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The Ohio Bioscience Sector, 2000-2010

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EXECUTIVE SUMMARY

INTRODUCTION

This report presents the findings of a research study analyzing the bioscience sector within the state of Ohio and its six geographic regions. It describes trends in the bioscience sector and each of its five subsectors: *Agricultural Biotechnology, Medical & Testing Laboratories, Medical Device & Equipment Manufacturers, Pharmaceuticals & Therapeutics,* and *Research & Development.* Trends are analyzed between the years 2000 and 2010 with special focus paid to the 2008 to 2010 time period coinciding with the recent recession and the beginning of the recovery.[1] The trend analysis examines four measures: employment, payroll, average wages, and number of establishments.

In addition to the trend analysis, this report estimates the economic impact of Ohio's bioscience sector in 2010. The economic impact of the bioscience sector and its five subsectors is measured for both Ohio as a whole and each of its six geographic regions. Economic impact is measured in terms of employment, output, value added, labor income, and taxes.

TREND ANALYSIS OF OHIO'S BIOSCIENCE SECTOR

Total bioscience employment in the state of Ohio was 60,870 in 2010. Bioscience employment grew continuously between 2000 and 2008, increasing by 20.7% or 10,799 jobs. Employment peaked at 62,281 employees in 2008 and then declined annually in both 2009 and 2010 for a total loss of 3.2% or 1,991 jobs. Ohio's bioscience sector experienced a net gain in employment of 16.9% (8,808 employees) from 2000 to 2010, which stands in stark contrast to Ohio's 11.6% loss in total statewide employment over the same time period.

The total payroll for Ohio's bioscience sector in 2010 was $4.4 billion. The bioscience sector experienced a net decrease of 0.7% between 2008 and 2010, a net loss of $30 million after adjusting for inflation. Over the course of the study period, 2000 to 2010, bioscience payroll increased $1.1 billion at an average annual rate of 2.8%.

The average wage for a job in Ohio's bioscience sector was $72,795 in 2010. This represents a net growth of 2.6% from 2008 to 2010. From 2000 to 2010, bioscience average wage increased $7,912 at an average annual rate of 1.2%.

The number of establishments in Ohio's bioscience sector has grown each year between 2000 and 2010. In 2010, 1,783 bioscience establishments existed, an increase of 72 since 2008 and 481 since 2000. Over the study period, the number of bioscience establishments has grown at an average annual rate of 3.2%.

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[1] Appendix D at the rear of the report includes preliminary information about the bioscience sector in 2011.
[2] For descriptions of Ohio's six geographic regions, see page 6 of this report.

The Ohio bioscience sector represented a growing share of the national bioscience sector between 2000 and 2010. This trend was consistent with regard to employment, payroll, and number of establishments. Additionally, the concentration and strength of the bioscience sector in Ohio's economy, measured by employment location quotient, grew from 1.01 in 2000 to 1.21 in 2010. Industries with location quotients greater than one are characterized as being highly concentrated, which produces specialization and, in most cases, a regional competitive advantage. Further, these industries are export industries that generate wealth by selling products outside the region, thereby producing economic growth. Together, these characteristics can help classify an industry with an LQ above 1 as a driver of a regional economy. Ohio's bioscience sector, which experienced an increase in its LQ, can be considered an increasingly specialized and vital component of the state economy. In terms of subsectors, *Agricultural Biotechnology* had the largest location quotient of all the bioscience subsectors in 2000, 2008, and 2010.

OHIO'S BIOSCIENCE SECTOR BY SUBSECTOR

This report divides the bioscience sector into five subsectors: *Agricultural Biotechnology, Medical & Testing Laboratories, Medical Device & Equipment Manufacturers, Pharmaceuticals & Therapeutics,* and *Research & Development.*

In 2010, the largest bioscience subsector in terms of employment was *Medical Device & Equipment Manufacturers* with 20,788 employees. This represented 34% of total bioscience employment in Ohio. Despite the size of its employment base, *Medical Device & Equipment Manufacturers* was the only subsector to sustain a net loss over the study period. Five of the six subsectors grew between 2000 and 2010. The *Medical & Testing Laboratories* subsector grew at the highest average rate of 4.3% annually. From 2008 to 2010, the recessionary period, *Research & Development* was the only subsector to grow in terms of employment. Given the timing of this occurrence, it could possibly be explained by companies investing in innovation through research and development as a means to mitigate recessionary effects and stimulate recovery.

The *Medical Device & Equipment Manufacturers* subsector had the largest bioscience payroll in 2010 ($1.4 billion). Although all subsectors grew between 2000 and 2010 in terms of payroll, the *Research & Development* subsector experienced the largest growth with an increase of $324.9 million and an average annual growth rate of 4.9%. The *Medical Device & Equipment Manufacturers* subsector, though possessing the largest payroll, experienced the smallest total growth of all subsectors between 2000 and 2010.

The *Agricultural Biotechnology* subsector paid the highest average wage by far in 2010 ($100,613), followed second by *Research & Development* ($84,447). After adjusting for inflation, all subsectors experienced an increase in average wages between 2000 and 2010 except *Medical & Testing Laboratories.* The average wage in the *Medical & Testing*

Laboratories subsector declined $731 between 2000 and 2010, a small average annual decrease of 0.2%. Between 2008 and 2010, *Agricultural Biotechnology* sustained a $15,235 increase in average wage while the average wage in *Research & Development* decreased $2,234.

The total number of bioscience establishments increased in every subsector between 2000 and 2010. In addition, all subsectors except *Medical Device & Equipment Manufacturers* saw an increase in their number of establishments from 2008 to 2010; *Medical Device & Equipment Manufacturers* lost only 6 establishments during the recessionary period.

OHIO'S BIOSCIENCE SECTOR BY REGION

This report divides the state of Ohio into six geographic regions: Central, Northeast, Northwest, Southeast, Southwest, and Western.[2]

The Northeast region had the highest bioscience employment of all regions in 2010. The Northeast region's 20,719 employees represented 34% of total bioscience employment in Ohio in 2010. The Southwest region had the second-largest employment of all regions (14,120 employees, or 23.2%), followed closely by the Central region (14,045 employees, or 23.1%). These statistics show that four-fifths (80.3%) of bioscience employment is located within the areas surrounding Ohio's three largest metropolitan areas: Cincinnati, Cleveland, and Columbus. The Southeast region had the smallest bioscience employment with 1,700 employees (2.8% of bioscience employment). Overall, employment grew in all six regions between 2000 and 2010, but only in three regions between 2008 and 2010. The Central, Northeast, and Northwest regions lost employment during the recessionary period with the largest loss sustained by the Central region (-1,312 employees).

The Northeast region, which had the largest bioscience employment of all regions in Ohio, also had the largest payroll in 2010 ($1.7 billion). This single region alone accounted for 37.2% of the total payroll in Ohio's bioscience sector. The Southwest region had the second-largest payroll in 2010 ($1.1 billion), followed closely by the Central region ($1.0 billion). While all regions experienced growth in payroll between 2000 and 2010, only the Northeast region grew during the 2008 to 2010 recessionary period.

The largest average wage of all regions belonged to the Northeast region ($79,795). As with employment and payroll, the regions with the next largest averages wages were Southwest ($77,798) and Central ($74,596). The Southeast region had the smallest average wage in 2010 ($48,506). Average wages increased only in the Central, Northeast, and Northwest regions from 2008 to 2010; the largest increase by far was in the Northeast region where average wage increased just shy of $10,000. The Southeast, Southwest, and Western regions each sustained a loss of several thousand dollars in their average wage between 2008 and 2010.

[2] For descriptions of Ohio's six geographic regions, see page 6 of this report.

The Northeast region also led the state of Ohio in number of bioscience establishments in 2010 with 733, or 41.1% of the total in Ohio. Both the Central and Southwest regions had approximately 17% of the total establishments with 319 and 300, respectively. The number of bioscience establishments grew in all regions from 2000 to 2010; growth also took place in every region except the Southeast during the recessionary period of 2000 to 2008. The largest growth rate during the recessionary period belonged to the Central region, which grew at an average annual rate of 5.2%.

Economic Impact of Ohio's Bioscience Sector

The total economic impact of Ohio's bioscience sector in 2010, including direct, indirect, and induced impacts, was as follows:

Employment	191,303 jobs
Output	$53.815 billion
Value-added	$15.072 billion
Labor income	$7.742 billion
Tax revenues	$3.103 billion

The *Agricultural Biotechnology* subsector had the largest total economic impact of all subsectors in terms of employment (61,082), output ($24.9 billion), value added ($5.4 billion), and taxes ($1.2 billion). The *Pharmaceuticals & Therapeutics* subsector had the largest labor income impact ($2.9 billion), followed by *Agricultural Biotechnology* ($2.7 billion). The *Medical & Testing Laboratories* subsector had the smallest economic impact overall.

The Northeast region of Ohio had a larger economic impact than all other regions in every measure of impact. This occurrence is not surprising due to the fact the Northeast region had the largest employment, payroll, average wage, and number of establishments of all regions. The total impact of the Northeast region, including direct, indirect, and induced impacts, was as follows: employment (66,193), output ($18.2 billion), value added ($5.1 billion), labor income ($2.6 billion), and tax ($1.1 billion). The Central region ranked second in all economic impact measures, followed by the Southwest region. The remaining regions ranked in order of their size of economic impact are Western, Northwest, and Southeast.

INTRODUCTION

This report presents the findings of a research study analyzing the bioscience sector within the state of Ohio. The study was conducted by the Center for Economic Development, located in the Maxine Goodman Levin College of Urban Affairs at Cleveland State University. The study was completed for BioOhio, a statewide advocacy and economic development group for bioscience in Ohio, and supports BioOhio's annual *Ohio Bioscience Growth Report.*[3] This is the third research study completed for BioOhio by the Center for Economic Development.

This report features two main research foci. The first is an analysis of the bioscience trends both in Ohio as a whole and in six distinct geographic regions defined by JobsOhio (Figure 1). The trend analysis examines Ohio's bioscience industry as a single entity and also breaks the sector down into five subsectors (Table 1). Trends are analyzed for the years 2000 to 2010. The second research focus is an estimation of the Ohio bioscience sector's economic impact in 2010. The economic impact looks at the impact of both the bioscience sector and the five subsectors on the state of Ohio as a whole and its six regions.

This report consists of six sections. The first includes the executive summary and this introduction. The second section defines Ohio's six geographic regions by county and the five bioscience subsectors by industry. The second section also explains the methodology underlying the trend and economic impact analyses as well as the methodology used to create the data set of bioscience companies in Ohio. The third section analyzes trends in Ohio's bioscience sector and each of its subsectors over the 11-year period. The fourth section analyzes trends in each of Ohio's six geographic regions. The fifth section discusses the economic impact of Ohio's bioscience sector and the subsectors on both the state as a whole and its six regions. The sixth section contains concluding comments.[4]

[3] For more information on BioOhio and its *Ohio Bioscience Growth Report,* visit http://www.bioohio.com.

[4] The appendices following the concluding comments feature a number of sections including comprehensive data tables associated with this report's analyses (Appendix A – Appendix C), an examination of preliminary 2011 bioscience data (Appendix D), and a trend analysis of 2000 to 2011 data for the newly-defined *Distribution* subsector of Ohio's bioscience sector (Appendix E).

METHODOLOGY

OHIO'S SIX GEOGRAPHIC REGIONS

This report analyzes the bioscience industry both in Ohio as a whole and in six distinct geographic regions (Figure 1). The regions were defined by JobsOhio, the state of Ohio's new private economic development corporation.[5]

The **Central** region envelops the city of Columbus and is comprised of 11 counties: Delaware, Fairfield, Franklin, Knox, Licking, Logan, Madison, Marion, Morrow, Pickaway, and Union. The Central region encompasses the entire Columbus Metropolitan Statistical Area (MSA).

The **Northeast** region incorporates the cities of Cleveland, Akron, Canton, and Youngstown, and is made up of 18 counties: Ashland, Ashtabula, Columbiana, Cuyahoga, Erie, Geauga, Huron, Lake, Lorain, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Tuscarawas, and Wayne. Included in the Northeast region are the following MSAs: Akron, Cleveland-Elyria-Mentor, Mansfield, Sandusky, and Youngstown-Warren-Boardman (Ohio counties only). This region also includes one-half of the Canton-Massillon MSA (Stark County).

The **Northwest** region includes the cities of Toledo, Bowling Green, Findlay, and Lima, and the Toledo and Lima MSAs. It is made up of the 17 counties: Allen, Crawford, Defiance, Fulton, Hancock, Hardin, Henry, Lucas, Ottawa, Paulding, Putnam, Sandusky, Seneca, Van Wert, Williams, Wood, and Wyandot.

The **Southeast** region is comprised of 25 counties: Adams, Athens, Belmont, Carroll, Cosochton, Gallia, Guernsey, Harrison, Highland, Hocking, Holmes, Jackson, Jefferson, Lawrence, Meigs, Monroe, Morgan, Muskingham, Noble, Perry, Pike, Ross, Scioto, Vinton, and Washington. The Southeast region is largely non-metropolitan, though it does include one county in each of the following MSAs: Canton-Massillon, OH; Steubenville-Weirton, OH-WV; Huntington-Ashland, WV-KY-OH; Parkersburg-Marietta-Vienna, WV-OH; and Wheeling, WV-OH.

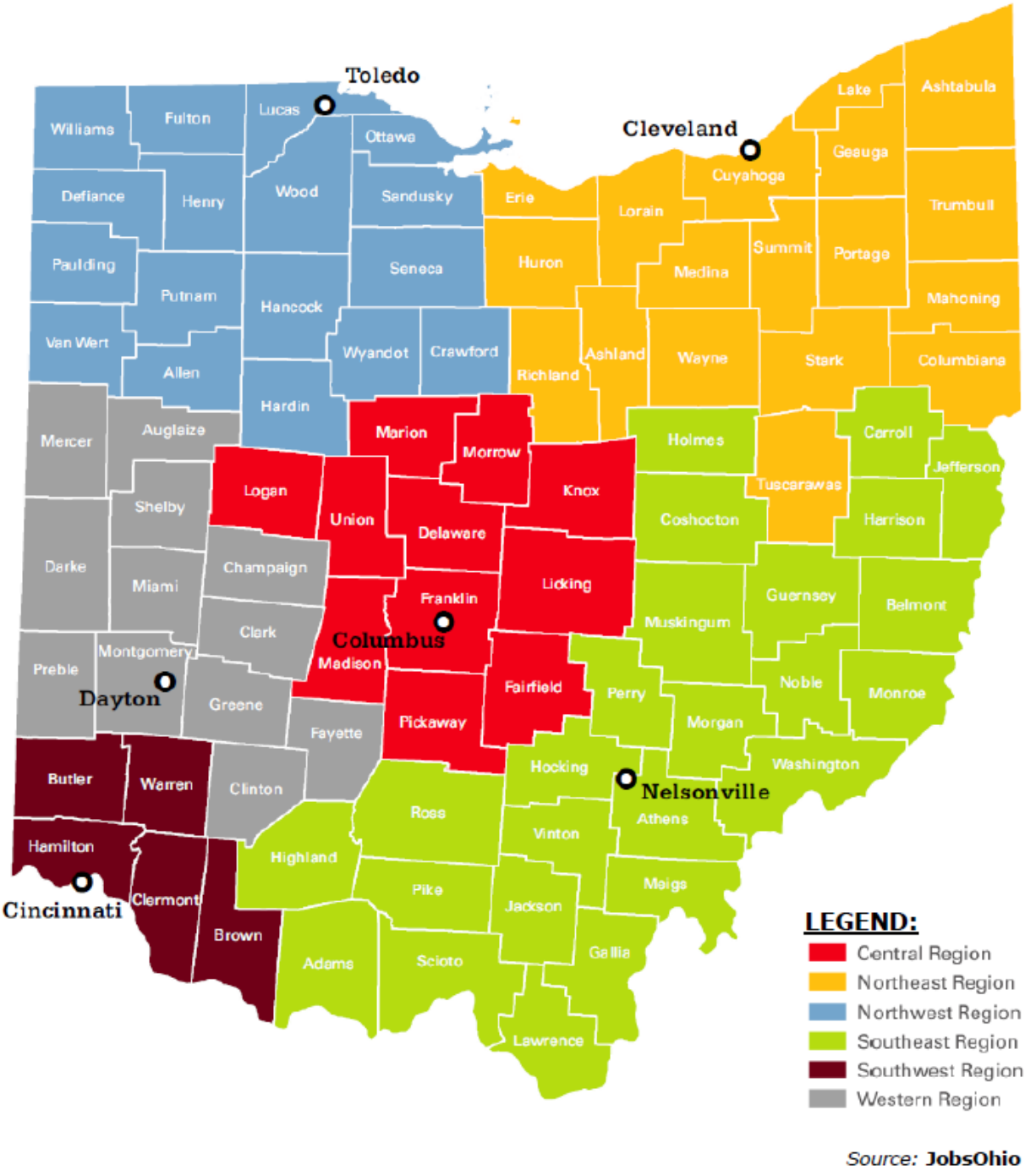
The **Southwest** region surrounds the city of Cincinnati and includes five counties: Brown, Butler, Clermont, Hamilton, and Warren. These five counties constitute the Ohio counties in the Cincinnati-Middletown MSA.

The **Western** region is made up of 12 counties: Auglaize, Champaign, Clark, Clinton, Darke, Fayette, Greene, Mercer, Miami, Montgomery, Preble, and Shelby. The Western region encompasses the entirety of both the Dayton and Springfield MSAs and includes the cities of Dayton, Springfield, Troy, and Xenia.[6]

[5] It should be noted that the regions deviate slightly from definitions used in prior reports. The Center for Economic Development's prior bioscience reports utilized geographic regions defined as part of the Ohio Department of Development's Entrepreneurial Signature Program.

[6] In prior reports, the Western region was designated the West Central region. The name was changed for this report to bring the regional definitions in line with the service areas of JobsOhio.

Figure 1: Map of BioOhio Regions



Source: **JobsOhio**

In prior reports, a category called "Unspecified County" was included as part of the regional trend analysis. This category acted as a catch-all classification for any establishment unable to be geocoded, or assigned to one of the six geographic regions, due to an invalid address. Typically, addresses are deemed invalid if the information is incorrect or if the address provided is for a location outside Ohio. In this report, the Unspecified County category was eliminated and the associated establishments dropped from the bioscience data set for all years 2000 to 2010. This has resulted in establishment figures throughout the 11-year period that are lower than those reported in previous reports.

THE FIVE BIOSCIENCE SUBSECTORS

This study uses five subsectors to define and measure Ohio's bioscience sector. These subsectors are:

- Agricultural Biotechnology
- Medical & Testing Laboratories
- Medical Device & Equipment Manufacturers
- Pharmaceuticals & Therapeutics
- Research & Development

Each subsector is comprised of a collection of bio-related NAICS codes that reflect the industries included (Table 1).

This definition of Ohio's bioscience sector builds upon the "Bioscience Subsector Industries" outlined in the *Battelle/BIO State Initiatives 2010* report.[7] Based on conversations between BioOhio and the Center for Economic Development, alterations were made to the subsector definitions including:

- NAICS code 333314 (*Optical Instrument and Lens Manufacturing*) was added as part of the *Medical Device & Equipment Manufacturers* subsector. This NAICS code was not included in the Battelle/BIO report.
- The Battelle/BIO report combines *Research, Testing, & Medical Laboratories* into one subsector while this report divides them into two: *Medical and Testing Laboratories* and *Research & Development.*
- NAICS code 339116 (*Dental Laboratories*) was reassigned from the *Research, Testing, & Medical Laboratories* subsector to the *Medical Device & Equipment Manufacturers* subsector.
- The names of each subsector differ slightly from those found in Battelle/BIO report.

In addition, this report features a change to the definition of the *Medical Device & Equipment*

[7] Battelle Technology Partnership Practice. (2010). *Battelle/BIO State Bioscience Initiatives 2010.* Retrieved from http://www3.bio.org/local/battelle2010/Battelle_Report_2010.pdf

Table 1: Definition of Bioscience Subsectors by NAICS Code

NAICS Code	Definition
Agricultural Biotechnology	
311221	Wet Corn Milling
311222	Soybean Processing
311223	Other Oilseed Processing
325193	Ethyl Alcohol Manufacturing
325199	All Other Basic Organic Chemical Manufacturing
325221	Cellulosic Organic Fiber Manufacturing
325311	Nitrogenous Fertilizer Manufacturing
325312	Phosphatic Fertilizer Manufacturing
325314	Fertilizer (Mixing Only) Manufacturing
325320	Pesticide and Other Agricultural Chemical Manufacturing
Medical & Testing Laboratories	
541380[1]	Testing Laboratories
621511	Medical Laboratories
621512	Diagnostic Imaging Centers
Medical Device & Equipment Manufacturers	
333314	Optical Instrument and Lens Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus 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
Pharmaceuticals & Therapeutics	
325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
Research & Development	
541711	Research and Development in Biotechnology
541712[2]	Research and Development in the Physical, Engineering, & Life Sciences (except Biotechnology)

Notes:

[1] NAICS code 541380 uses the following ratios for establishments with under 50 employees to capture testing laboratories associated with bioscience: Establishments share = 8.38%; Employment & Wages share = 3.99%. These ratios are from the Battelle/BIO report "Technology, Talent and Capital: State Bioscience Initiatives, 2008" The Center examined firms in this NAICS code with over 50 employees to determine if they are working in the biosciences.

[2] NAICS code 541712 uses the following ratios for establishments with under 50 employees to capture the life sciences: Establishments share = 41.72%; Employment share: 30.31%; Wages share = 27.01%. These ratios are based on the U.S. Census Bureau's 2007 Economic Census. The Center examined firms in this NAICS code with over 50 employees to determine if they are working in the biosciences.

Manufacturers subsector used in prior reports. NAICS code 339111 (*Medical Equipment and Supplies Manufacturing*), formerly used as a secondary bioscience NAICS code, was removed from this report. This code was a 2002 NAICS code and no longer exists as of the classification system's 2007 update.

TREND ANALYSIS

The first part of this study examines the economic performance of Ohio's bioscience industry. Ohio's six geographic regions are analyzed from 2000 to 2010 and resulting trends are compared to trends in Ohio and the United States. Further, the analysis details the 2008 to 2010 time period, which coincides with the recent economic recession. Please note that for all years in the trend analysis, first quarter data are being utilized, not annual averages.

Three measures of economic activity are used for the trend analysis: employment, payroll, and number of establishments. Analysis of employment trends provides information on local jobs without differentiation between part-time and full-time employment or between low-skill, low-paying jobs and high-skill, high-paying jobs. Analysis of payroll (wage) trends describes the scale of the bioscience sector in different economies. Although payroll does not measure gross regional product, it can be viewed as a proxy for value-added output. The number of establishments counts the individual locations of businesses and captures the different functionalities that firms have at different sites.

Additionally, two other variables are included. Average wage is calculated as payroll per employee and estimates the annual average wage in each industry and region. The average number of employees per establishment is calculated as the total employment divided by the number of establishments and shows the average size of bioscience firms.

ECONOMIC IMPACT

The second part this study explores the economic impact of Ohio's bioscience sector. This analysis uses IMPLAN Professional and IMPLAN Data Files. IMPLAN Professional® 3.0 is an economic impact assessment software system. The IMPLAN Data Files allow for the creation of sophisticated models of local economies in order to estimate a wide range of economic impacts.

Economic impact estimates are provided for total employment, output, value added, and labor income (household earnings). For each of these estimates, impacts will be divided into direct, indirect, and induced impacts. Tax impact is provided for federal as well as state and local levels.

The first four impact measures contain three distinct components. *Direct impact* refers to the initial value of goods and services, including labor, purchased by the bioscience industry within

a defined economic region. These purchases are sometimes referred to as the "first-round effect." *Indirect impact* measures the value of labor, capital, and other inputs of production needed to produce the goods and services required by the bioscience industry (second-round and additional-round effects). *Induced impact* measures the change in spending by local households due to increased earnings of employees working in local industries that produce goods and services for the bioscience industry and its suppliers.

CREATING THE BIOSCIENCE DATA SET

To conduct the trend and economic impact analyses of Ohio's bioscience sector, a data set of bioscience companies in Ohio was created using two sources: (1) a comprehensive list of companies received from BioOhio and (2) the Quarterly Census of Employment and Wages (QCEW or ES202) database. The list from BioOhio was received in November 2011 and included 1,767 establishments identified by BioOhio, per the industry definition of Ohio's bioscience sector,[8] for inclusion in this report's economic analysis.

The QCEW is managed, maintained, and edited by the Center for Economic Development at Cleveland State University's Maxine Goodman Levin College of Urban Affairs ("Center"). The Center receives quarterly updates of this data from the Ohio Department of Jobs and Family Services. The QCEW includes information such as company name, address, city, county, North American Industry Classification System (NAICS) code, employment, and wages on most establishments with paid employees in Ohio. It includes data for the years 2000 to 2010 that is aggregated by industry and region. Although the database includes company-level information, only industry level data can be reported due to confidentiality restrictions. As a result, information is suppressed for some industries, primarily small industries in small geographic areas of the state.

Using the two aforementioned data sources, the Center created a data set of Ohio bioscience companies for use in this study. The steps for assembling the data set are as follows:

- All companies in the QCEW database possessing a bioscience NAICS code were included in the data set (Table 1). Companies and establishments were included even if they were not on the list received from BioOhio.

- Every company on the list from BioOhio was assigned an industry (NAICS) code using as many as three sources: QCEW database, Hoover's database, and LexisNexis database. The BioOhio list was then organized into four categories:

    1) Companies assigned a bioscience NAICS code in the QCEW database were automatically included in the bioscience data set (as noted above).
    2) Companies not included in the QCEW database were not incorporated into the

[8] See page 9 for the industry definition of Ohio's bioscience sector.

bioscience data set.

3) Companies were added to the bioscience data set if their primary NAICS code in the QCEW database was not bioscience, but one or both of the other two sources (Hoover's and LexisNexis) assigned them a bioscience NAICS code. In this instance, companies were assigned a secondary bioscience NAICS code based on the NAICS assignments of the non-QCEW sources.
4) Companies were not included in the bioscience data set if none of the sources assigned them a bioscience NAICS code.

- For NAICS codes 541712 (*Research & Development in the Physical, Engineering, & Life Sciences)* and 541380 (*Testing Laboratories*), individual companies with over 50 employees were examined individually to determine if each is a bioscience company because these two NAICS codes also include non-bioscience establishments.

- Ratios were applied to approximate the number of establishments, employment, and wages to be included as part of the bioscience sector for companies assigned NAICS code 541712 or 541380 with less than 50 employees.

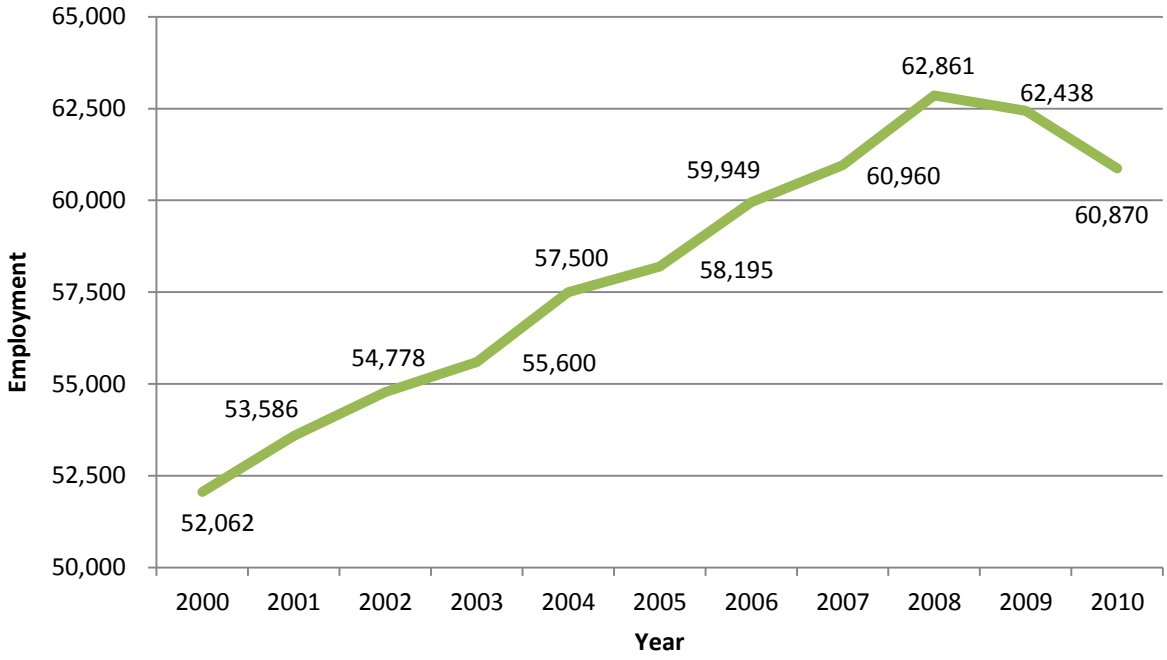
In summary, the Center for Economic Development created a data set of bioscience companies in Ohio based on confidential data from the QCEW database for years 2000 through 2010. The data set includes (1) all companies assigned a bioscience NAICS code in the QCEW database, and (2) companies included in the BioOhio list that were assigned a non-bioscience NAICS code in the QCEW database but were identified as a bioscience company by one of the other two sources used. Employment and wage data on these companies include all the workers at each business identified, regardless of their occupation. Because of confidentiality restrictions, data about individual companies cannot be reported, but industry trends can be described. Also due to confidentiality restrictions, detailed industry information for some smaller subsectors located in smaller regions is suppressed.

TREND ANALYSIS OF OHIO'S BIOSCIENCE SECTOR

OHIO'S BIOSCIENCE SECTOR AS A WHOLE

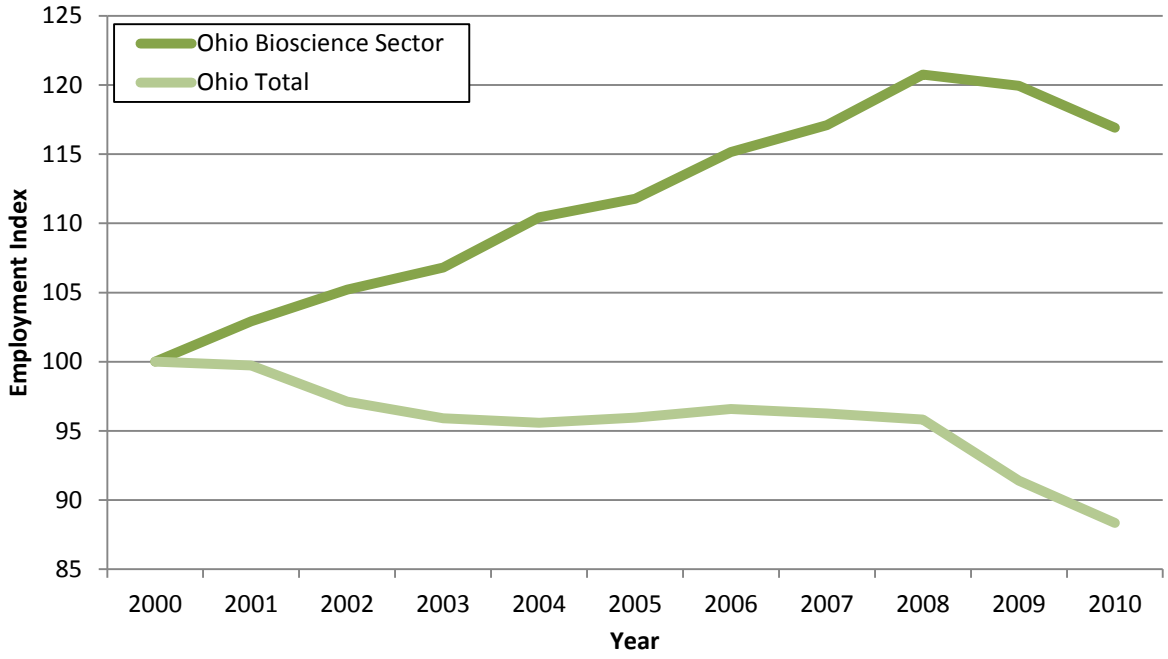
Total bioscience employment in the state of Ohio grew continuously from 2000 to 2008, reached its peak of 62,861 employees in 2008, and began to decline at the onset of the recession in December 2007 (Figure 2). Employment proceeded to decline 3.2% (1,991 employees) from 2008 to 2010, resulting in a total employment of 60,870 bioscience employees in 2010. Overall, Ohio's bioscience sector experienced a net gain of 8,808 employees between 2000 and 2010, a 16.9% increase in employment.

Figure 2: Total Bioscience Employment in Ohio, 2000-2010



Despite the losses from 2008 to 2010, the employment trends of Ohio's bioscience sector were less severe than the trends of total employment in Ohio (Figure 3). While the bioscience sector lost 3.2% of its employment from 2008 to 2010, total employment in Ohio decreased 7.8% over the same period of time. Moreover, while the bioscience sector experienced annual employment growth from 2000 to 2008 and a net gain over the study period, Ohio's level of total employment declined or experienced a small growth each year from 2000 to 2010. Also, the state of Ohio suffered an 11.6% loss of employment (-630,327 jobs) over the study period, 2000 to 2010.

Figure 3: Bioscience Employment and Total Employment in Ohio, 2000-2010
(2000 = 100)[9]

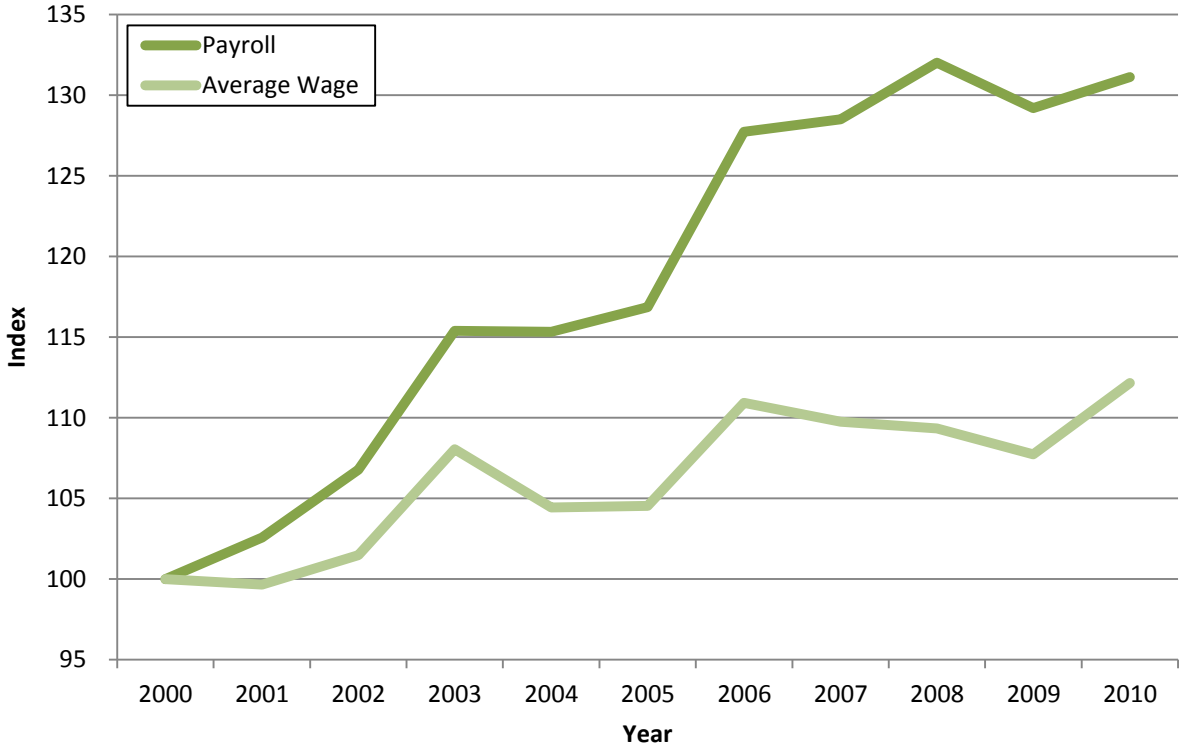


Ohio's bioscience sector had a payroll of $4.4 billion in 2010, which represents a net decrease of only 0.7% ($30.0 million) between 2008 and 2010 (Figure 4). Payroll actually increased 1.5% ($65.5 million) from 2009 to 2010 despite employment losses, nearly offsetting the loss of payroll experienced in the bioscience sector from 2008 to 2009. When considering the entire study period, payroll in Ohio's bioscience sector increased nearly a third, 31.1% or $1.1 billion, from 2000 to 2010.[10]

Employment in Ohio's bioscience sector paid an average wage of $72,975 in 2010. This statistic represents the average wage for all industries and occupations that support Ohio's bioscience sector, not just scientists and executives. The average wage in the bioscience sector grew from 2009 to 2010, yielding a total net growth of 2.6% during the recessionary period of 2008 to 2010 (Figure 4).

[9] The use of an index in Figure 3 allows for the comparison of changes in Ohio's bioscience employment with changes in the state of Ohio's total employment.
[10] All payroll and average wage statistics presented in this report were calculated using wage data inflated to 2010 dollar values.

Figure 4: Bioscience Payroll and Average Wage in Ohio, 2000-2010
(2000 = 100)



In 2010, Ohio's bioscience sector encompassed a total of 1,783 establishments and 1,318 unique firms.[11] When compared to all industries in Ohio, a total of 253,337 establishments and 189,143 unique firms, it is clear that the bioscience sector is relatively small. Despite losses in bioscience employment, the number of bioscience establishments in Ohio increased by 72 (4.2%) between 2008 and 2010. Further, the number of establishments grew by 481 (36.9%) over the entire study period, 2000 to 2010.

A detailed summary of Ohio's bioscience sector, including annual aggregated data on its employment, payroll, average wages, and number of establishments, is located in Appendix Table A1.

OHIO'S BIOSCIENCE SECTOR BY SUBSECTOR

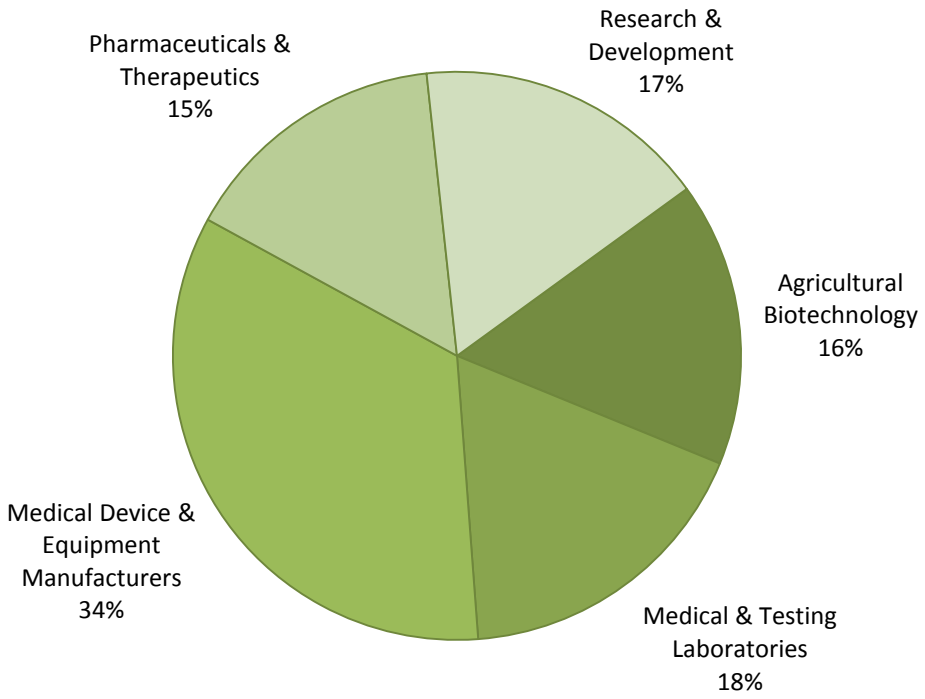
The following subsection analyzes Ohio's bioscience sector in terms of its five subsectors: *Agricultural Biotechnology, Medical & Testing Laboratories, Medical Device & Equipment Manufacturers, Pharmaceuticals & Therapeutics,* and *Research & Development* (Table 1).

[11] In addition, 97 establishments were removed from the data set for this report as a result of invalid addresses that could not be accurately assigned a geographic region. In prior reports, a catch-all category called "Unspecified County" was used to account for this type of establishment. However, that category was eliminated from this report and the associated establishments removed from the data set.

Employment

The subsector with the largest employment in 2010 was *Medical Device & Equipment Manufacturers* with 34% (20,788 employees) of the total employment in Ohio's bioscience sector (Figure 5). Each of the other subsectors accounted for between 15% and 18% of total employment, which represents an average of just over 10,000 employees.

Figure 5: Percentage of Ohio Bioscience Employment by Subsector, 2010



Medical Device & Equipment Manufacturers, the largest subsector, experienced a net loss of 498 jobs between 2000 and 2010 (Table 2). This net loss was perpetuated by a decrease of over 1,000 jobs during the recessionary period of 2008 to 2010. This four-figure loss represents an annual average decline of 2.5 percent 2008 and 2010. All subsectors experienced job losses, except for one subsector, *Research & Development,* that experienced an increase in employment between 2008 and 2010 (461 jobs).

In the overall study period, 2000 to 2010, *Medical Device & Equipment Manufacturers* was the only subsector to yield a net loss of jobs. Employment in the *Agricultural Biotechnology* subsector stayed essentially constant over the study period with an increase of only five jobs and an average annual rate of change of 0.01% between 2000 and 2010. The remaining three subsectors each posted employment increases between 2,600 and 3,700.

Table 2: Bioscience Employment Change by Subsector

Subsector	2010 Employ-ment	Change in Employment			Average Annual Percent Change in Employment		
		2000-2008	2008 - 2010	2000 - 2010	2000-2008	2008 - 2010	2000 - 2010
Agricultural Biotechnology	9,854	353	(348)	5	0.44	(1.72)	0.01
Medical & Testing Laboratories	10,727	3,779	(72)	3,707	5.53	(0.33)	4.33
Medical Device & Equipment Manufacturers	20,788	586	(1,084)	(498)	0.34	(2.51)	(0.24)
Pharmaceuticals & Therapeutics	9,330	3,580	(948)	2,632	5.50	(4.72)	3.37
Research & Development	10,171	2,501	461	2,962	3.79	2.35	3.50
Total Bioscience in Ohio	**60,870**	**10,799**	**(1,991)**	**8,808**	**2.38**	**(1.60)**	**1.58**

Payroll

In addition to having the largest employment level in 2010, the *Medical Device & Equipment Manufacturers* subsector also possessed the largest payroll ($1.4 billion) of all subsectors (Table 3). The subsectors with the second- and third-largest payrolls were *Agricultural Biotechnology* ($991.4 million) and *Research & Development* ($859.9 million), respectively.

Three subsectors lost payroll during the recessionary period of 2008 to 2010: *Medical & Testing Laboratories* (-$25.8 million), *Medical Device & Equipment Manufacturers* (-$71.0 million), and *Pharmaceuticals & Therapeutics* (-$70.9 million). In contrast, payroll in Agricultural Biotechnology increased by over $120 million over the recessionary period.

The *Research & Development* subsector had the largest increase in payroll between 2000 and 2010 ($324.9 million) as well as the largest annual average rate of change (4.9%) over the same time period. The subsectors with the second- and third-largest average annual rates of change over the study period were *Medical & Testing Laboratories* (4.2%) and *Pharmaceuticals & Therapeutics* (3.8%).

Table 3: Bioscience Payroll Change by Subsector

Subsector	2010 Payroll	Change in Payroll ($)			Average Annual Percent Change in Payroll		
		2000 - 2008	2008 – 2010	2000 - 2010	2000 - 2008	2008 – 2010	2000 - 2010
Agricultural Biotechnology	$991,443,836	$92,208,693	$120,413,269	$212,621,962	1.41	6.69	2.44
Medical & Testing Laboratories	$473,527,679	$184,355,843	($25,847,866)	$158,507,977	5.93	(2.62)	4.16
Medical Device & Equipment Manufacturers	$1,350,417,403	$190,096,705	($71,044,684)	$119,052,021	1.81	(2.53)	0.93
Pharmaceuticals & Therapeutics	$767,673,396	$310,528,106	($70,855,714)	$239,672,392	5.95	(4.32)	3.81
Research & Development	$858,910,312	$307,616,700	$17,237,909	$324,854,609	5.85	1.02	4.87
Total Bioscience in Ohio	**$4,441,972,626**	**$1,084,806,047**	**($30,097,086)**	**$1,054,708,961**	**3.53**	**(0.34)**	**2.75**

Average Wage

The *Agricultural Biotechnology* subsector paid the largest average wage by far of any subsector in 2010 ($100,613) (Table 4). Perhaps more interesting than the *Agricultural Biotechnology* paying a six-figure average wage is the fact that its average wage increased over $15,000 during the 2008 to 2010 recessionary period, while the average wages of all other subsectors declined or stayed fairly level. The next largest average wages were paid by *Research & Development* ($84,447) and *Pharmaceuticals & Therapeutics* ($82,280).

Only one subsector, *Medical & Testing Laboratories*, sustained a net loss in its average wage from 2000 to 2010. This subsector had the smallest payroll and average wage ($44,144) of all subsectors in 2010, but also possessed the second largest employment base after *Medical Device & Equipment Manufacturers.* Despite having the smallest average wage, however, the average wage paid in the *Medical & Testing Laboratories* subsector still exceeds the average wage of all industries in Ohio ($40,686).

During the study period, 2000 to 2010, average wage in *Agricultural Biotechnology* grew at the fastest annual rate (2.4% on average per year), followed by *Research & Development* (1.3% on average per year) and *Medical Device & Equipment Manufacturers* (1.2% on average per year). The large average annual percent change for the *Agricultural Biotechnology* subsector was due to its net increase in average wage between 2008 and 2010, especially when compared to all other subsectors. The only other subsector to see an increase in average wage from 2008 to 2010 was *Pharmaceuticals & Therapeutics* (an increase of $695).

Table 4: Bioscience Average Wage Change by Subsector

Subsector	2010 Average Wage	Change in Average Wage ($)			Average Annual Percent Change in Average Wage		
		2000 - 2008	2008 – 2010	2000 - 2010	2000 - 2008	2008 – 2010	2000 - 2010
Agricultural Biotechnology	$100,613	$6,302	$15,235	$21,537	0.96	8.56	2.44
Medical & Testing Laboratories	$44,144	$1,368	($2,099)	($731)	0.38	(2.30)	(0.16)
Medical Device & Equipment Manufacturers	$64,961	$7,141	($29)	$7,113	1.47	(0.02)	1.17
Pharmaceuticals & Therapeutics	$82,280	$2,755	$695	$3,450	0.43	0.43	0.43
Research & Development	$84,447	$12,599	($2,234)	$10,365	1.98	(1.30)	1.32
Total Bioscience in Ohio	**$72,975**	**$6,080**	**$1,833**	**$7,913**	**1.12**	**1.28**	**1.15**

Establishments

The total number of bioscience establishments increased in every subsector between 2000 and 2010 (Table 5). In addition, all subsectors except *Medical Device & Equipment Manufacturers* saw an increase in their number of establishments during the recessionary period of 2008 to

2010. Approximately 69% of all establishments in 2010 were included in the *Medical & Testing Laboratories* and *Medical Device & Equipment Manufacturers* subsectors combined. In addition, the number of establishments in the *Medical & Testing Laboratories* subsector nearly doubled over the study period from 338 establishments in 2000 to 641 in 2010. This increase resulted in the *Medical & Testing Laboratories* subsector having the highest annual average rate of change in the number of establishments (6.6%) of all subsectors.

Table 5: Bioscience Establishments Change by Subsector

Subsector	2010 Establish-ments	Change in Establishments			Average Annual Percent Change in Establishments		
		2000 - 2008	2008 – 2010	2000 - 2010	2000 - 2008	2008 – 2010	2000 - 2010
Agricultural Biotechnology	164	24	24	48	2.38	8.23	3.52
Medical & Testing Laboratories	641	264	39	303	7.48	3.19	6.61
Medical Device & Equipment Manufacturers	593	14	(6)	8	0.30	(0.50)	0.14
Pharmaceuticals & Therapeutics	92	23	2	25	3.76	1.11	3.22
Research & Development	293	84	13	97	4.56	2.30	4.10
Total Bioscience in Ohio	**1,783**	**409**	**72**	**481**	**3.47**	**2.08**	**3.19**

A detailed summary of Ohio's bioscience sector by subsector, including annual data on its employment, payroll, average wages, and number of establishments, is located in Appendix Table A1.

OHIO'S BIOSCIENCE SECTOR AND THE U.S. BIOSCIENCE SECTOR: A COMPARATIVE ANALYSIS

One method of analyzing the comparative size and strength of the bioscience sector in Ohio is to measure it against the national bioscience sector. This will be done two ways in this report. First, the employment, payroll, and number of establishments in Ohio's bioscience sector will be calculated as a share of the national bioscience sector. This analysis will show how large of a portion Ohio's bioscience sector represents of the national bioscience sector. Second, Ohio's bioscience sector, both as a whole and as separate subsectors, will be measured against the national bioscience sector to determine the concentration of bioscience. Using location quotients, this analysis will demonstrate how specialized the bioscience sector in Ohio is as well as show the sector's economic value to the state's total economy.

Ohio's Bioscience Sector as Shares of the U.S. Bioscience Sector

Table 6 reveals how large a percentage the Ohio bioscience sector represents of the U.S. bioscience sector. Special focus is paid to comparing the employment, payroll, and number of establishments of Ohio's bioscience sector to those of the U.S. bioscience sector. As shown in

Table 6, Ohio's bioscience employment represented 4.6% of total bioscience employment in the United States in 2010. This percentage was greater than Ohio's bioscience employment share in 2000 (4.3%), but smaller than the share in 2008 (4.7%).

Table 6: Ohio Bioscience Employment, Payroll, and Establishments as Shares of U.S. Bioscience Sector, 2000, 2008, & 2010

	2000	2008	2010
Employment	4.3%	4.7%	4.6%
Payroll	3.6%	3.9%	3.9%
Establishments	3.5%	3.7%	3.7%

The shares of the other two measures, payroll and number of establishments, each grew from 2000 to 2008. The share of establishments remained constant each year from 2008 to 2010 while the share of payroll dipped to 3.6% in 2009 and back up to 3.9% in 2010.

The Role and Concentration of Ohio's Bioscience Sector in the Ohio Economy

Location quotients (LQs) measure the concentration of a particular industry in a region relative to the concentration of the same industry within the national economy. If an industry has a higher concentration in the regional economy than in the national economy (LQ>1), it indicates that the industry is part of the regional economic base, producing some goods for export that generate wealth for the region. Further, industries with a high LQ are considered a specialization of the region and a driver of the regional economy. Industries with a location quotient less than one are considered non-basic or service industries.

In Table 7, the LQs for the Ohio bioscience sector and its individual subsectors are presented for the years 2000, 2008, and 2010, to show trends over time.

Table 7: Ohio Bioscience Employment Location Quotients, 2000, 2008 & 2010

Subsector	2000	2008	2010
Agricultural Biotechnology	1.79	2.35	2.40
Medical & Testing Laboratories	1.01	1.27	1.21
Medical Device & Equipment Manufacturers	1.17	1.29	1.28
Pharmaceuticals & Therapeutics	0.58	0.91	0.87
Research & Development	0.75	0.93	0.99
Total Bioscience in Ohio	**1.01**	**1.22**	**1.21**

The LQ of the Ohio bioscience sector as a whole was 1.01 in 2000, which shows that the concentration of bioscience employment in Ohio was nearly identical to the concentration in the U.S. bioscience sector. Since then, the Ohio bioscience sector's LQ increased to 1.22 in 2008 and 1.21 in 2010, revealing that the concentration of bioscience employment in Ohio now exceeds that of the U.S. bioscience sector.

Agricultural Biotechnology had the largest LQ of all subsectors in every year reviewed. The LQ of *Agricultural Biotechnology* was 1.79 in 2000, but that figure grew to 2.35 in 2008 and 2.40 in 2010. This growth shows that *Agricultural Biotechnology* is the most specialized of all the bioscience subsectors in Ohio.

It should also be noted that the LQs of all the subsectors grew from 2000 to 2008, which shows that the concentration and specialization of bioscience in Ohio grew over the study period. The only subsector that did not have a location quotient over one in 2010 was *Pharmaceuticals & Therapeutics.*

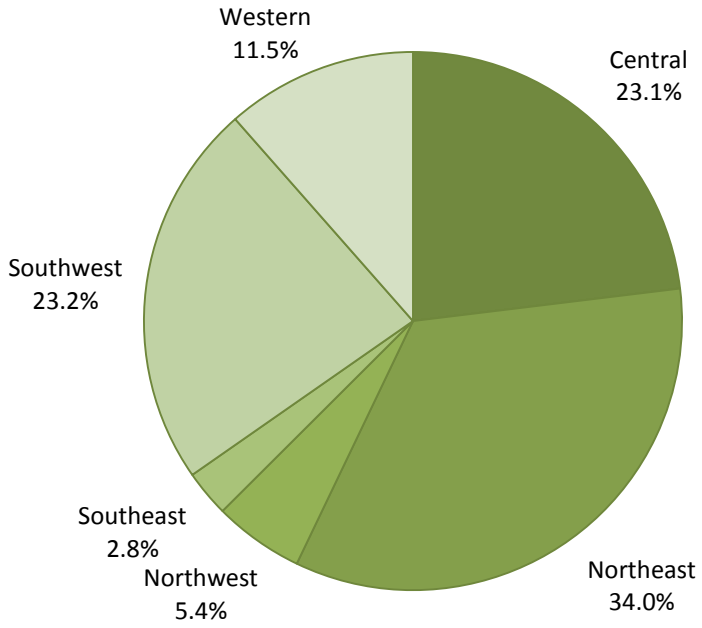
OHIO'S BIOSCIENCE SECTOR BY REGION

The following subsection analyzes Ohio's bioscience sector in terms of Ohio's six geographic regions: Central, Northeast, Northwest, Southeast, Southwest, and Western (Figure 1).

Employment

Bioscience employment in the Northeast region accounted for just over one third (34%) of Ohio's total bioscience employment (Figure 6). The next two regions with the highest bioscience employment were the Central and Southwest regions, each of which represented 23% of total employment. The Western region accounted for almost 12% of employment while the final two regions, Northwest and Southeast, each accounted for 5% or less of total bioscience employment in Ohio.

Figure 6: Ohio Bioscience Employment by Region, 2010



Bioscience employment grew in all six regions during the course of the study period, 2000 to 2010. Looking strictly at the recessionary period (2008 to 2010), however, reveals sizable employment losses in three of Ohio's regions. The biggest loss was in the Central region, which lost 1,312 employees (4.4% on average each year). In addition, the Northeast region lost 839 employees (2.0% on average annually) and the Northwest region lost 230 employees (3.3% on average annually). The Southeast, Southwest, and Western regions each gained employment between 2008 and 2010 (Table 8).

Table 8: Bioscience Employment Change by Region

Region	2010 Employ-ment	Change in Employment			Average Annual Percent Change in Employment		
		2000 - 2008	2008 - 2010	2000 - 2010	2000 - 2008	2008 - 2010	2000 - 2010
Central	14,045	4,745	(1,312)	3,433	4.73	(4.37)	2.84
Northeast	20,719	1,326	(839)	487	0.80	(1.97)	0.24
Northwest	3,293	457	(230)	227	1.75	(3.32)	0.72
Southeast	1,700	257	15	272	2.09	0.44	1.76
Southwest	14,120	2,028	260	2,288	2.00	0.93	1.78
Western	6,993	1,986	115	2,101	4.35	0.83	3.64
Total Bioscience in Ohio	**60,870**	**10,799**	**(1,991)**	**8,808**	**2.38**	**(1.60)**	**1.58**

Annual regional data on employment, payroll, average wages, and number of establishments can be found in Appendix Tables A2 to A7.

Medical Devices & Equipment Manufacturers, the largest subsector in all of Ohio in terms of employment, also represented the largest percentage of employment in all geographic regions in 2010 except the Central region. The largest subsector in the Central region was *Research & Development,* which represented 44.6% of all *Research & Development* employment in the state of Ohio in 2010. Appendix Table B1 contains a detailed look at regional bioscience employment by subsector in 2010.

Payroll

The Northeast region had the largest bioscience payroll in 2010 ($1.7 billion), followed by the Southwest region ($1.1 billion) and the Central region ($1.0 billion) (Table 9). In addition, the Northeast region was the only region to experience a growth in payroll during the recessionary period (2008 to 2010) while the Central and Southwest regions experienced the greatest payroll dollar losses during the same time period ($93.5 million and $55.7 million, respectively). The Northwest region lost $11.0 million from 2008 to 2010; since this is the smallest region, this loss is associated with the second-largest average annual rate of decline (3.0%) during the recessionary period (2008 to 2010). Only the Central region had a larger average annual rate of decline from 2008 to 2010 (4.2%).

Table 9: Bioscience Payroll Change by Region

Region	2010 Payroll	Change in Payroll ($)			Average Annual Percent Change in Payroll		
		2000 - 2008	2008 - 2010	2000 - 2010	2000 - 2008	2008 - 2010	2000 - 2010
Central	$1,047,606,020	$436,040,194	($93,453,605)	$342,586,589	6.20	(4.18)	4.04
Northeast	$1,653,246,236	$177,176,254	$148,159,863	$325,336,117	1.58	4.81	2.22
Northwest	$178,438,156	$58,212,358	($11,009,013)	$47,203,345	4.70	(2.95)	3.12
Southeast	$82,410,474	$21,635,798	($4,596,255)	$17,039,543	3.64	(2.68)	2.34
Southwest	$1,098,513,256	$254,488,958	($55,666,948)	$198,822,010	3.16	(2.44)	2.02
Western	$381,758,484	$137,252,485	($13,531,128)	$123,721,357	5.48	(1.73)	3.99
Total Bioscience in Ohio	**$4,441,972,626**	**$1,084,806,047**	**($30,097,086)**	**$1,054,708,961**	**3.53**	**(0.34)**	**2.75**

As with regional employment, the *Medical Devices & Equipment Manufacturers* subsector was the largest subsector in terms of payroll in all but two of Ohio's regions. *Research & Development* is the largest subsector in the Central region while *Agricultural Biotechnology* is the largest subsector in the Northwest region. Appendix Table B2 contains a detailed look at regional bioscience payroll by subsector in 2010.

Average Wage

The Northeast region, in addition to having the largest employment and payroll of all regions, had the largest average wage in 2010 ($79,795), followed closely by the Southwest region ($77,798) and the Central region ($74,596) (Table 10). The Southeast region had the smallest average wage in 2010 ($48,506). Average wages increased in three of the six regions from 2008 to 2010; the largest increase by far was in the Northeast region where average wage increased just shy of $10,000. The Southeast, Southwest, and Western regions each sustained a loss of several thousand dollars in their average wage between 2008 and 2010.

Table 10: Bioscience Average Wage Change by Region

Region	2010 Average Wage	Change in Average Wage ($)			Average Annual Percent Change in Average Wage		
		2000 - 2008	2008 - 2010	2000 - 2010	2000 - 2008	2008 - 2010	2000 - 2010
Central	$74,596	$7,865	$295	$8,160	1.41	0.20	1.17
Northeast	$79,795	$4,182	$9,979	$14,161	0.78	6.91	1.97
Northwest	$54,169	$10,973	$396	$11,369	2.89	0.37	2.38
Southeast	$48,506	$5,920	($3,174)	$2,746	1.53	(3.12)	0.58
Southwest	$77,798	$7,225	($5,473)	$1,752	1.14	(3.34)	0.23
Western	$54,587	$4,719	($2,883)	$1,836	1.08	(2.54)	0.34
Total Bioscience in Ohio	**$72,975**	**$6,080**	**$1,833**	**$7,913**	**1.12**	**1.28**	**1.15**

The bioscience subsector with the largest average wage varied by region; *Agricultural Biotechnology* was the subsector with the largest average wage in three regions (Northeast, Northwest, and Southeast), *Research & Development* had the largest average wage in two regions (Central and Western), and *Medical Device & Equipment Manufacturers* had the largest average wage in the Southwest region. Appendix Table B3 contains a detailed look at regional bioscience average wages in 2010 by subsector.

Establishments

The Northeast region led the state of Ohio in number of bioscience establishments in 2010 (733) (Table 11). The Central region had the second-largest number of establishments (319), followed by the Southwest region (300). The number of bioscience establishments grew in all regions over the entire study period (2000 to 2010); growth also took place in every region except the Southeast during the recessionary period (2008 to 2010). The Southeast region lost four establishments from 2008 to 2010. The Central and Southwest regions exhibited the largest average annual rate of growth from 2000 to 2008 (4.3%), while the Central region grew at the largest average annual rate over the entire study period (2000 to 2010) and during the recessionary period (2008 to 2010).

Table 11: Change in Number of Bioscience Establishments by Region

Region	2010	Change in Average Wage ($)			Average Annual Percent Change in Average Wage		
		2000 - 2008	2008 - 2010	2000 - 2010	2000 - 2008	2008 - 2010	2000 - 2010
Central	319	82	31	113	4.28	5.24	4.47
Northeast	733	159	30	189	3.26	2.11	3.03
Northwest	148	26	1	27	2.46	0.34	2.03
Southeast	66	12	(4)	8	2.38	(2.90)	1.30
Southwest	300	82	12	94	4.28	2.06	3.83
Western	217	48	2	50	3.21	0.46	2.65
Total Bioscience in Ohio	**1,783**	**409**	**72**	**481**	**3.47**	**2.08**	**3.19**

The *Medical & Testing Laboratories* subsector had the largest number of bioscience establishments in all Ohio regions but the Northeast region. This is congruent with the fact that *Medical & Testing Laboratories* has the most establishments of any subsector in Ohio as a whole. The subsector with the most establishments in the Northeast region was *Medical Device & Equipment Manufacturers.* Appendix Table B4 contains a detailed look at the number of regional bioscience establishments in 2010 by subsector.

Regional Shares of the Ohio Bioscience Sector

Table 12 showcases the percentage each region represents of the total employment, payroll, and establishments in Ohio's bioscience sector at various points throughout the study period. This data shows the size and strength of a region in the overall bioscience sector in Ohio, compared to all other regions.

Table 12: Regional Shares of Employment, Payroll, and Establishments in the Ohio Bioscience Sector, 2000, 2008 & 2010

Region	Employment			Payroll			Establishments		
	2000	2008	2010	2000	2008	2010	2000	2008	2010
Central	20.4%	24.4%	23.1%	20.8%	25.5%	23.6%	15.8%	16.8%	17.9%
Northeast	38.9%	34.3%	34.0%	39.2%	33.7%	37.2%	41.8%	41.1%	41.1%
Northwest	5.9%	5.6%	5.4%	3.9%	4.2%	4.0%	9.3%	8.6%	8.3%
Southeast	2.7%	2.7%	2.8%	1.9%	1.9%	1.9%	4.5%	4.1%	3.7%
Southwest	22.7%	22.1%	23.2%	26.6%	25.8%	24.7%	15.8%	16.8%	16.8%
Western	9.4%	10.9%	11.5%	7.6%	8.9%	8.6%	12.8%	12.6%	12.2%
Total Bioscience in Ohio	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

The Northeast region represented the largest share of bioscience employment, payroll, and establishments of all regions in each of the observed years. The Central and Southwest regions,

which generally had similar percentages, represented the second- and third-highest shares across the board for each measure. In the cases of employment and payroll, the Southwest region had larger shares in 2000, but its shares equalized with those of the Central region as the years progressed. The Central region also exhibited the greatest percentage point increase from 2000 to 2010 in employment (2.7%), payroll (2.8%), and establishments (2.1%).

Bioscience in the Northeast Region

Overall Trends

The Northeast region incorporates the cities of Cleveland, Akron, Canton, and Youngstown, and is made up of 18 counties: Ashland, Ashtabula, Columbiana, Cuyahoga, Erie, Geauga, Huron, Lake, Lorain, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Tuscarawas, and Wayne. Included in the Northeast region are the following Metropolitan Statistical Areas (MSAs): Akron, Cleveland-Elyria-Mentor, Mansfield, Sandusky, and Youngstown-Warren-Boardman (Ohio counties only).

Bioscience employment in the Northeast region was 20,719 in 2010. Employment declined 2.0% on average annually during the recessionary years (2008 to 2010), but still grew, on average, 0.2% annually over the entire study period of 2000 to 2010 (Figure 7). The number of bioscience establishments in the Northeast region in 2010 was 733. The region had a net gain of 189 establishments from 2000 to 2010, an average annual increase of 3.0%. During the recessionary years of 2008 to 2010 alone, the Northeast region's average annual increase in establishments was 2.1%.

Payroll in the Northeast region was $1.7 billion in 2010. Bioscience payroll in the Northeast region increased 4.8% on average annually from 2008 to 2010, but overall increased annually from 2000 to 2010 at an average rate of 2.2%. Finally, the average wage of the Northeast region was $79,795 in 2010, which represented an annual average increase of 6.9% from 2008 to 2010 and 2.0% over the entire study period, 2000 to 2010.

The Northeast region, despite the effects of the recession, experienced modest growth from 2000 to 2010 in all four measures being studied. From 2008 to 2010, the Northeast region had the third-smallest average annual growth rate of all regions in bioscience employment, the highest growth rate in payroll and average wage, and the second-highest growth rate in bioscience establishments.

Figure 7: Average Annual Percentage Change in Employment, Establishments, Payroll & Average Wages for the Northeast Region

Trends by Subsector

The *Medical Device & Equipment Manufacturers* subsector had by far the largest employment in 2010 of all subsectors in the Northeast region (9,395 employees) (Table 13). The second-highest subsector in terms of employment was *Agricultural Biotechnology* (3,609), followed closely by *Medical & Testing Laboratories* (3,465). In addition to the largest employment, the *Medical Device & Equipment Manufacturers* and *Agricultural Biotechnology* subsectors also had the largest payrolls in 2010 of all Northeast region subsectors ($539.7 million and $532.3 million, respectively). Further, the *Agricultural Biotechnology* subsector had the largest average wage at $147,482, followed by *Pharmaceuticals & Therapeutics* with $110,551.

Table 13: Employment, Payroll, Average Wages, Establishments & Average Employees per Establishment in the Northeast Region, 2010

Subsector	Employ-ment	Payroll ($)	Average Wages ($)	Establish-ments	Average Employees per Establishment
Agricultural Biotechnology	3,609	$532,312,932	$147,482	58	62
Medical & Testing Laboratories	3,465	$160,218,068	$46,242	248	14
Medical Device & Equipment Manufacturers	9,395	$539,688,512	$57,442	294	32
Pharmaceuticals & Therapeutics	2,522	$278,773,328	$110,551	29	87
Research & Development	1,728	$142,253,396	$82,345	104	17
Total Bioscience in Ohio	**20,719**	**$1,653,246,236**	**$79,795**	**733**	**28**

The *Medical Device & Equipment Manufacturers* subsector possessed the greatest number of bioscience establishments of any region in 2010 (294), followed by *Medical & Testing Laboratories* with 248 establishments. As for average number of employees per bioscience establishment, the *Pharmaceuticals & Therapeutics* subsector had the largest number (87), followed by *Agricultural Biotechnology* (62).

Growth in terms of payroll, average wage, and establishments was seen in nearly all subsectors from 2000 to 2010. While most subsectors posted average annual growth rates of 0.3% to 3.8% in these three measures, a few subsectors experienced larger growth rates over the study period. From 2000 to 2010, the *Pharmaceuticals & Therapeutics* subsector increased at the greatest annual average rate in terms of payroll (10.0%). The highest growth rate for average wage from 2000 to 2010 was possessed by the *Agricultural Biotechnology* subsector (5.3%). Finally, *Medical & Testing Laboratories* had the highest growth rate for establishments (7.0%) from 2000 to 2010.

Annual declines were seen in the payroll of the *Medical Device & Equipment Manufacturers* subsector (-0.7% on average annually) and the average wage of the *Medical & Testing Laboratories* subsector (-1.2% on average annually). However, the greatest volume of negative growth rates was in employment; three subsectors (*Agricultural Biotechnology, Medical Device & Equipment Manufacturers,* and *Research & Development*) experienced negative growth though the rates of decline were 2.0% or less. In contrast, the *Pharmaceuticals & Therapeutics* subsector increased at the greatest annual average rate in terms of employment (7.8%).

Bioscience in the Central Region

Overall Trends

The Central region envelops the city of Columbus and is comprised of 11 counties: Delaware, Fairfield, Franklin, Knox, Licking, Logan, Madison, Marion, Morrow, Pickaway, and Union. The Central region encompasses the entire Columbus MSA (Figure 1).

Bioscience employment in the Central region was 14,045 in 2010. Employment declined 4.4% on average annually during the recessionary years (2008 to 2010), but still grew, on average, 2.8% annually over the entire study period of 2000 to 2010 (Figure 8). The number of bioscience establishments in the Central region in 2010 was 319. The region had a net gain of 113 establishments from 2000 to 2010, an average annual increase of 4.5%. From 2008 to 2010 alone, the Central region's average annual increase in establishments was 5.2%.

Payroll in the Central region was $1.0 billion in 2010. Bioscience payroll in the Central region declined 4.2% on average annually from 2008 to 2010, but overall increased annually from 2000 to 2010 at an average rate of 4.0%. Finally, the average wage of bioscience in the Central region was $74,596 in 2010, which represented an annual average increase of 0.2% from 2008 to 2010 and 1.2% over the entire study period, 2000 to 2010.

Figure 8: Average Annual Percentage Change in Employment, Establishments, Payroll & Average Wages for the Central Region

Despite the effects of the recession, the Central region experienced growth from 2000 to 2010 in all four measures being studied. From 2008 to 2010, the Central region had the smallest, and negative, average annual growth rates of all regions in bioscience employment and payroll, the third-highest rate of growth in average wage, and the highest growth rate of all regions in bioscience establishments.

Trends by Subsector

The *Research & Development* subsector had the largest employment in 2010 of all subsectors in the Central region (4,535 employees) (Table 14). The second-highest subsector in terms of employment was *Pharmaceuticals & Therapeutics* (3,256 employees). In addition to the largest employment, the *Research & Development* and *Pharmaceuticals & Therapeutics* subsectors also had the largest payrolls in 2010 of all Central region subsectors ($404.1 million and $252.9 million, respectively). Further, the *Research & Development* subsector had the largest average wage at $89,106, followed closely by *Agricultural Biotechnology* with $86,820.

The *Medical & Testing Laboratories* subsector possessed the greatest number of bioscience establishments of any subsector in 2010 (130), followed by *Medical Device & Equipment Manufacturers* with 78 establishments. As for average number of employees per bioscience establishments, the *Pharmaceuticals & Therapeutics* subsector had the largest number by far (171), followed *Research & Development* (73) and *Agricultural Biotechnology* (66).

Table 14: Employment, Payroll, Average Wages, Establishments & Average Employees per Establishment in the Central Region, 2010

Subsector	Employ-ment	Payroll ($)	Average Wages ($)	Establish-ments	Average Employees per Establishment
Agricultural Biotechnology	1,990	$172,743,888	$86,820	30	66
Medical & Testing Laboratories	2,388	$103,254,548	$43,247	130	18
Medical Device & Equipment Manufacturers	1,876	$114,630,116	$61,114	78	24
Pharmaceuticals & Therapeutics	3,256	$252,872,836	$77,672	19	171
Research & Development	4,535	$404,104,632	$89,106	62	73
Total Bioscience in Ohio	**14,045**	**$1,047,606,020**	**$74,596**	**319**	**44**

Growth was seen from 2000 to 2010 in nearly all subsectors in all measures being studied. From 2000 to 2010, the *Medical & Testing Laboratories* subsector increased at the greatest annual average rate in terms of employment (5.2%) and establishments (9.4%). This rate of growth for establishments was nearly double that of *Research & Development*, the subsector with the second-largest average annual rate increase (5.6%). The *Medical & Testing Laboratories* and *Research & Development* also shared the highest average annual growth rate for payroll (5.1%). Finally, the highest growth rate for average wage from 2000 to 2010 was shared by the *Agricultural Biotechnology* and *Medical Device & Equipment Manufacturers* subsectors (2.0%).

Over the course of the study period, the only negative growth rates were seen in the average wage of the *Medical & Testing Laboratories* subsector (-0.01%) and the number of establishments in the *Medical Device & Equipment Manufacturers* subsector (0.5%), but the losses were very small.

Bioscience in the Southwest Region

Overall Trends

The Southwest region surrounds the city of Cincinnati and includes five counties: Brown, Butler, Clermont, Hamilton, and Warren. These five counties constitute the Ohio counties in the Cincinnati-Middletown MSA.

Bioscience employment in the Southwest region was 14,120 in 2010. Employment increased 1.0% on average annually during the recessionary years (2008 to 2010), and grew, on average, 1.8% annually over the entire study period of 2000 to 2010 (Figure 9). The number of bioscience establishments in the Southwest region in 2010 was 300. The region had a net gain of 94 establishments from 2000 to 2010, an average annual increase of 3.8%. During the recessionary years of 2008 to 2010, the Southwest region's number of establishments

increased by 12 for an average annual rate of 2.1%.

Payroll in the Southwest region was $1.1 billion in 2010. Bioscience payroll in the Southwest region declined 2.4% on average annually from 2008 to 2010, but overall increased annually from 2000 to 2010 at an average rate of 2.0%. Finally, the average wage in the Southwest region was $77,798 in 2010, which represented an annual average decrease of 3.3% from 2008 to 2010. From 2000 to 2010, average wage in the Southwest region increased annually at an average rate of 0.2%.

Figure 9: Average Annual Percentage Change in Employment, Establishments, Payroll & Average Wages for the Southwest Region

From 2000 to 2010, the Southwest region experienced modest growth (approximately 1% to 3% on average annually) in all four measures being studied. From 2008 to 2010, the Southwest region had the highest average annual growth rate of all regions in bioscience employment, the third-highest growth rate in payroll (negative growth) and establishments, and the smallest (negative) growth rate in average wage.

Trends by Subsector

The *Medical Device & Equipment Manufacturers* subsector had the largest employment in 2010 of all subsectors in the Southwest region (4,844 employees) (Table 15). The second-highest subsector in terms of employment was *Pharmaceuticals & Therapeutics* (2,570). In addition to the largest employment, the *Medical Device & Equipment Manufacturers* subsector also had the largest payroll in 2010 of all Southwest region subsectors ($477.7 million). The second-

largest payroll was in the *Research & Development* subsector ($205.1 million). Further, the *Medical Device & Equipment Manufacturers* and *Research & Development* subsectors also had the largest average wages at $98,622 and $85,137, respectively.

Table 15: Employment, Payroll, Average Wages, Establishments & Average Employees per Establishment in the Southwest Region, 2010

Subsector	Employ-ment	Payroll ($)	Average Wages ($)	Establish-ments	Average Employees per Establishment
Agricultural Biotechnology	1,804	$132,272,068	$73,322	25	72
Medical & Testing Laboratories	2,493	$102,877,380	$41,273	105	24
Medical Device & Equipment Manufacturers	4,844	$477,693,820	$98,622	80	61
Pharmaceuticals & Therapeutics	2,570	$180,540,684	$70,240	31	83
Research & Development	2,409	$205,129,304	$85,137	59	41
Total Bioscience in Ohio	**14,120**	**$1,098,513,256**	**$77,798**	**300**	**47**

The *Medical & Testing Laboratories* subsector possessed the greatest number of bioscience establishments of any subsector in 2010 (105), followed by *Medical Device & Equipment Manufacturers* with 80 establishments. As for average number of employees per bioscience establishments, the *Pharmaceuticals & Therapeutics* subsector had the largest number (83), followed by *Agricultural Biotechnology* (72) and *Medical Device & Equipment Manufacturers* (61).

Growth in terms of employment, payroll, average wage, and establishments was seen in nearly all subsectors from 2000 to 2010. From 2000 to 2010, the *Medical & Testing Laboratories* subsector increased at the greatest annual average rate in terms of employment (8.0%) and number of establishments (6.7%). The highest growth rate for payroll from 2000 to 2010 belonged to the *Research & Development* subsector (7.8%). Finally, *Medical Device & Equipment Manufacturers* had the highest growth rate for average wage (2.9%) from 2000 to 2010.

The greatest volume of negative growth rates was in average wage; three subsectors experienced negative growth from 2000 to 2010 (*Agricultural Biotechnology, Medical & Testing Laboratories,* and *Pharmaceuticals & Therapeutics*), though the rates of decline were less than 2.0% in each subsector. In addition, *Agricultural Biotechnology* experienced declines from 2000 to 2010 in all measures except number of establishments.

Bioscience in the Western Region

Overall Trends

The Western region is made up of 12 counties: Auglaize, Champaign, Clark, Clinton, Darke, Fayette, Greene, Mercer, Miami, Montgomery, Preble, and Shelby. The Western region encompasses the entirety of both the Dayton and Springfield MSAs and includes the cities of Dayton, Springfield, Troy, and Xenia.

Bioscience employment in the Western region was 6,993 in 2010. Employment increased 0.8% on average annually during the recessionary years (2008 to 2010), and grew, on average, 3.6% annually over the entire study period of 2000 to 2010 (Figure 10). The number of bioscience establishments in the Western region in 2010 was 217. The region had a net gain of 50 establishments from 2000 to 2010, an average annual increase of 2.7%. During the recessionary years of 2008 to 2010, the Western region's number of establishments increased by 2.

Payroll in the Western region was $381.8 million in 2010. Bioscience payroll in the Western region declined 1.7% on average annually from 2008 to 2010, but overall increased annually from 2000 to 2010 at an average rate of 4.0%. Finally, the average wage in the Western region was $54,587 in 2010, which represented an annual average decrease of 2.5% from 2008 to 2010. Average wage in the Western region increased annually at an average rate of 0.3% over the entire study period, 2000 to 2010.

Figure 10: Average Annual Percentage Change in Employment, Establishments, Payroll & Average Wages for the Western Region

The Western region experienced growth from 2000 to 2010 in all four measures being studied; average annual growth rates fell between 2.5% and 4% for employment, payroll, and the number of establishments while average wage grew at a smaller rate of 0.3%. From 2008 to 2010, the Western region experienced growth in bioscience employment and establishments, but had declines in payroll and average wage.

Trends by Subsector

The *Medical Device & Equipment Manufacturers* subsector had the largest employment in 2010 of all subsectors in the Western region (2,891 employees) (Table 16). The second-largest subsector in terms of employment was *Medical & Testing Laboratories* (1,335). In addition to the largest employment, the *Medical Device & Equipment Manufacturers* subsector also had the largest payroll in 2010 of all Western region subsectors ($144.1 million). The second-largest payroll was in the *Research & Development* subsector ($85.9 million). The largest average wages of all Western subsectors belonged to *Research & Development* and *Pharmaceuticals & Therapeutics* ($74,663 and $64,463, respectively).

Table 16: Employment, Payroll, Average Wages, Establishments & Average Employees per Establishment in the Western Region, 2010

Subsector	Employ-ment	Payroll ($)	Average Wages ($)	Establish-ments	Average Employees per Establishment
Agricultural Biotechnology	1,075	$58,506,904	$54,425	18	60
Medical & Testing Laboratories	1,335	$58,281,580	$43,656	77	17
Medical Device & Equipment Manufacturers	2,891	$144,145,840	$49,855	69	42
Pharmaceuticals & Therapeutics	541	$34,895,544	$64,463	7	77
Research & Development	1,151	$85,928,616	$74,663	46	25
Total Bioscience in Ohio	**6,993**	**$381,758,484**	**$54,587**	**217**	**32**

The *Medical & Testing Laboratories* subsector possessed the greatest number of bioscience establishments of any subsector in 2010 (77), followed by *Medical Device & Equipment Manufacturers* with 69 establishments. The *Pharmaceuticals & Therapeutics* subsector had the largest number of average employees per bioscience establishment (77), followed by *Agricultural Biotechnology* (60) and *Medical Device & Equipment Manufacturers* (42).

Growth in terms of payroll, average wage, and establishments was seen in nearly all subsectors from 2000 to 2010. From 2000 to 2010, the *Pharmaceuticals & Therapeutics* subsector increased at the greatest annual average rate in terms of employment (9.3%) and payroll (10.3%). The highest growth rate for average wage belonged to the *Medical & Testing Laboratories* subsector (2.5%). Finally, *Agricultural Biotechnology* had the highest growth rate for number of establishments (5.0%) from 2000 to 2010, adding 7 establishments.

The only declines in subsectors over the study period were in the average wages for the *Agricultural Biotechnology* and *Medical Device & Equipment Manufacturers* subsectors.

Bioscience in the Northwest Region

Overall Trends

The Northwest region includes the cities of Toledo, Bowling Green, Findlay, and Lima. It also includes the Toledo MSA. It is made up of the 17 counties: Allen, Crawford, Defiance, Fulton, Hancock, Hardin, Henry, Lucas, Ottawa, Paulding, Putnam, Sandusky, Seneca, Van Wert, Williams, Wood, and Wyandot.

Bioscience employment in the Northwest region was 3,293 in 2010. Employment declined 3.3% on average annually during the recessionary years (2008 to 2010), but still grew annually over the entire study period of 2000 to 2010 (Figure 11). The number of bioscience establishments in the Northwest region in 2010 was 148. The region had a net gain of establishments from 2000 to 2010, producing an annual increase over the study period. During the recessionary years of 2008 to 2010, the Northwest region added only one establishment.

Payroll in the Northwest region was $178.4 million in 2010. Bioscience payroll in the Northwest region declined 3.0% on average annually from 2008 to 2010, but overall increased annually from 2000 to 2010. Finally, the average wage of the Northwest region was $54,169 in 2010, which represented an annual average increase of 0.4% from 2008 to 2010 and an even larger growth rate over the entire study period, 2000 to 2010.

From 2000 to 2010, the Northwest region experienced growth in all four measures being studied. From 2008 to 2010, the Northwest region experienced losses in both employment and payroll and nominal increases in average wage and establishments.

Figure 11: Average Annual Percentage Change in Employment, Establishments, Payroll & Average Wages for the Northwest Region

Trends by Subsector

The *Medical Device & Equipment Manufacturers* subsector had the largest employment in 2010 of all subsectors in the Northwest region (1,070 employees) (Table 17). The second-highest subsector in terms of employment was *Agricultural Biotechnology* (947), followed closely by *Medical & Testing Laboratories* (857). In addition to the second-largest employment, the *Agricultural Biotechnology* subsector also had the largest payroll ($70.2 million) and average wage ($74,066) in 2010 of all Northwest region subsectors.

Table 17: Employment, Payroll, Average Wages, Establishments & Average Employees per Establishment in the Northwest Region, 2010

Subsector	Employ-ment	Payroll ($)	Average Wages ($)	Establish-ments	Average Employees per Establishment
Agricultural Biotechnology	947	$70,165,360	$74,066	23	41
Medical & Testing Laboratories	857	$42,003,864	$48,992	56	15
Medical Device & Equipment Manufacturers	1,070	$41,442,032	$38,719	51	21
Pharmaceuticals & Therapeutics	97	$4,282,848	$44,003	4	24
Research & Development	322	$20,544,052	$63,849	14	23
Total Bioscience in Ohio	**3,293**	**$178,438,156**	**$54,169**	**148**	**22**

The *Medical & Testing Laboratories* subsector possessed the greatest number of bioscience establishments of any subsector in 2010 (56), followed by *Medical Device & Equipment Manufacturers* with 51 establishments. As for average number of employees per bioscience establishments, the *Agricultural Biotechnology* subsector had the largest number (41), followed by *Medical Device & Equipment Manufacturers, Pharmaceuticals & Therapeutics,* and *Research & Development*, each with 21 to 24 employees per establishment.

Growth in terms of payroll, average wage, and establishments was seen in nearly all subsectors from 2000 to 2010. From 2000 to 2010, the *Pharmaceuticals & Therapeutics* subsector increased at the greatest annual average rate in terms of employment and payroll. The highest growth rate for average wage from 2000 to 2010 belonged to the *Agricultural Biotechnology* subsector. Finally, *Medical & Testing Laboratories* had the highest growth rate for establishments from 2000 to 2010.

From 2008 to 2010, the greatest volume of negative growth rates was in employment; three subsectors (*Agricultural Biotechnology, Medical Device & Equipment Manufacturers,* and *Research & Development*) experienced negative growth, though the rates of decline were 2.0% or less.

Bioscience in the Southeast Region

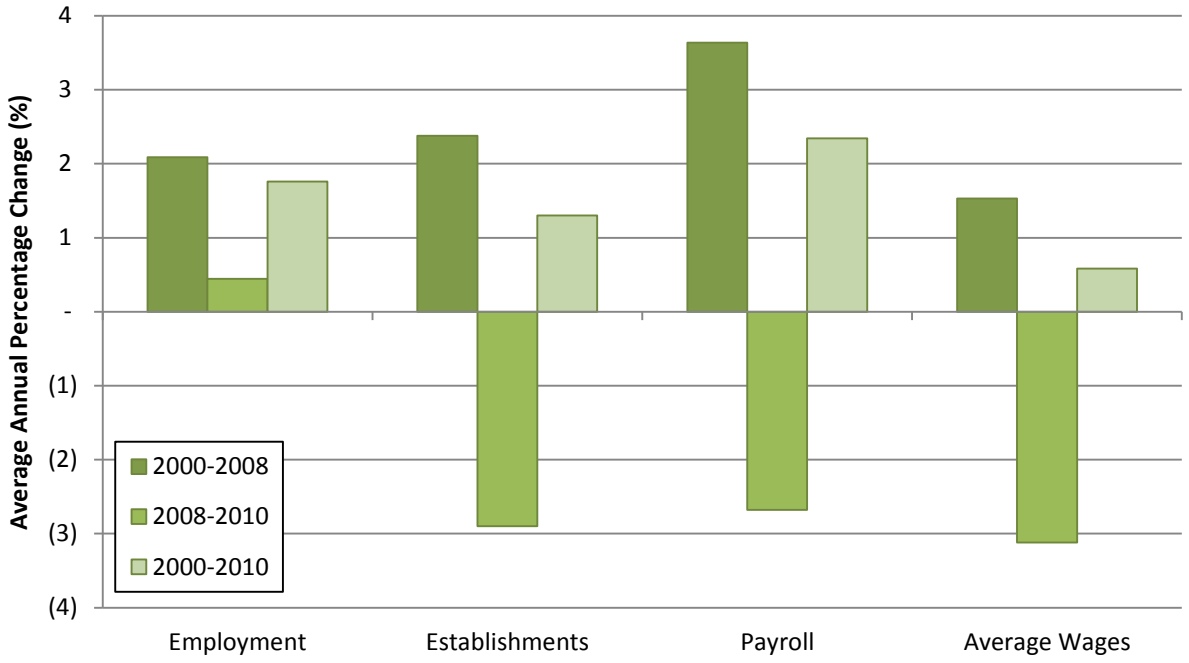
Overall Trends

The Southeast region is comprised of 25 counties: Adams, Athens, Belmont, Carroll, Coshocton, Gallia, Guernsey, Harrison, Highland, Hocking, Holmes, Jackson, Jefferson, Lawrence, Meigs, Monroe, Morgan, Muskingham, Noble, Perry, Pike, Ross, Scioto, Vinton, and Washington. The Southeast region is largely non-metropolitan, though it does include one county in each of the following MSAs: Steubenville-Weirton, OH-WV; Huntington-Ashland, WV-KY-OH; Parkersburg-Marietta-Vienna, WV-OH; and Wheeling, WV-OH.

Bioscience employment in the Southeast region was 1,700 in 2010. Employment increased 0.4% on average annually during the recessionary years (2008 to 2010), but grew, on average, 1.8% annually over the entire study period of 2000 to 2010 (Figure 12). The number of bioscience establishments in the Southeast region in 2010 was 66. The region had a net gain of eight establishments from 2000 to 2010, an average annual increase of 1.3%. During the recessionary years of 2008 to 2010, the Southeast region's number of establishments declined by 4.

Payroll in the Southeast region was $82.4 million in 2010. Bioscience payroll in the Southeast region declined 2.7% on average annually from 2008 to 2010, but overall increased annually from 2000 to 2010 at an average rate of 2.3%. Finally, the average wage of the Southeast region was $48,506 in 2010, which represented an annual average decrease of 3.1% from 2008 to 2010 and an annual average increase of 0.6% from 2000 to 2010.

Figure 12: Average Annual Percentage Change in Employment, Establishments, Payroll & Average Wages for the Southeast Region



From 2000 to 2010, the Southeast region experienced modest growth in all four measures being studied. From 2008 to 2010, the Southeast region experienced average annual losses in payroll, average wage, and establishments. Bioscience employment increased 0.3% on average annually from 2008 to 2010.

Trends by Subsector

The *Medical Device & Equipment Manufacturers* subsector had the largest employment in 2010 of all subsectors in the Southeast region (712 employees) (Table 16). The second-highest subsector in terms of employment was *Agricultural Biotechnology* (429). In addition to the largest employment, the *Medical Device & Equipment Manufacturers* and *Agricultural Biotechnology* subsectors also had the largest payrolls in 2010 of all Southeast region subsectors ($32.8 million and $25.4 million, respectively). Further, the *Agricultural Biotechnology* subsector had the largest average wage at $59,307.

The *Medical & Testing Laboratories* subsector possessed the greatest number of bioscience establishments of any subsector in 2010 (25), followed by *Medical Device & Equipment Manufacturers* with 21 establishments. As for average number of employees per bioscience establishment, *Agricultural Biotechnology* had the largest ratio (43) of those subsectors for which data were not suppressed, followed by *Medical Device & Equipment Manufacturers* (34).

Table 16: Employment, Payroll, Average Wages, Establishments & Average Employees per Establishment in the Southeast Region, 2010

Subsector	Employ-ment	Payroll ($)	Average Wages ($)	Establish-ments	Average Employees per Establishment
Agricultural Biotechnology	429	$25,442,684	$59,307	10	43
Medical & Testing Laboratories	189	$6,892,239	$36,446	25	8
Medical Device & Equipment Manufacturers	712	$32,817,083	$46,113	21	34
Pharmaceuticals & Therapeutics	S	S	S	S	S
Research & Development	S	S	S	S	S
Total Bioscience in Ohio	**1,700**	**$82,410,474**	**$48,506**	**66**	**26**

Note: S denotes data suppressed due to confidentiality restrictions.

Both *Agricultural Biotechnology* and *Medical & Testing Laboratories* experienced growth in terms of employment, payroll, average wage, and establishments from 2000 to 2010. In fact, *Medical & Testing Laboratories* increased at the greatest annual average rate in terms of employment (10.0%) and payroll (11.1%). In contrast, *Medical Device & Equipment Manufacturers* experienced a decline in all measures from 2000 to 2010.

ECONOMIC IMPACT OF OHIO'S BIOSCIENCE SECTOR

INTRODUCTION

Bioscience, like all industries, is linked to other industries through buy-sell relationships. In order to produce goods and services, companies in this sector buy intermediary goods and services from other companies both inside and outside the bioscience sector. The buy-sell relationships that occur within the state of Ohio contribute to the economic impact of the bioscience sector.

This report measures five impacts of the bioscience industry in Ohio: employment, output, value added, labor income, and taxes. *Employment* measures the number of jobs in Ohio due to the existence of the bioscience sector. *Output* measures the total value of goods and services produced in the state as a result of the activities of the bioscience sector. *Value added* measures the value of goods and services less the intermediary goods and represents a portion of output. *Labor income* is payroll paid to employees plus proprietors' income. *Taxes* include federal, state, and local tax revenues.

Each of the impacts, except for taxes, is a summation of direct impact, indirect impact, and induced impact. *Direct impact* is the initial value of goods and services the sector purchases in the state. *Indirect impact* measures the jobs and production needed to manufacture goods and services required by the sector. *Induced impact* is the increase in spending of local households because of income received through their work in the bioscience sector and with its suppliers.

ECONOMIC IMPACT OF BIOSCIENCE

Employment Impact

The bioscience sector in Ohio accounted for a total impact of 191,303 jobs in 2010. Thirty-two percent, or 60,870 jobs, were the direct impact of the sector, representing primarily the jobs that exist in bioscience firms. An additional 86,863 employees (45% of total) worked for industries that sell goods and services to the bioscience industry and its suppliers. Finally, 43,570 employees work for industries that sell goods and services to Ohio households associated with the bioscience industry and its suppliers (23% of the total). Table 19 shows the economic impact of the bioscience sector and presents estimates for these direct, indirect, and induced effects. A detailed look at the impact of the bioscience sector in Ohio is located in Appendix Table C1.

Table 19: Economic Impact of Ohio's Bioscience Sector (by Direct, Indirect, and Induced Impacts), 2010

Type of Impact	Employment	Output	Value Added	Labor Income
Direct	60,870	$34,313	$4,318	$1,110
Indirect	86,863	$14,563	$7,742	$4,969
Induced	43,570	$4,939	$3,012	$1,663
Total Bioscience	191,303	$53,815	$15,072	$7,742

Note: Output, Value Added, and Labor Income are in millions of dollars.

Output and Value Added Impacts

The estimated output impact of the bioscience industry was $53.8 billion in 2010. This is the value of goods and services that were produced in Ohio through the buy-sell relationships affiliated with the bioscience sector. Of the total output, 64% was associated with direct impact, 27% with indirect impact, and 9% with induced impact. Excluding all the intermediate goods and services, the value added to the goods and services produced in Ohio in association with bioscience was $15.1 billion. Of that, 29% was due to the direct impact, 51% to indirect impact, and 20% to induced impact.

Household Income and Tax Impacts

Over $7.7 billion in household income was associated with the bioscience sector in Ohio in 2010. Over 14% of this was due to the direct impact, 64% was due to the indirect impact, and 22% was due to the induced impact. Finally, $3.1 billion in tax revenues was associated with the bioscience sector in Ohio. Federal tax revenues ($1.6 billion) represented 51% of total tax revenues, and state and local tax revenues ($1.5 billion) represented 49%.

To summarize, the economic impact of the bioscience sector in Ohio in 2010 was:

Employment impact	191,303 jobs
Output impact	$53.815 billion
Value-added impact	$15.072 billion
Labor income impact	$7.742 billion
Tax revenues	$3.103 billion

Economic Impact of Bioscience Subsectors

Table 20 summarizes the total economic impact of Ohio's bioscience industry by subsector, using the five impact measures. *Agricultural Biotechnology* was the subsector with the largest

impact in terms of employment (61,082 jobs), output ($24.9 billion), and tax ($1.2 billion).[12] *Agricultural Biotechnology* accounted for 32% of the bioscience sector's employment, 46% of output, 36% of both value added, and 39% of tax revenues. According to most impact measures, the subsector with the second-largest impact was *Pharmaceuticals & Therapeutics*, followed by *Medical Device & Equipment Manufacturers*. The *Research & Development* and *Medical & Testing Laboratories* subsectors each accounted for less than 10% of the total impact of each measure. Figure 13 shows the percentages of the total bioscience impact represented by each of the five subsectors.

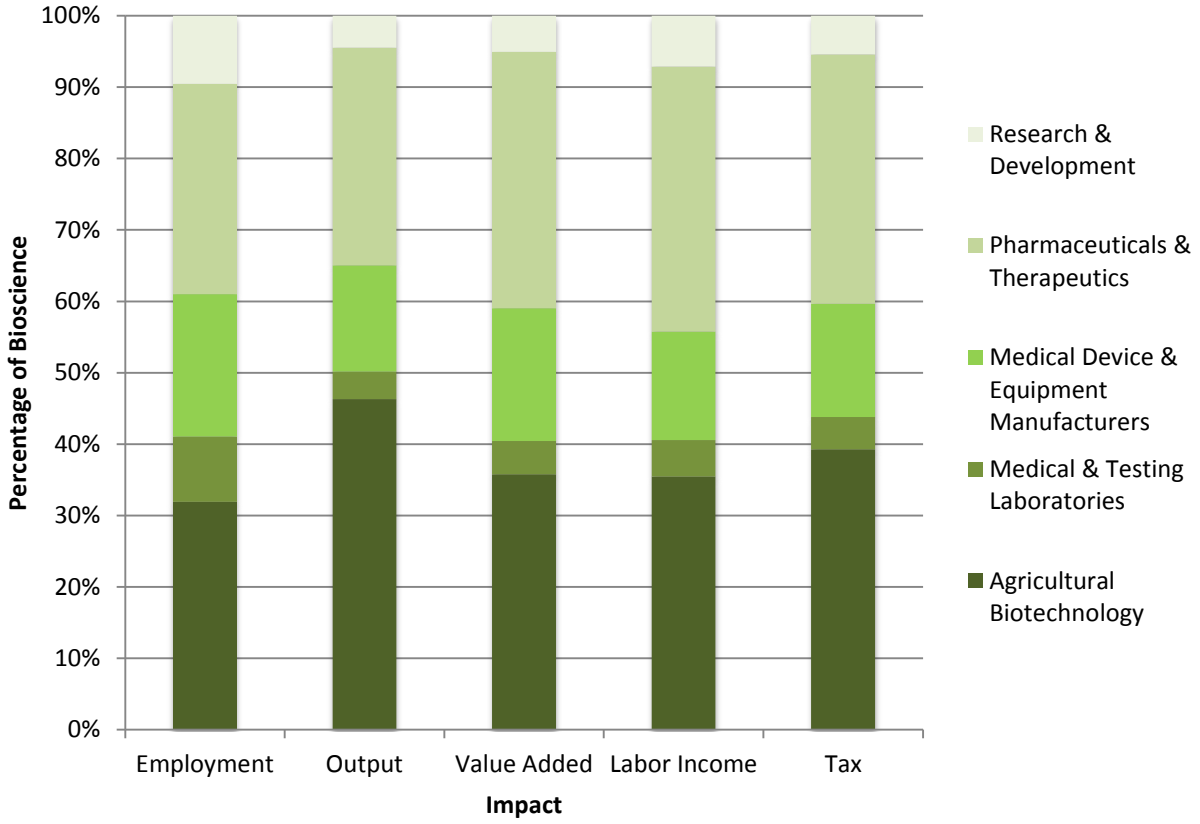
Table 20: Economic Impact of Ohio's Bioscience Sector by Subsector, 2010

Subsector	Employment	Output	Value Added	Labor Income	Tax
Agricultural Biotechnology	61,082	$24,930.96	$5,392.71	$2,745.05	$1,218.86
Medical & Testing Laboratories	17,462	$2,055.81	$704.18	$397.79	$139.81
Medical Device & Equipment Manufacturers	38,154	$8,012.68	$2,799.33	$1,176.27	$493.03
Pharmaceuticals & Therapeutics	56,365	$16,395.77	$5,410.73	$2,873.04	$1,082.89
Research & Development	18,240	$2,419.84	$764.98	$550.26	$168.73
Total Bioscience	**191,303**	**$53,815.06**	**$15,071.93**	**$7,742.42**	**$3,103.32**

Note: Output, Value Added, Labor Income, and Tax are in millions of dollars.

[12] Although *Agricultural Biotechnology* has the largest economic impact, the largest subsector in terms of direct employment is, as outlined in the previous section, *Medical Device & Equipment Manufacturers*. The *Agricultural Biotechnology* subsector has the largest economic impact because the industries included in this subsector have relatively large multipliers, particularly in the indirect portion.

Figure 13: Percentage of Bioscience Economic Impact in Ohio by Subsector, 2010



Economic Impact of Bioscience in Ohio's Six Regions

Although each of Ohio's six regions participates in the bioscience sector, data show three regions accounted for the majority of the industry in 2010: Northeast, Central, and Southwest (Table 21). These three regions encompass the three largest metropolitan areas in Ohio: Cleveland, Columbus, and Cincinnati.

Table 21: Economic Impact of Ohio's Bioscience Sector by Region, 2010

Region	Employment	Output	Value Added	Labor Income	Tax
Northeast	66,293	$18,196.90	$5,107.97	$2,621.08	$1,063.42
Central	49,963	$14,098.66	$4,193.68	$2,167.22	$861.25
Southwest	42,963	$11,503.65	$3,473.41	$1,851.00	$721.50
Western	18,869	$5,266.47	$1,389.39	$679.72	$274.30
Northwest	9,727	$3,373.90	$654.25	$323.15	$131.84
Southeast	3,488	$1,375.48	$253.23	$100.26	$51.02
Total Bioscience	**191,303**	**$53,815.06**	**$15,071.93**	**$7,742.42**	**$3,103.32**

Note: Output, Value Added, Labor Income, and Tax are in millions of dollars.

Economic Impact of Bioscience in the Northeast Region

The bioscience sector in the Northeast region yielded 66,293 jobs, $18.2 billion in the production of goods and services, $5.1 billion in value-added production, and $2.6 billion in labor income. Of the employment impact, 31% was attributed to direct impact, 45% to indirect impact, and 24% to induced impact (Table 22). Sixteen percent of the labor income impact was attributed to direct impact, 61% to indirect impact, and 23% to induced impact. Tax revenues in the Northeast region amounted to over $1 billion; 51% went to the federal government ($540 million) and 49% ($524 million) went to Ohio and local governments. A detailed summary of the impact of the bioscience sector in the Northeast region is located in Appendix Table C2.

Table 22: Economic Impact of Bioscience in the Northeast Region (by Direct, Indirect, and Induced Impacts), 2010

Impact	Employment	Output	Value Added	Labor Income
Direct	20,719	$11,438.61	$1,464.24	$413.31
Indirect	29,580	$4,989.48	$2,573.60	$1,612.38
Induced	15,994	$1,768.81	$1,070.13	$595.38
Total Bioscience	**66,293**	**$18,196.90**	**$5,107.97**	**$2,621.08**

Note: Output, Value Added, and Labor Income are in millions of dollars.

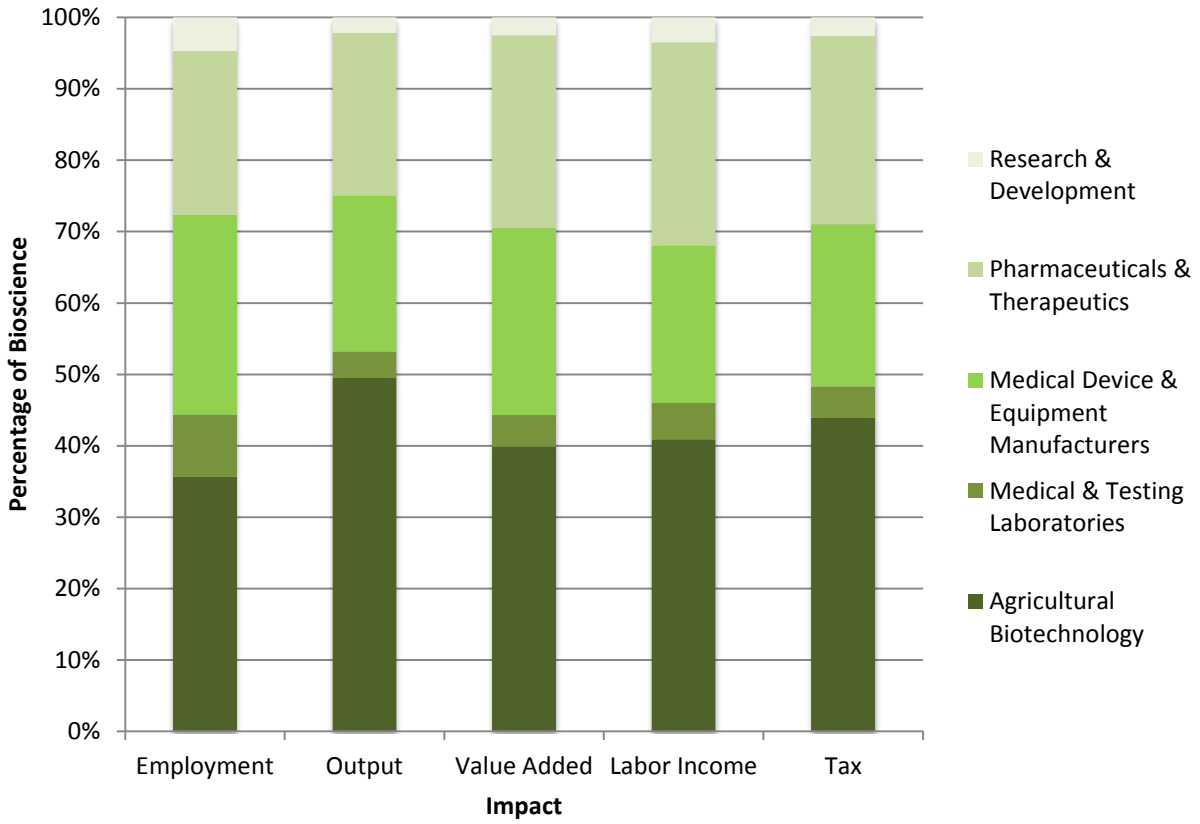
The bioscience subsector with the highest impact in the Northeast region was *Agricultural Biotechnology* (Table 23). *Agricultural Biotechnology* accounted for 36% of the bioscience employment impact in the Northeast region, 50% of the output impact, 40% of value added, 41% of labor income, and 44% of tax revenues (Figure 14). The *Medical Device & Equipment Manufacturers* subsector accounted for 28% of the bioscience employment impact, 22% of the output impact, 26% of value added, 22% of labor income, and 23% of tax revenues. The *Pharmaceuticals & Therapeutics* subsector accounted for 23% of the bioscience employment and output impact, 27% of value added, 28% of labor income, and 26% of tax revenues.

Table 23: Economic Impact of Bioscience in the Northeast Region by Subsector, 2010

Subsector	Employment	Output	Value Added	Labor Income	Tax
Agricultural Biotechnology	23,628	$9,016.24	$2,035.63	$1,071.77	$467.35
Medical & Testing Laboratories	5,753	$657.25	$227.15	$133.69	$45.96
Medical Device & Equipment Manufacturers	18,559	$3,971.75	$1,336.17	$577.21	$241.93
Pharmaceuticals & Therapeutics	15,204	$4,149.92	$1,379.53	$745.62	$279.86
Research & Development	3,149	$401.75	$129.49	$92.78	$28.31
Total Bioscience	**66,293**	**$18,196.90**	**$5,107.97**	**$2,621.08**	**$1,063.42**

Note: Output, Value Added, Labor Income, and Tax are in millions of dollars.

Figure 14: Percentage of Economic Impact in the Northeast Region by Subsector, 2010



Economic Impact of Bioscience in the Central Region

The economic impact of bioscience in the Central region was 49,963 jobs, $14.1 billion in output, $4.2 billion in value added, and $2.2 billion in labor income in 2010 (Table 24). Of the employment impact, 28% was attributed to direct impact, 48% to indirect impact, and 24% to induced impact. Of the output impact of bioscience in the Central region, 62% was attributed

to direct impact, 28% to indirect impact, and 10% to induced impact. A detailed look at the economic impact of the bioscience sector in the Central region can be found in Appendix Table C3.

Table 24: Economic Impact of Bioscience in the Central Region (by Direct, Indirect, and Induced Impacts), 2010

Impact	Employment	Output	Value Added	Labor Income
Direct	14,045	$8,738.22	$1,106.36	$261.90
Indirect	24,135	$3,982.16	$2,233.31	$1,444.65
Induced	11,783	$1,378.27	$854.00	$460.67
Total Bioscience	**49,963**	**$14,098.66**	**$4,193.68**	**$2,167.22**

Note: Output, Value Added, and Labor Income are in millions of dollars.

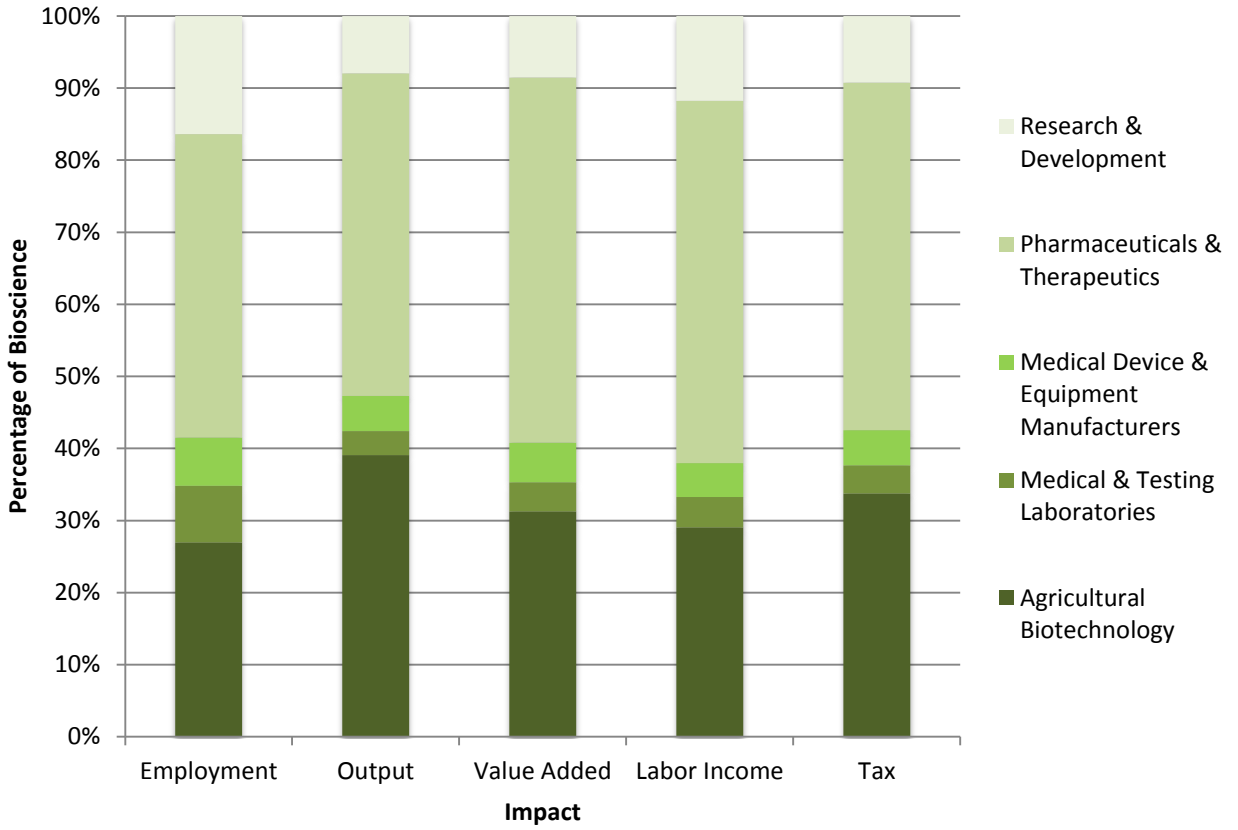
Tax revenues in the Central region amounted to $861 million in 2010. Of that amount, 52% ($447 million) went to the federal government and 48% ($414 million) went to state and local governments.

In both the Central and Southwest regions, the largest subsector was *Pharmaceuticals & Therapeutics* in all measures of impact (Table 25). *Pharmaceuticals & Therapeutics* had the second-highest number of direct employees and the highest employment multiplier, a combination that produced the high overall impact of this subsector. The employment impact in the *Pharmaceuticals & Therapeutics* subsector was 21,029 jobs, which accounted for 42% of the total bioscience employment impact in the Central region (Figure 15). *Agricultural Biotechnology* ranked second (13,472 jobs or 27%) followed by *Research & Development* (8,188 jobs or 16%).

Table 25: Economic Impact of Bioscience by Subsector in the Central Region, 2010

Subsector	Employment	Output	Value Added	Labor Income	Tax
Agricultural Biotechnology	13,472	$5,509.98	$1,311.71	$629.93	$290.75
Medical & Testing Laboratories	3,929	$469.96	$168.61	$90.81	$33.43
Medical Device & Equipment Manufacturers	3,345	$689.79	$231.61	$101.84	$42.28
Pharmaceuticals & Therapeutics	21,029	$6,308.35	$2,124.22	$1,090.01	$415.41
Research & Development	8,188	$1,120.58	$357.54	$254.62	$79.38
Total Bioscience	**49,963**	**$14,098.66**	**$4,193.68**	**$2,167.22**	**$861.25**

Note: Output, Value Added, Labor Income, and Tax are in millions of dollars.



Economic Impact of Bioscience in the Southwest Region

The economic impact of bioscience in the Southwest region was 42,963 jobs, $11.5 billion in output, $3.5 billion in value added, and $1.9 billion in labor income in 2010 (Table 26). Of the employment impact, 33% was attributed to direct impact, 43% to indirect impact, and 24% to induced impact. Of the labor income impact of bioscience in the Southwest region, 15% was attributed to direct impact, 63% to indirect impact, and 22% to induced impact. A detailed look at the impact of the bioscience sector in the Southwest region is located in Appendix Table C4.

Table 26: Economic Impact of Bioscience in the Southwest Region (by Direct, Indirect, and Induced Impacts), 2010

Impact	Employment	Output	Value Added	Labor Income
Direct	14,120	$7,263.22	$1,003.44	$274.63
Indirect	18,701	$3,045.84	$1,739.14	$1,171.29
Induced	10,142	$1,194.59	$730.83	$405.08
Total Bioscience	**42,963**	**$11,503.65**	**$3,473.41**	**$1,851.00**

Note: Output, Value Added, and Labor Income are in millions of dollars.

Tax revenues in the Southwest region amounted to $722 million in 2010. Of that amount, 53% ($385 million) went to the federal government and 47% ($337 million) went to the state and local governments.

Like the Central region, the *Pharmaceuticals & Therapeutics* subsector had the greatest impact in the Southwest region in terms of employment, output, value added, labor income, and tax impacts (Table 27). The second-largest impact in the Southwest region was *Medical Device & Equipment Manufacturers* with an impact of 9,088 jobs.

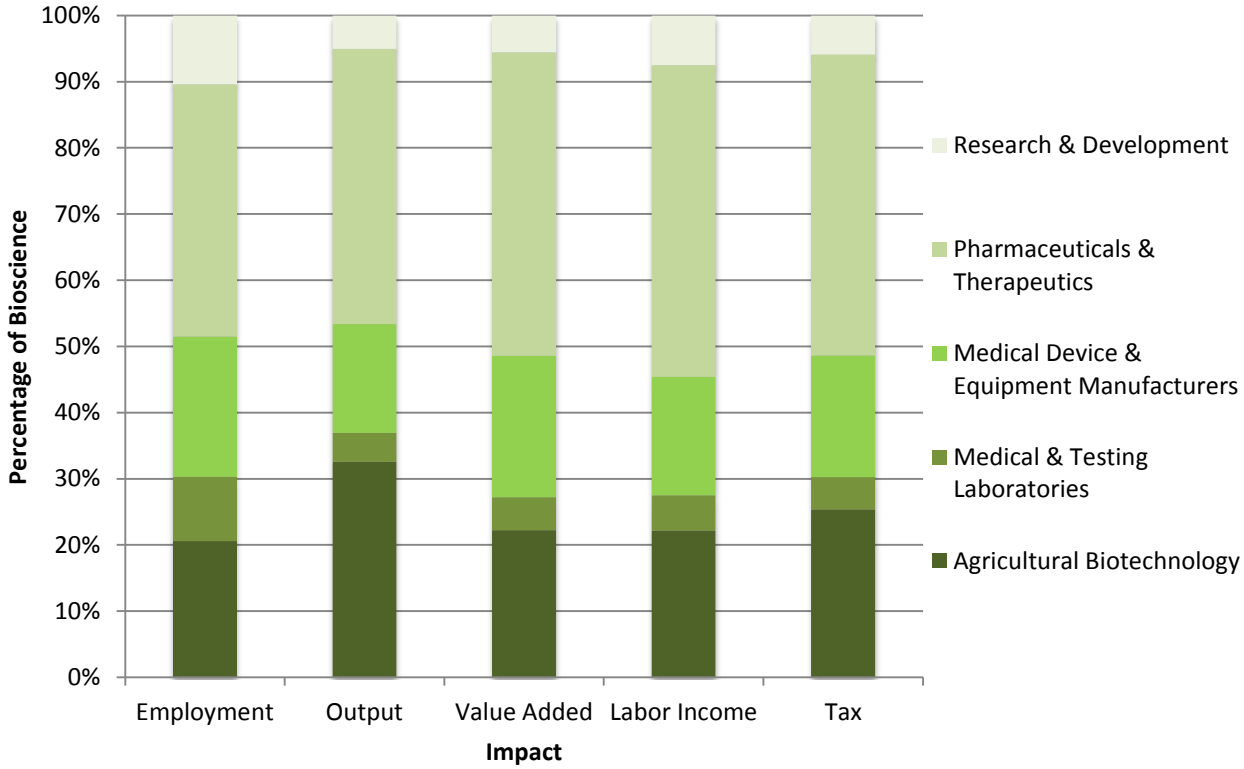
Table 27: Economic Impact of Bioscience by Subsector in the Southwest Region, 2010

Subsector	Employment	Output	Value Added	Labor Income	Tax
Agricultural Biotechnology	8,841	$3,746.50	$771.75	$410.36	$182.99
Medical & Testing Laboratories	4,190	$503.75	$174.53	$99.14	$35.36
Medical Device & Equipment Manufacturers	9,088	$1,890.63	$741.54	$330.53	$132.61
Pharmaceuticals & Therapeutics	16,372	$4,781.07	$1,592.00	$872.26	$327.80
Research & Development	4,472	$581.70	$193.59	$138.71	$42.74
Total Bioscience	**42,963**	**$11,503.65**	**$3,473.41**	**$1,851.00**	**$721.50**

Note: Output, Value Added, Labor Income, and Tax are in millions of dollars.

The *Pharmaceuticals & Therapeutics* subsector represented 38% of the employment impact, 42% of the output impact, 46% of the value-added impact, 47% of the labor income impact, and 45% of the tax impact (Figure 16). *Agricultural Biotechnology* was the next largest subsector with 21% of the employment impact, 33% of the output impact, 22% of the value-added and labor income impacts, and 25% of the tax impact. The other three subsectors each represented a much smaller percentage of the total bioscience activity in the Southwest region.

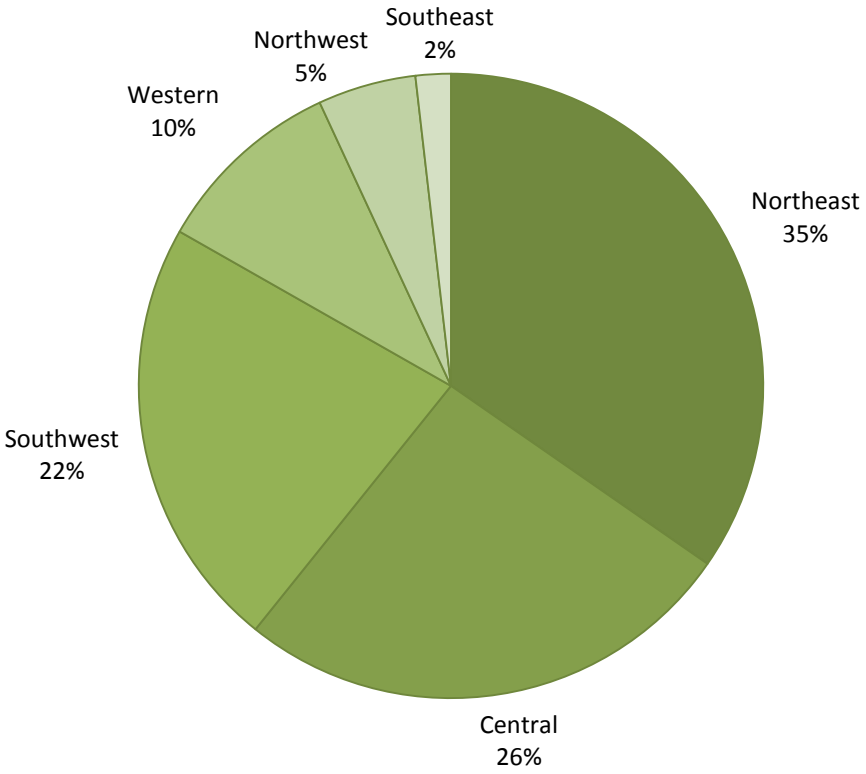
Figure 16: Percentage of Economic Impact by Bioscience Subsector in the Southwest Region, 2010



Economic Impact of Bioscience in the Western, Northwest, and Southeast Regions

Ranked by the size of their regional bioscience sectors, the remaining regions are ordered as follows: Western, Northwest, and Southeast. In terms of employment, these three regions represented only 20% of the direct impact in Ohio, 17% of the indirect impact, and 13% of the induced impact. Combined, these three regions represented 17% of the total employment impact in Ohio (Figure 17). A detailed look at the impact of the bioscience sectors in each of these three regions can be found in Appendix Tables C5, C6, and C7.

Figure 17: Percent of Total Employment Impact by Region, 2010



Mirroring the state as a whole, the *Agricultural Biotechnology* subsector had the greatest impact in the Western, Northwest, and Southeast regions. In addition, the *Medical Device & Equipment Manufacturers* subsector was ranked second in terms of total economic impact. This contrasts with the state of Ohio as a whole where the *Pharmaceuticals & Therapeutics* subsector was ranked second and *Medical Device & Equipment Manufacturers* was ranked third. Again, these three smaller geographic regions combined make up only 17% of the employment impact in Ohio, 19% of the output impact, 15% of the value added impact, 14% of the labor income impact, 14% of the state and local tax impact, and 13% of the federal tax impact.

Tables 28 through 30 show the total economic impact of the bioscience sector and its subsectors in the Western, Northwest, and Southeast regions.

Table 28: Economic Impact of Bioscience by Subsector in the Western Region, 2010

Subsector	Employment	Output	Value Added	Labor Income	Tax
Agricultural Biotechnology	7,348	$2,840.28	$630.25	$322.60	$139.14
Medical & Testing Laboratories	2,042	$245.20	$78.71	$44.02	$14.92
Medical Device & Equipment Manufacturers	4,733	$1,023.89	$348.12	$122.53	$55.25
Pharmaceuticals & Therapeutics	2,859	$906.58	$264.22	$138.59	$50.16
Research & Development	1,887	$250.52	$68.09	$51.97	$14.82
Total Bioscience	**18,869**	**$5,266.47**	**$1,389.39**	**$679.72**	**$274.30**

Note: Output, Value Added, Labor Income, and Tax are in millions of dollars.

Table 29: Economic Impact of Bioscience by Subsector in the Northwest Region, 2010

Subsector	Employment	Output	Value Added	Labor Income	Tax
Agricultural Biotechnology	6,040	$2,771.94	$476.86	$242.54	$101.16
Medical & Testing Laboratories	1,303	$152.84	$48.70	$26.47	$8.90
Medical Device & Equipment Manufacturers	1,505	$261.39	$82.93	$27.95	$12.86
Pharmaceuticals & Therapeutics	370	$126.64	$30.19	$14.55	$5.59
Research & Development	509	$61.10	$15.58	$11.64	$3.32
Total Bioscience	**9,727**	**$3,373.90**	**$654.25**	**$323.15**	**$131.84**

Note: Output, Value Added, Labor Income, and Tax are in millions of dollars.

Table 30: Economic Impact of Bioscience by Subsector in the Southeast Region, 2010

Subsector	Employment	Output	Value Added	Labor Income	Tax
Agricultural Biotechnology	1,753	$1,046.02	$166.52	$67.85	$37.46
Medical & Testing Laboratories	245	$26.82	$6.48	$3.66	$1.24
Medical Device & Equipment Manufacturers	924	$175.23	$58.95	$16.21	$8.09
Pharmaceuticals & Therapeutics	531	$123.21	$20.58	$12.01	$4.07
Research & Development	35	$4.19	$0.70	$0.53	$0.16
Total Bioscience	**3,488**	**$1,375.48**	**$253.23**	**$100.26**	**$51.02**

Note: Output, Value Added, Labor Income, and Tax are in millions of dollars.

CONCLUDING COMMENTS

The bioscience sector in Ohio remains an important part of the state's economy, despite the effects of the recent recession on industries nationwide. While total bioscience employment, payroll, and average wages in Ohio all declined from 2008 to 2009, the latter two measures experienced a modest resurgence going into 2010. Coupled with the consistent annual growth in number of establishments from 2000 to 2010, evidence shows that Ohio's bioscience sector was successfully able to weather the recession. When compared against aggregate data for all industries in Ohio, which display substantial recessionary losses, the strength of the bioscience sector can easily be seen. The strength of the bioscience sector can further be seen through acknowledgements such as *Business Facilities* magazine ranking Ohio 8th in terms of biotechnology strength in 2011.[13]

The bioscience sector has grown over time to become an integral part of the state's economic portfolio. The sector includes firms in a number of industries including, but not limited to, medical devices, pharmaceuticals, biomedical imaging, research and development, professional services, information technology, and distribution. While the bioscience sector has successfully instituted itself into Ohio's business ecosystem, perhaps more important is the development of bioscience as an economic driver of the state's economy, as evidenced by location quotient calculations. Ohio's bioscience sector began 2000 on par with the United States in terms of concentration of bioscience employment, but grew comparatively more concentrated and specialized by 2010.

Justifiably so, the state of Ohio has taken a special interest in facilitating the growth of bioscience within its borders. JobsOhio, Ohio's new private economic development corporation created under the Kasich administration, has targeted biohealth as one of nine economy-driving industries that will receive additional state resources to facilitate growth. In addition, Battelle released a report in November 2011 that identified medical technology, particularly those technologies utilized by the subsectors of Ohio's bioscience sector, as one of eight industries that represent a growth opportunity in Ohio.[14] The Ohio Third Frontier program, a statewide initiative designed to support technology-based economic growth, has adopted these eight industries as areas to which it will proactively funnel funding and other resources.

The future of bioscience in Ohio appears promising. In addition to the increase in state policies targeting bioscience for growth, regional innovative work is being done by local universities and regional entities such as BioEnterprise and JumpStart in Cleveland, the Akron Global Business Accelerator and the Austin BioInnovation Institute in Akron, CincyTech and the Hamilton County Business Incubator in Cincinnati, Dayton Development Coalition, Regional Growth Partnership and Rocket Ventures in Toledo, the Innovation Center & Edison Biotechnology

[13] *Business Facilities* Magazine. (2011). 2011 Rankings: California Still Biotech King. Retrieved from http://business facilities.com/news/2011-rankings-california-still-biotech-king/

[14] Battelle Technology Partnership Practice. (2011). *Ohio Third Frontier: Targeting Growth Opportunities for the Next 3 to 5 Years.* Retrieved from http://www.thirdfrontier.com/Documents/OTFTargetingGrowthOpportunities FINAL.pdf

Center in Athens, and TechColumbus. Further, the U.S. Bureau of Labor Statistics projects the bioscience sector to grow 1.5% annually between 2008 and 2018, which is one of the fastest industry growth rates in the United States.[15] In all, the circumstances are ripe for bioscience to continue growing in strength while maintaining its position as one of Ohio's leading emerging industries.

[15] Battelle Technology Partnership Practice. (2010). *Battelle/BIO State Bioscience Initiatives 2010.* Retrieved from http://www3.bio.org/local/battelle2010/Battelle_Report_2010.pdf

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APPENDIX

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APPENDIX A: EMPLOYMENT, PAYROLL, AVERAGE WAGES & NUMBER OF ESTABLISHMENTS IN OHIO & SIX REGIONS, 2000-2010

Tables A1 – A7

Appendix Table A1: Employment, Payroll, Average Wage & Establishments for Ohio, 2000-2010

Table 1: Employment by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	9,849	9,870	9,840	10,249	10,171	9,545	9,688	9,804	10,202	10,089	9,854
Medical & Testing Laboratories	7,020	7,469	7,996	8,246	9,657	9,775	10,350	10,835	10,799	10,918	10,727
Medical Device & Equipment Manufacturers	21,286	21,897	22,080	21,339	21,407	21,672	21,599	21,608	21,872	21,926	20,788
Pharmaceuticals & Therapeutics	6,698	7,001	7,129	7,838	8,293	8,843	9,397	9,531	10,278	9,249	9,330
Research & Development	7,209	7,349	7,733	7,928	7,972	8,360	8,915	9,182	9,710	10,256	10,171
Total Bioscience in Ohio	**52,062**	**53,586**	**54,778**	**55,600**	**57,500**	**58,195**	**59,949**	**60,960**	**62,861**	**62,438**	**60,870**

Table 2: Payroll by Subsector

Subsector	2000	2001	2002	2003	2004	2005
Agricultural Biotechnology	778,821,874	778,364,594	765,917,546	869,158,906	842,364,185	844,461,382
Medical & Testing Laboratories	315,019,702	348,785,236	364,978,380	373,430,576	421,293,707	451,495,354
Medical Device & Equipment Manufacturers	1,231,365,382	1,259,580,006	1,268,319,103	1,304,176,973	1,332,074,838	1,303,447,766
Pharmaceuticals & Therapeutics	528,001,004	555,887,835	624,413,069	735,131,645	670,118,852	695,364,146
Research & Development	534,055,703	531,935,056	593,093,036	626,725,784	641,001,380	663,448,852
Total Bioscience in Ohio	**3,387,263,665**	**3,474,552,727**	**3,616,721,134**	**3,908,623,884**	**3,906,852,962**	**3,958,217,500**

Subsector	2006	2007	2008	2009	2010
Agricultural Biotechnology	838,182,146	896,547,363	871,030,567	838,405,413	991,443,836
Medical & Testing Laboratories	487,284,648	518,529,628	499,375,545	518,324,262	473,527,679
Medical Device & Equipment Manufacturers	1,413,961,900	1,374,685,491	1,421,462,087	1,466,887,293	1,350,417,403
Pharmaceuticals & Therapeutics	833,072,462	779,339,710	838,529,110	672,756,355	767,673,396
Research & Development	753,956,316	783,948,123	841,672,403	880,052,627	858,910,312
Total Bioscience in Ohio	**4,326,457,472**	**4,353,050,315**	**4,472,069,712**	**4,376,425,950**	**4,441,972,626**

Appendix Table A1, Continued

Table 3: Average Wages by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	79,076	78,862	77,837	84,804	82,820	88,472	86,518	91,447	85,378	83,101	100,613
Medical & Testing Laboratories	44,875	46,698	45,645	45,286	43,626	46,189	47,081	47,857	46,243	47,474	44,144
Medical Device & Equipment Manufacturers	57,849	57,523	57,442	61,117	62,226	60,144	65,464	63,619	64,990	66,902	64,961
Pharmaceuticals & Therapeutics	78,830	79,401	87,588	93,791	80,805	78,634	88,653	81,769	81,585	72,738	82,280
Research & Development	74,082	72,382	76,696	79,052	80,407	79,360	84,572	85,379	86,681	85,809	84,447
Total Bioscience in Ohio	**65,062**	**64,841**	**66,025**	**70,299**	**67,945**	**68,016**	**72,169**	**71,408**	**71,142**	**70,092**	**72,975**

Table 4: Number of Establishments by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	116	120	120	123	124	126	129	134	140	164	164
Medical & Testing Laboratories	338	347	421	442	464	498	558	578	602	631	641
Medical Device & Equipment Manufacturers	585	605	603	610	610	620	620	617	599	596	593
Pharmaceuticals & Therapeutics	67	66	64	70	74	77	81	84	90	91	92
Research & Development	196	215	219	209	215	232	253	269	280	291	293
Total Bioscience in Ohio	**1,302**	**1,353**	**1,427**	**1,454**	**1,487**	**1,553**	**1,641**	**1,682**	**1,711**	**1,773**	**1,783**

Note:
All payroll and average wage figures have been inflated in 2010 dollars.

Source:
Quarterly Census of Employment and Wages (QCEW)

Appendix Table A2: Employment, Payroll, Average Wage & Establishments for the Northeast Region, 2000-2010

Table 1: Employment by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	4,447	4,480	4,286	4,400	4,292	4,100	4,033	3,855	3,897	3,649	3,609
Medical & Testing Laboratories	2,453	2,621	3,128	3,111	3,309	3,387	3,523	3,699	3,780	3,789	3,465
Medical Device & Equipment Manufacturers	10,366	10,570	10,577	9,695	10,070	10,263	10,029	9,901	9,876	9,812	9,395
Pharmaceuticals & Therapeutics	1,196	1,309	1,488	1,627	1,672	1,945	2,178	1,982	2,279	2,351	2,522
Research & Development	1,770	1,705	1,870	1,733	1,599	1,562	1,614	1,708	1,726	1,756	1,728
Total Bioscience in Northeast Region	**20,232**	**20,685**	**21,349**	**20,566**	**20,942**	**21,257**	**21,377**	**21,145**	**21,558**	**21,357**	**20,719**

Table 2: Payroll by Subsector

Subsector	2000	2001	2002	2003	2004	2005
Agricultural Biotechnology	391,601,161	359,954,659	364,535,703	409,243,957	392,996,729	415,637,987
Medical & Testing Laboratories	127,470,756	136,169,502	152,597,052	151,308,602	162,754,185	179,596,725
Medical Device & Equipment Manufacturers	578,688,812	589,348,837	560,097,173	526,844,443	605,535,438	570,760,707
Pharmaceuticals & Therapeutics	107,678,300	103,249,854	114,715,365	137,196,282	130,448,775	141,762,487
Research & Development	122,471,090	108,736,740	119,188,661	130,127,306	121,985,801	108,601,266
Total Bioscience in Northeast Region	**1,327,910,119**	**1,297,459,592**	**1,311,133,954**	**1,354,720,590**	**1,413,720,928**	**1,416,359,172**

Subsector	2006	2007	2008	2009	2010
Agricultural Biotechnology	394,081,345	451,693,697	415,513,679	364,323,988	532,312,932
Medical & Testing Laboratories	177,355,524	197,772,762	193,616,294	198,286,703	160,218,068
Medical Device & Equipment Manufacturers	544,206,917	558,427,307	577,295,411	596,407,152	539,688,512
Pharmaceuticals & Therapeutics	163,527,312	160,543,387	181,032,978	179,500,609	278,773,328
Research & Development	137,476,711	128,165,980	137,628,011	152,528,528	142,253,396
Total Bioscience in Northeast Region	**1,416,647,809**	**1,496,603,133**	**1,505,086,373**	**1,491,046,980**	**1,653,246,236**

Appendix Table A2, Continued

Table 3: Average Wages by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	88,053	80,353	85,046	93,003	91,565	101,367	97,722	117,181	106,624	99,842	147,482
Medical & Testing Laboratories	51,972	51,960	48,788	48,631	49,187	53,025	50,338	53,473	51,215	52,336	46,242
Medical Device & Equipment Manufacturers	55,823	55,757	52,955	54,344	60,131	55,613	54,263	56,401	58,456	60,785	57,442
Pharmaceuticals & Therapeutics	90,057	78,857	77,111	84,342	78,004	72,886	75,093	81,014	79,424	76,351	110,551
Research & Development	69,196	63,775	63,732	75,081	76,286	69,544	85,168	75,023	79,756	86,883	82,345
Total Bioscience in Northeast Region	**65,634**	**62,726**	**61,415**	**65,871**	**67,505**	**66,630**	**66,270**	**70,781**	**69,816**	**69,819**	**79,795**

Table 4: Number of Establishments by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	45	45	46	46	48	50	52	49	47	58	58
Medical & Testing Laboratories	126	126	167	172	178	187	214	225	229	247	248
Medical Device & Equipment Manufacturers	281	289	300	300	298	304	305	304	297	295	294
Pharmaceuticals & Therapeutics	20	20	19	20	22	22	24	29	31	28	29
Research & Development	72	82	82	78	78	85	87	98	99	103	104
Total Bioscience in Northeast Region	**544**	**562**	**614**	**616**	**624**	**648**	**682**	**705**	**703**	**731**	**733**

Note:
All payroll and average wage figures have been inflated in 2010 dollars.

Source:
Quarterly Census of Employment and Wages (QCEW)

Appendix Table A3: Employment, Payroll, Average Wage & Establishments for the Central Region, 2000-2010

Table 1: Employment by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	1,780	1,681	1,777	1,648	1,664	1,599	1,651	1,662	1,803	1,984	1,990
Medical & Testing Laboratories	1,445	1,590	1,472	1,636	1,966	2,036	2,130	2,258	2,181	2,231	2,388
Medical Device & Equipment Manufacturers	1,567	1,573	1,946	2,187	2,270	2,445	2,409	2,486	2,602	2,602	1,876
Pharmaceuticals & Therapeutics	2,612	2,693	2,638	3,244	3,400	3,492	3,612	4,061	4,428	3,334	3,256
Research & Development	3,208	3,557	3,570	3,663	3,752	3,936	4,203	4,207	4,343	4,481	4,535
Total Bioscience in Central Region	**10,612**	**11,094**	**11,403**	**12,378**	**13,052**	**13,508**	**14,005**	**14,674**	**15,357**	**14,632**	**14,045**

Table 2: Payroll by Subsector

Subsector	2000	2001	2002	2003	2004	2005
Agricultural Biotechnology	126,215,676	162,960,876	143,574,793	152,283,296	162,183,779	130,386,430
Medical & Testing Laboratories	62,562,006	75,437,508	76,251,288	79,827,668	96,907,253	94,419,208
Medical Device & Equipment Manufacturers	78,248,847	82,527,938	98,823,092	125,567,100	121,091,390	145,342,557
Pharmaceuticals & Therapeutics	192,238,524	222,922,368	247,322,220	359,844,828	289,707,979	290,106,321
Research & Development	245,754,378	272,756,050	293,915,817	300,143,472	315,098,282	323,591,179
Total Bioscience in Central Region	**705,019,431**	**816,604,740**	**859,887,210**	**1,017,666,364**	**984,988,683**	**983,845,695**

Subsector	2006	2007	2008	2009	2010
Agricultural Biotechnology	153,308,024	146,201,675	142,665,284	176,675,113	172,743,888
Medical & Testing Laboratories	102,450,504	109,923,286	101,220,826	104,811,712	103,254,548
Medical Device & Equipment Manufacturers	135,601,382	134,635,298	140,843,918	148,508,978	114,630,116
Pharmaceuticals & Therapeutics	381,268,635	346,355,912	384,319,691	242,401,512	252,872,836
Research & Development	347,376,799	376,566,068	372,009,906	400,236,494	404,104,632
Total Bioscience in Central Region	**1,120,005,344**	**1,113,682,239**	**1,141,059,625**	**1,072,633,809**	**1,047,606,020**

Appendix Table A3, Continued

Table 3: Average Wages by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	70,921	96,962	80,796	92,423	97,466	81,526	92,876	87,950	79,127	89,050	86,820
Medical & Testing Laboratories	43,302	47,456	51,809	48,808	49,291	46,386	48,105	48,684	46,416	46,983	43,247
Medical Device & Equipment Manufacturers	49,935	52,465	50,783	57,407	53,352	59,437	56,282	54,157	54,122	57,068	61,114
Pharmaceuticals & Therapeutics	73,589	82,789	93,742	110,915	85,208	83,085	105,546	85,281	86,787	72,706	77,672
Research & Development	76,602	76,683	82,341	81,934	83,980	82,210	82,650	89,501	85,661	89,313	89,106
Total Bioscience in Central Region	**66,436**	**73,615**	**75,411**	**82,215**	**75,468**	**72,834**	**79,971**	**75,890**	**74,301**	**73,305**	**74,596**

Table 4: Number of Establishments by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	20	20	22	23	24	25	24	26	25	33	30
Medical & Testing Laboratories	53	54	71	76	83	91	105	109	109	108	130
Medical Device & Equipment Manufacturers	82	89	84	84	85	90	83	83	80	78	78
Pharmaceuticals & Therapeutics	15	14	10	13	16	16	18	18	21	21	19
Research & Development	36	38	41	43	45	53	56	56	53	56	62
Total Bioscience in Central Region	**206**	**215**	**228**	**239**	**253**	**275**	**286**	**292**	**288**	**296**	**319**

Note:
All payroll and average wage figures have been inflated in 2010 dollars.

Source:
Quarterly Census of Employment and Wages (QCEW)

Appendix Table A4: Employment, Payroll, Average Wage & Establishments for the Southwest Region, 2000-2010

Table 1: Employment by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	2,001	2,006	1,997	1,952	1,891	1,580	1,702	1,858	1,926	2,023	1,804
Medical & Testing Laboratories	1,160	1,174	1,287	1,232	2,125	1,988	2,240	2,459	2,442	2,441	2,493
Medical Device & Equipment Manufacturers	5,023	5,324	5,349	5,486	5,043	4,730	4,636	4,677	4,672	4,716	4,844
Pharmaceuticals & Therapeutics	2,450	2,587	2,524	2,441	2,632	2,793	2,835	2,583	2,682	2,681	2,570
Research & Development	1,198	1,095	1,269	1,437	1,525	1,657	1,700	1,893	2,138	2,495	2,409
Total Bioscience in Southwest Region	**11,832**	**12,186**	**12,426**	**12,548**	**13,216**	**12,748**	**13,113**	**13,470**	**13,860**	**14,356**	**14,120**

Table 2: Payroll by Subsector

Subsector	2000	2001	2002	2003	2004	2005
Agricultural Biotechnology	170,897,000	164,022,595	159,581,237	154,114,839	138,994,111	138,765,569
Medical & Testing Laboratories	51,538,416	50,697,844	55,360,649	53,799,501	78,680,286	80,846,146
Medical Device & Equipment Manufacturers	372,455,579	373,504,160	408,693,985	460,707,401	417,450,401	396,925,658
Pharmaceuticals & Therapeutics	208,012,090	210,137,787	238,214,917	211,296,717	220,807,961	232,773,579
Research & Development	96,788,161	83,120,657	110,507,665	120,539,379	127,310,407	146,472,724
Total Bioscience in Southwest Region	**899,691,246**	**881,483,043**	**972,358,453**	**1,000,457,837**	**983,243,166**	**995,783,676**

Subsector	2006	2007	2008	2009	2010
Agricultural Biotechnology	130,182,532	145,492,009	147,020,103	157,380,800	132,272,068
Medical & Testing Laboratories	95,515,786	101,434,532	97,973,824	102,995,502	102,877,380
Medical Device & Equipment Manufacturers	502,352,584	463,072,398	467,983,876	474,669,742	477,693,820
Pharmaceuticals & Therapeutics	244,174,656	220,402,510	217,925,059	197,995,860	180,540,684
Research & Development	171,291,968	179,100,330	223,277,342	215,091,450	205,129,304
Total Bioscience in Southwest Region	**1,143,517,526**	**1,109,501,779**	**1,154,180,204**	**1,148,133,354**	**1,098,513,256**

Appendix Table A4, Continued

Table 3: Average Wages by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	85,420	81,753	79,897	78,952	73,503	87,826	76,488	78,292	76,321	77,783	73,322
Medical & Testing Laboratories	44,445	43,187	43,013	43,669	37,028	40,664	42,639	41,256	40,119	42,191	41,273
Medical Device & Equipment Manufacturers	74,155	70,159	76,401	83,974	82,778	83,917	108,351	99,004	100,175	100,644	98,622
Pharmaceuticals & Therapeutics	84,903	81,239	94,380	86,550	83,904	83,352	86,139	85,339	81,255	73,842	70,240
Research & Development	80,799	75,912	87,071	83,893	83,506	88,387	100,746	94,595	104,411	86,194	85,137
Total Bioscience in Southwest Region	**76,046**	**72,338**	**78,246**	**79,728**	**74,403**	**78,113**	**87,203**	**82,366**	**83,271**	**79,967**	**77,798**

Table 4: Number of Establishments by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	19	22	20	22	21	18	18	22	22	24	25
Medical & Testing Laboratories	55	57	62	63	70	77	82	93	98	111	105
Medical Device & Equipment Manufacturers	79	83	79	80	78	79	83	82	79	80	80
Pharmaceuticals & Therapeutics	17	18	20	21	23	26	26	25	29	29	31
Research & Development	36	38	39	36	40	39	46	49	60	60	59
Total Bioscience in Southwest Region	**206**	**218**	**220**	**222**	**232**	**239**	**255**	**271**	**288**	**304**	**300**

Notes:
All payroll and average wage figures have been inflated in 2010 dollars.

Source:
Quarterly Census of Employment and Wages (QCEW)

Appendix Table A5: Employment, Payroll, Average Wage & Establishments for the Western Region, 2000-2010

Table 1: Employment by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	662	761	851	926	960	1,017	1,042	1,010	1,091	1,072	1,075
Medical & Testing Laboratories	1,161	1,214	1,258	1,303	1,290	1,374	1,403	1,371	1,408	1,410	1,335
Medical Device & Equipment Manufacturers	2,060	2,159	2,084	2,032	2,114	2,270	2,584	2,631	2,794	2,863	2,891
Pharmaceuticals & Therapeutics	222	223	266	289	322	362	486	599	548	502	541
Research & Development	787	740	743	781	796	874	950	956	1,037	1,080	1,151
Total Bioscience in Western Region	**4,892**	**5,097**	**5,202**	**5,331**	**5,482**	**5,897**	**6,465**	**6,567**	**6,878**	**6,927**	**6,993**

Table 2: Payroll by Subsector

Subsector	2000	2001	2002	2003	2004	2005
Agricultural Biotechnology	43,536,974	45,187,076	50,404,119	54,284,636	56,490,364	61,651,636
Medical & Testing Laboratories	39,784,655	43,114,803	46,310,293	51,161,496	46,340,864	58,412,832
Medical Device & Equipment Manufacturers	103,062,122	111,053,000	97,260,185	101,982,357	103,067,717	107,568,886
Pharmaceuticals & Therapeutics	13,148,927	13,659,289	16,812,777	17,913,841	18,851,266	19,886,472
Research & Development	58,504,449	55,402,684	54,713,838	58,077,417	59,806,116	66,997,972
Total Bioscience in Western Region	**258,037,127**	**268,416,852**	**265,501,212**	**283,419,747**	**284,556,327**	**314,517,798**

Subsector	2006	2007	2008	2009	2010
Agricultural Biotechnology	52,901,031	51,304,396	60,940,551	59,168,269	58,506,904
Medical & Testing Laboratories	64,845,972	60,053,499	62,765,678	64,981,037	58,281,580
Medical Device & Equipment Manufacturers	142,359,846	134,622,588	152,263,825	163,951,406	144,145,840
Pharmaceuticals & Therapeutics	30,293,718	37,754,657	40,026,769	34,346,488	34,895,544
Research & Development	70,955,759	75,743,298	79,292,789	85,279,526	85,928,616
Total Bioscience in Western Region	**361,356,326**	**359,478,438**	**395,289,612**	**407,726,726**	**381,758,484**

Appendix Table A5, Continued

Table 3: Average Wages by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	65,799	59,379	59,206	58,602	58,824	60,621	50,769	50,813	55,841	55,211	54,425
Medical & Testing Laboratories	34,264	35,505	36,819	39,257	35,918	42,519	46,218	43,789	44,576	46,082	43,656
Medical Device & Equipment Manufacturers	50,022	51,445	46,670	50,196	48,755	47,387	55,086	51,168	54,503	57,266	49,855
Pharmaceuticals & Therapeutics	59,318	61,343	63,284	61,915	58,484	54,885	62,290	62,995	73,042	68,419	64,463
Research & Development	74,350	74,863	73,660	74,359	75,149	76,615	74,712	79,255	76,458	78,953	74,663
Total Bioscience in Western Region	**52,751**	**52,665**	**51,043**	**53,158**	**51,901**	**53,329**	**55,890**	**54,739**	**57,470**	**58,861**	**54,587**

Table 4: Number of Establishments by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	11	12	13	13	13	13	13	13	18	18	18
Medical & Testing Laboratories	48	50	54	58	58	64	72	71	77	81	77
Medical Device & Equipment Manufacturers	66	69	64	67	69	69	71	72	69	70	69
Pharmaceuticals & Therapeutics	7	7	7	8	5	5	5	5	4	8	7
Research & Development	35	38	37	35	35	36	43	46	47	50	46
Total Bioscience in Western Region	**167**	**176**	**175**	**181**	**180**	**187**	**204**	**207**	**215**	**227**	**217**

Notes:
All payroll and average wage figures have been inflated in 2010 dollars.

Source:
Quarterly Census of Employment and Wages (QCEW)

Appendix Table A6: Employment, Payroll, Average Wage & Establishments for the Northwest Region, 2000-2010

Table 1: Employment by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	764	775	753	1,158	1,186	1,082	1,069	1,030	1,025	952	947
Medical & Testing Laboratories	728	778	741	853	849	852	901	877	827	825	857
Medical Device & Equipment Manufacturers	1,303	1,343	1,255	1,120	1,156	1,229	1,219	1,195	1,194	1,180	1,070
Pharmaceuticals & Therapeutics	S[1]	S	69	S	65	56	73	77	66	75	97
Research & Development	S	S	226	S	264	288	345	365	411	414	322
Total Bioscience in Northwest Region	**3,066**	**3,166**	**3,044**	**3,462**	**3,520**	**3,507**	**3,607**	**3,544**	**3,523**	**3,446**	**3,293**

Table 2: Payroll by Subsector

Subsector	2000	2001	2002	2003	2004	2005
Agricultural Biotechnology	35,951,164	35,813,761	37,783,185	89,158,747	82,320,174	89,107,414
Medical & Testing Laboratories	31,249,111	40,461,638	31,014,085	33,367,232	32,718,066	33,662,832
Medical Device & Equipment Manufacturers	52,142,320	55,366,690	55,116,346	48,378,618	47,788,066	49,286,552
Pharmaceuticals & Therapeutics	S	S	2,975,812	S	3,298,858	3,179,460
Research & Development	S	S	12,672,226	S	14,931,017	15,970,402
Total Bioscience in Northwest Region	**131,234,811**	**144,399,701**	**139,561,654**	**190,112,029**	**181,056,181**	**191,206,660**

Subsector	2006	2007	2008	2009	2010
Agricultural Biotechnology	96,255,481	77,656,746	74,429,787	54,507,236	70,165,360
Medical & Testing Laboratories	41,290,383	43,216,019	38,029,012	39,262,484	42,003,864
Medical Device & Equipment Manufacturers	51,450,147	48,069,651	46,637,337	46,166,478	41,442,032
Pharmaceuticals & Therapeutics	4,350,498	4,485,132	3,158,816	3,357,552	4,282,848
Research & Development	22,918,145	22,060,073	27,192,217	25,748,886	20,544,052
Total Bioscience in Northwest Region	**216,264,654**	**195,487,621**	**189,447,169**	**169,042,636**	**178,438,156**

Appendix Table A6, Continued

Table 3: Average Wages by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	47,077	46,231	50,199	77,016	69,391	82,379	90,043	75,395	72,638	57,236	74,066
Medical & Testing Laboratories	42,924	52,025	41,842	39,122	38,557	39,514	45,849	49,288	46,006	47,581	48,992
Medical Device & Equipment Manufacturers	40,007	41,216	43,906	43,182	41,327	40,114	42,195	40,215	39,049	39,124	38,719
Pharmaceuticals & Therapeutics	S	S	42,922	S	51,011	56,443	59,328	58,000	47,623	44,965	44,003
Research & Development	S	S	56,027	S	56,467	55,549	66,501	60,483	66,134	62,138	63,849
Total Bioscience in Northwest Region	**42,800**	**45,617**	**45,837**	**54,915**	**51,432**	**54,536**	**59,959**	**55,157**	**53,773**	**49,047**	**54,169**

Table 4: Number of Establishments by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	14	15	14	14	14	16	18	18	19	21	23
Medical & Testing Laboratories	41	43	51	53	51	54	61	53	61	58	56
Medical Device & Equipment Manufacturers	50	50	49	51	52	52	52	50	50	51	51
Pharmaceuticals & Therapeutics	S	S	4	S	4	4	5	4	3	3	4
Research & Development	S	S	13	S	11	13	14	12	14	14	14
Total Bioscience in Northwest Region	**121**	**124**	**131**	**133**	**132**	**139**	**150**	**137**	**147**	**147**	**148**

Note:

All payroll and average wage figures have been inflated in 2010 dollars.

[1] S denotes data suppressed due to confidentiality restrictions.

Source:

Quarterly Census of Employment and Wages (QCEW)

Appendix Table A7: Employment, Payroll, Average Wage & Establishments for the Southeast Region, 2000-2010

Table 1: Employment by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	195	167	176	165	178	167	191	389	460	409	429
Medical & Testing Laboratories	73	92	110	111	118	138	153	171	161	222	189
Medical Device & Equipment Manufacturers	967	928	869	819	754	735	722	718	734	753	712
Pharmaceuticals & Therapeutics	153	123	144	170	202	195	213	229	S [1]	S	S
Research & Development	40	48	55	50	36	43	103	53	S	S	S
Total Bioscience in Southeast Region	**1,428**	**1,358**	**1,354**	**1,315**	**1,288**	**1,278**	**1,382**	**1,560**	**1,685**	**1,720**	**1,700**

Table 2: Payroll by Subsector

Subsector	2000	2001	2002	2003	2004	2005
Agricultural Biotechnology	10,619,899	10,425,627	10,038,509	10,073,431	9,379,028	8,912,346
Medical & Testing Laboratories	2,414,758	2,903,941	3,445,013	3,966,077	3,893,053	4,557,611
Medical Device & Equipment Manufacturers	46,767,702	47,779,381	48,328,322	40,697,054	37,141,826	33,563,406
Pharmaceuticals & Therapeutics	4,140,405	3,309,722	4,371,978	5,603,384	7,004,013	7,655,827
Research & Development	1,428,167	1,770,128	2,094,829	1,907,371	1,869,757	1,815,309
Total Bioscience in Southeast Region	**65,370,931**	**66,188,799**	**68,278,651**	**62,247,317**	**59,287,677**	**56,504,499**

Subsector	2006	2007	2008	2009	2010
Agricultural Biotechnology	11,453,733	24,198,840	30,461,163	26,350,007	25,442,684
Medical & Testing Laboratories	5,826,479	6,129,530	5,769,911	7,986,824	6,892,239
Medical Device & Equipment Manufacturers	37,991,024	35,858,249	36,437,720	37,183,537	32,817,083
Pharmaceuticals & Therapeutics	9,457,643	9,798,112	S	S	S
Research & Development	3,936,934	2,312,374	S	S	S
Total Bioscience in Southeast Region	**68,665,813**	**78,297,105**	**87,006,729**	**87,842,445**	**82,410,474**

Appendix Table A7, Continued

Table 3: Average Wages by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	54,369	62,306	57,037	60,929	52,789	53,262	59,864	62,208	66,220	64,425	59,307
Medical & Testing Laboratories	32,930	31,606	31,324	35,701	33,020	32,952	38,047	35,851	35,914	36,004	36,446
Medical Device & Equipment Manufacturers	48,380	51,505	55,614	49,711	49,281	45,685	52,643	49,942	49,665	49,381	46,113
Pharmaceuticals & Therapeutics	27,003	26,908	30,431	33,025	34,730	39,194	44,333	42,787	S	S	S
Research & Development	35,785	36,626	37,929	38,270	51,894	42,246	38,234	43,490	S	S	S
Total Bioscience in Southeast Region	**45,760**	**48,732**	**50,432**	**47,351**	**46,069**	**44,192**	**49,670**	**50,186**	**51,680**	**51,083**	**48,506**

Table 4: Number of Establishments by Subsector

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agricultural Biotechnology	7	6	5	5	4	4	4	6	9	10	10
Medical & Testing Laboratories	15	17	16	20	24	25	24	27	28	26	25
Medical Device & Equipment Manufacturers	27	25	27	28	28	26	26	26	24	22	21
Pharmaceuticals & Therapeutics	5	4	4	4	4	4	3	3	S	S	S
Research & Development	4	6	7	6	6	6	7	8	S	S	S
Total Bioscience in Southeast Region	**58**	**58**	**59**	**63**	**66**	**65**	**64**	**70**	**70**	**68**	**66**

Note:

All payroll and average wage figures have been inflated in 2010 dollars.

[1] S denotes data suppressed due to confidentiality restrictions.

Source:

Quarterly Census of Employment and Wages (QCEW)

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APPENDIX B: SUMMARY OF EMPLOYMENT, PAYROLL, AVERAGE WAGES & NUMBER OF ESTABLISHMENTS BY SUBSECTOR AND REGION, 2010

Tables B1 – B4

Appendix Table B1: Employment by Subsector and Region, 2010

Subsector	Region						State of Ohio
	Central	Northeast	Northwest	Southeast	Southwest	Western	
Agricultural Biotechnology	1,990	3,609	947	429	1,804	1,075	9,854
Medical & Testing Laboratories	2,388	3,465	857	189	2,493	1,335	10,727
Medical Device & Equipment Manufacturers	1,876	9,395	1,070	712	4,844	2,891	20,788
Pharmaceuticals & Therapeutics	3,256	2,522	97	S[1]	2,570	541	9,330
Research & Development	4,535	1,728	322	S	2,409	1,151	10,171
Total Bioscience in Ohio	**14,045**	**20,719**	**3,293**	**1,700**	**14,120**	**6,993**	**60,870**

Appendix Table B2: Payroll by Subsector and Region, 2010

Subsector	Region						State of Ohio
	Central	Northeast	Northwest	Southeast	Southwest	Western	
Agricultural Biotechnology	172,743,888	532,312,932	70,165,360	25,442,684	132,272,068	58,506,904	991,443,836
Medical & Testing Laboratories	103,254,548	160,218,068	42,003,864	6,892,239	102,877,380	58,281,580	473,527,679
Medical Device & Equipment Manufacturers	114,630,116	539,688,512	41,442,032	32,817,083	477,693,820	144,145,840	1,350,417,403
Pharmaceuticals & Therapeutics	252,872,836	278,773,328	4,282,848	S	180,540,684	34,895,544	767,673,396
Research & Development	404,104,632	142,253,396	20,544,052	S	205,129,304	85,928,616	858,910,312
Total Bioscience in Ohio	**1,047,606,020**	**1,653,246,236**	**178,438,156**	**82,410,474**	**1,098,513,256**	**381,758,484**	**4,441,972,626**

Appendix Table B3: Average Wages by Subsector and Region, 2010

Subsector	Region						State of Ohio
	Central	Northeast	Northwest	Southeast	Southwest	Western	
Agricultural Biotechnology	86,820	147,482	74,066	59,307	73,322	54,425	100,613
Medical & Testing Laboratories	43,247	46,242	48,992	36,446	41,273	43,656	44,144
Medical Device & Equipment Manufacturers	61,114	57,442	38,719	46,113	98,622	49,855	64,961
Pharmaceuticals & Therapeutics	77,672	110,551	44,003	S	70,240	64,463	82,280
Research & Development	89,106	82,345	63,849	S	85,137	74,663	84,447
Total Bioscience in Ohio	**74,596**	**79,795**	**54,169**	**48,506**	**77,798**	**54,587**	**72,975**

Appendix Table B4: Number of Establishments by Subsector and Region, 2010

Subsector	Region						State of Ohio
	Central	Northeast	Northwest	Southeast	Southwest	Western	
Agricultural Biotechnology	30	58	23	10	25	18	164
Medical & Testing Laboratories	130	248	56	25	105	77	641
Medical Device & Equipment Manufacturers	78	294	51	21	80	69	593
Pharmaceuticals & Therapeutics	19	29	4	S	31	7	92
Research & Development	62	104	14	S	59	46	293
Total Bioscience in Ohio	**319**	**733**	**148**	**66**	**300**	**217**	**1,783**

Notes:

All payroll and average wage figures have been inflated in 2010 dollars.

[1] S denotes data suppressed due to confidentiality restrictions.

Source:

Quarterly Census of Employment and Wages (QCEW)

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APPENDIX C: ECONOMIC IMPACT OF BIOSCIENCE IN OHIO & SIX REGIONS, 2010

Tables C1 – C7

Appendix Table C1: Economic Impact of Bioscience in Ohio, 2010

	Employment				Output			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	9,854	35,751	15,477	61,082	$16,197,562,487	$7,001,965,595	$1,731,431,915	$24,930,959,997
Medical & Testing Laboratories	10,727	4,504	2,231	17,462	$1,300,070,873	$503,742,735	$251,992,954	$2,055,806,562
Medical Device & Equipment Manufacturers	20,788	10,638	6,728	38,154	$5,643,686,583	$1,611,819,380	$757,176,857	$8,012,682,820
Pharmaceuticals & Therapeutics	9,330	30,941	16,094	56,365	$9,663,611,767	$4,882,744,298	$1,849,414,989	$16,395,771,054
Research & Development	10,171	5,029	3,040	18,240	$1,507,667,804	$562,974,196	$349,201,517	$2,419,843,517
Total Bioscience	60,870	86,863	43,570	191,303	$34,312,599,514	$14,563,246,204	$4,939,218,232	$53,815,063,950

	Value Added				Labor Income			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	$1,099,029,083	$3,241,353,566	$1,052,325,498	$5,392,708,147	$247,860,963	$1,914,840,454	$582,348,220	$2,745,049,637
Medical & Testing Laboratories	$240,522,167	$310,246,716	$153,407,177	$704,176,060	$118,381,920	$194,534,125	$84,878,840	$397,794,885
Medical Device & Equipment Manufacturers	$1,409,912,497	$929,625,397	$459,788,106	$2,799,326,000	$337,604,354	$583,260,777	$255,407,665	$1,176,272,796
Pharmaceuticals & Therapeutics	$1,358,621,348	$2,919,894,295	$1,132,218,433	$5,410,734,076	$191,918,349	$2,058,601,757	$622,519,026	$2,873,039,132
Research & Development	$209,801,799	$341,186,008	$213,995,000	$764,982,807	$214,727,570	$218,047,668	$117,484,994	$550,260,232
Total Bioscience	$4,317,886,894	$7,742,305,982	$3,011,734,214	$15,071,927,090	$1,110,493,156	$4,969,284,781	$1,662,638,745	$7,742,416,682

	Tax		
	Federal Government Non Defense	State/Local Government Non Education	Total
Agricultural Biotechnology	$818,716,417	$747,125,643	$1,565,842,060
Medical & Testing Laboratories	$64,804,737	$80,595,908	$145,400,645
Medical Device & Equipment Manufacturers	$241,084,877	$274,209,847	$515,294,724
Pharmaceuticals & Therapeutics	$503,363,873	$583,689,194	$1,087,053,067
Research & Development	$71,257,567	$100,473,338	$171,730,905
Total Bioscience	$1,699,227,471	$1,786,093,930	$3,485,321,401

Appendix Table C2: Economic Impact of Bioscience in the Northeast Region, 2010

	Employment				Output			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	3,609	13,468	6,551	23,628	$5,701,289,226	$2,590,571,556	$724,378,187	$9,016,238,969
Medical & Testing Laboratories	3,465	1,473	815	5,753	$402,049,908	$165,020,908	$90,174,524	$657,245,340
Medical Device & Equipment Manufacturers	9,395	5,648	3,516	18,559	$2,695,362,544	$887,476,010	$388,908,259	$3,971,746,813
Pharmaceuticals & Therapeutics	2,522	8,136	4,546	15,204	$2,396,532,823	$1,250,587,322	$502,802,562	$4,149,922,707
Research & Development	1,728	855	566	3,149	$243,376,623	$95,825,212	$62,546,488	$401,748,323
Total Bioscience	20,719	29,580	15,994	66,293	$11,438,611,124	$4,989,481,008	$1,768,810,020	$18,196,902,152

	Value Added				Labor Income			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	$415,062,233	$1,182,287,439	$438,280,305	$2,035,629,977	$133,078,237	$694,883,589	$243,809,592	$1,071,771,418
Medical & Testing Laboratories	$72,094,243	$100,503,666	$54,554,669	$227,152,578	$40,054,517	$63,278,693	$30,353,595	$133,686,805
Medical Device & Equipment Manufacturers	$601,816,968	$499,084,016	$235,273,866	$1,336,174,850	$134,922,128	$311,374,306	$130,917,073	$577,213,507
Pharmaceuticals & Therapeutics	$340,477,834	$734,861,376	$304,186,818	$1,379,526,028	$69,693,334	$506,677,922	$169,250,214	$745,621,470
Research & Development	$34,790,884	$56,860,877	$37,838,983	$129,490,744	$35,563,345	$36,165,120	$21,054,331	$92,782,796
Total Bioscience	$1,464,242,162	$2,573,597,374	$1,070,134,641	$5,107,974,177	$413,311,561	$1,612,379,630	$595,384,805	$2,621,075,996

	Tax		
	Federal Government Non Defense	State/Local Government Non Education	Total
Agricultural Biotechnology	$245,721,847	$221,632,602	$467,354,449
Medical & Testing Laboratories	$20,282,156	$25,673,838	$45,955,994
Medical Device & Equipment Manufacturers	$115,127,937	$126,800,454	$241,928,391
Pharmaceuticals & Therapeutics	$130,652,082	$149,211,792	$279,863,874
Research & Development	$11,729,160	$16,584,345	$28,313,505
Total Bioscience	$523,513,182	$539,903,031	$1,063,416,213

Appendix Table C3: Economic Impact of Bioscience in the Central Region, 2010

	Employment				Output			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	1,990	8,049	3,433	13,472	$3,481,692,317	$1,626,769,044	$401,520,200	$5,509,981,561
Medical & Testing Laboratories	2,388	1,048	493	3,929	$290,940,651	$121,303,981	$57,713,627	$469,958,259
Medical Device & Equipment Manufacturers	1,876	916	553	3,345	$488,604,235	$136,527,486	$64,655,067	$689,786,788
Pharmaceuticals & Therapeutics	3,256	11,852	5,921	21,029	$3,775,157,067	$1,840,544,839	$692,644,995	$6,308,346,901
Research & Development	4,535	2,270	1,383	8,188	$701,826,016	$257,015,882	$161,740,832	$1,120,582,730
Total Bioscience	14,045	24,135	11,783	49,963	$8,738,220,286	$3,982,161,232	$1,378,274,721	$14,098,656,239

	Value Added				Labor Income			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	$268,247,839	$794,649,803	$248,812,457	$1,311,710,099	$43,185,973	$452,548,411	$134,192,506	$629,926,890
Medical & Testing Laboratories	$56,674,899	$76,171,118	$35,759,405	$168,605,422	$25,813,636	$45,707,796	$19,290,406	$90,811,838
Medical Device & Equipment Manufacturers	$107,673,340	$83,874,582	$40,058,566	$231,606,488	$28,657,529	$51,573,640	$21,611,295	$101,842,464
Pharmaceuticals & Therapeutics	$575,096,414	$1,119,960,922	$429,161,056	$2,124,218,392	$63,218,206	$795,279,556	$231,513,086	$1,090,010,848
Research & Development	$98,669,441	$158,654,279	$100,212,679	$357,536,399	$101,026,158	$99,536,361	$54,061,709	$254,624,228
Total Bioscience	$1,106,361,933	$2,233,310,704	$854,004,163	$4,193,676,800	$261,901,502	$1,444,645,764	$460,669,002	$2,167,216,268

	Tax		
	Federal Government Non Defense	State/Local Government Non Education	Total
Agricultural Biotechnology	$153,665,386	$137,089,417	$290,754,803
Medical & Testing Laboratories	$15,197,158	$18,236,776	$33,433,934
Medical Device & Equipment Manufacturers	$19,909,485	$22,369,903	$42,279,388
Pharmaceuticals & Therapeutics	$191,693,155	$223,712,520	$415,405,675
Research & Development	$33,418,338	$45,957,770	$79,376,108
Total Bioscience	$413,883,522	$447,366,386	$861,249,908

Appendix Table C4: Economic Impact of Bioscience in the Southwest Region, 2010

	Employment				Output			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	1,804	4,786	2,251	8,841	$2,595,644,763	$885,726,849	$265,124,598	$3,746,496,210
Medical & Testing Laboratories	2,493	1,153	544	4,190	$308,629,619	$131,071,959	$64,046,805	$503,748,383
Medical Device & Equipment Manufacturers	4,844	2,437	1,807	9,088	$1,304,821,976	$372,913,149	$212,899,207	$1,890,634,332
Pharmaceuticals & Therapeutics	2,570	9,022	4,780	16,372	$2,709,023,013	$1,509,052,533	$562,992,186	$4,781,067,732
Research & Development	2,409	1,303	760	4,472	$345,100,754	$147,071,204	$89,528,718	$581,700,676
Total Bioscience	14,120	18,701	10,142	42,963	$7,263,220,125	$3,045,835,694	$1,194,591,514	$11,503,647,333

	Value Added				Labor Income			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	$160,376,968	$449,163,803	$162,205,059	$771,745,830	$33,068,016	$287,394,248	$89,895,132	$410,357,396
Medical & Testing Laboratories	$53,757,749	$81,584,928	$39,184,081	$174,526,758	$25,719,346	$51,707,380	$21,716,387	$99,143,113
Medical Device & Equipment Manufacturers	$389,524,475	$221,783,337	$130,236,795	$741,544,607	$119,423,457	$138,903,634	$72,203,643	$330,530,734
Pharmaceuticals & Therapeutics	$349,599,675	$897,974,320	$344,428,427	$1,592,002,422	$45,135,172	$636,216,684	$190,906,457	$872,258,313
Research & Development	$50,181,797	$88,632,611	$54,772,064	$193,586,472	$51,282,323	$57,067,376	$30,358,506	$138,708,205
Total Bioscience	$1,003,440,664	$1,739,138,999	$730,826,426	$3,473,406,089	$274,628,314	$1,171,289,322	$405,080,125	$1,850,997,761

	Tax		
	Federal Government Non Defense	State/Local Government Non Education	Total
Agricultural Biotechnology	$95,208,391	$87,776,881	$182,985,272
Medical & Testing Laboratories	$15,531,069	$19,831,922	$35,362,991
Medical Device & Equipment Manufacturers	$59,326,755	$73,286,849	$132,613,604
Pharmaceuticals & Therapeutics	$149,221,616	$178,577,397	$327,799,013
Research & Development	$17,253,489	$25,486,552	$42,740,041
Total Bioscience	$336,541,320	$384,959,601	$721,500,921

Appendix Table C5: Economic Impact of Bioscience in the Western Region, 2010

	Employment				Output			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	1,075	4,592	1,681	7,348	$1,923,347,990	$734,727,912	$182,205,185	$2,840,281,087
Medical & Testing Laboratories	1,335	479	228	2,042	$167,948,918	$52,527,252	$24,721,554	$245,197,724
Medical Device & Equipment Manufacturers	2,891	1,208	634	4,733	$794,342,666	$160,857,669	$68,693,048	$1,023,893,383
Pharmaceuticals & Therapeutics	541	1,601	717	2,859	$591,370,983	$237,430,348	$77,779,179	$906,580,510
Research & Development	1,151	467	269	1,887	$171,403,521	$49,965,075	$29,150,399	$250,518,995
Total Bioscience	6,993	8,347	3,529	18,869	$3,648,414,078	$1,235,508,256	$382,549,365	$5,266,471,699

	Value Added				Labor Income			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	$120,199,900	$400,786,465	$109,260,516	$630,246,881	$14,626,726	$245,891,702	$62,082,284	$322,600,712
Medical & Testing Laboratories	$31,855,923	$32,037,793	$14,821,274	$78,714,990	$14,570,395	$21,027,393	$8,425,459	$44,023,247
Medical Device & Equipment Manufacturers	$211,461,666	$95,482,447	$41,180,869	$348,124,982	$36,036,461	$63,081,327	$23,413,317	$122,531,105
Pharmaceuticals & Therapeutics	$75,571,370	$142,019,553	$46,629,761	$264,220,684	$8,723,886	$103,358,725	$26,508,982	$138,591,593
Research & Development	$20,925,801	$29,684,105	$17,475,697	$68,085,603	$21,482,153	$20,556,005	$9,935,414	$51,973,572
Total Bioscience	$460,014,660	$700,010,363	$229,368,117	$1,389,393,140	$95,439,621	$453,915,152	$130,365,456	$679,720,229

	Tax		
	Federal Government Non Defense	State/Local Government Non Education	Total
Agricultural Biotechnology	$74,875,219	$64,269,561	$139,144,780
Medical & Testing Laboratories	$6,665,966	$8,251,987	$14,917,953
Medical Device & Equipment Manufacturers	$26,841,209	$28,411,884	$55,253,093
Pharmaceuticals & Therapeutics	$23,363,681	$26,794,598	$50,158,279
Research & Development	$6,123,516	$8,700,958	$14,824,474
Total Bioscience	$137,869,591	$136,428,988	$274,298,579

Appendix Table C6: Economic Impact of Bioscience in the Northwest Region, 2010

	Employment				Output			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	947	3,858	1,235	6,040	$1,770,019,710	$876,126,440	$125,792,275	$2,771,938,425
Medical & Testing Laboratories	857	313	133	1,303	$109,197,406	$30,044,573	$13,594,153	$152,836,132
Medical Device & Equipment Manufacturers	1,070	294	141	1,505	$211,242,219	$35,823,488	$14,322,050	$261,387,757
Pharmaceuticals & Therapeutics	97	200	73	370	$91,330,147	$27,824,919	$7,484,909	$126,639,975
Research & Development	322	128	59	509	$42,624,177	$12,493,066	$5,983,368	$61,100,611
Total Bioscience	3,293	4,793	1,641	9,727	$2,224,413,659	$982,312,486	$167,176,755	$3,373,902,900

	Value Added				Labor Income			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	$85,735,328	$316,526,266	$74,596,576	$476,858,170	$17,541,340	$183,101,435	$41,898,092	$242,540,867
Medical & Testing Laboratories	$22,797,897	$17,841,261	$8,058,117	$48,697,275	$10,500,966	$11,434,871	$4,529,679	$26,465,516
Medical Device & Equipment Manufacturers	$53,970,578	$20,466,949	$8,488,688	$82,926,215	$10,360,508	$12,816,623	$4,772,702	$27,949,833
Pharmaceuticals & Therapeutics	$10,169,983	$15,579,768	$4,437,086	$30,186,837	$1,070,712	$10,984,422	$2,493,867	$14,549,001
Research & Development	$5,006,361	$7,029,952	$3,546,805	$15,583,118	$5,136,013	$4,512,726	$1,993,661	$11,642,400
Total Bioscience	$177,680,147	$377,444,196	$99,127,272	$654,251,615	$44,609,539	$222,850,077	$55,688,001	$323,147,617

	Tax		
	Federal Government Non Defense	State/Local Government Non Education	Total
Agricultural Biotechnology	$52,861,033	$48,302,596	$101,163,629
Medical & Testing Laboratories	$3,898,002	$5,002,356	$8,900,358
Medical Device & Equipment Manufacturers	$6,228,837	$6,631,903	$12,860,740
Pharmaceuticals & Therapeutics	$2,671,060	$2,921,878	$5,592,938
Research & Development	$1,362,327	$1,955,453	$3,317,780
Total Bioscience	$67,021,259	$64,814,186	$131,835,445

Appendix Table C7: Economic Impact of Bioscience in the Southeast Region, 2010

	Employment				Output			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	429	998	326	1,753	$725,568,481	$288,043,794	$32,411,470	$1,046,023,745
Medical & Testing Laboratories	189	38	18	245	$21,304,371	$3,774,062	$1,742,291	$26,820,724
Medical Device & Equipment Manufacturers	712	135	77	924	$149,312,943	$18,221,578	$7,699,226	$175,233,747
Pharmaceuticals & Therapeutics	344	130	57	531	$100,197,734	$17,304,337	$5,711,158	$123,213,229
Research & Development	26	6	3	35	$3,336,713	$603,757	$251,712	$4,192,182
Total Bioscience	1,700	1,307	481	3,488	$999,720,242	$327,947,528	$47,815,857	$1,375,483,627

	Value Added				Labor Income			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agricultural Biotechnology	$49,406,815	$97,939,790	$19,170,585	$166,517,190	$6,360,671	$51,021,069	$10,470,614	$67,852,354
Medical & Testing Laboratories	$3,341,456	$2,107,950	$1,029,631	$6,479,037	$1,723,060	$1,377,992	$563,314	$3,664,366
Medical Device & Equipment Manufacturers	$45,465,470	$8,934,066	$4,549,322	$58,948,858	$8,204,271	$5,511,247	$2,489,635	$16,205,153
Pharmaceuticals & Therapeutics	$7,706,072	$9,498,356	$3,375,285	$20,579,713	$4,077,039	$6,084,448	$1,846,420	$12,007,907
Research & Development	$227,515	$324,184	$148,772	$700,471	$237,578	$210,080	$81,373	$529,031
Total Bioscience	$106,147,328	$118,804,346	$28,273,595	$253,225,269	$20,602,619	$64,204,836	$15,451,356	$100,258,811

	Tax		
	Federal Government Non Defense	State/Local Government Non Education	Total
Agricultural Biotechnology	$22,388,915	$15,068,747	$37,457,662
Medical & Testing Laboratories	$564,879	$676,556	$1,241,435
Medical Device & Equipment Manufacturers	$3,876,322	$4,215,272	$8,091,594
Pharmaceuticals & Therapeutics	$1,875,389	$2,193,655	$4,069,044
Research & Development	$72,454	$88,203	$160,657
Total Bioscience	$28,777,959	$22,242,433	$51,020,392

APPENDIX D: PRELIMINARY BIOSCIENCE TRENDS, 2011

INTRODUCTION

This appendix contains a brief analysis of preliminary 2011 data for Ohio's bioscience sector. Please note that all payroll and average wage figures in this appendix have been inflated to 2011 dollars. This may result in small discrepancies between the data found here and data for years 2000 to 2010 found in the body of the main report.

OVERVIEW OF 2011 BIOSCIENCE DATA

Appendix Table D1 features a snapshot of Ohio's bioscience sector in 2011 and includes data on employment, payroll, average wages, and number of establishments by subsector and for the sector as a whole.

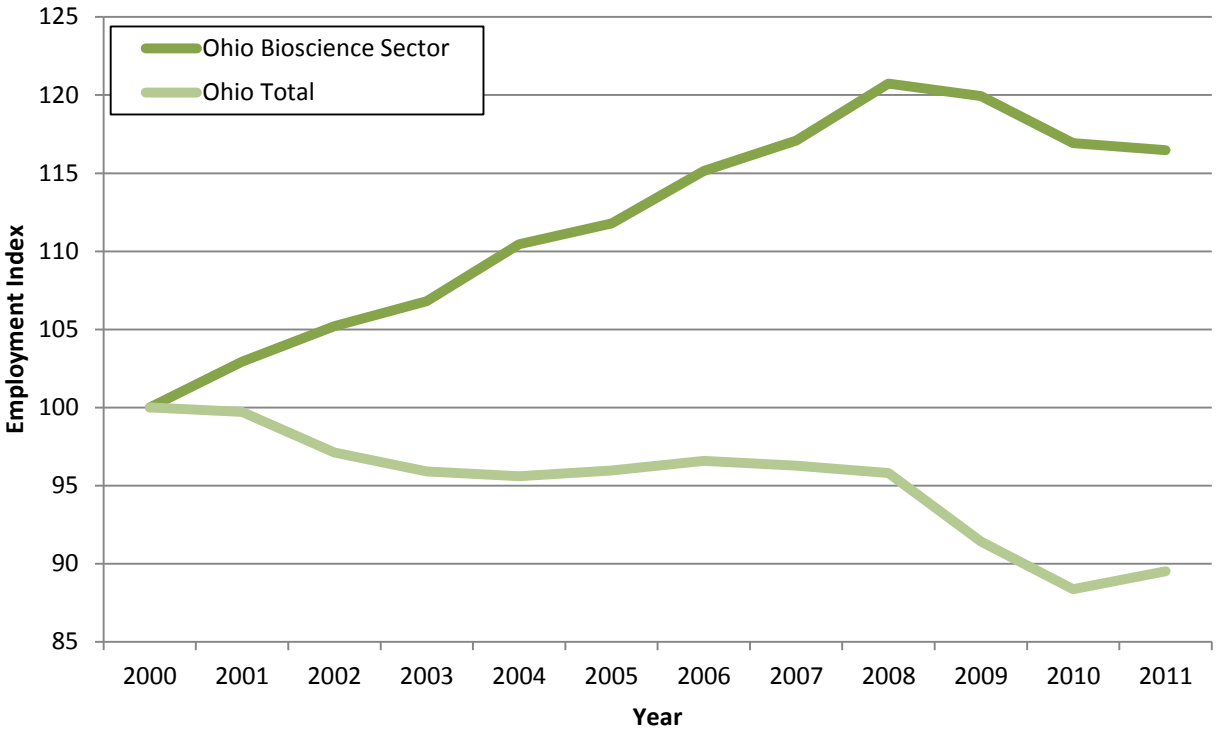
Appendix Table D1: Bioscience Employment, Payroll, Wages, and Establishments by Subsector, 2011

Subsector	Employment	Payroll ($)	Average Wages ($)	Establish-ments
Agricultural Biotechnology	10,217	1,086,233,536	106,316	155
Medical & Testing Laboratories	10,446	474,990,116	45,471	618
Medical Device & Equipment Manufacturers	20,808	1,420,431,908	68,264	585
Pharmaceuticals & Therapeutics	9,137	692,142,240	75,752	88
Research & Development	10,028	905,641,768	90,311	297
Total Bioscience in Ohio	**60,636**	**4,579,439,568**	**75,523**	**1,743**

Bioscience employment in Ohio declined slightly from 2010 to 2011 (-0.4%) as it did between 2008 and 2010 (Appendix Figure D1). However, the most recent decline (2010-2011) was less steep than in the preceding two years. This differs from total employment in Ohio, which grew 1.3% from 2010 to 2011 and saw its first uptick since 2006. Appendix Figure D1 shows that, despite its loss from the preceding year, bioscience employment in 2011 still remained 16.5% greater than base year 2000, a much more favorable position than total Ohio employment.

At the regional level, changes in employment from 2010 to 2011 varied; three regions grew in terms of bioscience employment while the remaining three regions declined (Appendix Table D7). The biggest increase was experienced by the Southeast region (14.5%), which traditionally accounts for the smallest percentage of Ohio's bioscience sector across all measures. The other two regions that saw increased employment were the Western (3.4%) and Northeast regions (1.5%). The Southwest region sustained the largest percentage loss of employment (-5.1%), followed by the Northwest (-4.4%) and Central (-1.2%) regions.

Appendix Figure D1: Bioscience Employment and Total Employment in Ohio, 2000-2011



Appendix Tables D2 through D5 provide annual data (2000 to 2011) on bioscience employment, payroll, average wages, and establishments, respectively, broken down by subsector. Overall, employment decreased by 0.4% from 2010 to 2011, payroll decreased by 0.1%, and establishments decreased by 2.2%. Average wage for the sector increased 0.3% from 2010 to 2011.

Appendix Table D2: Bioscience Employment in Ohio by Subsector, 2000-2011

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agricultural Biotechnology	9,849	9,870	9,840	10,249	10,171	9,545	9,688	9,804	10,202	10,089	9,854	10,217
Medical & Testing Laboratories	7,020	7,469	7,996	8,246	9,657	9,775	10,350	10,835	10,799	10,918	10,727	10,446
Medical Device & Equipment Manufacturers	21,286	21,897	22,080	21,339	21,407	21,672	21,599	21,608	21,872	21,926	20,788	20,808
Pharmaceuticals & Therapeutics	6,698	7,001	7,129	7,838	8,293	8,843	9,397	9,531	10,278	9,249	9,330	9,137
Research & Development	7,209	7,349	7,733	7,928	7,972	8,360	8,915	9,182	9,710	10,256	10,171	10,028
Total Bioscience in Ohio	**52,062**	**53,586**	**54,778**	**55,600**	**57,500**	**58,195**	**59,949**	**60,960**	**62,861**	**62,438**	**60,870**	**60,636**

Appendix Table D3: Bioscience Payroll in Ohio by Subsector, 2000-2011

Subsector	2000	2001	2002	2003	2004	2005	2006
Agricultural Biotechnology	803,892,148	803,420,148	790,572,428	897,137,128	869,479,885	871,644,591	865,163,225
Medical & Testing Laboratories	325,160,186	360,012,628	376,727,031	385,451,309	434,855,154	466,028,990	502,970,338
Medical Device & Equipment Manufacturers	1,271,003,031	1,300,125,882	1,309,146,289	1,346,158,425	1,374,954,321	1,345,405,746	1,459,477,327
Pharmaceuticals & Therapeutics	544,997,354	573,781,863	644,512,922	758,795,530	691,689,974	717,747,917	859,889,062
Research & Development	551,246,955	549,058,044	612,184,698	646,900,085	661,635,211	684,805,269	778,226,171
Total Bioscience in Ohio	**3,496,299,674**	**3,586,398,565**	**3,733,143,368**	**4,034,442,477**	**4,032,614,545**	**4,085,632,513**	**4,465,726,123**

Subsector	2007	2008	2009	2010	2011
Agricultural Biotechnology	925,407,219	899,069,040	865,393,681	1,023,358,410	1,086,233,536
Medical & Testing Laboratories	535,221,095	515,450,439	535,009,109	488,770,534	474,990,116
Medical Device & Equipment Manufacturers	1,418,936,611	1,467,218,947	1,514,106,388	1,393,887,335	1,420,431,908
Pharmaceuticals & Therapeutics	804,426,652	865,521,361	694,412,380	792,384,800	692,142,240
Research & Development	809,183,412	868,765,833	908,381,520	886,558,632	905,641,768
Total Bioscience in Ohio	**4,493,174,989**	**4,616,025,620**	**4,517,303,078**	**4,584,959,711**	**4,579,439,568**

Note: Data inflated to 2011 dollars.

Appendix Table D4: Bioscience Average Wages in Ohio by Subsector, 2000-2011

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agricultural Biotechnology	81,622	81,400	80,343	87,534	85,486	91,319	89,303	94,391	88,127	85,776	103,852	106,316
Medical & Testing Laboratories	46,319	48,201	47,114	46,744	45,030	47,676	48,596	49,397	47,731	49,002	45,565	45,471
Medical Device & Equipment Manufacturers	59,711	59,375	59,291	63,084	64,229	62,080	67,572	65,667	67,082	69,055	67,052	68,264
Pharmaceuticals & Therapeutics	81,367	81,957	90,407	96,810	83,406	81,166	91,507	84,401	84,211	75,080	84,929	75,752
Research & Development	76,466	74,712	79,165	81,597	82,995	81,915	87,294	88,127	89,471	88,571	87,165	90,311
Total Bioscience in Ohio	**67,156**	**66,928**	**68,150**	**72,562**	**70,132**	**70,206**	**74,492**	**73,707**	**73,432**	**72,349**	**75,324**	**75,523**

Note: Data inflated to 2011 dollars.

Appendix Table D5: Bioscience Establishments in Ohio by Subsector, 2000-2011

Subsector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agricultural Biotechnology	116	120	120	123	124	126	129	134	140	164	164	155
Medical & Testing Laboratories	338	347	421	442	464	498	558	578	602	631	641	618
Medical Device & Equipment Manufacturers	585	605	603	610	610	620	620	617	599	596	593	585
Pharmaceuticals & Therapeutics	67	66	64	70	74	77	81	84	90	91	92	88
Research & Development	196	215	219	209	215	232	253	269	280	291	293	297
Total Bioscience in Ohio	**1,302**	**1,353**	**1,427**	**1,454**	**1,487**	**1,553**	**1,641**	**1,682**	**1,711**	**1,773**	**1,783**	**1,743**

Regional Analysis

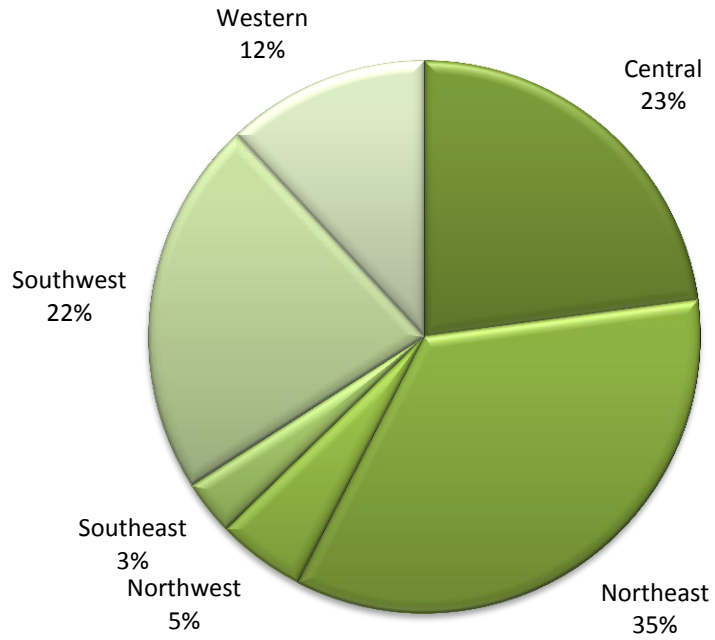
Appendix Table D6 shows bioscience employment, payroll, average wages, and number of establishments in 2011 by geographic region. The proceeding tables and figures utilize the same six regions used throughout the body of the main report (see pages 6-7 for further details).

Appendix Table D6: Bioscience Employment, Payroll, Average Wages, and Establishments by Region, 2011

Region	Employment	Payroll ($)	Average Wages ($)	Establish-ments
Central	13,877	1,065,818,587	76,805	319
Northeast	21,029	1,701,080,223	80,892	729
Northwest	3,149	172,814,387	54,879	134
Southeast	1,947	97,733,951	50,197	67
Southwest	13,406	1,127,274,904	84,087	288
Western	7,228	414,717,516	57,377	206
Total Bioscience in Ohio	**60,636**	**4,579,439,568**	**75,523**	**1,743**

Appendix Figure D2 pictorially shows the percentage of bioscience employment each region accounted for in 2011. As in preceding years, the Northeast region of Ohio represented the largest percentage of employment, followed by the Central and Southwest regions. Appendix Table D7 provides annual employment data (2000 to 2011) for each region.

Appendix Figure D2: Bioscience Employment by Region, 2011



Appendix Table D7: Bioscience Employment by Region, 2000-2011

Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Central	10,612	11,094	11,403	12,378	13,052	13,508	14,005	14,674	15,357	14,632	14,045	13,877
Northeast	20,232	20,685	21,349	20,566	20,942	21,257	21,377	21,145	21,558	21,357	20,719	21,029
Northwest	3,066	3,166	3,044	3,462	3,520	3,507	3,607	3,544	3,523	3,446	3,293	3,149
Southeast	1,428	1,358	1,354	1,315	1,288	1,278	1,382	1,560	1,685	1,720	1,700	1,947
Southwest	11,832	12,186	12,426	12,548	13,216	12,748	13,113	13,470	13,860	14,356	14,120	13,406
Western	4,892	5,097	5,202	5,331	5,482	5,897	6,465	6,567	6,878	6,927	6,993	7,228
Total	**52,062**	**53,586**	**54,778**	**55,600**	**57,500**	**58,195**	**59,949**	**60,960**	**62,861**	**62,438**	**60,870**	**60,636**

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APPENDIX E: TREND ANALYSIS OF *DISTRIBUTION* SUBSECTOR, 2000-2011

INTRODUCTION

During the preparatory phase of this report, BioOhio expressed interest in developing a sixth bioscience subsector: *Distribution*. This subsector, which includes companies whose primary business is selling, renting, and transporting bioscience products and services for consumption, introduces a set of industries not included in the original definition of Ohio's bioscience sector used in prior studies. As such, this appendix represents the initial analysis of trends in the bioscience *Distribution* subsector. Trends in total employment, payroll, average wage, and number of establishments will be briefly discussed for the time period 2000 to 2011. The primary focus of the regional trend analysis, however, will be the status of the *Distribution* subsector as of 2011.

METHODOLOGY

Creating a definition of the *Distribution* subsector began with a list of organizations identified by BioOhio as bioscience distribution companies. Using this list as a guide, three databases (Quarterly Census of Employment and Wages (QCEW), Hoover's, and LexisNexis) were utilized to gather the NAICS codes assigned to each company. These NAICS codes were then analyzed to determine which codes appeared most frequently and whether these recurrent NAICS codes were applicable to bioscience distribution industries. Coupled with a general search of the 2007 NAICS classifications, four bioscience distribution NAICS were selected as an industry definition of the *Distribution* subsector (Appendix Table E1).

Appendix Table E1: Definition of *Distribution* Subsector by NAICS Code

NAICS Code	Definition
424210	Drugs and Druggists Sundries Merchant Wholesalers
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
423460	Ophthalmic Goods Merchant Wholesalers
532291	Home Health Equipment Rental

During the process of assembling the *Distribution* data set from the QCEW database, 295 of 1,181 total establishments were found to possess invalid addresses. Typically, addresses are deemed invalid if the information is incorrect and cannot be verified from other sources, or if the address provided is for a location outside the state of Ohio. In the case of wholesale industries, many companies may not have a physical location in Ohio, but rather hire sales people across the state that report to a firm located outside Ohio. As a result, these 295 establishments could not be accurately geocoded, or assigned to one of Ohio's six geographic regions for analysis purposes. Therefore, these establishments were withdrawn from the *Distribution* data set and are not included in either the trend analysis of the subsector as a whole or by region. Instead, the 295 establishments were aggregated and their total employment, payroll, and average wage for 2011 are presented below:

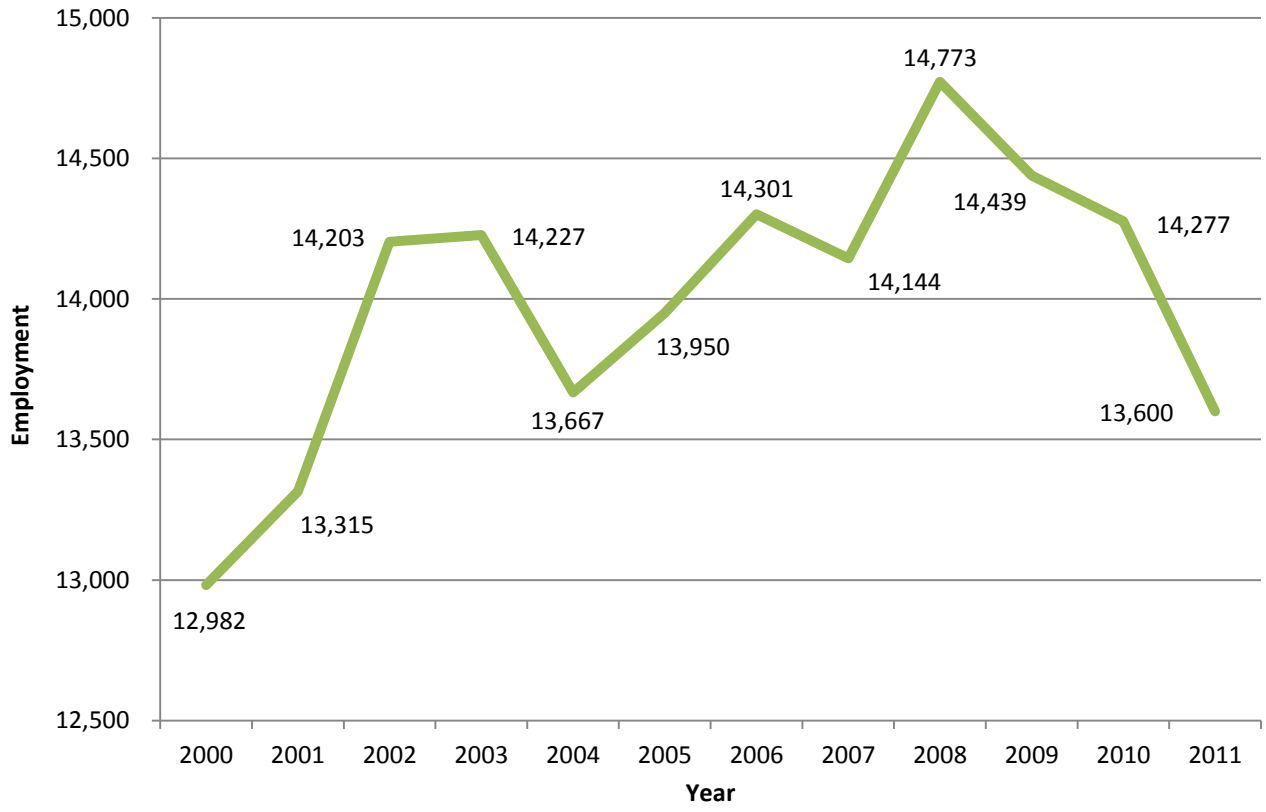
Number of establishments:	295
Employment:	2,157 jobs
Payroll:	$267,141,260
Average Wage:	$123,868

TREND ANALYSIS

Total Employment

From 2000 to 2011, total employment in the *Distribution* subsector grew 4.8% (Appendix Figure E1). The year-to-year changes in employment were sporadic; the general trend was positive from 2000 to 2008 when employment peaked at 14,773. However, employment declined annually between 2008 and 2011 for a loss of 1,173 employees (-7.9%). Despite this loss, the subsector was still bigger in 2011 than in 2000. Annual employment data for the *Distribution* subsector by region can be found in Appendix Table E2.

Appendix Figure E1: Total *Distribution* Employment in Ohio, 2000-2011



Appendix Table E2: *Distribution* Employment by Region, 2000-2011

Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Central	2,717	2,938	3,088	3,049	3,140	3,400	3,515	3,594	3,890	4,043	4,063	4,127
Northeast	4,459	4,322	4,440	4,786	4,647	4,718	4,853	5,021	4,977	4,734	4,685	4,476
Northwest	1,320	1,233	1,238	1,226	991	1,018	956	873	931	918	996	850
Southeast	233	172	207	175	219	241	273	286	271	261	273	286
Southwest	3,325	3,792	4,367	4,164	3,895	3,693	3,913	3,562	3,823	3,650	3,499	3,053
Western	928	858	863	827	775	880	791	808	881	833	761	808
State of Ohio	**12,982**	**13,315**	**14,203**	**14,227**	**13,667**	**13,950**	**14,301**	**14,144**	**14,773**	**14,439**	**14,277**	**13,600**

Total Payroll & Average Wage

To show and compare the annual changes in the *Distribution* subsector's payroll and average wage, Appendix Figure E2 uses an index in which the base value is established in 2000 and is equal to 100. The annual changes in payroll and average wage generally followed the same patterns, though the percentage changes for payroll were consistently larger in value than those for average wage. Overall, both payroll and average wage for the *Distribution* subsector increased from 2000 to 2011 (8.1% and 3.2%, respectively, after adjusting for inflation). Besides a dip in value between 2003 and 2004, payroll and average wage increased annually from 2000 to 2007 when each peaked. Since 2007, however, both measures have decreased each year (except for small increases between 2009 and 2010). Additional annual payroll and average wage data for the *Distribution* subsector can be found in Appendix Tables E3 and E4.

Appendix Figure E2: Index of *Distribution* Payroll and Average Wage, 2000-2011
(2000 = 100)

Note: Data adjusted to 2011 dollars.

Appendix Table E3: *Distribution* Payroll by Region, 2000-2011

Region	2000	2001	2002	2003	2004	2005	2006	2007
Central	202,468,530	205,695,425	228,203,273	220,014,906	215,950,557	232,912,779	245,794,464	272,415,229
Northeast	260,217,146	272,177,671	298,628,536	335,158,055	322,707,727	345,027,469	363,125,308	425,634,229
Northwest	55,899,244	50,363,253	53,263,150	52,009,806	44,427,387	42,690,712	43,266,317	41,330,668
Southeast	15,373,139	5,190,796	6,927,145	5,179,625	6,463,543	7,038,619	8,185,620	8,629,330
Southwest	228,202,673	278,298,497	308,026,264	337,524,270	304,063,316	291,755,566	305,227,231	278,064,532
Western	35,218,607	31,964,257	31,990,357	33,977,430	31,524,907	33,934,956	35,455,738	34,288,284
State of Ohio	**797,379,339**	**843,689,899**	**927,038,724**	**983,864,091**	**925,137,437**	**953,360,102**	**1,001,054,679**	**1,060,362,272**

Region	2008	2009	2010	2011
Central	276,598,536	263,552,738	270,553,575	276,187,468
Northeast	352,056,890	324,641,860	338,818,534	279,557,984
Northwest	41,216,444	43,681,966	45,749,737	39,299,112
Southeast	7,947,208	8,899,337	7,957,516	8,493,072
Southwest	286,360,605	279,818,931	277,782,344	218,366,292
Western	35,359,591	33,952,112	29,675,822	39,931,312
State of Ohio	**999,539,274**	**954,546,943**	**970,537,527**	**861,835,240**

Note: Data inflated to 2011 dollars.

Appendix Table E4: *Distribution* Average Wages by Region, 2000-2011

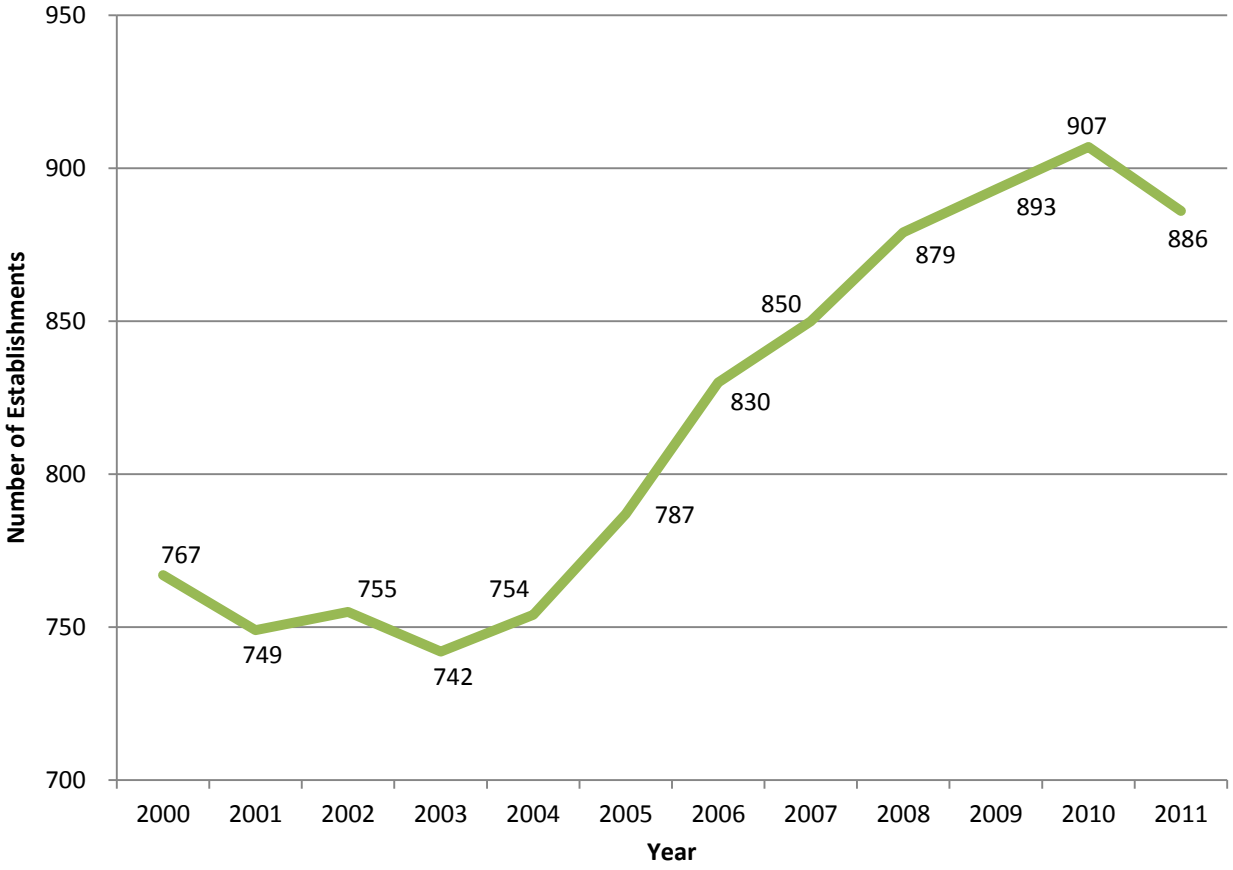
Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Central	74,519	70,012	73,900	72,160	68,774	68,504	69,927	75,797	71,105	65,187	66,590	66,922
Northeast	58,358	62,975	67,259	70,029	69,444	73,130	74,825	84,771	70,737	68,577	72,320	62,457
Northwest	42,348	40,846	43,024	42,422	44,831	41,936	45,258	47,343	44,271	47,584	45,933	46,234
Southeast	65,979	30,179	33,464	29,598	29,514	29,206	29,984	30,172	29,325	34,097	29,148	29,696
Southwest	68,632	73,391	70,535	81,058	78,065	79,002	78,003	78,064	74,905	76,663	79,389	71,525
Western	37,951	37,254	37,069	41,085	40,677	38,562	44,824	42,436	40,136	40,759	38,996	49,420
State of Ohio	**61,422**	**63,364**	**65,271**	**69,155**	**67,691**	**68,341**	**69,999**	**74,969**	**67,660**	**66,109**	**67,979**	**63,370**

Note: Data inflated to 2011 dollars.

Total Number of Establishments

The total number of establishments in the *Distribution* subsector increased 15.5% (119 establishments) from 2000 to 2011 (Appendix Figure E3). From 2000 to 2003, the number of bioscience distribution establishments was sporadic; the number of establishments alternated between increases and decreases. The trough of the establishment count during the 12-year study period was also in 2003. Starting in 2003, however, the number of *Distribution* establishments increased each year until 2011. From 2010 to 2011, the number of establishments in Ohio's *Distribution* subsector decreased by 21, or 2.3%. Additional annual establishment data for the *Distribution* subsector can be found in Appendix Table E5.

Appendix Figure E3: Total Number of *Distribution* Establishments in Ohio, 2000-2011



Appendix Table E5: Number of *Distribution* Establishments by Region, 2000-2011

Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Central	154	156	160	153	159	161	176	182	184	190	194	190
Northeast	320	314	317	316	310	329	339	345	352	361	361	355
Northwest	60	58	56	52	54	53	54	53	61	68	68	58
Southeast	25	20	22	19	25	30	31	33	36	37	38	39
Southwest	160	157	154	155	156	159	179	180	184	178	190	184
Western	48	44	46	47	50	55	51	57	62	59	56	60
State of Ohio	**767**	**749**	**755**	**742**	**754**	**787**	**830**	**850**	**879**	**893**	**907**	**886**

Regional Trends

Appendix Table E6 provides data on the bioscience *Distribution* employment, payroll, average wages, and number of establishments for each of Ohio's six geographic regions in 2011. This table also includes regional shares of each measure, except average wages, that show what percentage each region represents of the total statewide *Distribution* subsector.

Appendix Table E6: Employment, Payroll, Average Wage, Number of Establishments, and Shares of Each Measure by Region, 2011

Region	Employment		Payroll		Average Wages		Establishments	
	2011 Emp	*Regional Share*	*2011 Payroll ($)*	*Regional Share*	*2011 Avg Wage ($)*	*Regional Share*	*2011 Est*	*Regional Share*
Central	4,127	30.3%	276,187,468	32.1%	66,922	NA	190	21.4%
Northeast	4,476	32.9%	279,557,984	32.4%	62,457	NA	355	40.1%
Northwest	850	6.3%	39,299,112	4.6%	46,234	NA	58	6.5%
Southeast	286	2.1%	8,493,072	1.0%	29,696	NA	39	4.4%
Southwest	3,053	22.5%	218,366,292	25.3%	71,525	NA	184	20.8%
Western	808	5.9%	39,931,312	4.6%	49,420	NA	60	6.8%
State of Ohio	**13,600**	**100.0%**	**861,835,240**	**100.0%**	**63,370**	**NA**	**886**	**100.0%**

Notes:
Regional shares cannot be derived for average wages.
Payroll and average wage data inflated to 2011 dollars.

Each region represented a fairly consistent share of the total *Distribution* subsector across all measures in 2011. The Northeast region accounted for the largest shares of employment, payroll, and number of establishments in 2011, followed by the Central and Southwest regions, which possessed similar shares of each measure. The Southeast region accounted for the smallest shares of employment, payroll, and number of establishments. This ranking of regional shares is congruent with the rankings for the other five subsectors in Ohio's bioscience sector.