholesalers
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers
42431	Piece Goods, Notions, and Other Dry Goods Merchant Wholesalers
424310	Piece Goods, Notions, and Other Dry Goods Merchant Wholesalers
42432	Men's and Boys' Clothing and Furnishings Merchant Wholesalers
424320	Men's and Boys' Clothing and Furnishings Merchant Wholesalers
42433	Women's, Children's, and Infants' Clothing and Accessories Merchant Wholesalers
424330	Women's, Children's, and Infants' Clothing and Accessories Merchant Wholesalers
42434	Footwear Merchant Wholesalers
424340	Footwear Merchant Wholesalers
4244	Grocery and Related Product Merchant Wholesalers
42441	General Line Grocery Merchant Wholesalers
424410	General Line Grocery Merchant Wholesalers
42442	Packaged Frozen Food Merchant Wholesalers
424420	Packaged Frozen Food Merchant Wholesalers
42443	Dairy Product (except Dried or Canned) Merchant Wholesalers
424430	Dairy Product (except Dried or Canned) Merchant Wholesalers
42444	Poultry and Poultry Product Merchant Wholesalers
424440	Poultry and Poultry Product Merchant Wholesalers
42445	Confectionery Merchant Wholesalers
424450	Confectionery Merchant Wholesalers
42446	Fish and Seafood Merchant Wholesalers
424460	Fish and Seafood Merchant Wholesalers

42447	Meat and Meat Product Merchant Wholesalers
424470	Meat and Meat Product Merchant Wholesalers
42448	Fresh Fruit and Vegetable Merchant Wholesalers
424480	Fresh Fruit and Vegetable Merchant Wholesalers
42449	Other Grocery and Related Products Merchant Wholesalers
424490	Other Grocery and Related Products Merchant Wholesalers
4245	Farm Product Raw Material Merchant Wholesalers
42451	Grain and Field Bean Merchant Wholesalers
424510	Grain and Field Bean Merchant Wholesalers
42452	Livestock Merchant Wholesalers
424520	Livestock Merchant Wholesalers
42459	Other Farm Product Raw Material Merchant Wholesalers
424590	Other Farm Product Raw Material Merchant Wholesalers
4246	Chemical and Allied Products Merchant Wholesalers
42461	Plastics Materials and Basic Forms and Shapes Merchant Wholesalers
424610	Plastics Materials and Basic Forms and Shapes Merchant Wholesalers
42469	Other Chemical and Allied Products Merchant Wholesalers
424690	Other Chemical and Allied Products Merchant Wholesalers
4247	Petroleum and Petroleum Products Merchant Wholesalers
42471	Petroleum Bulk Stations and Terminals
424710	Petroleum Bulk Stations and Terminals
42472	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers
42481	Beer and Ale Merchant Wholesalers
424810	Beer and Ale Merchant Wholesalers
42482	Wine and Distilled Alcoholic Beverage Merchant Wholesalers
424820	Wine and Distilled Alcoholic Beverage Merchant Wholesalers
4249	Miscellaneous Nondurable Goods Merchant Wholesalers
42491	Farm Supplies Merchant Wholesalers

424910	Farm Supplies Merchant Wholesalers
42492	Book, Periodical, and Newspaper Merchant Wholesalers
424920	Book, Periodical, and Newspaper Merchant Wholesalers
42493	Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers
424930	Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers
42494	Tobacco and Tobacco Product Merchant Wholesalers
424940	Tobacco and Tobacco Product Merchant Wholesalers
42495	Paint, Varnish, and Supplies Merchant Wholesalers
424950	Paint, Varnish, and Supplies Merchant Wholesalers
42499	Other Miscellaneous Nondurable Goods Merchant Wholesalers
424990	Other Miscellaneous Nondurable Goods Merchant Wholesalers
425	Wholesale Electronic Markets and Agents and Brokers
4251	Wholesale Electronic Markets and Agents and Brokers
42511	Business to Business Electronic Markets
425110	Business to Business Electronic Markets
42512	Wholesale Trade Agents and Brokers
425120	Wholesale Trade Agents and Brokers
44-45	Retail Trade
441	Motor Vehicle and Parts Dealers
4411	Automobile Dealers
44111	New Car Dealers
441110	New Car Dealers
44112	Used Car Dealers
441120	Used Car Dealers
4412	Other Motor Vehicle Dealers
44121	Recreational Vehicle Dealers
441210	Recreational Vehicle Dealers
44122	Motorcycle, Boat, and Other Motor Vehicle Dealers
441222	Boat Dealers
441228	Motorcycle, ATV, and All Other Motor Vehicle Dealers
4413	Automotive Parts, Accessories, and Tire Stores
44131	Automotive Parts and Accessories Stores

441310	Automotive Parts and Accessories Stores
44132	Tire Dealers
441320	Tire Dealers
442	Furniture and Home Furnishings Stores
4421	Furniture Stores
44211	Furniture Stores
442110	Furniture Stores
4422	Home Furnishings Stores
44221	Floor Covering Stores
442210	Floor Covering Stores
44229	Other Home Furnishings Stores
442291	Window Treatment Stores
442299	All Other Home Furnishings Stores
443	Electronics and Appliance Stores
4431	Electronics and Appliance Stores
44314	Electronics and Appliance Stores
443141	Household Appliance Stores
443142	Electronics Stores
444	Building Material and Garden Equipment and Supplies Dealers
4441	Building Material and Supplies Dealers
44411	Home Centers
444110	Home Centers
44412	Paint and Wallpaper Stores
444120	Paint and Wallpaper Stores
44413	Hardware Stores
444130	Hardware Stores
44419	Other Building Material Dealers
444190	Other Building Material Dealers
4442	Lawn and Garden Equipment and Supplies Stores
44421	Outdoor Power Equipment Stores
444210	Outdoor Power Equipment Stores
44422	Nursery, Garden Center, and Farm Supply Stores
444220	Nursery, Garden Center, and Farm Supply Stores
445	Food and Beverage Stores

4451	Grocery Stores
44511	Supermarkets and Other Grocery (except Convenience) Stores
445110	Supermarkets and Other Grocery (except Convenience) Stores
44512	Convenience Stores
445120	Convenience Stores
4452	Specialty Food Stores
44521	Meat Markets
445210	Meat Markets
44522	Fish and Seafood Markets
445220	Fish and Seafood Markets
44523	Fruit and Vegetable Markets
445230	Fruit and Vegetable Markets
44529	Other Specialty Food Stores
445291	Baked Goods Stores
445292	Confectionery and Nut Stores
445299	All Other Specialty Food Stores
4453	Beer, Wine, and Liquor Stores
44531	Beer, Wine, and Liquor Stores
445310	Beer, Wine, and Liquor Stores
446	Health and Personal Care Stores
4461	Health and Personal Care Stores
44611	Pharmacies and Drug Stores
446110	Pharmacies and Drug Stores
44612	Cosmetics, Beauty Supplies, and Perfume Stores
446120	Cosmetics, Beauty Supplies, and Perfume Stores
44613	Optical Goods Stores
446130	Optical Goods Stores
44619	Other Health and Personal Care Stores
446191	Food (Health) Supplement Stores
446199	All Other Health and Personal Care Stores
447	Gasoline Stations
4471	Gasoline Stations
44711	Gasoline Stations with Convenience Stores
447110	Gasoline Stations with Convenience Stores

44719	Other Gasoline Stations
447190	Other Gasoline Stations
448	Clothing and Clothing Accessories Stores
4481	Clothing Stores
44811	Men's Clothing Stores
448110	Men's Clothing Stores
44812	Women's Clothing Stores
448120	Women's Clothing Stores
44813	Children's and Infants' Clothing Stores
448130	Children's and Infants' Clothing Stores
44814	Family Clothing Stores
448140	Family Clothing Stores
44815	Clothing Accessories Stores
448150	Clothing Accessories Stores
44819	Other Clothing Stores
448190	Other Clothing Stores
4482	Shoe Stores
44821	Shoe Stores
448210	Shoe Stores
4483	Jewelry, Luggage, and Leather Goods Stores
44831	Jewelry Stores
448310	Jewelry Stores
44832	Luggage and Leather Goods Stores
448320	Luggage and Leather Goods Stores
451	Sporting Goods, Hobby, Musical Instrument, and Book Stores
4511	Sporting Goods, Hobby, and Musical Instrument Stores
45111	Sporting Goods Stores
451110	Sporting Goods Stores
45112	Hobby, Toy, and Game Stores
451120	Hobby, Toy, and Game Stores
45113	Sewing, Needlework, and Piece Goods Stores
451130	Sewing, Needlework, and Piece Goods Stores
45114	Musical Instrument and Supplies Stores
451140	Musical Instrument and Supplies Stores

4512	Book Stores and News Dealers
45121	Book Stores and News Dealers
451211	Book Stores
451212	News Dealers and Newsstands
452	General Merchandise Stores
4521	Department Stores
45211	Department Stores
452111	Department Stores (except Discount Department Stores)
452112	Discount Department Stores
4529	Other General Merchandise Stores
45291	Warehouse Clubs and Supercenters
452910	Warehouse Clubs and Supercenters
45299	All Other General Merchandise Stores
452990	All Other General Merchandise Stores
453	Miscellaneous Store Retailers
4531	Florists
45311	Florists
453110	Florists
4532	Office Supplies, Stationery, and Gift Stores
45321	Office Supplies and Stationery Stores
453210	Office Supplies and Stationery Stores
45322	Gift, Novelty, and Souvenir Stores
453220	Gift, Novelty, and Souvenir Stores
4533	Used Merchandise Stores
45331	Used Merchandise Stores
453310	Used Merchandise Stores
4539	Other Miscellaneous Store Retailers
45391	Pet and Pet Supplies Stores
453910	Pet and Pet Supplies Stores
45392	Art Dealers
453920	Art Dealers
45393	Manufactured (Mobile) Home Dealers
453930	Manufactured (Mobile) Home Dealers
45399	All Other Miscellaneous Store Retailers
453991	Tobacco Stores
453998	All Other Miscellaneous Store Retailers (except Tobacco)

	Stores)
454	Nonstore Retailers
4541	Electronic Shopping and Mail-Order Houses
45411	Electronic Shopping and Mail-Order Houses
454111	Electronic Shopping
454112	Electronic Auctions
454113	Mail-Order Houses
4542	Vending Machine Operators
45421	Vending Machine Operators
454210	Vending Machine Operators
4543	Direct Selling Establishments
45431	Fuel Dealers
454310	Fuel Dealers
45439	Other Direct Selling Establishments
454390	Other Direct Selling Establishments
48-49	Transportation and Warehousing
481	Air Transportation
4811	Scheduled Air Transportation
48111	Scheduled Air Transportation
481111	Scheduled Passenger Air Transportation
481112	Scheduled Freight Air Transportation
4812	Nonscheduled Air Transportation
48121	Nonscheduled Air Transportation
481211	Nonscheduled Chartered Passenger Air Transportation
481212	Nonscheduled Chartered Freight Air Transportation
481219	Other Nonscheduled Air Transportation
482	Rail Transportation
4821	Rail Transportation
48211	Rail Transportation
482111	Line-Haul Railroads
482112	Short Line Railroads
483	Water Transportation
4831	Deep Sea, Coastal, and Great Lakes Water Transportation
48311	Deep Sea, Coastal, and Great Lakes Water Transportation
483111	Deep Sea Freight Transportation

483112	Deep Sea Passenger Transportation
483113	Coastal and Great Lakes Freight Transportation
483114	Coastal and Great Lakes Passenger Transportation
4832	Inland Water Transportation
48321	Inland Water Transportation
483211	Inland Water Freight Transportation
483212	Inland Water Passenger Transportation
484	Truck Transportation
4841	General Freight Trucking
48411	General Freight Trucking, Local
484110	General Freight Trucking, Local
48412	General Freight Trucking, Long-Distance
484121	General Freight Trucking, Long-Distance, Truckload
484122	General Freight Trucking, Long-Distance, Less Than Truckload
4842	Specialized Freight Trucking
48421	Used Household and Office Goods Moving
484210	Used Household and Office Goods Moving
48422	Specialized Freight (except Used Goods) Trucking, Local
484220	Specialized Freight (except Used Goods) Trucking, Local
48423	Specialized Freight (except Used Goods) Trucking, Long-Distance
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance
485	Transit and Ground Passenger Transportation
4851	Urban Transit Systems
48511	Urban Transit Systems
485111	Mixed Mode Transit Systems
485112	Commuter Rail Systems
485113	Bus and Other Motor Vehicle Transit Systems
485119	Other Urban Transit Systems
4852	Interurban and Rural Bus Transportation
48521	Interurban and Rural Bus Transportation
485210	Interurban and Rural Bus Transportation
4853	Taxi and Limousine Service
48531	Taxi Service
485310	Taxi Service

48532	Limousine Service
485320	Limousine Service
4854	School and Employee Bus Transportation
48541	School and Employee Bus Transportation
485410	School and Employee Bus Transportation
4855	Charter Bus Industry
48551	Charter Bus Industry
485510	Charter Bus Industry
4859	Other Transit and Ground Passenger Transportation
48599	Other Transit and Ground Passenger Transportation
485991	Special Needs Transportation
485999	All Other Transit and Ground Passenger Transportation
486	Pipeline Transportation
4861	Pipeline Transportation of Crude Oil
48611	Pipeline Transportation of Crude Oil
486110	Pipeline Transportation of Crude Oil
4862	Pipeline Transportation of Natural Gas
48621	Pipeline Transportation of Natural Gas
486210	Pipeline Transportation of Natural Gas
4869	Other Pipeline Transportation
48691	Pipeline Transportation of Refined Petroleum Products
486910	Pipeline Transportation of Refined Petroleum Products
48699	All Other Pipeline Transportation
486990	All Other Pipeline Transportation
487	Scenic and Sightseeing Transportation
4871	Scenic and Sightseeing Transportation, Land
48711	Scenic and Sightseeing Transportation, Land
487110	Scenic and Sightseeing Transportation, Land
4872	Scenic and Sightseeing Transportation, Water
48721	Scenic and Sightseeing Transportation, Water
487210	Scenic and Sightseeing Transportation, Water
4879	Scenic and Sightseeing Transportation, Other
48799	Scenic and Sightseeing Transportation, Other
487990	Scenic and Sightseeing Transportation, Other
488	Support Activities for Transportation

4881	Support Activities for Air Transportation
48811	Airport Operations
488111	Air Traffic Control
488119	Other Airport Operations
48819	Other Support Activities for Air Transportation
488190	Other Support Activities for Air Transportation
4882	Support Activities for Rail Transportation
48821	Support Activities for Rail Transportation
488210	Support Activities for Rail Transportation
4883	Support Activities for Water Transportation
48831	Port and Harbor Operations
488310	Port and Harbor Operations
48832	Marine Cargo Handling
488320	Marine Cargo Handling
48833	Navigational Services to Shipping
488330	Navigational Services to Shipping
48839	Other Support Activities for Water Transportation
488390	Other Support Activities for Water Transportation
4884	Support Activities for Road Transportation
48841	Motor Vehicle Towing
488410	Motor Vehicle Towing
48849	Other Support Activities for Road Transportation
488490	Other Support Activities for Road Transportation
4885	Freight Transportation Arrangement
48851	Freight Transportation Arrangement
488510	Freight Transportation Arrangement
4889	Other Support Activities for Transportation
48899	Other Support Activities for Transportation
488991	Packing and Crating
488999	All Other Support Activities for Transportation
491	Postal Service
4911	Postal Service
49111	Postal Service
491110	Postal Service
492	Couriers and Messengers

4921	Couriers and Express Delivery Services
49211	Couriers and Express Delivery Services
492110	Couriers and Express Delivery Services
4922	Local Messengers and Local Delivery
49221	Local Messengers and Local Delivery
492210	Local Messengers and Local Delivery
493	Warehousing and Storage
4931	Warehousing and Storage
49311	General Warehousing and Storage
493110	General Warehousing and Storage
49312	Refrigerated Warehousing and Storage
493120	Refrigerated Warehousing and Storage
49313	Farm Product Warehousing and Storage
493130	Farm Product Warehousing and Storage
49319	Other Warehousing and Storage
493190	Other Warehousing and Storage
51	Information
511	Publishing Industries (except Internet)
5111	Newspaper, Periodical, Book, and Directory Publishers
51111	Newspaper Publishers
511110	Newspaper Publishers
51112	Periodical Publishers
511120	Periodical Publishers
51113	Book Publishers
511130	Book Publishers
51114	Directory and Mailing List Publishers
511140	Directory and Mailing List Publishers
51119	Other Publishers
511191	Greeting Card Publishers
511199	All Other Publishers
5112	Software Publishers
51121	Software Publishers
511210	Software Publishers
512	Motion Picture and Sound Recording Industries
5121	Motion Picture and Video Industries

51211	Motion Picture and Video Production
512110	Motion Picture and Video Production
51212	Motion Picture and Video Distribution
512120	Motion Picture and Video Distribution
51213	Motion Picture and Video Exhibition
512131	Motion Picture Theaters (except Drive-Ins)
512132	Drive-In Motion Picture Theaters
51219	Postproduction Services and Other Motion Picture and Video Industries
512191	Teleproduction and Other Postproduction Services
512199	Other Motion Picture and Video Industries
5122	Sound Recording Industries
51221	Record Production
512210	Record Production
51222	Integrated Record Production/Distribution
512220	Integrated Record Production/Distribution
51223	Music Publishers
512230	Music Publishers
51224	Sound Recording Studios
512240	Sound Recording Studios
51229	Other Sound Recording Industries
512290	Other Sound Recording Industries
515	Broadcasting (except Internet)
5151	Radio and Television Broadcasting
51511	Radio Broadcasting
515111	Radio Networks
515112	Radio Stations
51512	Television Broadcasting
515120	Television Broadcasting
5152	Cable and Other Subscription Programming
51521	Cable and Other Subscription Programming
515210	Cable and Other Subscription Programming
517	Telecommunications
5171	Wired Telecommunications Carriers
51711	Wired Telecommunications Carriers

517110	Wired Telecommunications Carriers
5172	Wireless Telecommunications Carriers (except Satellite)
51721	Wireless Telecommunications Carriers (except Satellite)
517210	Wireless Telecommunications Carriers (except Satellite)
5174	Satellite Telecommunications
51741	Satellite Telecommunications
517410	Satellite Telecommunications
5179	Other Telecommunications
51791	Other Telecommunications
517911	Telecommunications Resellers
517919	All Other Telecommunications
518	Data Processing, Hosting, and Related Services
5182	Data Processing, Hosting, and Related Services
51821	Data Processing, Hosting, and Related Services
518210	Data Processing, Hosting, and Related Services
519	Other Information Services
5191	Other Information Services
51911	News Syndicates
519110	News Syndicates
51912	Libraries and Archives
519120	Libraries and Archives
51913	Internet Publishing and Broadcasting and Web Search Portals
519130	Internet Publishing and Broadcasting and Web Search Portals
51919	All Other Information Services
519190	All Other Information Services
52	Finance and Insurance
521	Monetary Authorities-Central Bank
5211	Monetary Authorities-Central Bank
52111	Monetary Authorities-Central Bank
521110	Monetary Authorities-Central Bank
522	Credit Intermediation and Related Activities
5221	Depository Credit Intermediation
52211	Commercial Banking
522110	Commercial Banking

52212	Savings Institutions
522120	Savings Institutions
52213	Credit Unions
522130	Credit Unions
52219	Other Depository Credit Intermediation
522190	Other Depository Credit Intermediation
5222	Nondepository Credit Intermediation
52221	Credit Card Issuing
522210	Credit Card Issuing
52222	Sales Financing
522220	Sales Financing
52229	Other Nondepository Credit Intermediation
522291	Consumer Lending
522292	Real Estate Credit
522293	International Trade Financing
522294	Secondary Market Financing
522298	All Other Nondepository Credit Intermediation
5223	Activities Related to Credit Intermediation
52231	Mortgage and Nonmortgage Loan Brokers
522310	Mortgage and Nonmortgage Loan Brokers
52232	Financial Transactions Processing, Reserve, and Clearinghouse Activities
522320	Financial Transactions Processing, Reserve, and Clearinghouse Activities
52239	Other Activities Related to Credit Intermediation
522390	Other Activities Related to Credit Intermediation
523	Securities, Commodity Contracts, and Other Financial Investments and Related Activities
5231	Securities and Commodity Contracts Intermediation and Brokerage
52311	Investment Banking and Securities Dealing
523110	Investment Banking and Securities Dealing
52312	Securities Brokerage
523120	Securities Brokerage
52313	Commodity Contracts Dealing
523130	Commodity Contracts Dealing

52314	Commodity Contracts Brokerage
523140	Commodity Contracts Brokerage
5232	Securities and Commodity Exchanges
52321	Securities and Commodity Exchanges
523210	Securities and Commodity Exchanges
5239	Other Financial Investment Activities
52391	Miscellaneous Intermediation
523910	Miscellaneous Intermediation
52392	Portfolio Management
523920	Portfolio Management
52393	Investment Advice
523930	Investment Advice
52399	All Other Financial Investment Activities
523991	Trust, Fiduciary, and Custody Activities
523999	Miscellaneous Financial Investment Activities
524	Insurance Carriers and Related Activities
5241	Insurance Carriers
52411	Direct Life, Health, and Medical Insurance Carriers
524113	Direct Life Insurance Carriers
524114	Direct Health and Medical Insurance Carriers
52412	Direct Insurance (except Life, Health, and Medical) Carriers
524126	Direct Property and Casualty Insurance Carriers
524127	Direct Title Insurance Carriers
524128	Other Direct Insurance (except Life, Health, and Medical) Carriers
52413	Reinsurance Carriers
524130	Reinsurance Carriers
5242	Agencies, Brokerages, and Other Insurance Related Activities
52421	Insurance Agencies and Brokerages
524210	Insurance Agencies and Brokerages
52429	Other Insurance Related Activities
524291	Claims Adjusting
524292	Third Party Administration of Insurance and Pension Funds
524298	All Other Insurance Related Activities
525	Funds, Trusts, and Other Financial Vehicles

5251	Insurance and Employee Benefit Funds
52511	Pension Funds
525110	Pension Funds
52512	Health and Welfare Funds
525120	Health and Welfare Funds
52519	Other Insurance Funds
525190	Other Insurance Funds
5259	Other Investment Pools and Funds
52591	Open-End Investment Funds
525910	Open-End Investment Funds
52592	Trusts, Estates, and Agency Accounts
525920	Trusts, Estates, and Agency Accounts
52599	Other Financial Vehicles
525990	Other Financial Vehicles
53	Real Estate and Rental and Leasing
531	Real Estate
5311	Lessors of Real Estate
53111	Lessors of Residential Buildings and Dwellings
531110	Lessors of Residential Buildings and Dwellings
53112	Lessors of Nonresidential Buildings (except Miniwarehouses)
531120	Lessors of Nonresidential Buildings (except Miniwarehouses)
53113	Lessors of Miniwarehouses and Self-Storage Units
531130	Lessors of Miniwarehouses and Self-Storage Units
53119	Lessors of Other Real Estate Property
531190	Lessors of Other Real Estate Property
5312	Offices of Real Estate Agents and Brokers
53121	Offices of Real Estate Agents and Brokers
531210	Offices of Real Estate Agents and Brokers
5313	Activities Related to Real Estate
53131	Real Estate Property Managers
531311	Residential Property Managers
531312	Nonresidential Property Managers
53132	Offices of Real Estate Appraisers
531320	Offices of Real Estate Appraisers

53139	Other Activities Related to Real Estate
531390	Other Activities Related to Real Estate
532	Rental and Leasing Services
5321	Automotive Equipment Rental and Leasing
53211	Passenger Car Rental and Leasing
532111	Passenger Car Rental
532112	Passenger Car Leasing
53212	Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing
532120	Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing
5322	Consumer Goods Rental
53221	Consumer Electronics and Appliances Rental
532210	Consumer Electronics and Appliances Rental
53222	Formal Wear and Costume Rental
532220	Formal Wear and Costume Rental
53223	Video Tape and Disc Rental
532230	Video Tape and Disc Rental
53229	Other Consumer Goods Rental
532291	Home Health Equipment Rental
532292	Recreational Goods Rental
532299	All Other Consumer Goods Rental
5323	General Rental Centers
53231	General Rental Centers
532310	General Rental Centers
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing
53241	Construction, Transportation, Mining, and Forestry Machinery and Equipment Rental and Leasing
532411	Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing
532412	Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing
53242	Office Machinery and Equipment Rental and Leasing
532420	Office Machinery and Equipment Rental and Leasing
53249	Other Commercial and Industrial Machinery and Equipment Rental and Leasing

532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing
533	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
53311	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
54	Professional, Scientific, and Technical Services
541	Professional, Scientific, and Technical Services
5411	Legal Services
54111	Offices of Lawyers
541110	Offices of Lawyers
54112	Offices of Notaries
541120	Offices of Notaries
54119	Other Legal Services
541191	Title Abstract and Settlement Offices
541199	All Other Legal Services
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services
54121	Accounting, Tax Preparation, Bookkeeping, and Payroll Services
541211	Offices of Certified Public Accountants
541213	Tax Preparation Services
541214	Payroll Services
541219	Other Accounting Services
5413	Architectural, Engineering, and Related Services
54131	Architectural Services
541310	Architectural Services
54132	Landscape Architectural Services
541320	Landscape Architectural Services
54133	Engineering Services
541330	Engineering Services
54134	Drafting Services
541340	Drafting Services

54135	Building Inspection Services
541350	Building Inspection Services
54136	Geophysical Surveying and Mapping Services
541360	Geophysical Surveying and Mapping Services
54137	Surveying and Mapping (except Geophysical) Services
541370	Surveying and Mapping (except Geophysical) Services
54138	Testing Laboratories
541380	Testing Laboratories
5414	Specialized Design Services
54141	Interior Design Services
541410	Interior Design Services
54142	Industrial Design Services
541420	Industrial Design Services
54143	Graphic Design Services
541430	Graphic Design Services
54149	Other Specialized Design Services
541490	Other Specialized Design Services
5415	Computer Systems Design and Related Services
54151	Computer Systems Design and Related Services
541511	Custom Computer Programming Services
541512	Computer Systems Design Services
541513	Computer Facilities Management Services
541519	Other Computer Related Services
5416	Management, Scientific, and Technical Consulting Services
54161	Management Consulting Services
541611	Administrative Management and General Management Consulting Services
541612	Human Resources Consulting Services
541613	Marketing Consulting Services
541614	Process, Physical Distribution, and Logistics Consulting Services
541618	Other Management Consulting Services
54162	Environmental Consulting Services
541620	Environmental Consulting Services
54169	Other Scientific and Technical Consulting Services

541690	Other Scientific and Technical Consulting Services
5417	Scientific Research and Development Services
54171	Research and Development in the Physical, Engineering, and Life Sciences
541711	Research and Development in Biotechnology
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)
54172	Research and Development in the Social Sciences and Humanities
541720	Research and Development in the Social Sciences and Humanities
5418	Advertising, Public Relations, and Related Services
54181	Advertising Agencies
541810	Advertising Agencies
54182	Public Relations Agencies
541820	Public Relations Agencies
54183	Media Buying Agencies
541830	Media Buying Agencies
54184	Media Representatives
541840	Media Representatives
54185	Outdoor Advertising
541850	Outdoor Advertising
54186	Direct Mail Advertising
541860	Direct Mail Advertising
54187	Advertising Material Distribution Services
541870	Advertising Material Distribution Services
54189	Other Services Related to Advertising
541890	Other Services Related to Advertising
5419	Other Professional, Scientific, and Technical Services
54191	Marketing Research and Public Opinion Polling
541910	Marketing Research and Public Opinion Polling
54192	Photographic Services
541921	Photography Studios, Portrait
541922	Commercial Photography
54193	Translation and Interpretation Services
541930	Translation and Interpretation Services
54194	Veterinary Services

541940	Veterinary Services
54199	All Other Professional, Scientific, and Technical Services
541990	All Other Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
551	Management of Companies and Enterprises
5511	Management of Companies and Enterprises
55111	Management of Companies and Enterprises
551111	Offices of Bank Holding Companies
551112	Offices of Other Holding Companies
551114	Corporate, Subsidiary, and Regional Managing Offices
56	Administrative and Support and Waste Management and Remediation Services
561	Administrative and Support Services
5611	Office Administrative Services
56111	Office Administrative Services
561110	Office Administrative Services
5612	Facilities Support Services
56121	Facilities Support Services
561210	Facilities Support Services
5613	Employment Services
56131	Employment Placement Agencies and Executive Search Services
561311	Employment Placement Agencies
561312	Executive Search Services
56132	Temporary Help Services
561320	Temporary Help Services
56133	Professional Employer Organizations
561330	Professional Employer Organizations
5614	Business Support Services
56141	Document Preparation Services
561410	Document Preparation Services
56142	Telephone Call Centers
561421	Telephone Answering Services

561422	Telemarketing Bureaus and Other Contact Centers
56143	Business Service Centers
561431	Private Mail Centers
561439	Other Business Service Centers (including Copy Shops)
56144	Collection Agencies
561440	Collection Agencies
56145	Credit Bureaus
561450	Credit Bureaus
56149	Other Business Support Services
561491	Repossession Services
561492	Court Reporting and Stenotype Services
561499	All Other Business Support Services
5615	Travel Arrangement and Reservation Services
56151	Travel Agencies
561510	Travel Agencies
56152	Tour Operators
561520	Tour Operators
56159	Other Travel Arrangement and Reservation Services
561591	Convention and Visitors Bureaus
561599	All Other Travel Arrangement and Reservation Services
5616	Investigation and Security Services
56161	Investigation, Guard, and Armored Car Services
561611	Investigation Services
561612	Security Guards and Patrol Services
561613	Armored Car Services
56162	Security Systems Services
561621	Security Systems Services (except Locksmiths)
561622	Locksmiths
5617	Services to Buildings and Dwellings
56171	Exterminating and Pest Control Services
561710	Exterminating and Pest Control Services
56172	Janitorial Services
561720	Janitorial Services
56173	Landscaping Services
561730	Landscaping Services
56174	Carpet and Upholstery Cleaning Services

561740	Carpet and Upholstery Cleaning Services
56179	Other Services to Buildings and Dwellings
561790	Other Services to Buildings and Dwellings
5619	Other Support Services
56191	Packaging and Labeling Services
561910	Packaging and Labeling Services
56192	Convention and Trade Show Organizers
561920	Convention and Trade Show Organizers
56199	All Other Support Services
561990	All Other Support Services
562	Waste Management and Remediation Services
5621	Waste Collection
56211	Waste Collection
562111	Solid Waste Collection
562112	Hazardous Waste Collection
562119	Other Waste Collection
5622	Waste Treatment and Disposal
56221	Waste Treatment and Disposal
562211	Hazardous Waste Treatment and Disposal
562212	Solid Waste Landfill
562213	Solid Waste Combustors and Incinerators
562219	Other Nonhazardous Waste Treatment and Disposal
5629	Remediation and Other Waste Management Services
56291	Remediation Services
562910	Remediation Services
56292	Materials Recovery Facilities
562920	Materials Recovery Facilities
56299	All Other Waste Management Services
562991	Septic Tank and Related Services
562998	All Other Miscellaneous Waste Management Services
61	Educational Services
611	Educational Services
6111	Elementary and Secondary Schools
61111	Elementary and Secondary Schools
611110	Elementary and Secondary Schools

6112	Junior Colleges
61121	Junior Colleges
611210	Junior Colleges
6113	Colleges, Universities, and Professional Schools
61131	Colleges, Universities, and Professional Schools
611310	Colleges, Universities, and Professional Schools
6114	Business Schools and Computer and Management Training
61141	Business and Secretarial Schools
611410	Business and Secretarial Schools
61142	Computer Training
611420	Computer Training
61143	Professional and Management Development Training
611430	Professional and Management Development Training
6115	Technical and Trade Schools
61151	Technical and Trade Schools
611511	Cosmetology and Barber Schools
611512	Flight Training
611513	Apprenticeship Training
611519	Other Technical and Trade Schools
6116	Other Schools and Instruction
61161	Fine Arts Schools
611610	Fine Arts Schools
61162	Sports and Recreation Instruction
611620	Sports and Recreation Instruction
61163	Language Schools
611630	Language Schools
61169	All Other Schools and Instruction
611691	Exam Preparation and Tutoring
611692	Automobile Driving Schools
611699	All Other Miscellaneous Schools and Instruction
6117	Educational Support Services
61171	Educational Support Services
611710	Educational Support Services
62	Health Care and Social Assistance
621	Ambulatory Health Care Services

6211	Offices of Physicians
62111	Offices of Physicians
621111	Offices of Physicians (except Mental Health Specialists)
621112	Offices of Physicians, Mental Health Specialists
6212	Offices of Dentists
62121	Offices of Dentists
621210	Offices of Dentists
6213	Offices of Other Health Practitioners
62131	Offices of Chiropractors
621310	Offices of Chiropractors
62132	Offices of Optometrists
621320	Offices of Optometrists
62133	Offices of Mental Health Practitioners (except Physicians)
621330	Offices of Mental Health Practitioners (except Physicians)
62134	Offices of Physical, Occupational and Speech Therapists, and Audiologists
621340	Offices of Physical, Occupational and Speech Therapists, and Audiologists
62139	Offices of All Other Health Practitioners
621391	Offices of Podiatrists
621399	Offices of All Other Miscellaneous Health Practitioners
6214	Outpatient Care Centers
62141	Family Planning Centers
621410	Family Planning Centers
62142	Outpatient Mental Health and Substance Abuse Centers
621420	Outpatient Mental Health and Substance Abuse Centers
62149	Other Outpatient Care Centers
621491	HMO Medical Centers
621492	Kidney Dialysis Centers
621493	Freestanding Ambulatory Surgical and Emergency Centers
621498	All Other Outpatient Care Centers
6215	Medical and Diagnostic Laboratories
62151	Medical and Diagnostic Laboratories
621511	Medical Laboratories
621512	Diagnostic Imaging Centers
6216	Home Health Care Services

62161	Home Health Care Services
621610	Home Health Care Services
6219	Other Ambulatory Health Care Services
62191	Ambulance Services
621910	Ambulance Services
62199	All Other Ambulatory Health Care Services
621991	Blood and Organ Banks
621999	All Other Miscellaneous Ambulatory Health Care Services
622	Hospitals
6221	General Medical and Surgical Hospitals
62211	General Medical and Surgical Hospitals
622110	General Medical and Surgical Hospitals
6222	Psychiatric and Substance Abuse Hospitals
62221	Psychiatric and Substance Abuse Hospitals
622210	Psychiatric and Substance Abuse Hospitals
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals
62231	Specialty (except Psychiatric and Substance Abuse) Hospitals
622310	Specialty (except Psychiatric and Substance Abuse) Hospitals
623	Nursing and Residential Care Facilities
6231	Nursing Care Facilities (Skilled Nursing Facilities)
62311	Nursing Care Facilities (Skilled Nursing Facilities)
623110	Nursing Care Facilities (Skilled Nursing Facilities)
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities
62321	Residential Intellectual and Developmental Disability Facilities
623210	Residential Intellectual and Developmental Disability Facilities
62322	Residential Mental Health and Substance Abuse Facilities
623220	Residential Mental Health and Substance Abuse Facilities
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly
62331	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly
623311	Continuing Care Retirement Communities
623312	Assisted Living Facilities for the Elderly

6239	Other Residential Care Facilities
62399	Other Residential Care Facilities
623990	Other Residential Care Facilities
624	Social Assistance
6241	Individual and Family Services
62411	Child and Youth Services
624110	Child and Youth Services
62412	Services for the Elderly and Persons with Disabilities
624120	Services for the Elderly and Persons with Disabilities
62419	Other Individual and Family Services
624190	Other Individual and Family Services
6242	Community Food and Housing, and Emergency and Other Relief Services
62421	Community Food Services
624210	Community Food Services
62422	Community Housing Services
624221	Temporary Shelters
624229	Other Community Housing Services
62423	Emergency and Other Relief Services
624230	Emergency and Other Relief Services
6243	Vocational Rehabilitation Services
62431	Vocational Rehabilitation Services
624310	Vocational Rehabilitation Services
6244	Child Day Care Services
62441	Child Day Care Services
624410	Child Day Care Services
71	Arts, Entertainment, and Recreation
711	Performing Arts, Spectator Sports, and Related Industries
7111	Performing Arts Companies
71111	Theater Companies and Dinner Theaters
711110	Theater Companies and Dinner Theaters
71112	Dance Companies
711120	Dance Companies
71113	Musical Groups and Artists

711130	Musical Groups and Artists
71119	Other Performing Arts Companies
711190	Other Performing Arts Companies
7112	Spectator Sports
71121	Spectator Sports
711211	Sports Teams and Clubs
711212	Racetracks
711219	Other Spectator Sports
7113	Promoters of Performing Arts, Sports, and Similar Events
71131	Promoters of Performing Arts, Sports, and Similar Events with Facilities
711310	Promoters of Performing Arts, Sports, and Similar Events with Facilities
71132	Promoters of Performing Arts, Sports, and Similar Events without Facilities
711320	Promoters of Performing Arts, Sports, and Similar Events without Facilities
7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures
71141	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures
711410	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures
7115	Independent Artists, Writers, and Performers
71151	Independent Artists, Writers, and Performers
711510	Independent Artists, Writers, and Performers
712	Museums, Historical Sites, and Similar Institutions
7121	Museums, Historical Sites, and Similar Institutions
71211	Museums
712110	Museums
71212	Historical Sites
712120	Historical Sites
71213	Zoos and Botanical Gardens
712130	Zoos and Botanical Gardens
71219	Nature Parks and Other Similar Institutions
712190	Nature Parks and Other Similar Institutions
713	Amusement, Gambling, and Recreation Industries
7131	Amusement Parks and Arcades

71311	Amusement and Theme Parks
713110	Amusement and Theme Parks
71312	Amusement Arcades
713120	Amusement Arcades
7132	Gambling Industries
71321	Casinos (except Casino Hotels)
713210	Casinos (except Casino Hotels)
71329	Other Gambling Industries
713290	Other Gambling Industries
7139	Other Amusement and Recreation Industries
71391	Golf Courses and Country Clubs
713910	Golf Courses and Country Clubs
71392	Skiing Facilities
713920	Skiing Facilities
71393	Marinas
713930	Marinas
71394	Fitness and Recreational Sports Centers
713940	Fitness and Recreational Sports Centers
71395	Bowling Centers
713950	Bowling Centers
71399	All Other Amusement and Recreation Industries
713990	All Other Amusement and Recreation Industries
72	Accommodation and Food Services
721	Accommodation
7211	Traveler Accommodation
72111	Hotels (except Casino Hotels) and Motels
721110	Hotels (except Casino Hotels) and Motels
72112	Casino Hotels
721120	Casino Hotels
72119	Other Traveler Accommodation
721191	Bed-and-Breakfast Inns
721199	All Other Traveler Accommodation
7212	RV (Recreational Vehicle) Parks and Recreational Camps
72121	RV (Recreational Vehicle) Parks and Recreational Camps
721211	RV (Recreational Vehicle) Parks and Campgrounds

721214	Recreational and Vacation Camps (except Campgrounds)
7213	Rooming and Boarding Houses
72131	Rooming and Boarding Houses
721310	Rooming and Boarding Houses
722	Food Services and Drinking Places
7223	Special Food Services
72231	Food Service Contractors
722310	Food Service Contractors
72232	Caterers
722320	Caterers
72233	Mobile Food Services
722330	Mobile Food Services
7224	Drinking Places (Alcoholic Beverages)
72241	Drinking Places (Alcoholic Beverages)
722410	Drinking Places (Alcoholic Beverages)
7225	Restaurants and Other Eating Places
72251	Restaurants and Other Eating Places
722511	Full-Service Restaurants
722513	Limited-Service Restaurants
722514	Cafeterias, Grill Buffets, and Buffets
722515	Snack and Nonalcoholic Beverage Bars
81	Other Services (except Public Administration)
811	Repair and Maintenance
8111	Automotive Repair and Maintenance
81111	Automotive Mechanical and Electrical Repair and Maintenance
811111	General Automotive Repair
811112	Automotive Exhaust System Repair
811113	Automotive Transmission Repair
811118	Other Automotive Mechanical and Electrical Repair and Maintenance
81112	Automotive Body, Paint, Interior, and Glass Repair
811121	Automotive Body, Paint, and Interior Repair and Maintenance
811122	Automotive Glass Replacement Shops
81119	Other Automotive Repair and Maintenance

811191	Automotive Oil Change and Lubrication Shops
811192	Car Washes
811198	All Other Automotive Repair and Maintenance
8112	Electronic and Precision Equipment Repair and Maintenance
81121	Electronic and Precision Equipment Repair and Maintenance
811211	Consumer Electronics Repair and Maintenance
811212	Computer and Office Machine Repair and Maintenance
811213	Communication Equipment Repair and Maintenance
811219	Other Electronic and Precision Equipment Repair and Maintenance
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance
81131	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance
8114	Personal and Household Goods Repair and Maintenance
81141	Home and Garden Equipment and Appliance Repair and Maintenance
811411	Home and Garden Equipment Repair and Maintenance
811412	Appliance Repair and Maintenance
81142	Reupholstery and Furniture Repair
811420	Reupholstery and Furniture Repair
81143	Footwear and Leather Goods Repair
811430	Footwear and Leather Goods Repair
81149	Other Personal and Household Goods Repair and Maintenance
811490	Other Personal and Household Goods Repair and Maintenance
812	Personal and Laundry Services
8121	Personal Care Services
81211	Hair, Nail, and Skin Care Services
812111	Barber Shops
812112	Beauty Salons
812113	Nail Salons

81219	Other Personal Care Services
812191	Diet and Weight Reducing Centers
812199	Other Personal Care Services
8122	Death Care Services
81221	Funeral Homes and Funeral Services
812210	Funeral Homes and Funeral Services
81222	Cemeteries and Crematories
812220	Cemeteries and Crematories
8123	Drycleaning and Laundry Services
81231	Coin-Operated Laundries and Drycleaners
812310	Coin-Operated Laundries and Drycleaners
81232	Drycleaning and Laundry Services (except Coin-Operated)
812320	Drycleaning and Laundry Services (except Coin-Operated)
81233	Linen and Uniform Supply
812331	Linen Supply
812332	Industrial Launderers
8129	Other Personal Services
81291	Pet Care (except Veterinary) Services
812910	Pet Care (except Veterinary) Services
81292	Photofinishing
812921	Photofinishing Laboratories (except One-Hour)
812922	One-Hour Photofinishing
81293	Parking Lots and Garages
812930	Parking Lots and Garages
81299	All Other Personal Services
812990	All Other Personal Services
813	Religious, Grantmaking, Civic, Professional, and Similar Organizations
8131	Religious Organizations
81311	Religious Organizations
813110	Religious Organizations
8132	Grantmaking and Giving Services
81321	Grantmaking and Giving Services
813211	Grantmaking Foundations
813212	Voluntary Health Organizations

813219	Other Grant making and Giving Services
8133	Social Advocacy Organizations
81331	Social Advocacy Organizations
813311	Human Rights Organizations
813312	Environment, Conservation and Wildlife Organizations
813319	Other Social Advocacy Organizations
8134	Civic and Social Organizations
81341	Civic and Social Organizations
813410	Civic and Social Organizations
8139	Business, Professional, Labor, Political, and Similar Organizations
81391	Business Associations
813910	Business Associations
81392	Professional Organizations
813920	Professional Organizations
81393	Labor Unions and Similar Labor Organizations
813930	Labor Unions and Similar Labor Organizations
81394	Political Organizations
813940	Political Organizations
81399	Other Similar Organizations (except Business, Professional, Labor, and Political Organizations)
813990	Other Similar Organizations (except Business, Professional, Labor, and Political Organizations)
814	Private Households
8141	Private Households
81411	Private Households
814110	Private Households
92	Public Administration
921	Executive, Legislative, and Other General Government Support
9211	Executive, Legislative, and Other General Government Support
92111	Executive Offices
921110	Executive Offices
92112	Legislative Bodies
921120	Legislative Bodies
92113	Public Finance Activities

921130	Public Finance Activities
92114	Executive and Legislative Offices, Combined
921140	Executive and Legislative Offices, Combined
92115	American Indian and Alaska Native Tribal Governments
921150	American Indian and Alaska Native Tribal Governments
92119	Other General Government Support
921190	Other General Government Support
922	Justice, Public Order, and Safety Activities
9221	Justice, Public Order, and Safety Activities
92211	Courts
922110	Courts
92212	Police Protection
922120	Police Protection
92213	Legal Counsel and Prosecution
922130	Legal Counsel and Prosecution
92214	Correctional Institutions
922140	Correctional Institutions
92215	Parole Offices and Probation Offices
922150	Parole Offices and Probation Offices
92216	Fire Protection
922160	Fire Protection
92219	Other Justice, Public Order, and Safety Activities
922190	Other Justice, Public Order, and Safety Activities
923	Administration of Human Resource Programs
9231	Administration of Human Resource Programs
92311	Administration of Education Programs
923110	Administration of Education Programs
92312	Administration of Public Health Programs
923120	Administration of Public Health Programs
92313	Administration of Human Resource Programs (except Education, Public Health, and Veterans' Affairs Programs)
923130	Administration of Human Resource Programs (except Education, Public Health, and Veterans' Affairs Programs)
92314	Administration of Veterans' Affairs
923140	Administration of Veterans' Affairs
924	Administration of Environmental Quality Programs

9241	Administration of Environmental Quality Programs
92411	Administration of Air and Water Resource and Solid Waste Management Programs
924110	Administration of Air and Water Resource and Solid Waste Management Programs
92412	Administration of Conservation Programs
924120	Administration of Conservation Programs
925	Administration of Housing Programs, Urban Planning, and Community Development
9251	Administration of Housing Programs, Urban Planning, and Community Development
92511	Administration of Housing Programs
925110	Administration of Housing Programs
92512	Administration of Urban Planning and Community and Rural Development
925120	Administration of Urban Planning and Community and Rural Development
926	Administration of Economic Programs
9261	Administration of Economic Programs
92611	Administration of General Economic Programs
926110	Administration of General Economic Programs
92612	Regulation and Administration of Transportation Programs
926120	Regulation and Administration of Transportation Programs
92613	Regulation and Administration of Communications, Electric, Gas, and Other Utilities
926130	Regulation and Administration of Communications, Electric, Gas, and Other Utilities
92614	Regulation of Agricultural Marketing and Commodities
926140	Regulation of Agricultural Marketing and Commodities
92615	Regulation, Licensing, and Inspection of Miscellaneous Commercial Sectors
926150	Regulation, Licensing, and Inspection of Miscellaneous Commercial Sectors
927	Space Research and Technology
9271	Space Research and Technology
92711	Space Research and Technology
927110	Space Research and Technology
928	National Security and International Affairs

9281	National Security and International Affairs
92811	National Security
928110	National Security
92812	International Affairs
928120	International Affairs

APPENDIX B

University Research Park Impact to Employment by Industry and Effects in Florida, 2012

Sector	Description	Direct	Indirect	Induced	Total
0	Total	202	20.1	47.1	269.1
392	Private junior colleges, colleges, universities, and professional schools	231	0	0.5	231.6
360	Real estate establishments	0	9.4	2.3	11.8
413	Food services and drinking places	0	2.4	5	7.6
393	Other private educational services	0	2.8	0.4	3.2
388	Services to buildings and dwellings	0	2.2	0.8	2.9
394	Offices of physicians, dentists, and other health practitioners	0	0	2.6	2.6
397	Private hospitals	0	0	2.2	2.2
319	Wholesale trade businesses	0	0.7	1.5	2.2
398	Nursing and residential care facilities	0	0	1.7	1.7
324	Retail Stores - Food and beverage	0	-0.1	1.5	1.5
329	Retail Stores - General merchandise	0	-0.1	1.6	1.5
350	Internet publishing and broadcasting	0	1.2	0	1.3
376	Scientific research and development services	0	1.4	0.1	1.3
426	Private household operations	0	0	1.3	1.3
425	Civic, social, professional, and similar organizations	0	0.4	0.8	1.2
421	Dry-cleaning and laundry services	0	0.8	0.2	1
427	US Postal Service	0	0.7	0.2	0.9
351	Telecommunications	0	0.5	0.3	0.9
396	Medical and diagnostic labs and outpatient and other ambulatory care services	0	0	0.9	0.9
320	Retail Stores - Motor vehicle and parts	0	-0.1	1	0.9
367	Legal services	0	0.3	0.5	0.8
386	Business support services	0	0.6	0.4	0.8
414	Automotive repair and maintenance, except car washes	0	0.2	0.5	0.8
330	Retail Stores - Miscellaneous	0	0	0.7	0.7
31	Electric power generation, transmission, and distribution	0	0.6	0.1	0.7
327	Retail Stores - Clothing and clothing accessories	0	0	0.8	0.7
331	Retail Non-stores - Direct and electronic sales	0	0	0.7	0.7
395	Home health care services	0	0	0.7	0.7
339	Couriers and messengers	0	0.4	0.2	0.6
356	Securities, commodity contracts, investments, and related activities	0	-0.6	1.1	0.6
357	Insurance carriers	0	0	0.6	0.6
382	Employment services	0	-0.4	1	0.6

391	Private elementary and secondary schools	0	0	0.6	0.6
399	Child day care services	0	0	0.6	0.6
419	Personal care services	0	0	0.6	0.6
325	Retail Stores - Health and personal care	0	0	0.6	0.5
358	Insurance agencies, brokerages, and related activities	0	0.1	0.4	0.5
377	Advertising and related services	0	0.3	0.2	0.5
400	Individual and family services	0	0	0.5	0.5
417	Commercial and industrial machinery and equipment repair and maintenance	0	0.5	0	0.5
323	Retail Stores - Building material and garden supply	0	0	0.5	0.4
373	Other computer related services, including facilities management	0	0.3	0.1	0.4
381	Management of companies and enterprises	0	0.1	0.3	0.4
407	Fitness and recreational sports centers	0	0.1	0.3	0.4
409	Amusement parks, arcades, and gambling industries	0	0	0.4	0.4
332	Transport by air	0	0.2	0.1	0.3
335	Transport by truck	0	-0.1	0.4	0.3
355	Non-depository credit intermediation and related activities	0	-0.1	0.4	0.3
363	General and consumer goods rental except video tapes and discs	0	0.2	0.1	0.3
374	Management, scientific, and technical consulting services	0	0	0.3	0.3
383	Travel arrangement and reservation services	0	0.1	0	0.3
387	Investigation and security services	0	0.1	0.3	0.3
389	Other support services	0	0.2	0	0.3
411	Hotels and motels, including casino hotels	0	0.3	0.1	0.3
62	Bread and bakery product manufacturing	0	0.3	0.1	0.3
322	Retail Stores - Electronics and appliances	0	0	0.3	0.3
326	Retail Stores - Gasoline stations	0	0	0.3	0.3
328	Retail Stores - Sporting goods, hobby, book and music	0	0	0.3	0.3
336	Transit and ground passenger transportation	0	0.2	0.2	0.3
401	Community food, housing, and other relief services, including rehabilitation services	0	0	0.3	0.3
403	Spectator sports companies	0	0.2	0.2	0.3
410	Other amusement and recreation industries	0	0.1	0.2	0.3
422	Other personal services	0	0	0.2	0.3
424	Grant making, giving, and social advocacy organizations	0	0	0.3	0.3
372	Computer systems design services	0	0.2	0	0.3
380	All other miscellaneous professional, scientific, and technical services	0	0.3	0.1	0.3
11	Cattle ranching and farming	0	0.2	0	0.2

12	Dairy cattle and milk production	0	0.1	0	0.2
321	Retail Stores - Furniture and home furnishings	0	0	0.2	0.2
340	Warehousing and storage	0	0	0.2	0.2
359	Funds, trusts, and other financial vehicles	0	0	0.2	0.2
402	Performing arts companies	0	0	0.2	0.2
404	Promoters of performing arts and sports and agents for public figures	0	0.1	0.2	0.2
418	Personal and household goods repair and maintenance	0	0.1	0.1	0.2
423	Religious organizations	0	0	0.2	0.2
429	Other Federal Government enterprises	0	0	0.2	0.2
113	Printing	0	0.2	0.1	0.2
348	Radio and television broadcasting	0	0.1	0	0.2
352	Data processing, hosting, ISP, web search portals and related services	0	0.1	0.1	0.2
379	Veterinary services	0	0	0.2	0.2
416	Electronic and precision equipment repair and maintenance	0	0.2	0.1	0.2
368	Accounting, tax preparation, bookkeeping, and payroll services	0	-0.2	0.4	0.2
390	Waste management and remediation services	0	0	0	0.2
384	Office administrative services	0	0	0.1	0.1
3	Vegetable and melon farming	0	0	0.1	0.1
4	Fruit farming	0	0	0	0.1
6	Greenhouse, nursery, and floriculture production	0	0	0.1	0.1
14	Animal production, except cattle and poultry and eggs	0	0.1	0	0.1
19	Support activities for agriculture and forestry	0	0.1	0	0.1
32	Natural gas distribution	0	0.1	0	0.1
53	Frozen food manufacturing	0	0	0	0.1
54	Fruit and vegetable canning, pickling, and drying	0	0	0	0.1
55	Fluid milk and butter manufacturing	0	0.1	0	0.1
59	Animal (except poultry) slaughtering, rendering, and processing	0	0.1	0	0.1
61	Seafood product preparation and packaging	0	0.1	0	0.1
70	Soft drink and ice manufacturing	0	0	0.1	0.1
149	Other plastics product manufacturing	0	0	0	0.1
333	Transport by rail	0	0	0	0.1
341	Newspaper publishers	0	0.1	0	0.1
342	Periodical publishers	0	0.2	0.1	0.1
344	Directory, mailing list, and other publishers	0	0	0	0.1
345	Software publishers	0	0.1	0	0.1
346	Motion picture and video industries	0	0.1	0	0.1
349	Cable and other subscription programming	0	0	0	0.1

362	Automotive equipment rental and leasing	0	0.1	0.1	0.1
371	Custom computer programming services	0	0.1	0	0.1
378	Photographic services	0	0	0.1	0.1
405	Independent artists, writers, and performers	0	0	0.1	0.1
406	Museums, historical sites, zoos, and parks	0	0	0.1	0.1
415	Car washes	0	0	0.1	0.1
420	Death care services	0	0	0.1	0.1
430	State and local government passenger transit	0	0	0	0.1
431	State and local government electric utilities	0	0.1	0	0.1
338	Scenic and sightseeing transportation and support activities for transportation	0	-0.1	0.2	0.1
354	Monetary authorities and depository credit intermediation activities	0	-0.7	0.6	-0.1
25	Mining and quarrying stone	0	0	0	-0.1
26	Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals	0	-0.1	0	-0.1
40	Maintenance and repair construction of residential structures	0	0	0	-0.1
161	Ready-mix concrete manufacturing	0	-0.1	0	-0.1
162	Concrete pipe, brick, and block manufacturing	0	-0.1	0	-0.1
163	Other concrete product manufacturing	0	-0.1	0	-0.1
187	Ornamental and architectural metal products manufacturing	0	-0.1	0	-0.1
385	Facilities support services	0	-0.2	0	-0.1
20	Extraction of oil and natural gas	0	-0.4	0.1	-0.3
33	Water, sewage and other treatment and delivery systems	-1.5	0.3	0	-1.1
369	Architectural, engineering, and related services	0	-2.1	0.1	-2
39	Maintenance and repair construction of nonresidential structures	0	-6.2	0.3	-5.9
432	Other state and local government enterprises	-27.5	1.2	0.2	-26.2

APPENDIX C

University Research Park Impact to Labor Income by Industry and Effects in Florida, 2012

Sector	Description	Direct (\$)	Indirect(\$)	Induced(\$)	Total Impact(\$)
0	Total	5,839,352	889,567	2,087,722	8,816,641
392	Private junior colleges, colleges, universities, and professional schools	9,636,931	62	23,572	9,660,565
360	Real estate establishments	-	193,565	47,465	241,030
394	Offices of physicians, dentists, and other health practitioners	-	1	206,715	206,715
413	Food services and drinking places	-	62,932	128,436	191,368
319	Wholesale trade businesses	-	56,674	122,004	178,678
397	Private hospitals	-	1	152,329	152,330
393	Other private educational services	-	99,006	16,746	115,753
376	Scientific research and development services	-	110,053	4,068	114,122
31	Electric power generation, transmission, and distribution	-	89,385	15,204	104,589
350	Internet publishing and broadcasting	-	99,166	2,134	101,300
427	US Postal Service	-	75,076	14,014	89,090
388	Services to buildings and dwellings	-	51,998	17,891	69,888
367	Legal services	-	19,918	45,276	65,194
351	Telecommunications	-	40,566	24,348	64,914
398	Nursing and residential care facilities	-	-	61,783	61,783

425	Civic, social, professional, and similar organizations	-	19,151	35,553	54,704
320	Retail Stores - Motor vehicle and parts	-	(2,203)	54,168	51,965
357	Insurance carriers	-	5,748	40,336	46,084
324	Retail Stores - Food and beverage	-	(1,535)	47,304	45,769
373	Other computer related services, including facilities management	-	41,425	3,273	44,699
396	Medical and diagnostic labs and outpatient and other ambulatory care services	-	19	44,540	44,559
329	Retail Stores - General merchandise	-	(1,406)	44,830	43,424
381	Management of companies and enterprises	-	13,772	29,401	43,175
421	Dry-cleaning and laundry services	-	30,252	8,606	38,859
358	Insurance agencies, brokerages, and related activities	-	4,141	28,013	32,155
417	Commercial and industrial machinery and equipment repair and maintenance	-	27,450	4,266	31,715
355	Non-depository credit intermediation and related activities	-	(4,890)	34,296	29,406
386	Business support services	-	18,764	10,000	28,764
395	Home health care services	-	-	28,028	28,028
356	Securities, commodity contracts, investments, and related activities	-	(28,879)	56,669	27,791
414	Automotive repair and maintenance, except car washes	-	9,768	17,316	27,084
377	Advertising and related services	-	15,664	10,095	25,761
372	Computer systems design services	-	17,232	6,502	23,734

339	Couriers and messengers	-	16,468	6,364	22,833
325	Retail Stores - Health and personal care	-	(760)	23,550	22,791
419	Personal care services	-	-	22,772	22,772
380	All other miscellaneous professional, scientific, and technical services	-	15,243	6,924	22,167
332	Transport by air	-	12,688	9,453	22,141
374	Management, scientific, and technical consulting services	-	(1,888)	23,743	21,855
403	Spectator sports companies	-	9,066	10,693	19,759
327	Retail Stores - Clothing and clothing accessories	-	(574)	19,510	18,935
382	Employment services	-	(11,156)	29,566	18,410
348	Radio and television broadcasting	-	10,808	7,558	18,367
391	Private elementary and secondary schools	-	-	17,956	17,956
331	Retail Nonstores - Direct and electronic sales	-	(283)	18,098	17,815
352	Data processing, hosting, ISP, web search portals and related services	-	7,568	9,765	17,333
330	Retail Stores - Miscellaneous	-	(593)	17,785	17,190
323	Retail Stores - Building material and garden supply	-	(983)	16,980	15,998
416	Electronic and precision equipment repair and maintenance	-	10,838	4,005	14,844
424	Grantmaking, giving, and social advocacy organizations	-	11	14,621	14,634
326	Retail Stores - Gasoline stations	-	(411)	14,553	14,142

400	Individual and family services	-	-	13,747	13,747
409	Amusement parks, arcades, and gambling industries	-	(115)	13,808	13,693
322	Retail Stores - Electronics and appliances	-	(434)	14,103	13,669
363	General and consumer goods rental except video tapes and discs	-	7,944	5,234	13,178
399	Child day care services	-	-	12,899	12,899
336	Transit and ground passenger transportation	-	6,368	6,488	12,858
62	Bread and bakery product manufacturing	-	10,748	1,720	12,468
113	Printing	-	10,050	2,127	12,177
342	Periodical publishers	-	9,361	2,420	11,782
411	Hotels and motels, including casino hotels	-	8,207	3,426	11,634
431	State and local government electric utilities	-	9,834	1,798	11,631
383	Travel arrangement and reservation services	-	7,393	3,958	11,352
422	Other personal services	-	(312)	11,082	10,771
335	Transport by truck	-	(4,724)	15,317	10,593
389	Other support services	-	7,583	2,789	10,372
32	Natural gas distribution	-	9,580	734	10,314
410	Other amusement and recreation industries	-	2,506	7,552	10,058
387	Investigation and security services	-	2,017	7,962	9,980

368	Accounting, tax preparation, bookkeeping, and payroll services	-	(12,761)	21,923	9,161
401	Community food, housing, and other relief services, including rehabilitation services	-	-	8,968	8,968
321	Retail Stores - Furniture and home furnishings	-	(390)	9,241	8,851
371	Custom computer programming services	-	7,572	1,201	8,773
340	Warehousing and storage	-	1,901	6,328	8,229
426	Private household operations	-	-	8,088	8,088
328	Retail Stores - Sporting goods, hobby, book and music	-	(239)	8,150	7,912
407	Fitness and recreational sports centers	-	2,323	5,316	7,639
390	Waste management and remediation services	-	2,547	4,914	7,460
345	Software publishers	-	5,461	1,894	7,356
341	Newspaper publishers	-	3,254	3,696	6,950
423	Religious organizations	-	-	6,904	6,904
384	Office administrative services	-	(1,942)	8,833	6,891
418	Personal and household goods repair and maintenance	-	4,666	2,141	6,807
349	Cable and other subscription programming	-	3,898	2,887	6,787
404	Promoters of performing arts and sports and agents for public figures	-	2,639	4,044	6,683
61	Seafood product preparation and packaging	-	5,813	534	6,347
430	State and local government passenger transit	-	3,058	3,117	6,175

362	Automotive equipment rental and leasing	-	1,780	4,341	6,122
420	Death care services	-	-	5,824	5,824
359	Funds, trusts, and other financial vehicles	-	(258)	6,068	5,810
379	Veterinary services	-	55	5,390	5,445
3	Vegetable and melon farming	-	2,762	2,311	5,073
346	Motion picture and video industries	-	1,732	2,953	4,685
55	Fluid milk and butter manufacturing	-	3,759	713	4,472
54	Fruit and vegetable canning, pickling, and drying	-	3,264	999	4,263
59	Animal (except poultry) slaughtering, rendering, and processing	-	3,732	382	4,114
70	Soft drink and ice manufacturing	-	546	3,565	4,112
402	Performing arts companies	-	217	3,679	3,895
19	Support activities for agriculture and forestry	-	1,626	1,904	3,530
53	Frozen food manufacturing	-	1,878	1,370	3,248
344	Directory, mailing list, and other publishers	-	2,357	735	3,092
333	Transport by rail	-	1,066	1,669	2,735
338	Scenic and sightseeing transportation and support activities for transportation	-	(5,800)	8,519	2,719
4	Fruit farming	-	859	1,644	2,503
415	Car washes	-	163	2,171	2,334

405	Independent artists, writers, and performers	-	997	1,329	2,325
68	Seasoning and dressing manufacturing	-	1,987	299	2,286
6	Greenhouse, nursery, and floriculture production	-	119	2,130	2,250
429	Other Federal Government enterprises	-	250	1,913	2,164
366	Lessors of nonfinancial intangible assets	-	1,762	268	2,029
406	Museums, historical sites, zoos, and parks	-	-	2,007	2,007
12	Dairy cattle and milk production	-	1,505	290	1,795
63	Cookie, cracker, and pasta manufacturing	-	1,392	357	1,749
11	Cattle ranching and farming	-	1,555	176	1,731
71	Breweries	-	1,041	587	1,630
107	Paperboard container manufacturing	-	836	786	1,621
334	Transport by water	-	341	1,277	1,618
58	Ice cream and frozen dessert manufacturing	-	1,319	260	1,580
343	Book publishers	-	865	645	1,509
133	Pharmaceutical preparation manufacturing	-	195	1,264	1,459
347	Sound recording industries	-	663	519	1,182
317	All other miscellaneous manufacturing	-	144	939	1,083
365	Commercial and industrial machinery and equipment rental and leasing	-	(926)	2,005	1,079

69	All other food manufacturing	-	633	426	1,059
149	Other plastics product manufacturing	-	462	482	943
18	Commercial hunting and trapping	-	-	915	915
378	Photographic services	-	191	648	839
74	Tobacco product manufacturing	-	-	798	798
306	Surgical appliance and supplies manufacturing	-	(93)	864	771
138	Soap and cleaning compound manufacturing	-	599	148	746
353	Other information services	-	115	601	716
314	Sign manufacturing	-	432	278	710
248	Electro medical and electrotherapeutic apparatus manufacturing	-	53	568	622
66	Coffee and tea manufacturing	-	443	173	616
111	Sanitary paper product manufacturing	-	105	501	606
308	Ophthalmic goods manufacturing	-	4	589	591
52	Non-chocolate confectionery manufacturing	-	500	77	577
309	Dental laboratories manufacturing	-	-	576	576
60	Poultry processing	-	69	461	530
215	Heating equipment (except warm air furnaces) manufacturing	-	484	40	522
14	Animal production, except cattle and poultry and eggs	-	349	125	473

114	Support activities for printing	-	375	57	432
136	Paint and coating manufacturing	-	333	81	414
283	Motor vehicle parts manufacturing	-	230	165	396
105	Paper mills	-	171	223	394
42	Other animal food manufacturing	-	240	151	391
190	Metal can, box, and other metal container (light gauge) manufacturing	-	236	139	375
139	Toilet preparation manufacturing	-	58	307	365
412	Other accommodations	-	49	309	358
65	Snack food manufacturing	-	128	216	345
216	Air conditioning, refrigeration, and warm air heating equipment manufacturing	-	284	60	344
73	Distilleries	-	43	279	322
90	Other cut and sew apparel manufacturing	-	261	58	319
110	Stationery product manufacturing	-	258	61	319
241	Electron tube manufacturing	-	281	4	285
243	Semiconductor and related device manufacturing	-	119	158	277
305	Surgical and medical instrument, laboratory and medical instrument manufacturing	-	11	264	275
228	Material handling equipment manufacturing	-	245	11	256
297	Nonupholstered wood household furniture manufacturing	-	1	255	255

43	Flour milling and malt manufacturing	-	181	70	252
89	Women's and girl's cut and sew apparel manufacturing	-	10	242	252
10	All other crop farming	-	175	71	246
88	Men's and boy's cut and sew apparel manufacturing	-	2	243	245
13	Poultry and egg production	-	159	83	242
48	Sugar cane mills and refining	-	130	112	242
100	Wood container and pallet manufacturing	-	(12)	245	233
148	Plastics bottle manufacturing	-	70	160	230
140	Printing ink manufacturing	-	205	22	227
313	Office supplies (except paper) manufacturing	-	90	122	213
273	Wiring device manufacturing	-	176	24	200
158	Glass container manufacturing	-	114	82	196
159	Glass product manufacturing made of purchased glass	-	82	107	190
134	In-vitro diagnostic substance manufacturing	-	141	47	188
364	Video tape and disc rental	-	-	188	188
184	Cutlery, utensil, pot, and pan manufacturing	-	138	48	187
131	Pesticide and other agricultural chemical manufacturing	-	138	48	186
108	Coated and laminated paper, packaging paper and plastics film manufacturing	-	56	124	180

296	Upholstered household furniture manufacturing	-	(1)	166	166
236	Computer terminals and other computer peripheral equipment manufacturing	-	85	78	163
64	Tortilla manufacturing	-	115	39	154
142	Plastics packaging materials and unlaminated film and sheet manufacturing	-	46	103	149
84	Textile bag and canvas mills	-	20	113	134
109	All other paper bag and coated and treated paper manufacturing	-	79	49	128
408	Bowling centers	-	5	122	127
85	All other textile product mills	-	(38)	162	123
87	Cut and sew apparel contractors	-	(22)	144	122
103	All other miscellaneous wood product manufacturing	-	11	109	121
17	Commercial Fishing	-	91	28	120
234	Electronic computer manufacturing	-	38	81	119
51	Confectionery manufacturing from purchased chocolate	-	53	65	118
242	Bare printed circuit board manufacturing	-	73	43	116
112	All other converted paper product manufacturing	-	66	48	114
311	Sporting and athletic goods manufacturing	-	(2)	116	113
303	Mattress manufacturing	-	(3)	114	112
9	Sugarcane and sugar beet farming	-	57	54	111

318	Broom, brush, and mop manufacturing	-	45	66	111
141	All other chemical product and preparation manufacturing	-	32	77	109
312	Doll, toy, and game manufacturing	-	-	107	108
57	Dry, condensed, and evaporated dairy product manufacturing	-	89	16	104
147	Urethane and other foam product (except polystyrene) manufacturing	-	54	50	104
213	Other commercial and service industry machinery manufacturing	-	47	49	96
304	Blind and shade manufacturing	-	2	95	96
83	Curtain and linen mills	-	8	86	94
298	Metal and other household furniture manufacturing	-	4	87	91
238	Broadcast and wireless communications equipment manufacturing	-	38	49	87
106	Paperboard Mills	-	28	57	85
240	Audio and video equipment manufacturing	-	53	23	75
246	Printed circuit assembly (electronic assembly) manufacturing	-	23	51	74
80	Textile and fabric finishing mills	-	8	66	73
67	Flavoring syrup and concentrate manufacturing	-	31	40	71
259	Electric lamp bulb and part manufacturing	-	41	26	67
307	Dental equipment and supplies manufacturing	-	(8)	75	66
310	Jewelry and silverware manufacturing	-	2	65	65

94	Other leather and allied product manufacturing	-	6	59	64
150	Tire manufacturing	-	(6)	68	62
46	Fats and oils refining and blending	-	49	11	59
72	Wineries	-	7	50	58
185	Handtool manufacturing	-	26	30	56
282	Travel trailer and camper manufacturing	-	(16)	69	53
174	Aluminum product manufacturing from purchased aluminum	-	(9)	55	46
91	Apparel accessories and other apparel manufacturing	-	2	44	45
157	Other pressed and blown glass and glassware manufacturing	-	21	21	42
300	Office Furniture	-	1	40	41
151	Rubber and plastics hoses and belting manufacturing	-	20	19	38
245	Electronic connector manufacturing	-	27	8	35
294	All other transportation equipment manufacturing	-	-	34	33
210	Vending, commercial, industrial, and office machinery manufacturing	-	(2)	33	32
118	Petroleum lubricating oil and grease manufacturing	-	(124)	153	29
50	Chocolate and confectionery manufacturing from cacao beans	-	12	16	28
192	Arms, ordnance, and accessories manufacturing	-	1	27	27
271	Primary battery manufacturing	-	(1)	26	25

281	Motor home manufacturing	-	-	25	25
244	Electronic capacitor, resistor, coil, transformer, and other inductor manufacturing	-	16	8	24
93	Footwear manufacturing	-	-	23	23
285	Aircraft engine and engine parts manufacturing	-	18	5	23
166	Cut stone and stone product manufacturing	-	(247)	268	21
41	Dog and cat food manufacturing	-	-	20	20
292	Motorcycle, bicycle, and parts manufacturing	-	1	18	20
196	Turned product and screw, nut, and bolt manufacturing	-	1	19	19
261	Small electrical appliance manufacturing	-	2	16	18
77	Narrow fabric mills and schiffli machine embroidery	-	(1)	18	17
209	Semiconductor machinery manufacturing	-	15	2	17
86	Apparel knitting mills	-	-	17	16
316	Musical instrument manufacturing	-	2	14	16
82	Carpet and rug mills	-	-	15	15
137	Adhesive manufacturing	-	(7)	22	15
143	Unlaminated plastics profile shape manufacturing	-	(28)	42	15
279	Motor vehicle body manufacturing	-	7	9	15
286	Other aircraft parts and auxiliary equipment manufacturing	-	7	9	15

239	Other communications equipment manufacturing	-	(47)	61	14
104	Pulp mills	-	3	10	13
132	Medicinal and botanical manufacturing	-	3	10	13
237	Telephone apparatus manufacturing	-	1	11	12
288	Propulsion units and parts for space vehicles and guided missiles manufacturing	-	(3)	14	11
8	Cotton farming	-	5	5	10
56	Cheese manufacturing	-	7	3	10
221	Rolling mill and other metalworking machinery manufacturing	-	8	2	10
284	Aircraft manufacturing	-	5	5	10
257	Software, audio, and video media for reproduction	-	(21)	31	9
287	Guided missile and space vehicle manufacturing	-	9	-	9
129	Artificial and synthetic fibers and filaments manufacturing	-	(4)	12	8
258	Magnetic and optical recording media manufacturing	-	2	6	8
278	Heavy duty truck manufacturing	-	1	7	8
156	Flat glass manufacturing	-	(1)	8	7
191	Ammunition manufacturing	-	(4)	11	7
247	Other electronic component manufacturing	-	(12)	20	7
249	Search, detection, and navigation instruments manufacturing	-	1	6	7

44	Wet corn milling	-	3	3	6
45	Soybean and other oilseed processing	-	4	1	6
2	Grain farming	-	4	2	5
76	Broadwoven fabric mills	-	1	4	5
78	Nonwoven fabric mills	-	-	4	5
222	Turbine and turbine generator set units manufacturing	-	(1)	5	5
262	Household cooking appliance manufacturing	-	1	4	5
265	Other major household appliance manufacturing	-	1	4	5
276	Automobile manufacturing	-	-	5	5
128	Synthetic rubber manufacturing	-	(7)	11	4
135	Biological product (except diagnostic) manufacturing	-	(2)	5	4
231	Packaging machinery manufacturing	-	-	3	4
263	Household refrigerator and home freezer manufacturing	-	-	4	4
266	Power, distribution, and specialty transformer manufacturing	-	(9)	13	4
1	Oilseed farming	-	3	-	3
79	Knit fabric mills	-	-	2	3
81	Fabric coating mills	-	-	2	3
92	Leather and hide tanning and finishing	-	1	2	3

232	Industrial process furnace and oven manufacturing	-	2	1	3
255	Irradiation apparatus manufacturing	-	-	3	3
315	Gasket, packing, and sealing device manufacturing	-	(2)	5	3
21	Mining coal	-	1	-	2
153	Pottery, ceramics, and plumbing fixture manufacturing	-	(12)	15	2
218	Metal cutting and forming machine tool manufacturing	-	-	2	2
253	Electricity and signal testing instruments manufacturing	-	1	1	2
290	Ship building and repairing	-	(1)	3	2
299	Institutional furniture manufacturing	-	(3)	6	2
5	Tree nut farming	-	1	1	1
75	Fiber, yarn, and thread mills	-	-	1	1
122	Synthetic dye and pigment manufacturing	-	(2)	3	1
199	Plumbing fixture fitting and trim manufacturing	-	(7)	7	1
211	Optical instrument and lens manufacturing	-	(2)	3	1
235	Computer storage device manufacturing	-	-	-	1
264	Household laundry equipment manufacturing	-	-	-	1
277	Light truck and utility vehicle manufacturing	-	-	1	1
289	Railroad rolling stock manufacturing	-	-	-	1

293	Military armored vehicle, tank, and tank component manufacturing	-	1	-	1
7	Tobacco farming	-	-	-	-
23	Mining copper, nickel, lead, and zinc	-	-	-	-
24	Mining gold, silver, and other metal ore	-	(2)	2	-
28	Drilling oil and gas wells	-	-	-	-
34	Construction of new nonresidential commercial and health care structures	-	-	-	-
35	Construction of new nonresidential manufacturing structures	-	-	-	-
36	Construction of other new nonresidential structures	-	-	-	-
37	Construction of new residential permanent site single- and multi-family structures	-	-	-	-
38	Construction of other new residential structures	-	-	-	-
47	Breakfast cereal manufacturing	-	-	-	-
49	Beet sugar manufacturing	-	-	-	-
124	Carbon black manufacturing	-	-	-	-
204	Lawn and garden equipment manufacturing	-	(4)	3	-
212	Photographic and photocopying equipment manufacturing	-	-	-	-
219	Special tool, die, jig, and fixture manufacturing	-	(2)	2	-
229	Power-driven hand tool manufacturing	-	(1)	1	-
280	Truck trailer manufacturing	-	(1)	1	-

301	Custom architectural woodwork and millwork manufacturing	-	(1)	2	-
361	Imputed rental activity for owner-occupied dwellings	-	-	-	-
428	Federal electric utilities	-	-	-	-
115	Petroleum refineries	-	(12)	11	(1)
120	Petrochemical manufacturing	-	(4)	4	(1)
165	Abrasive product manufacturing	-	(2)	1	(1)
176	Primary smelting and refining of nonferrous metal (except copper and aluminum)	-	(1)	1	(1)
182	Custom roll forming	-	(2)	1	(1)
208	Plastics and rubber industry machinery manufacturing	-	(3)	2	(1)
98	Reconstituted wood product manufacturing	-	(6)	5	(2)
172	Alumina refining and primary aluminum production	-	(4)	-	(3)
220	Cutting tool and machine tool accessory manufacturing	-	(9)	6	(3)
22	Mining iron ore	-	(4)	1	(4)
200	Ball and roller bearing manufacturing	-	(7)	3	(4)
126	Other basic organic chemical manufacturing	-	(43)	37	(5)
127	Plastics material and resin manufacturing	-	(20)	14	(6)
177	Copper rolling, drawing, extruding and alloying	-	(8)	2	(6)
175	Primary smelting and refining of copper	-	(9)	-	(9)

205	Construction machinery manufacturing	-	(10)	1	(9)
206	Mining and oil and gas field machinery manufacturing	-	(10)	1	(9)
302	Showcase, partition, shelving, and locker manufacturing	-	(33)	23	(9)
102	Prefabricated wood building manufacturing	-	(13)	2	(10)
193	Hardware manufacturing	-	(24)	12	(12)
254	Analytical laboratory instrument manufacturing	-	(22)	10	(12)
119	All other petroleum and coal products manufacturing	-	(23)	9	(14)
227	Air and gas compressor manufacturing	-	(16)	3	(14)
179	Ferrous metal foundries	-	(26)	11	(15)
173	Secondary smelting and alloying of aluminum	-	(19)	3	(16)
197	Coating, engraving, heat treating and allied activities	-	(68)	52	(16)
155	Clay and nonclay refractory manufacturing	-	(20)	3	(18)
274	Carbon and graphite product manufacturing	-	(20)	1	(18)
181	All other forging, stamping, and sintering	-	(22)	3	(19)
145	Laminated plastics plate, sheet (except packaging), and shape manufacturing	-	(41)	21	(20)
180	Nonferrous metal foundries	-	(25)	5	(20)
226	Pump and pumping equipment manufacturing	-	(26)	6	(20)
251	Industrial process variable instruments manufacturing	-	(28)	6	(23)

207	Other industrial machinery manufacturing	-	(38)	11	(27)
125	All other basic inorganic chemical manufacturing	-	(49)	21	(28)
230	Other general purpose machinery manufacturing	-	(30)	2	(28)
256	Watch, clock, and other measuring and controlling device manufacturing	-	(71)	42	(29)
224	Mechanical power transmission equipment manufacturing	-	(32)	1	(31)
291	Boat building	-	(484)	447	(37)
167	Ground or treated mineral and earth manufacturing	-	(47)	6	(41)
225	Other engine equipment manufacturing	-	(57)	15	(42)
146	Polystyrene foam product manufacturing	-	(163)	119	(44)
272	Communication and energy wire and cable manufacturing	-	(75)	29	(45)
250	Automatic environmental control manufacturing	-	(52)	4	(48)
101	Manufactured home (mobile home) manufacturing	-	(61)	3	(57)
233	Fluid power process machinery manufacturing	-	(60)	3	(57)
275	All other miscellaneous electrical equipment and component manufacturing	-	(79)	15	(65)
189	Metal tank (heavy gauge) manufacturing	-	(77)	8	(69)
223	Speed changer, industrial high-speed drive, and gear manufacturing	-	(76)	5	(71)
97	Engineered wood member and truss manufacturing	-	(182)	107	(75)
203	Farm machinery and equipment manufacturing	-	(76)	2	(75)

269	Relay and industrial control manufacturing	-	(99)	19	(79)
178	Nonferrous metal (except copper and aluminum) rolling, drawing, extruding and alloying	-	(93)	12	(81)
96	Veneer and plywood manufacturing	-	(121)	36	(85)
188	Power boiler and heat exchanger manufacturing	-	(93)	8	(86)
267	Motor and generator manufacturing	-	(97)	7	(90)
30	Support activities for other mining	-	(96)	4	(93)
201	Fabricated pipe and pipe fitting manufacturing	-	(128)	10	(118)
268	Switchgear and switchboard apparatus manufacturing	-	(147)	28	(119)
194	Spring and wire product manufacturing	-	(168)	38	(129)
171	Steel product manufacturing from purchased steel	-	(167)	27	(140)
15	Forestry, forest products, and timber tract production	-	(243)	97	(146)
183	Crown and closure manufacturing and metal stamping	-	(191)	41	(149)
170	Iron and steel mills and ferroalloy manufacturing	-	(194)	29	(165)
168	Mineral wool manufacturing	-	(199)	25	(174)
260	Lighting fixture manufacturing	-	(253)	75	(178)
152	Other rubber product manufacturing	-	(246)	64	(182)
214	Air purification and ventilation equipment manufacturing	-	(198)	11	(188)
202	Other fabricated metal manufacturing	-	(400)	173	(226)

121	Industrial gas manufacturing	-	(333)	97	(237)
217	Industrial mold manufacturing	-	(269)	5	(264)
154	Brick, tile, and other structural clay product manufacturing	-	(342)	33	(309)
16	Commercial logging	-	(431)	113	(318)
123	Alkalies and chlorine manufacturing	-	(386)	25	(361)
252	Totalizing fluid meters and counting devices manufacturing	-	(368)	7	(361)
99	Wood windows and doors and millwork manufacturing	-	(711)	198	(513)
29	Support activities for oil and gas operations	-	(638)	68	(571)
195	Machine shops	-	(681)	94	(587)
160	Cement manufacturing	-	(793)	46	(747)
337	Transport by pipeline	-	(886)	127	(759)
169	Miscellaneous nonmetallic mineral product manufacturing	-	(792)	19	(772)
95	Sawmills and wood preservation	-	(951)	169	(782)
130	Fertilizer manufacturing	-	(911)	122	(789)
270	Storage battery manufacturing	-	(944)	71	(874)
198	Valve and fittings other than plumbing manufacturing	-	(1,075)	33	(1,042)
295	Wood kitchen cabinet and countertop manufacturing	-	(1,410)	308	(1,102)
144	Plastics pipe and pipe fitting manufacturing	-	(1,312)	60	(1,252)

27	Mining and quarrying other nonmetallic minerals	-	(1,424)	103	(1,321)
370	Specialized design services	-	(2,829)	1,467	(1,363)
117	Asphalt shingle and coating materials manufacturing	-	(1,920)	150	(1,770)
186	Plate work and fabricated structural product manufacturing	-	(1,995)	102	(1,893)
164	Lime and gypsum product manufacturing	-	(2,084)	97	(1,988)
116	Asphalt paving mixture and block manufacturing	-	(2,376)	106	(2,271)
25	Mining and quarrying stone	-	(2,365)	93	(2,272)
40	Maintenance and repair construction of residential structures	-	(5,912)	3,460	(2,452)
375	Environmental and other technical consulting services	-	(6,712)	3,983	(2,729)
20	Extraction of oil and natural gas	-	(3,659)	381	(3,278)
162	Concrete pipe, brick, and block manufacturing	-	(3,485)	147	(3,338)
187	Ornamental and architectural metal products manufacturing	-	(3,744)	379	(3,364)
26	Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals	-	(3,882)	71	(3,809)
163	Other concrete product manufacturing	-	(5,613)	346	(5,267)
161	Ready-mix concrete manufacturing	-	(6,981)	270	(6,711)
354	Monetary authorities and depository credit intermediation activities	-	(49,008)	42,063	(6,945)
385	Facilities support services	-	(14,428)	1,777	(12,651)
33	Water, sewage and other treatment and delivery systems	(100,043)	22,747	1,442	(75,852)

369	Architectural, engineering, and related services	-	(139,969)	8,374	(131,595)
39	Maintenance and repair construction of nonresidential structures	-	(298,105)	16,172	(281,933)
432	Other state and local government enterprises	(3,697,536)	155,041	20,133	(3,522,361)

APPENDIX D

University Research Park Impact to Value Added by Industry in Florida, 2012

Sector	Description	Direct (\$)	Indirect(\$)	Induced(\$)	Total Value Added (\$)
0	Total	5,237,472	2,733,589	3,669,389	11,640,450
392	Private junior colleges, colleges, universities, and professional schools	9,952,665	65	24,344	9,977,074
360	Real estate establishments	-	1,263,140	309,740	1,572,880
31	Electric power generation, transmission, and distribution	-	551,552	93,819	645,371
361	Imputed rental activity for owner-occupied dwellings	-	-	489,557	489,557
319	Wholesale trade businesses	-	102,605	220,881	323,486
413	Food services and drinking places	-	85,443	174,377	259,819
351	Telecommunications	-	155,270	93,196	248,467
394	Offices of physicians, dentists, and other health practitioners	-	1	210,077	210,078
397	Private hospitals	-	1	166,746	166,747
393	Other private educational services	-	109,884	18,586	128,470
376	Scientific research and development services	-	118,740	4,389	123,129
367	Legal services	-	28,406	64,570	92,976
357	Insurance carriers	-	11,152	78,249	89,401
427	US Postal Service	-	74,854	13,972	88,827
350	Internet publishing and broadcasting	-	86,627	1,863	88,490
366	Lessors of nonfinancial intangible assets	-	76,331	11,591	87,922
388	Services to buildings and dwellings	-	63,941	22,000	85,940
373	Other computer related services, including facilities management	-	68,178	5,388	73,566

398	Nursing and residential care facilities	-	-	70,104	70,104
329	Retail Stores - General merchandise	-	(2,078)	66,273	64,195
320	Retail Stores - Motor vehicle and parts	-	(2,664)	65,495	62,831
324	Retail Stores - Food and beverage	-	(2,005)	61,786	59,781
396	Medical and diagnostic labs and outpatient and other ambulatory care services	-	23	52,582	52,605
381	Management of companies and enterprises	-	15,836	33,805	49,640
331	Retail Nonstores - Direct and electronic sales	-	(690)	44,072	43,383
358	Insurance agencies, brokerages, and related activities	-	5,368	36,311	41,680
377	Advertising and related services	-	24,712	15,927	40,639
32	Natural gas distribution	-	36,868	2,828	39,696
352	Data processing, hosting, ISP, web search portals and related services	-	17,235	22,237	39,471
417	Commercial and industrial machinery and equipment repair and maintenance	-	33,727	5,242	38,968
380	All other miscellaneous professional, scientific, and technical services	-	25,933	11,780	37,713
332	Transport by air	-	21,026	15,666	36,692
356	Securities, commodity contracts, investments, and related activities	-	(37,521)	73,628	36,107
421	Dry-cleaning and laundry services	-	26,196	7,452	33,648
339	Couriers and messengers	-	23,097	8,927	32,024
327	Retail Stores - Clothing and clothing accessories	-	(945)	32,083	31,139
386	Business support services	-	19,918	10,614	30,533
409	Amusement parks, arcades, and gambling industries	-	(254)	30,441	30,188
395	Home health care services	-	-	28,751	28,751

414	Automotive repair and maintenance, except car washes	-	10,217	18,112	28,329
425	Civic, social, professional, and similar organizations	-	9,899	18,376	28,275
325	Retail Stores - Health and personal care	-	(939)	29,119	28,179
355	Nondepository credit intermediation and related activities	-	(4,530)	31,777	27,247
330	Retail Stores - Miscellaneous	-	(924)	27,679	26,755
431	State and local government electric utilities	-	22,431	4,101	26,533
411	Hotels and motels, including casino hotels	-	17,848	7,450	25,299
419	Personal care services	-	-	24,016	24,016
323	Retail Stores - Building material and garden supply	-	(1,380)	23,848	22,468
374	Management, scientific, and technical consulting services	-	(1,906)	23,956	22,051
322	Retail Stores - Electronics and appliances	-	(674)	21,890	21,215
382	Employment services	-	(12,213)	32,367	20,154
326	Retail Stores - Gasoline stations	-	(558)	19,743	19,184
416	Electronic and precision equipment repair and maintenance	-	13,927	5,147	19,074
345	Software publishers	-	13,890	4,819	18,709
342	Periodical publishers	-	14,864	3,842	18,706
113	Printing	-	15,047	3,185	18,233
383	Travel arrangement and reservation services	-	11,778	6,306	18,084
389	Other support services	-	13,207	4,857	18,064
423	Religious organizations	-	-	17,894	17,894
403	Spectator sports companies	-	8,168	9,634	17,803
62	Bread and bakery product manufacturing	-	14,782	2,366	17,149

348	Radio and television broadcasting	-	9,372	6,555	15,927
399	Child day care services	-	-	15,015	15,015
372	Computer systems design services	-	10,867	4,101	14,968
362	Automotive equipment rental and leasing	-	4,242	10,345	14,588
55	Fluid milk and butter manufacturing	-	11,777	2,234	14,012
390	Waste management and remediation services	-	4,771	9,205	13,977
422	Other personal services	-	(398)	14,170	13,772
335	Transport by truck	-	(5,975)	19,372	13,397
410	Other amusement and recreation industries	-	3,226	9,720	12,945
368	Accounting, tax preparation, bookkeeping, and payroll services	-	(17,635)	30,295	12,660
391	Private elementary and secondary schools	-	-	12,615	12,615
74	Tobacco product manufacturing	-	-	12,373	12,373
400	Individual and family services	-	-	12,158	12,158
321	Retail Stores - Furniture and home furnishings	-	(517)	12,237	11,721
336	Transit and ground passenger transportation	-	5,687	5,794	11,480
387	Investigation and security services	-	2,097	8,278	10,375
341	Newspaper publishers	-	4,804	5,457	10,261
346	Motion picture and video industries	-	3,687	6,285	9,972
404	Promoters of performing arts and sports and agents for public figures	-	3,794	5,813	9,607
328	Retail Stores - Sporting goods, hobby, book and music	-	(289)	9,878	9,589
418	Personal and household goods repair and maintenance	-	6,514	2,988	9,503
424	Grantmaking, giving, and social advocacy organizations	-	8	9,215	9,222

54	Fruit and vegetable canning, pickling, and drying	-	7,047	2,157	9,204
363	General and consumer goods rental except video tapes and discs	-	5,540	3,650	9,190
371	Custom computer programming services	-	7,895	1,252	9,148
407	Fitness and recreational sports centers	-	2,699	6,174	8,873
340	Warehousing and storage	-	2,021	6,728	8,748
12	Dairy cattle and milk production	-	7,326	1,411	8,737
401	Community food, housing, and other relief services, including rehabilitation services	-	-	8,444	8,444
3	Vegetable and melon farming	-	4,452	3,727	8,178
426	Private household operations	-	-	8,088	8,088
359	Funds, trusts, and other financial vehicles	-	(348)	8,181	7,833
61	Seafood product preparation and packaging	-	6,838	629	7,466
349	Cable and other subscription programming	-	4,009	2,970	6,979
344	Directory, mailing list, and other publishers	-	5,265	1,643	6,909
133	Pharmaceutical preparation manufacturing	-	853	5,527	6,381
384	Office administrative services	-	(1,716)	7,806	6,090
379	Veterinary services	-	56	5,436	5,492
70	Soft drink and ice manufacturing	-	722	4,716	5,438
333	Transport by rail	-	2,096	3,285	5,381
71	Breweries	-	3,437	1,940	5,378
53	Frozen food manufacturing	-	2,805	2,046	4,851
138	Soap and cleaning compound manufacturing	-	3,830	945	4,775

420	Death care services	-	-	4,674	4,674
402	Performing arts companies	-	256	4,344	4,600
405	Independent artists, writers, and performers	-	1,874	2,497	4,372
406	Museums, historical sites, zoos, and parks	-	-	4,360	4,360
4	Fruit farming	-	1,393	2,668	4,061
347	Sound recording industries	-	2,251	1,760	4,011
11	Cattle ranching and farming	-	3,588	408	3,996
343	Book publishers	-	2,249	1,680	3,928
63	Cookie, cracker, and pasta manufacturing	-	3,008	770	3,778
68	Seasoning and dressing manufacturing	-	2,914	439	3,353
429	Other Federal Government enterprises	-	381	2,918	3,300
59	Animal (except poultry) slaughtering, rendering, and processing	-	2,934	301	3,234
111	Sanitary paper product manufacturing	-	520	2,481	3,001
6	Greenhouse, nursery, and floriculture production	-	150	2,672	2,821
338	Scenic and sightseeing transportation and support activities for transportation	-	(5,823)	8,552	2,729
415	Car washes	-	176	2,337	2,513
58	Ice cream and frozen dessert manufacturing	-	2,087	412	2,499
107	Paperboard container manufacturing	-	1,236	1,162	2,398
73	Distilleries	-	310	2,001	2,311
334	Transport by water	-	470	1,760	2,230
19	Support activities for agriculture and forestry	-	928	1,088	2,016

365	Commercial and industrial machinery and equipment rental and leasing	-	(1,678)	3,634	1,956
378	Photographic services	-	437	1,491	1,928
69	All other food manufacturing	-	1,089	734	1,823
317	All other miscellaneous manufacturing	-	229	1,499	1,729
149	Other plastics product manufacturing	-	839	875	1,714
139	Toilet preparation manufacturing	-	267	1,415	1,682
66	Coffee and tea manufacturing	-	1,204	470	1,673
306	Surgical appliance and supplies manufacturing	-	(187)	1,722	1,535
67	Flavoring syrup and concentrate manufacturing	-	618	797	1,415
14	Animal production, except cattle and poultry and eggs	-	992	355	1,346
65	Snack food manufacturing	-	485	819	1,305
105	Paper mills	-	565	734	1,299
243	Semiconductor and related device manufacturing	-	533	705	1,239
52	Nonchocolate confectionery manufacturing	-	1,066	163	1,229
353	Other information services	-	195	1,017	1,213
18	Commercial hunting and trapping	-	-	1,184	1,184
308	Ophthalmic goods manufacturing	-	7	1,145	1,152
60	Poultry processing	-	150	1,002	1,151
131	Pesticide and other agricultural chemical manufacturing	-	813	285	1,099
248	Electromedical and electrotherapeutic apparatus manufacturing	-	92	975	1,068
42	Other animal food manufacturing	-	634	400	1,035

190	Metal can, box, and other metal container (light gauge) manufacturing	-	603	356	959
283	Motor vehicle parts manufacturing	-	501	359	860
136	Paint and coating manufacturing	-	685	167	853
215	Heating equipment (except warm air furnaces) manufacturing	-	743	61	805
314	Sign manufacturing	-	404	259	663
148	Plastics bottle manufacturing	-	184	421	606
43	Flour milling and malt manufacturing	-	428	167	594
114	Support activities for printing	-	512	78	591
309	Dental laboratories manufacturing	-	-	591	591
110	Stationery product manufacturing	-	447	106	553
412	Other accommodations	-	74	470	545
216	Air conditioning, refrigeration, and warm air heating equipment manufacturing	-	427	90	517
337	Transport by pipeline	-	592	(84)	507
313	Office supplies (except paper) manufacturing	-	208	282	489
228	Material handling equipment manufacturing	-	467	20	487
273	Wiring device manufacturing	-	404	56	460
305	Surgical and medical instrument, laboratory and medical instrument manufacturing	-	17	435	453
89	Womens and girls cut and sew apparel manufacturing	-	17	432	450
10	All other crop farming	-	316	127	443
158	Glass container manufacturing	-	255	183	437
46	Fats and oils refining and blending	-	345	74	419

297	Nonupholstered wood household furniture manufacturing	-	-	412	411
90	Other cut and sew apparel manufacturing	-	334	74	408
184	Cutlery, utensil, pot, and pan manufacturing	-	292	101	393
88	Mens and boys cut and sew apparel manufacturing	-	3	359	361
108	Coated and laminated paper, packaging paper and plastics film manufacturing	-	109	246	355
13	Poultry and egg production	-	221	114	336
142	Plastics packaging materials and unlaminated film and sheet manufacturing	-	103	231	334
364	Video tape and disc rental	-	-	332	332
48	Sugar cane mills and refining	-	178	152	329
159	Glass product manufacturing made of purchased glass	-	135	175	310
303	Mattress manufacturing	-	(8)	310	302
51	Confectionery manufacturing from purchased chocolate	-	131	162	293
100	Wood container and pallet manufacturing	-	(15)	301	286
241	Electron tube manufacturing	-	274	4	278
296	Upholstered household furniture manufacturing	-	-	272	272
134	In-vitro diagnostic substance manufacturing	-	203	68	271
234	Electronic computer manufacturing	-	83	183	266
9	Sugarcane and sugar beet farming	-	134	128	263
64	Tortilla manufacturing	-	196	65	262
318	Broom, brush, and mop manufacturing	-	102	150	252
140	Printing ink manufacturing	-	221	24	245

106	Paperboard Mills	-	80	163	243
236	Computer terminals and other computer peripheral equipment manufacturing	-	118	108	227
213	Other commercial and service industry machinery manufacturing	-	111	115	226
312	Doll, toy, and game manufacturing	-	2	218	220
311	Sporting and athletic goods manufacturing	-	(4)	220	217
141	All other chemical product and preparation manufacturing	-	62	150	213
147	Urethane and other foam product (except polystyrene) manufacturing	-	109	100	209
112	All other converted paper product manufacturing	-	110	79	190
103	All other miscellaneous wood product manufacturing	-	18	164	182
57	Dry, condensed, and evaporated dairy product manufacturing	-	151	27	178
109	All other paper bag and coated and treated paper manufacturing	-	109	67	177
408	Bowling centers	-	6	164	170
84	Textile bag and canvas mills	-	23	123	146
150	Tire manufacturing	-	(13)	158	144
85	All other textile product mills	-	(44)	187	142
87	Cut and sew apparel contractors	-	(26)	165	140
242	Bare printed circuit board manufacturing	-	85	50	135
259	Electric lamp bulb and part manufacturing	-	81	52	133
307	Dental equipment and supplies manufacturing	-	(16)	146	130
17	Commercial Fishing	-	97	30	126
310	Jewelry and silverware manufacturing	-	2	123	126

83	Curtain and linen mills	-	10	115	125
271	Primary battery manufacturing	-	(5)	118	113
94	Other leather and allied product manufacturing	-	10	103	112
298	Metal and other household furniture manufacturing	-	5	105	109
240	Audio and video equipment manufacturing	-	73	31	104
304	Blind and shade manufacturing	-	1	103	104
174	Aluminum product manufacturing from purchased aluminum	-	(20)	123	102
185	Handtool manufacturing	-	47	53	99
294	All other transportation equipment manufacturing	-	-	99	99
80	Textile and fabric finishing mills	-	11	86	97
246	Printed circuit assembly (electronic assembly) manufacturing	-	29	62	90
41	Dog and cat food manufacturing	-	-	87	87
300	Office Furniture	-	1	85	86
192	Arms, ordnance, and accessories manufacturing	-	2	83	85
118	Petroleum lubricating oil and grease manufacturing	-	(362)	447	84
238	Broadcast and wireless communications equipment manufacturing	-	37	47	84
157	Other pressed and blown glass and glassware manufacturing	-	40	39	79
151	Rubber and plastics hoses and belting manufacturing	-	39	37	75
72	Wineries	-	9	57	66
282	Travel trailer and camper manufacturing	-	(19)	83	64
292	Motorcycle, bicycle, and parts manufacturing	-	4	59	63

91	Apparel accessories and other apparel manufacturing	-	2	61	62
50	Chocolate and confectionery manufacturing from cacao beans	-	23	31	53
261	Small electrical appliance manufacturing	-	8	44	52
285	Aircraft engine and engine parts manufacturing	-	37	11	48
245	Electronic connector manufacturing	-	35	11	47
82	Carpet and rug mills	-	1	43	43
210	Vending, commercial, industrial, and office machinery manufacturing	-	(1)	43	40
244	Electronic capacitor, resistor, coil, transformer, and other inductor manufacturing	-	27	13	40
281	Motor home manufacturing	-	-	38	39
196	Turned product and screw, nut, and bolt manufacturing	-	1	34	35
93	Footwear manufacturing	-	-	33	33
104	Pulp mills	-	7	24	30
279	Motor vehicle body manufacturing	-	13	15	28
137	Adhesive manufacturing	-	(14)	40	27
143	Unlaminated plastics profile shape manufacturing	-	(53)	80	27
166	Cut stone and stone product manufacturing	-	(318)	347	27
132	Medicinal and botanical manufacturing	-	5	19	26
237	Telephone apparatus manufacturing	-	3	23	25
286	Other aircraft parts and auxiliary equipment manufacturing	-	11	14	25
86	Apparel knitting mills	-	-	23	23
77	Narrow fabric mills and schiffli machine embroidery	-	-	21	21

276	Automobile manufacturing	-	-	21	21
156	Flat glass manufacturing	-	(2)	22	20
239	Other communications equipment manufacturing	-	(70)	89	20
316	Musical instrument manufacturing	-	2	18	20
191	Ammunition manufacturing	-	(11)	30	19
209	Semiconductor machinery manufacturing	-	18	2	19
284	Aircraft manufacturing	-	8	10	19
265	Other major household appliance manufacturing	-	5	11	17
222	Turbine and turbine generator set units manufacturing	-	-	15	15
258	Magnetic and optical recording media manufacturing	-	5	11	15
278	Heavy duty truck manufacturing	-	1	13	15
44	Wet corn milling	-	6	8	14
56	Cheese manufacturing	-	10	4	14
129	Artificial and synthetic fibers and filaments manufacturing	-	(7)	21	14
221	Rolling mill and other metalworking machinery manufacturing	-	11	2	14
288	Propulsion units and parts for space vehicles and guided missiles manufacturing	-	(4)	18	14
1	Oilseed farming	-	10	4	13
2	Grain farming	-	9	4	12
257	Software, audio, and video media for reproduction	-	(28)	40	12
8	Cotton farming	-	5	6	11
78	Nonwoven fabric mills	-	-	11	11

262	Household cooking appliance manufacturing	-	-	11	11
287	Guided missile and space vehicle manufacturing	-	10	-	11
128	Synthetic rubber manufacturing	-	(16)	26	10
249	Search, detection, and navigation instruments manufacturing	-	2	8	10
263	Household refrigerator and home freezer manufacturing	-	-	9	10
45	Soybean and other oilseed processing	-	6	3	9
277	Light truck and utility vehicle manufacturing	-	-	9	9
135	Biological product (except diagnostic) manufacturing	-	(4)	12	8
247	Other electronic component manufacturing	-	(14)	22	8
76	Broadwoven fabric mills	-	-	6	7
21	Mining coal	-	4	1	6
255	Irradiation apparatus manufacturing	-	-	6	6
266	Power, distribution, and specialty transformer manufacturing	-	(18)	24	6
232	Industrial process furnace and oven manufacturing	-	5	-	5
299	Institutional furniture manufacturing	-	(11)	16	5
75	Fiber, yarn, and thread mills	-	-	3	4
92	Leather and hide tanning and finishing	-	2	3	4
218	Metal cutting and forming machine tool manufacturing	-	-	3	4
231	Packaging machinery manufacturing	-	-	4	4
315	Gasket, packing, and sealing device manufacturing	-	(3)	7	4
79	Knit fabric mills	-	-	3	3
81	Fabric coating mills	-	1	3	3

153	Pottery, ceramics, and plumbing fixture manufacturing	-	(20)	24	3
253	Electricity and signal testing instruments manufacturing	-	2	2	3
264	Household laundry equipment manufacturing	-	-	2	3
290	Ship building and repairing	-	(1)	4	3
5	Tree nut farming	-	1	2	2
122	Synthetic dye and pigment manufacturing	-	(3)	7	2
211	Optical instrument and lens manufacturing	-	(2)	4	2
229	Power-driven handtool manufacturing	-	(1)	3	2
199	Plumbing fixture fitting and trim manufacturing	-	(13)	14	1
289	Railroad rolling stock manufacturing	-	-	1	1
293	Military armored vehicle, tank, and tank component manufacturing	-	1	1	1
7	Tobacco farming	-	-	-	-
23	Mining copper, nickel, lead, and zinc	-	-	-	-
28	Drilling oil and gas wells	-	-	-	-
34	Construction of new nonresidential commercial and health care structures	-	-	-	-
35	Construction of new nonresidential manufacturing structures	-	-	-	-
36	Construction of other new nonresidential structures	-	-	-	-
37	Construction of new residential permanent site single- and multi-family structures	-	-	-	-
38	Construction of other new residential structures	-	-	-	-
47	Breakfast cereal manufacturing	-	-	-	-
49	Beet sugar manufacturing	-	-	-	-

124	Carbon black manufacturing	-	-	-	-
204	Lawn and garden equipment manufacturing	-	(9)	8	-
212	Photographic and photocopying equipment manufacturing	-	-	-	-
219	Special tool, die, jig, and fixture manufacturing	-	(2)	2	-
235	Computer storage device manufacturing	-	-	1	-
301	Custom architectural woodwork and millwork manufacturing	-	(2)	2	-
428	Federal electric utilities	-	-	-	-
433	* Not an industry (Used and secondhand goods)	-	-	-	-
434	* Not an industry (Scrap)	-	-	-	-
435	* Not an industry (Rest of the world adjustment)	-	-	-	-
436	* Not an industry (Noncomparable foreign imports)	-	-	-	-
437	* Employment and payroll only (state & local govt, non-education)	-	-	-	-
438	* Employment and payroll only (state & local govt, education)	-	-	-	-
439	* Employment and payroll only (federal govt, non-military)	-	-	-	-
440	* Employment and payroll only (federal govt, military)	-	-	-	-
24	Mining gold, silver, and other metal ore	-	(12)	10	(1)
280	Truck trailer manufacturing	-	(2)	1	(1)
98	Reconstituted wood product manufacturing	-	(8)	5	(2)
182	Custom roll forming	-	(4)	2	(2)
115	Petroleum refineries	-	(40)	37	(3)
208	Plastics and rubber industry machinery manufacturing	-	(4)	2	(3)
165	Abrasive product manufacturing	-	(7)	3	(4)

176	Primary smelting and refining of nonferrous metal (except copper and aluminum)	-	(8)	3	(4)
220	Cutting tool and machine tool accessory manufacturing	-	(13)	8	(5)
172	Alumina refining and primary aluminum production	-	(12)	2	(9)
200	Ball and roller bearing manufacturing	-	(17)	8	(9)
102	Prefabricated wood building manufacturing	-	(16)	3	(12)
120	Petrochemical manufacturing	-	(47)	35	(12)
126	Other basic organic chemical manufacturing	-	(98)	86	(12)
127	Plastics material and resin manufacturing	-	(45)	32	(13)
155	Clay and nonclay refractory manufacturing	-	(17)	2	(15)
254	Analytical laboratory instrument manufacturing	-	(30)	13	(16)
206	Mining and oil and gas field machinery manufacturing	-	(18)	2	(17)
302	Showcase, partition, shelving, and locker manufacturing	-	(63)	46	(19)
227	Air and gas compressor manufacturing	-	(27)	5	(21)
177	Copper rolling, drawing, extruding and alloying	-	(30)	5	(24)
193	Hardware manufacturing	-	(50)	24	(25)
205	Construction machinery manufacturing	-	(29)	3	(27)
197	Coating, engraving, heat treating and allied activities	-	(121)	93	(29)
180	Nonferrous metal foundries	-	(37)	7	(30)
179	Ferrous metal foundries	-	(52)	21	(31)
251	Industrial process variable instruments manufacturing	-	(40)	8	(32)
119	All other petroleum and coal products manufacturing	-	(59)	24	(35)

181	All other forging, stamping, and sintering	-	(41)	6	(36)
145	Laminated plastics plate, sheet (except packaging), and shape manufacturing	-	(78)	39	(39)
226	Pump and pumping equipment manufacturing	-	(51)	11	(40)
173	Secondary smelting and alloying of aluminum	-	(50)	9	(42)
256	Watch, clock, and other measuring and controlling device manufacturing	-	(103)	61	(42)
230	Other general purpose machinery manufacturing	-	(47)	3	(43)
274	Carbon and graphite product manufacturing	-	(47)	2	(45)
175	Primary smelting and refining of copper	-	(54)	2	(52)
22	Mining iron ore	-	(65)	13	(53)
207	Other industrial machinery manufacturing	-	(76)	22	(54)
291	Boat building	-	(753)	697	(56)
224	Mechanical power transmission equipment manufacturing	-	(59)	2	(57)
101	Manufactured home (mobile home) manufacturing	-	(62)	3	(58)
125	All other basic inorganic chemical manufacturing	-	(112)	48	(65)
250	Automatic environmental control manufacturing	-	(85)	7	(78)
233	Fluid power process machinery manufacturing	-	(103)	6	(97)
272	Communication and energy wire and cable manufacturing	-	(169)	67	(102)
275	All other miscellaneous electrical equipment and component manufacturing	-	(130)	23	(106)
225	Other engine equipment manufacturing	-	(146)	38	(108)
189	Metal tank (heavy gauge) manufacturing	-	(128)	14	(115)
146	Polystyrene foam product manufacturing	-	(460)	336	(124)

97	Engineered wood member and truss manufacturing	-	(307)	181	(126)
223	Speed changer, industrial high-speed drive, and gear manufacturing	-	(141)	10	(131)
96	Veneer and plywood manufacturing	-	(191)	57	(134)
30	Support activities for other mining	-	(141)	6	(135)
188	Power boiler and heat exchanger manufacturing	-	(151)	12	(138)
269	Relay and industrial control manufacturing	-	(179)	35	(144)
167	Ground or treated mineral and earth manufacturing	-	(207)	23	(184)
201	Fabricated pipe and pipe fitting manufacturing	-	(204)	16	(188)
16	Commercial logging	-	(266)	69	(195)
15	Forestry, forest products, and timber tract production	-	(333)	132	(201)
267	Motor and generator manufacturing	-	(226)	15	(211)
203	Farm machinery and equipment manufacturing	-	(221)	6	(215)
194	Spring and wire product manufacturing	-	(321)	73	(249)
268	Switchgear and switchboard apparatus manufacturing	-	(352)	66	(285)
183	Crown and closure manufacturing and metal stamping	-	(403)	87	(316)
178	Nonferrous metal (except copper and aluminum) rolling, drawing, extruding and alloying	-	(365)	45	(320)
217	Industrial mold manufacturing	-	(339)	7	(333)
171	Steel product manufacturing from purchased steel	-	(404)	64	(340)
260	Lighting fixture manufacturing	-	(485)	144	(340)
152	Other rubber product manufacturing	-	(501)	131	(369)
168	Mineral wool manufacturing	-	(486)	62	(424)

214	Air purification and ventilation equipment manufacturing	-	(463)	24	(439)
202	Other fabricated metal manufacturing	-	(840)	365	(475)
252	Totalizing fluid meters and counting devices manufacturing	-	(521)	9	(511)
29	Support activities for oil and gas operations	-	(591)	63	(529)
170	Iron and steel mills and ferroalloy manufacturing	-	(652)	97	(554)
99	Wood windows and doors and millwork manufacturing	-	(849)	237	(612)
154	Brick, tile, and other structural clay product manufacturing	-	(779)	74	(704)
121	Industrial gas manufacturing	-	(1,024)	297	(727)
123	Alkalies and chlorine manufacturing	-	(784)	51	(733)
195	Machine shops	-	(897)	124	(773)
95	Sawmills and wood preservation	-	(1,139)	202	(936)
295	Wood kitchen cabinet and countertop manufacturing	-	(1,473)	322	(1,151)
270	Storage battery manufacturing	-	(1,615)	121	(1,495)
169	Miscellaneous nonmetallic mineral product manufacturing	-	(1,831)	45	(1,786)
160	Cement manufacturing	-	(1,999)	115	(1,884)
130	Fertilizer manufacturing	-	(2,249)	302	(1,947)
370	Specialized design services	-	(4,096)	2,124	(1,973)
40	Maintenance and repair construction of residential structures	-	(6,005)	3,515	(2,491)
375	Environmental and other technical consulting services	-	(6,603)	3,918	(2,685)
186	Plate work and fabricated structural product manufacturing	-	(3,254)	167	(3,087)
144	Plastics pipe and pipe fitting manufacturing	-	(3,284)	148	(3,136)

27	Mining and quarrying other nonmetallic minerals	-	(3,884)	280	(3,604)
198	Valve and fittings other than plumbing manufacturing	-	(3,796)	117	(3,678)
187	Ornamental and architectural metal products manufacturing	-	(5,303)	538	(4,766)
164	Lime and gypsum product manufacturing	-	(5,458)	254	(5,205)
116	Asphalt paving mixture and block manufacturing	-	(5,691)	253	(5,439)
117	Asphalt shingle and coating materials manufacturing	-	(5,906)	461	(5,445)
26	Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals	-	(6,178)	114	(6,064)
162	Concrete pipe, brick, and block manufacturing	-	(7,190)	304	(6,886)
430	State and local government passenger transit	-	(3,517)	(3,583)	(7,100)
163	Other concrete product manufacturing	-	(8,703)	538	(8,166)
25	Mining and quarrying stone	-	(8,671)	341	(8,330)
161	Ready-mix concrete manufacturing	-	(10,985)	426	(10,560)
20	Extraction of oil and natural gas	-	(20,268)	2,111	(18,157)
385	Facilities support services	-	(25,995)	3,201	(22,794)
354	Monetary authorities and depository credit intermediation activities	-	(185,618)	159,316	(26,302)
369	Architectural, engineering, and related services	-	(141,016)	8,437	(132,580)
33	Water, sewage and other treatment and delivery systems	(260,706)	59,279	3,759	(197,668)
39	Maintenance and repair construction of nonresidential structures	-	(307,389)	16,675	(290,713)
432	Other state and local government enterprises	(4,454,487)	186,781	24,255	(4,243,451)