

# **Northeast Ohio High-Technology Economy Report**

**Prepared for: NorTech**

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February 10, 2011

# Introduction

- This report analyzes the technology-based economy of Northeast Ohio (NEO). It was prepared for NorTech by the Center for Economic Development at Cleveland State University's Levin College of Urban Affairs. This is an update of four previous reports that examined the high-tech sector in Northeast Ohio.
- This study shows trends of NEO's technology-based economic sector and compares it to the same sectors in the remainder of Ohio, remainder of the Midwest, and the United States.
- This study analyzes the technology-based sector of NEO's economy for the period of time from 2004 to 2009 with special highlights on the changes in the years from 2004 to 2009 and 2008 to 2009.
- The report consists of two major parts. The first part includes an analysis of employment and wages. The second part highlights findings from the analysis of gross domestic product (GDP) and productivity.

# Methodology Note

- This study uses a definition of high-tech industries established by Daniel Hecker in “High-technology employment: a NAICS-based update” published in *Monthly Labor Review*, pp.57-72, July 2005. Our definition takes into account the changes in North American Industry Classification System (NAICS) and includes 44 industries with unique 4-digit NAICS codes.
- The NEO region encompasses 21 counties (Appendix 1). The remainder of Ohio is defined as Ohio less NEO. The remainder of the Midwest is defined as an aggregation of five Midwest states other than Ohio: Illinois, Indiana, Michigan, Minnesota, and Wisconsin.
- The first part of the analysis is based on the data drawn from the Quarterly Census of Employment and Wages (QCEW). The second part of the analysis uses Moody’s Economy.com database. Throughout the analysis, we emphasize NEO industries with a higher than the average in the U.S. concentration of employment and GDP (also called economic base industries or export industries).
- Additional technical note on data is included in Appendix 2.

# Analysis of Employment and Wages

## Table 1. Employment in All Industries and High-Tech Industries in NEO and the U.S., 2004-2009

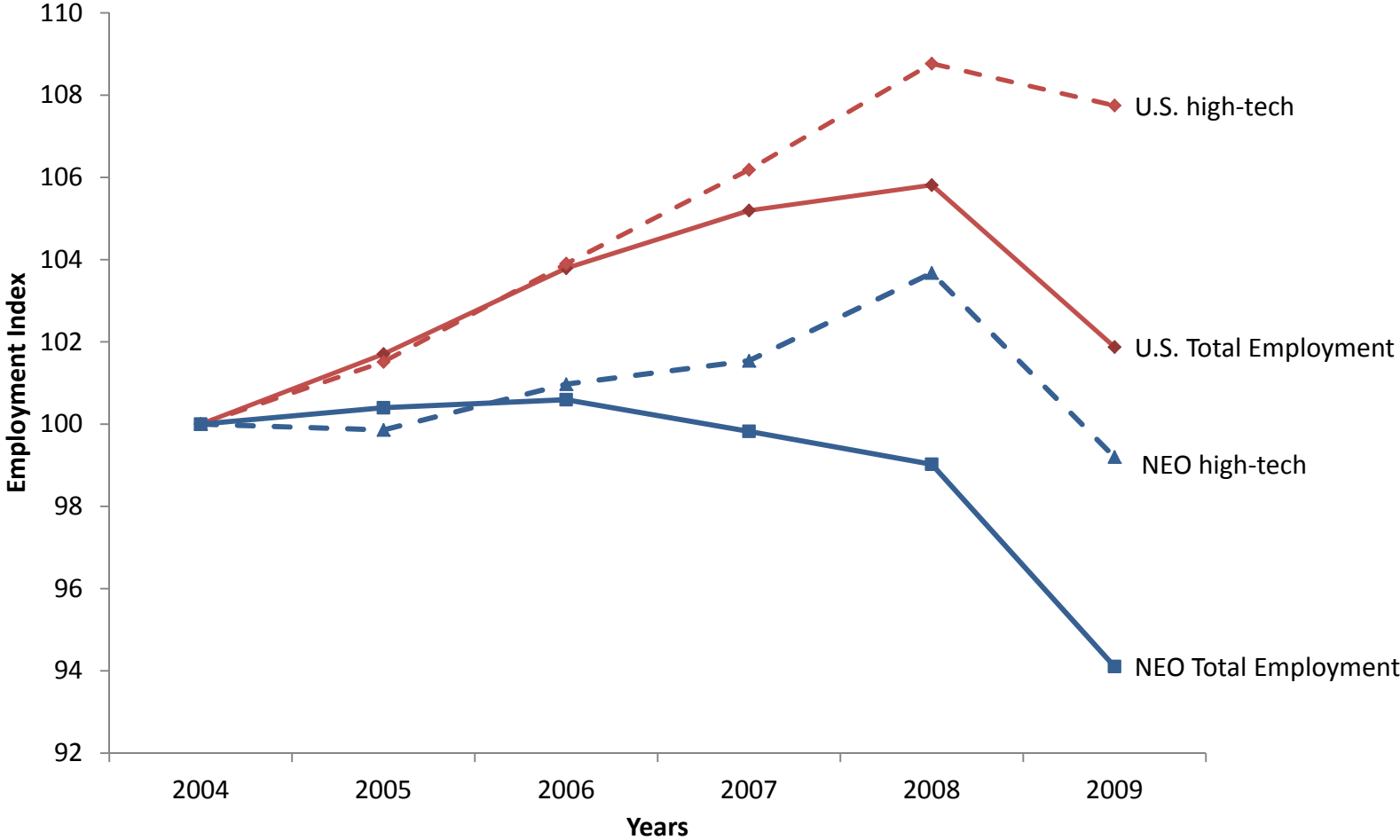
	2004	2005	2006	2007	2008	2009
<b>U.S. all industries</b>	126,730,069	128,889,163	131,534,435	133,311,681	134,097,038	129,107,064
<b>U.S. high-tech</b>	12,057,007	12,239,453	12,527,484	12,802,735	13,114,147	12,991,032
<b>NEO all industries</b>	2,003,754	2,011,749	2,015,648	2,000,223	1,984,188	1,885,620
<b>NEO high-tech</b>	169,608	169,367	171,255	172,220	175,842	168,250

Source: Quarterly Census of Employment and Wages

- NEO employment in high-tech industries grew by 3.8%, between 2005 and 2008 reaching its highest point in 2008; employment in high-tech industries declined by 4.3% between 2008 and 2009 (Table 1).
  - One-half of employment losses in 2008-2009 occurred in four industries: Management of Companies (-1,400), Architectural and Engineering (-940), Other General Purpose Machinery Manufacturing (-800), and Management, Scientific, and Technical Consulting Services (-680).
- US employment in high-tech industries has the dynamics similar to NEO. It grew in period from 2004 to 2008 and declined in 2008 to 2009 (-1%).
- NEO's employment in all industries reached its highest point in 2006 and declined thereafter.
- U.S. total employment grew between 2004 and 2008 and declined in 2008-2009 as well.

# Figure 1. Employment in All Industries and High-Tech Industries, 2004-2009

## Index, 2004=100



Source: Quarterly Census of Employment and Wages

## Table 2. Employment in High-Tech Industries and All Industries in NEO and Benchmark Regions, 2004-2009

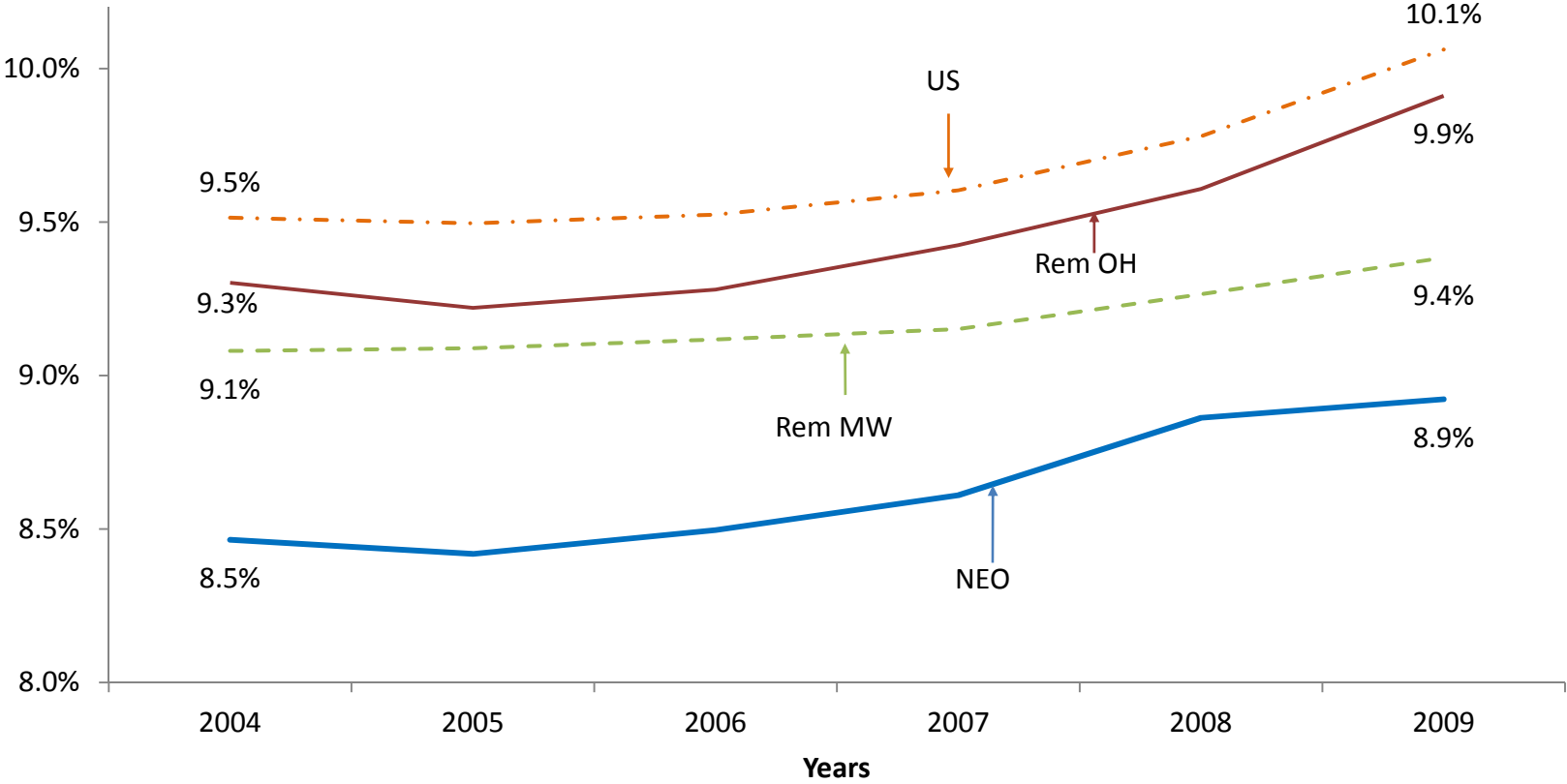
Geography	2004	2005	2006	2007	2008	2009	2004-2009	2008-2009
<b>Northeast Ohio</b>								
NEO high-tech	169,608	169,367	171,255	172,220	175,842	168,250	-0.8%	-4.3%
NEO non-high-tech	1,834,146	1,842,381	1,844,393	1,828,003	1,808,347	1,717,370	-6.4%	-5.0%
NEO all industries	2,003,754	2,011,749	2,015,648	2,000,223	1,984,188	1,885,620	-5.9%	-5.0%
<b>Remainder of Ohio</b>								
Remainder of Ohio high-tech	294,996	293,517	298,148	302,653	307,717	303,576	2.9%	-1.3%
Remainder of Ohio non-high-tech	2,876,261	2,889,748	2,914,683	2,908,527	2,895,057	2,759,424	-4.1%	-4.7%
Remainder of Ohio all industries	3,171,257	3,183,265	3,212,831	3,211,180	3,202,774	3,063,000	-3.4%	-4.4%
<b>Remainder of Midwest</b>								
Remainder of Midwest high-tech	1,898,577	1,913,646	1,937,973	1,946,440	1,968,650	1,902,595	0.2%	-3.4%
Remainder of Midwest non-high-tech	19,010,553	19,140,784	19,317,200	19,323,092	19,279,632	18,372,652	-3.4%	-4.7%
Remainder of Midwest All industries	20,909,130	21,054,430	21,255,173	21,269,531	21,248,283	20,275,247	-3.0%	-4.6%
<b>United States</b>								
U.S. high-tech	12,057,007	12,239,453	12,527,484	12,802,735	13,114,147	12,991,032	7.7%	-0.9%
U.S. non-high-tech	114,673,062	116,649,710	119,006,951	120,508,945	120,982,892	116,116,033	1.3%	-4.0%
U.S. all industries	126,730,069	128,889,163	131,534,435	133,311,681	134,097,038	129,107,064	1.9%	-3.7%

Source: Quarterly Census of Employment and Wages

## Employment in High-Tech Industries in NEO and Benchmark Regions, 2004-2009

- Over the period studied, NEO employment in high-tech industries declined by 0.8 % as a result of the great losses in 2008-2009 (-4.3%) (Table 2).
- The remainder of Ohio performed better than NEO. Employment in high-tech industries grew 2.9% in the 5-year period from 2004 to 2009. The decline was only -1.3% in 2008-2009.
- Employment in high-tech industries in the remainder of the Midwest showed a modest growth of 0.2% for the period studied. It declined by -3.4% in the period from 2008 to 2009.
- U.S. high-tech industries performed better than the Midwest: it grew 7.7% from 2004 to 2009, even after a decline of -0.9% in 2008-2009.

# Figure 2. Share of Employment in High-Tech Industries: NEO, Remainder of Ohio, Remainder of Midwest, and the U.S., 2004-2009



Source: Quarterly Census of Employment and Wages

## **Share of Employment in High-Tech Industries: NEO, Remainder of Ohio, Remainder of Midwest, and the U.S., 2004-2009**

- Share of employment in high-tech industries in NEO has increased (8.9%) , but it is still lagging all benchmark regions (Figure 2).
- NEO's large decline of employment in high-tech industries in 2008-2009 slowed down the growing trend of previous years.
- The remainder of Ohio has a share of employment in high-tech industries similar to that of the U.S. (9.9% compared to 10.1%, respectively).

## Table 3. NEO's High-Tech Base Industries (High-Tech Industries with Employment LQ ≥ 1)

Rank	NAICS	Industry Description	2009		Emp LQ 2004			Emp LQ 2009			Emp Change, %, 2004-2009				Emp Change, %, 2008-2009			
			NEO Emp	Rem OH Emp	NEO	Rem OH	Rem MW	NEO	Rem OH	Rem MW	NEO	Rem OH	Rem MW	US	NEO	Rem OH	Rem MW	US
1	3255	Paint, Coating, and Adhesive Manufacturing	4,338	2,380	4.4	1.7	1.6	<b>5.1</b>	1.7	1.7	-9.8%	-16.7%	-16.2%	-15.6%	-7.5%	-7.7%	-7.7%	-7.4%
2	3339	Other General Purpose Machinery Manufacturing	10,966	11,909	2.7	1.8	1.9	<b>3.0</b>	2.0	1.9	-2.6%	-1.2%	-6.8%	-3.4%	-6.8%	-8.3%	-8.9%	-7.4%
3	3353	Electrical Equipment Manufacturing	5,227	3,796	2.0	1.3	1.7	<b>2.4</b>	1.1	1.7	9.0%	-22.3%	-10.2%	-0.7%	0.8%	-11.5%	-6.5%	-3.4%
4	3259	Other Chemical Product and Preparation Manufacturing	2,654	2,549	1.9	1.1	1.1	<b>2.1</b>	1.2	1.2	-16.6%	-11.0%	-13.2%	-18.1%	-13.4%	-7.7%	-11.6%	-8.7%
5	3332	Industrial Machinery Manufacturing	3,287	5,831	1.8	2.0	1.6	<b>2.1</b>	2.2	1.8	-2.0%	-3.9%	-3.6%	-9.4%	-9.7%	-8.6%	-9.7%	-10.8%
6	3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	2,837	2,694	1.9	1.0	0.7	<b>2.0</b>	1.2	1.0	-14.5%	-2.1%	15.6%	-11.6%	-14.8%	-3.5%	-4.1%	-8.5%
7	3251	Basic Chemical Manufacturing	4,313	6,092	2.0	1.6	0.8	<b>2.0</b>	1.7	0.9	-10.8%	-4.8%	2.9%	-5.0%	-4.6%	-3.6%	1.2%	-1.7%
8	5511	Management of Companies and Enterprises	40,929	68,487	1.6	1.6	1.3	<b>1.5</b>	1.5	1.2	-2.2%	0.5%	3.0%	11.7%	-3.3%	-1.3%	-0.8%	-0.3%
9	3333	Commercial and Service Industry Machinery Manufacturing	1,484	1,859	1.2	1.1	1.3	<b>1.0</b>	0.8	1.3	-32.1%	-39.5%	-16.5%	-13.7%	-13.8%	-8.3%	-7.5%	-7.3%

Note: The location quotient (LQ) is the calculated ratio between the local economy and the economy of some reference unit – in our case the national economy. A location quotient greater than one suggests that there is a concentration of an industry in the region, while a location quotient less than one suggests an industry is not concentrated in the region. The concentration of an industry in the region suggests that the industry is a part of the economic base of the region and that the industry is an exporter.

This table is ranked by NEO High-Tech Employment LQ, 2009. One industry with LQ>1 is suppressed (Appendix 2).

Source: Quarterly Census of Employment and Wages

## **NEO's High-Tech Base Industries (High-Tech Industries with Employment LQ $\geq 1$ )**

- Ten high-tech industries in NEO have a location quotient greater than 1 (Table 3). These industries are likely to be export industries that sell their products outside of the region. One industry in Table 3 is not included due to the suppression of data.
- All ten industries lost employment in 2008-2009 in NEO, except Electric Equipment Manufacturing (NAICS 3353).
- Eight of the ten high-tech base industries in NEO are manufacturing.
- Eight of the ten industries (including one that is suppressed) high-tech base industries in NEO increased their LQ from 2004 to 2009.

## NEO's High-Tech Base Industries in Benchmark Regions

- All NEO high-tech base industries in the remainder of Ohio lost employment over the study period and decreased their location quotients (Table 3).
- Of these industries in the remainder of the Midwest, two industries performed well:
  - Resin, Synthetic Rubber, and Artificial Synthetic Fiber (NAICS 3252)
  - Basic Chemical Manufacturing (NAICS 3251)
- However, these two industries are not part of the remainder of the Midwest economic base (LQ=1).

## Table 4. Remainder of Ohio's High-Tech Base Industries (High-Tech Industries with Employment LQ $\geq 1$ )

Rank	NAICS	Industry Description	2009		Emp LQ 2004			Emp LQ 2009			Emp Change, %, 2004-2009				Emp Change, %, 2008-2009			
			NEO Emp	Rem OH Emp	NEO	Rem OH	Rem MW	NEO	Rem OH	Rem MW	NEO	Rem OH	Rem MW	US	NEO	Rem OH	Rem MW	US
1	3369	Other Transportation Equipment Manufacturing	89	2,869	0.3	1.9	2.3	0.2	<b>3.1</b>	2.1	-48.2%	62.5%	-7.5%	6.1%	-20.6%	8.7%	-3.1%	-3.2%
2	3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	104	2,150	0.9	1.7	0.9	0.2	<b>2.5</b>	1.1	-83.2%	18.4%	1.0%	-13.1%	-57.9%	12.3%	3.6%	0.2%
3	3332	Industrial Machinery Manufacturing	3,287	5,831	1.8	2.0	1.6	2.1	<b>2.2</b>	1.8	-2.0%	-3.9%	-3.6%	-9.4%	-9.7%	-8.6%	-9.7%	-10.8%
4	3339	Other General Purpose Machinery Manufacturing	10,966	11,909	2.7	1.8	1.9	3.0	<b>2.0</b>	1.9	-2.6%	-1.2%	-6.8%	-3.4%	-6.8%	-8.3%	-8.9%	-7.4%
5	3255	Paint, Coating, and Adhesive Manufacturing	4,338	2,380	4.4	1.7	1.6	5.1	<b>1.7</b>	1.7	-9.8%	-16.7%	-16.2%	-15.6%	-7.5%	-7.7%	-7.7%	-7.4%
6	3251	Basic Chemical Manufacturing	4,313	6,092	2.0	1.6	0.8	2.0	<b>1.7</b>	0.9	-10.8%	-4.8%	2.9%	-5.0%	-4.6%	-3.6%	1.2%	-1.7%
7	5511	Management of Companies and Enterprises	40,929	68,487	1.6	1.6	1.3	1.5	<b>1.5</b>	1.2	-2.2%	0.5%	3.0%	11.7%	-3.3%	-1.3%	-0.8%	-0.3%
8	3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	1,350	2,932	0.9	1.5	2.5	0.9	<b>1.2</b>	2.4	0.3%	-13.4%	-1.3%	11.1%	-5.5%	-10.9%	-4.7%	-1.6%
9	3259	Other Chemical Product and Preparation Manufacturing	2,654	2,549	1.9	1.1	1.1	2.1	<b>1.2</b>	1.2	-16.6%	-11.0%	-13.2%	-18.1%	-13.4%	-7.7%	-11.6%	-8.7%
10	3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	2,837	2,694	1.9	1.0	0.7	2.0	<b>1.2</b>	1.0	-14.5%	-2.1%	15.6%	-11.6%	-14.8%	-3.5%	-4.1%	-8.5%
11	5415	Computer Systems Design and Related Services	14,400	37,967	0.6	1.2	0.9	0.7	<b>1.1</b>	0.9	29.5%	17.3%	17.4%	27.9%	0.0%	2.1%	-2.2%	0.4%
12	4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	8,679	15,785	0.9	1.0	1.0	0.9	<b>1.1</b>	1.0	-7.5%	3.0%	-1.1%	-0.9%	-4.0%	0.5%	-3.2%	-3.7%
13	3353	Electrical Equipment Manufacturing	5,227	3,796	2.0	1.3	1.7	2.4	<b>1.1</b>	1.7	9.0%	-22.3%	-10.2%	-0.7%	0.8%	-11.5%	-6.5%	-3.4%
14	3364	Aerospace Product and Parts Manufacturing	4,015	12,706	0.5	0.9	0.3	0.5	<b>1.0</b>	0.3	14.3%	24.6%	15.5%	17.1%	2.1%	-1.5%	-1.4%	1.3%
15	2211	Electric Power Generation, Transmission and Distribution	5,859	12,342	0.7	0.9	1.0	0.8	<b>1.0</b>	1.0	4.9%	6.4%	2.5%	-0.2%	0.4%	0.5%	2.0%	1.5%
16	3241	Petroleum and Coal Products Manufacturing	1,252	2,777	0.7	1.0	0.8	0.8	<b>1.0</b>	0.9	3.4%	3.0%	0.0%	3.7%	-3.7%	4.0%	1.6%	-0.2%

Note: This table is ranked by 2009 employment LQ for the Remainder of Ohio.

Source: Quarterly Census of Employment and Wages

## **Remainder of Ohio's High-Tech Base Industries (High-Tech Industries with Employment LQ > 1)**

- Most of the high-tech base industries in the remainder of Ohio increased their employment LQ from 2004 to 2009 (Table 4).
- Out of 16 high-tech base industries:
  - Six industries grew in the period from 2004 to 2009, including the last year
  - Another two industries grew between 2004 and 2009 even though they declined in 2008-2009
  - Three industries (with LQ=1) increased employment in the period from 2004 to 2009 and may become a part of the emerging remainder of Ohio's high-tech base:
    - NAICS 3364 – Aerospace Product and Parts Manufacturing
    - NAICS 2211 – Electric Power Generation
    - NAICS 3241 – Petroleum and Coal Products Manufacturing

# Table 5. Growing High-Tech Industries in NEO: 2004-2009

Rank	NAICS	Industry Description	2009		Emp LQ 2009			Emp Change, 2004-2009					Emp Change, %, 2008-2009			
			NEO Emp	Rem OH Emp	NEO	Rem OH	Rem MW	NEO	NEO, %	Rem OH, %	Rem MW, %	US	NEO	Rem OH	Rem MW	US
1	3254	Pharmaceutical and Medicine Manufacturing	1,484	3,655	0.4	0.5	1.2	N.A.	N.A	N.A	N.A	-0.1%	4.8%	1.7%	-3.4%	-1.7%
2	5417	Scientific Research and Development Services	3,733	12,260	0.4	0.8	0.8	940	<b>33.7%</b>	12.1%	-5.4%	12.2%	0.4%	3.8%	-1.3%	1.0%
3	5415	Computer Systems Design and Related Services	14,400	37,967	0.7	1.1	0.9	3,281	<b>29.5%</b>	17.3%	17.4%	27.9%	0.0%	2.1%	-2.2%	0.4%
4	5191	Other Information Services	570	4,358	0.2	0.8	0.3	103	<b>22.0%</b>	-12.3%	21.3%	237.5%	-14.0%	-10.1%	-3.4%	128.4%
5	2111	Oil and Gas Extraction	489	2,166	0.2	0.6	0.1	81	<b>19.9%</b>	2.4%	5.4%	34.8%	3.2%	3.4%	3.4%	5.1%
6	3364	Aerospace Product and Parts Manufacturing	4,015	12,706	0.5	1.0	0.3	504	<b>14.3%</b>	24.6%	15.5%	17.1%	2.1%	-1.5%	-1.4%	1.3%
7	5612	Facilities Support Services	1,731	1,543	0.9	0.5	0.4	183	<b>11.8%</b>	42.9%	24.0%	16.5%	-11.3%	27.1%	-6.4%	-2.9%
8	5416	Management, Scientific, and Technical Consulting Services	8,221	14,851	0.6	0.6	0.8	810	<b>10.9%</b>	24.4%	22.8%	36.2%	-7.6%	0.1%	0.7%	0.5%
9	3353	Electrical Equipment Manufacturing	5,227	3,796	2.4	1.1	1.7	430	<b>9.0%</b>	-22.3%	-10.2%	-0.7%	0.8%	-11.5%	-6.5%	-3.4%
10	5182	Data Processing, Hosting, and Related Services	2,132	2,870	0.6	0.5	0.8	113	<b>5.6%</b>	-19.7%	-10.9%	-4.3%	-1.2%	-3.1%	-3.7%	-3.7%
11	2211	Electric Power Generation, Transmission and Distribution	5,859	12,342	0.8	1.0	1.0	272	<b>4.9%</b>	6.4%	2.5%	-0.2%	0.4%	0.5%	2.0%	1.5%
12	3241	Petroleum and Coal Products Manufacturing	1,252	2,777	0.8	1.0	0.9	41	<b>3.4%</b>	3.0%	0.0%	3.7%	-3.7%	4.0%	1.6%	-0.2%
13	3341	Computer and Peripheral Equipment Manufacturing	472	1,052	0.2	0.3	0.7	11	<b>2.3%</b>	-12.9%	-18.6%	-17.0%	-1.4%	-2.4%	-6.3%	-3.7%
14	3344	Semiconductor and Other Electronic Component Manufacturing	2,590	4,045	0.4	0.4	0.7	47	<b>1.9%</b>	-9.2%	-6.8%	-9.9%	-8.1%	-0.5%	-9.5%	-8.3%
15	3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	1,350	2,932	0.9	1.2	2.4	4	<b>0.3%</b>	-13.4%	-1.3%	11.1%	-5.5%	-10.9%	-4.7%	-1.6%

Note: This table is ranked by NEO 2004-2009 employment change.

Four industries are suppressed (Appendix 2). The 2004 data for Pharmaceutical and Medicine Manufacturing industry are suppressed and marked as N/A in the table.

Source: Quarterly Census of Employment and Wages

## Growing High-Tech Industries in NEO: 2004-2009

- Out of 42 NEO high-tech industries, 19 increased their employment between 2004 and 2009 (4 industries are omitted in the Table 5 due to data suppression). Of these 19 industries, 7 industries continued to grow from 2008 to 2009 (Table 5).
- Employment gains in the growing industries totaled more than 7,000 jobs.
- Only two growing NEO high-tech industries are a part of NEO's economic base (have  $LQ > 1$ ): Electrical Equipment Manufacturing (NAICS 3353) and Monetary Authorities-Central Bank (NAICS 5211) (data on this industry are suppressed).
- Scientific Research and Development Services industries (NAICS 5417) showed the second highest growth of high-tech industries studied; however, only about half of its growth can be attributed to an increase in R&D operation (the other half is due to changes in data reporting by several large companies in this sector).

## Table 6. Growing High-Tech Industries in NEO: 2008-2009

Rank	NAICS	Industry Description	2009		Emp LQ 2009			Emp Change, %, 2004-2009				Emp Change, 2008-2009				
			NEO Emp	Rem OH Emp	NEO	Rem OH	Rem MW	NEO	Rem OH	Rem MW	US	NEO	NEO, %	Rem OH, %	Rem MW, %	US, %
1	3254	Pharmaceutical and Medicine Manufacturing	1,484	3,655	0.4	0.5	1.2	N.A.	N.A.	N.A.	-0.1%	68	<b>4.8%</b>	1.7%	-3.4%	-1.7%
2	2111	Oil and Gas Extraction	489	2,166	0.2	0.6	0.1	19.9%	2.4%	5.4%	34.8%	15	<b>3.2%</b>	3.4%	3.4%	5.1%
3	3364	Aerospace Product and Parts Manufacturing	4,015	12,706	0.5	1.0	0.3	14.3%	24.6%	15.5%	17.1%	84	<b>2.1%</b>	-1.5%	-1.4%	1.3%
4	3353	Electrical Equipment Manufacturing	5,227	3,796	2.4	1.1	1.7	9.0%	-22.3%	-10.2%	-0.7%	42	<b>0.8%</b>	-11.5%	-6.5%	-3.4%
5	2211	Electric Power Generation, Transmission and Distribution	5,859	12,342	0.8	1.0	1.0	4.9%	6.4%	2.5%	-0.2%	23	<b>0.4%</b>	0.5%	2.0%	1.5%
6	5417	Scientific Research and Development Services	3,733	12,260	0.4	0.8	0.8	33.7%	12.1%	-5.4%	12.2%	14	<b>0.4%</b>	3.8%	-1.3%	1.0%

Note: This table is ranked by the rate of change of NEO's employment of high-tech industries, 2008-2009.

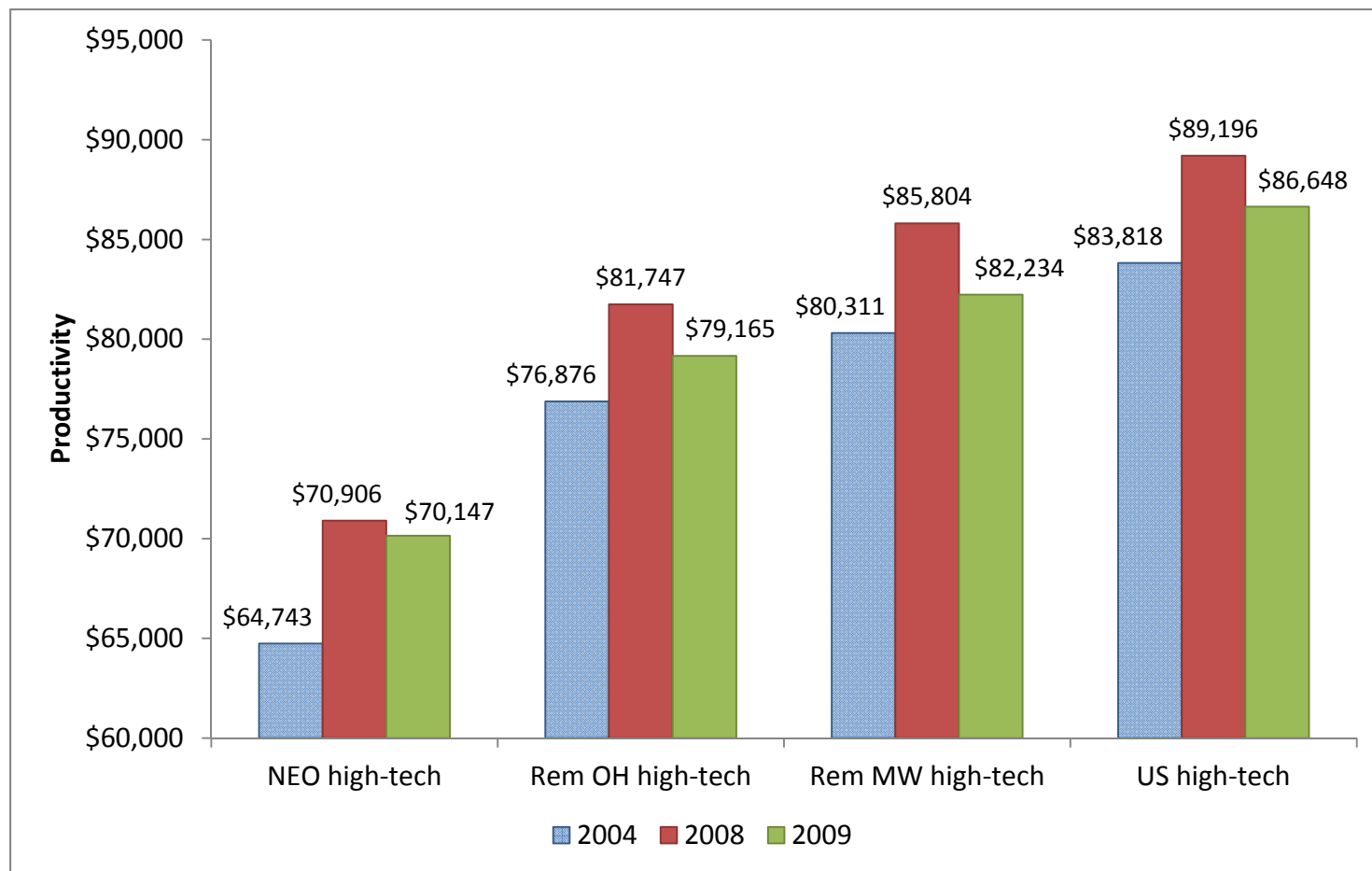
Four industries are suppressed (Appendix 2).

Source: Quarterly Census of Employment and Wages

## **Growing High-Tech Industries in NEO: 2008-2009**

- A total of ten high-tech industries added employment in the period from 2008 to 2009. However, four of ten industries had fewer than 500 employees each and these industries are not included in Table 6 (the data for these industries are suppressed).
- Pharmaceutical (NAICS 3254) had the highest rate of growth in NEO in the period from 2004 to 2009 (40.4%). It also had the highest rate of growth from 2008 to 2009 (4.8%), adding 68 employees.

# Figure 3. Average Wages in High-Tech: NEO, Remainder of Ohio, Remainder of Midwest, and the U.S., 2004-2009



Source: Quarterly Census of Employment and Wages

## Table 7. Average Annual Wages in NEO and Benchmark Regions, 2004-2009

Geography	2004	2005	2006	2007	2008	2009	2004-2009	2008-2009
<b>Northeast Ohio</b>								
NEO high-tech	\$64,743	\$67,056	\$71,317	\$73,060	\$70,906	\$70,147	8.3%	-1.1%
NEO non-high-tech	\$36,785	\$36,028	\$37,264	\$38,354	\$36,721	\$36,831	0.1%	0.3%
NEO all industries	\$39,151	\$38,640	\$40,157	\$41,342	\$39,751	\$39,804	1.7%	0.1%
<b>Remainder of Ohio</b>								
Remainder of Ohio high-tech	\$76,876	\$77,887	\$81,883	\$83,911	\$81,747	\$79,165	3.0%	-3.2%
Remainder of Ohio non-high-tech	\$37,144	\$36,603	\$37,956	\$38,913	\$37,969	\$37,713	1.5%	-0.7%
Remainder of Ohio all industries	\$40,840	\$40,410	\$42,032	\$43,154	\$42,175	\$41,821	2.4%	-0.8%
<b>Remainder of Midwest</b>								
Remainder of Midwest high-tech	\$80,311	\$80,632	\$83,570	\$85,831	\$85,804	\$82,234	2.4%	-4.2%
Remainder of Midwest non-high-tech	\$39,684	\$38,966	\$40,686	\$41,221	\$40,469	\$39,781	0.2%	-1.7%
Remainder of Midwest All industries	\$43,373	\$42,753	\$44,596	\$45,304	\$44,669	\$43,765	0.9%	-2.0%
<b>United States</b>								
U.S. high-tech	\$83,818	\$83,542	\$89,078	\$90,424	\$89,196	\$86,648	3.4%	-2.9%
U.S. non-high-tech	\$40,669	\$40,147	\$42,132	\$43,022	\$42,303	\$41,289	1.5%	-2.4%
U.S. all industries	\$44,774	\$44,268	\$46,603	\$47,574	\$46,889	\$45,853	2.4%	-2.2%

Note: All data are inflated to 2009 dollars.

Source: Quarterly Census of Employment and Wages

## **Average Wages in High-Tech: NEO, Remainder of Ohio, Remainder of Midwest, and U.S., 2004-2009**

- Average annual wage (AAW) in NEO's high-tech industries was \$70,147 in 2009 (Table 7).
- NEO experienced the highest growth of AAW from 2004 to 2009 (8.3%) compared to all benchmark regions.
  - AAW in NEO's non high-tech industries was almost flat, growing by only 0.1%
- AAW in NEO's high-tech industries are still significantly lower than in the benchmark areas.
- All regions showed declining AAW in the period from 2008 to 2009.
- NEO lost only 1.1% in AAW during 2008 to 2009, while the benchmark regions lost about 3 times more.

# Analysis of GDP and Productivity

**Table 8. GDP for NEO and Benchmark Regions, 2004-2009  
(In Thousands of 2009 Dollars)**

Geography	2004	2005	2006	2007	2008	2009	2004-2009	2008-2009
<b>Northeast Ohio</b>								
NEO high-tech	\$25,165,149	\$25,825,970	\$26,351,762	\$27,861,052	\$28,398,154	\$28,189,254	12.0%	-0.7%
NEO non-high-tech	\$156,635,756	\$155,970,928	\$155,304,568	\$153,532,525	\$149,270,446	\$149,165,419	-4.8%	-0.1%
NEO all industries	\$181,800,905	\$181,796,898	\$181,656,330	\$181,393,577	\$177,668,600	\$177,354,673	-2.4%	-0.2%
<b>Remainder of Ohio</b>								
Remainder of Ohio high-tech	\$45,635,535	\$47,261,254	\$48,764,612	\$50,502,421	\$52,205,799	\$52,937,830	16.0%	1.4%
Remainder of Ohio non-high-tech	\$246,044,624	\$246,191,665	\$244,608,095	\$244,454,620	\$238,605,178	\$237,374,849	-3.5%	-0.5%
Remainder of Ohio all industries	\$291,680,159	\$293,452,919	\$293,372,706	\$294,957,041	\$290,810,977	\$290,312,679	-0.5%	-0.2%
<b>Remainder of Midwest</b>								
Remainder of Midwest high-tech	\$336,974,025	\$337,450,960	\$347,728,368	\$363,283,457	\$371,245,213	\$371,594,900	10.3%	0.1%
Remainder of Midwest non-high-tech	\$1,692,479,506	\$1,694,633,556	\$1,712,116,510	\$1,715,975,667	\$1,682,550,362	\$1,674,749,036	-1.0%	-0.5%
Remainder of Midwest All industries	\$2,029,453,531	\$2,032,084,516	\$2,059,844,879	\$2,079,259,124	\$2,053,795,574	\$2,046,343,937	0.8%	-0.4%
<b>United States</b>								
U.S. high-tech	\$2,408,403,265	\$2,499,696,616	\$2,592,007,229	\$2,716,381,350	\$2,777,918,214	\$2,763,948,287	14.8%	-0.5%
U.S. non-high-tech	\$10,774,438,948	\$11,054,600,648	\$11,338,792,056	\$11,474,740,731	\$11,336,623,818	\$11,378,547,606	5.6%	0.4%
U.S. all industries	\$13,182,842,213	\$13,554,297,264	\$13,930,799,285	\$14,191,122,081	\$14,114,542,032	\$14,142,495,893	7.3%	0.2%

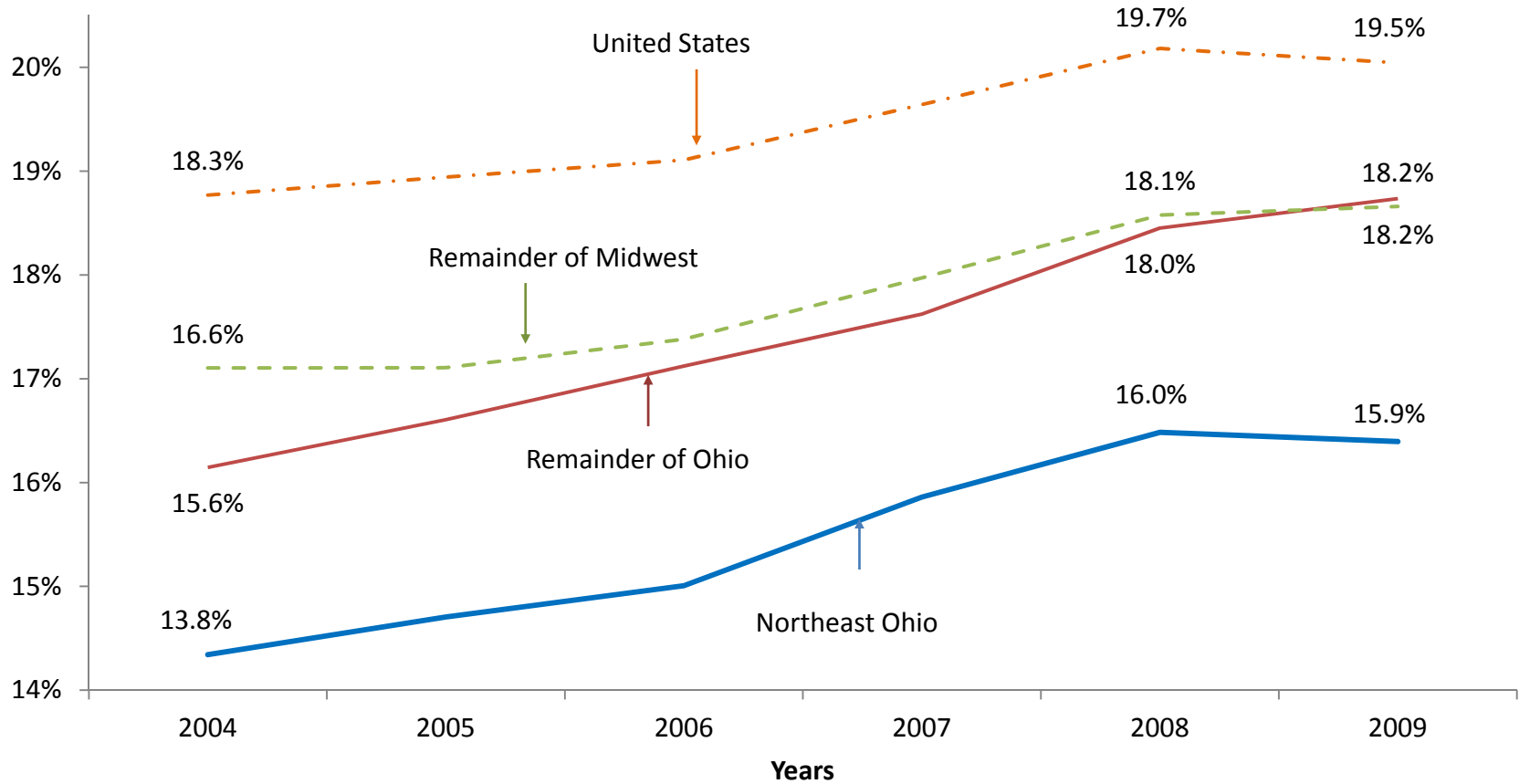
Note: All data are inflated to 2009 dollars.

Source: Moody's Economy.com

## **GDP for NEO and Benchmark Regions, 2004-2009**

- NEO high-tech sector accounts for 34.7% of Ohio's high-tech GDP in 2009 (Table 8).
- NEO high-tech industries account for 15.9% of total NEO GDP.
- NEO high-tech sector's GDP grew while the GDP for the rest of the regional economy declined.
- NEO high-tech GDP grew by 12% between 2004 and 2009, faster than the remainder of the Midwest (10.3%), but lagging the remainder of Ohio (16%) and the U.S. (14.8%).

# Figure 4. Share of High-Tech GDP in Total GDP: NEO, Remainder of Ohio, Remainder of Midwest, and the U.S., 2004-2009



Note: All data are inflated to 2009 dollars.  
 Source: Moody's Economy.com

## Share of High-Tech GDP in Total GDP: NEO, Remainder of Ohio, Remainder of Midwest, and U.S., 2004-2009

- Although the GDP of NEO's high-tech sector is growing, the region's share of high-tech in total GDP (15.9%) still lags the benchmark regions (Figure 4).
- The remainder of Ohio and the remainder of the Midwest increased their high-tech GDP shares between 2008 and 2009, while the shares in NEO and US declined slightly.

## Table 9. NEO High-Tech Base Industries (High-Tech Industries with GDP LQ ≥ 1)

Rank	NAICS	Industry Description	2009		GDP LQ 2004			GDP LQ 2009			% GDP Change, 2004-2009				% GDP Change, 2008-2009			
			NEO Emp	Rem OH Emp	NEO	Rem OH	Rem MW	NEO	Rem OH	Rem MW	NEO	Rem OH	Rem MW	US	NEO	Rem OH	Rem MW	US
1	3255	Paint, Coating, and Adhesive Manufacturing	4,338	2,380	4.2	2.1	1.7	<b>3.7</b>	1.9	1.6	-25.9%	-20.7%	-16.6%	-8.2%	-7.9%	-3.9%	-6.3%	-5.2%
2	3353	Electrical Equipment Manufacturing	5,227	3,796	3.4	1.5	1.9	<b>3.5</b>	1.0	1.9	12.4%	-24.5%	12.8%	19.9%	-7.4%	-16.6%	-5.6%	-5.7%
3	3339	Other General Purpose Machinery Manufacturing	10,966	11,909	2.7	1.7	2.0	<b>2.8</b>	1.7	2.1	5.3%	0.3%	8.5%	8.8%	-7.7%	-9.5%	-4.4%	-5.2%
4	3369	Other Transportation Equipment Manufacturing	89	2,869	1.7	1.5	2.5	<b>2.3</b>	3.0	2.2	29.9%	94.0%	-16.3%	4.9%	14.1%	28.4%	12.0%	10.1%
5	3332	Industrial Machinery Manufacturing	3,287	5,831	1.8	2.1	1.6	<b>1.8</b>	2.1	1.9	-10.7%	-10.5%	1.4%	-6.4%	-4.4%	-5.9%	-1.7%	-5.6%
6	3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	2,837	2,694	1.8	0.9	0.9	<b>1.8</b>	1.0	0.9	-8.4%	13.6%	1.0%	3.4%	-9.2%	-4.7%	-0.7%	-4.1%
7	3251	Basic Chemical Manufacturing	4,313	6,092	1.8	1.3	0.7	<b>1.6</b>	1.2	0.7	-9.9%	-4.9%	6.5%	16.1%	-7.5%	-2.7%	-2.5%	-4.0%
8	5511	Management of Companies and Enterprises	40,929	68,487	1.3	1.6	1.4	<b>1.5</b>	1.9	1.4	26.9%	24.0%	12.1%	16.0%	-3.4%	-0.5%	-1.0%	-2.0%
9	3259	Other Chemical Product and Preparation Manufacturing	2,654	2,549	1.8	1.7	1.2	<b>1.5</b>	1.2	1.1	-27.3%	-40.4%	-14.2%	-6.0%	-16.5%	-12.1%	-8.5%	-4.7%
10	3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	104	2,150	1.3	1.3	1.1	<b>1.3</b>	1.4	1.1	-6.8%	0.4%	-5.5%	-2.3%	8.2%	14.8%	0.4%	-4.0%
11	4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	8,679	15,785	0.9	0.9	1.0	<b>1.2</b>	1.1	1.1	15.5%	7.2%	-2.2%	-3.0%	7.9%	7.5%	-2.9%	-3.3%
12	5612	Facilities Support Services	1,731	1,543	0.9	0.3	0.3	<b>1.1</b>	0.4	0.4	44.2%	56.0%	41.5%	27.7%	2.2%	2.7%	-3.9%	-2.1%
13	2211	Electric Power Generation, Transmission and Distribution	5,859	12,342	0.9	1.1	1.1	<b>1.0</b>	1.3	1.2	23.0%	27.0%	22.5%	20.2%	12.3%	9.2%	10.4%	8.8%
14	3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	5,586	4,407	0.6	0.5	0.8	<b>1.0</b>	0.7	1.0	44.2%	32.9%	18.7%	-1.2%	0.3%	-1.2%	-2.3%	-6.8%

Note: This table is ranked by 2009 NEO GDP LQ. One industry with LQ>1 is suppressed (Appendix 2).

All data are inflated to 2009 dollars.

Source: Moody's Economy.com

## NEO High-Tech Base Industries (High-Tech Industries with GDP LQ $\geq 1$ )

- 14 out of 42 high-tech NEO industries are part of NEO economic base (GDP LQ $\geq 1$ ) (Table 9).
- 10 of these 14 industries are manufacturing.
- Moreover, 4 high-tech manufacturing industries produce GDP in NEO at least twice more than these industries in the U.S., on average. (The 2009 GDP LQ of these industries exceeds 2):
  - NAICS 3255 – Paint, Coating, and Adhesive Manufacturing
  - NAICS 3353 – Electric Equipment Manufacturing
  - NAICS 3339 – Other General Machinery Manufacturing
  - NAICS 3369 – Other Transportation Equipment Manufacturing
- GDP grew in 2004-2009 in two large manufacturing industries that are part of the regional economic base: Electric Equipment Manufacturing (NAICS 3353) with LQ=3.5 and Other General Machinery Manufacturing (NAICS 3339) with LQ=2.8. GDP growth over this period absorbs a decline between 2008 and 2009.
- GDP grew in one additional manufacturing industry in 2004 to 2009: Navigational, Measuring, Electromedical, and Control Instruments Manufacturing (NAICS 3345, LQ=1).

## Table 10. Productivity in NEO and Benchmark Regions, 2004-2009

Geography	2004	2005	2006	2007	2008	2009	2004-2009	2008-2009
<b>Northeast Ohio</b>								
NEO high-tech	\$124,502	\$126,406	\$128,203	\$135,375	\$136,733	\$146,479	17.7%	7.1%
NEO non-high-tech	\$80,583	\$80,115	\$79,915	\$79,438	\$78,476	\$83,156	3.2%	6.0%
NEO all industries	\$84,719	\$84,511	\$84,533	\$84,822	\$84,211	\$89,291	5.4%	6.0%
<b>Remainder of Ohio</b>								
Remainder of Ohio high-tech	\$124,225	\$127,452	\$129,612	\$131,771	\$135,751	\$145,133	16.8%	6.9%
Remainder of Ohio non-high-tech	\$80,969	\$80,823	\$80,152	\$80,228	\$79,371	\$83,209	2.8%	4.8%
Remainder of Ohio all industries	\$85,634	\$85,884	\$85,580	\$85,987	\$85,765	\$90,229	5.4%	5.2%
<b>Remainder of Midwest</b>								
Remainder of Midwest high-tech	\$134,772	\$133,620	\$136,771	\$142,541	\$145,151	\$156,356	16.0%	7.7%
Remainder of Midwest non-high-tech	\$84,026	\$83,603	\$84,156	\$84,223	\$83,474	\$87,506	4.1%	4.8%
Remainder of Midwest All industries	\$89,629	\$89,144	\$90,001	\$90,707	\$90,419	\$95,111	6.1%	5.2%
<b>United States</b>								
U.S. high-tech	\$152,429	\$156,160	\$159,513	\$164,830	\$166,723	\$174,762	14.7%	4.8%
U.S. non-high-tech	\$89,025	\$89,867	\$90,675	\$90,787	\$90,184	\$94,606	6.3%	4.9%
U.S. all industries	\$96,346	\$97,501	\$98,592	\$99,328	\$99,142	\$103,922	7.9%	4.8%

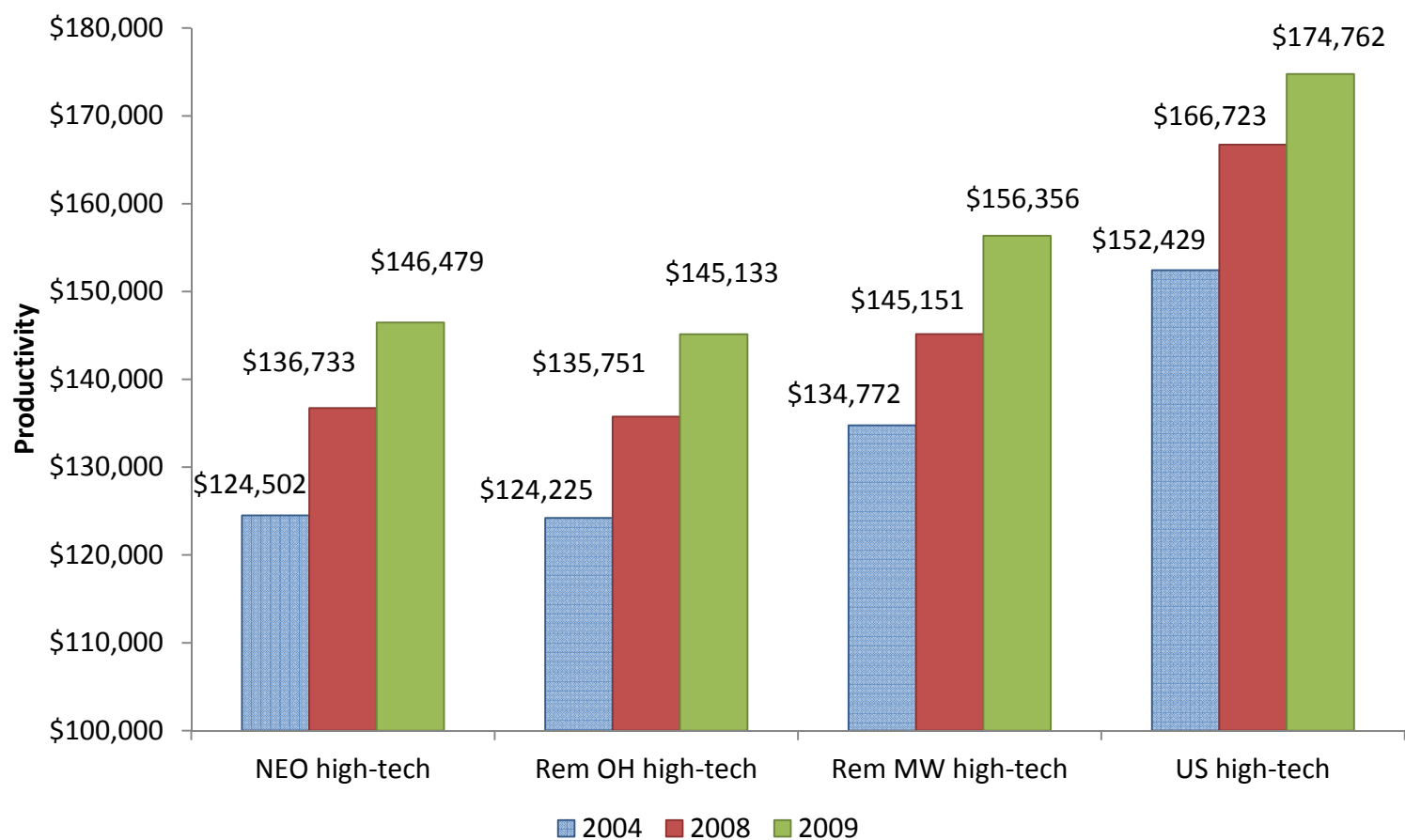
Note: All data are inflated to 2009 dollars.

Source: Moody's Economy.com

## Productivity in NEO and Benchmark Regions, 2004-2009

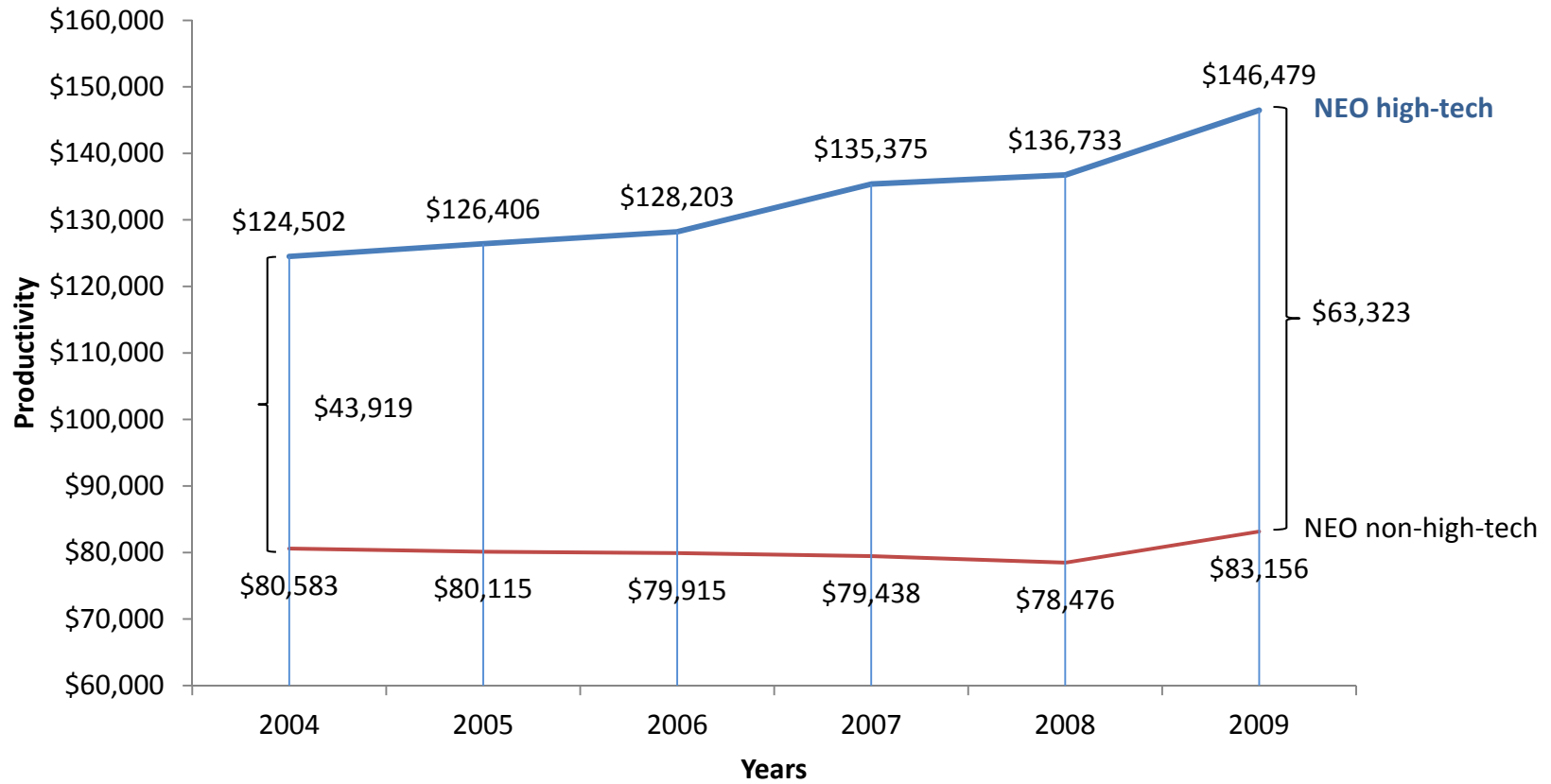
- NEO high-tech productivity is similar to that of the remainder of Ohio, but about \$10,000 per employee lower than the productivity in the remainder of the Midwest and about \$30,000 lower than the productivity in the U.S (Table 10, Figure 5).
- The productivity gap between NEO and benchmark areas remained the same during the period from 2004 to 2009.
- In 2004 to 2009, productivity in NEO's high-tech sector grew 17.7%, including 7.1% growth in the period from 2008 to 2009. This was the highest long-term growth rate of all benchmark areas.
- In 2008 to 2009, productivity in NEO grew slightly faster than in the remainder of Ohio and the U.S. Productivity in the remainder of the Midwest grew at the fastest rate (7.7%).
- Growth of productivity in NEO was accompanied by large employment losses.

# Figure 5. Productivity of High-Tech in NEO and Benchmark Regions, 2004-2009



Note: All data are inflated to 2009 dollars.  
Source: Moody's Economy.com

## Figure 6. Productivity Gap in NEO: High-Tech vs. Non-High-Tech



Note: All data are inflated to 2009 dollars.

Source: Moody's Economy.com

## Productivity Gap in NEO: High-Tech vs. Non-High-Tech

- Productivity in NEO's high-tech industries is significantly higher than that of the non-high-tech sector (Figure 6).
- The productivity gap between high-tech and non-high-tech sector is growing over time:
  - From \$43,919 in 2004 to \$63,323 in 2009.

# Table 11. Productivity Growth in NEO's High-Tech Industries: 2004-2009 (In Thousands of 2009 Dollars)

Rank	NAICS	Industry Description	NEO		Productivity Change, 2004-2009					% Productivity Change, 2008-2009			
			Employment 2009	Productivity 2009	Prod. Change	NEO %	Rem OH %	Rem MW %	US %	NEO	Rem OH	Rem MW	US
1	3369	Other Transportation Equipment Manufacturing	89	\$302,412	\$182,603	<b>152.4%</b>	124.7%	-1.2%	11.1%	53.2%	36.7%	30.9%	25.6%
2	5612	Facilities Support Services	1,731	\$113,126	\$49,555	<b>78.0%</b>	4.2%	96.8%	26.9%	29.2%	-24.5%	12.0%	0.9%
3	3342	Communications Equipment Manufacturing	995	\$77,997	\$30,835	<b>65.4%</b>	63.3%	26.7%	7.3%	-3.3%	10.1%	8.9%	0.0%
4	3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	5,586	\$92,457	\$36,491	<b>65.2%</b>	42.0%	24.0%	4.3%	11.1%	7.8%	4.7%	-0.7%
5	3344	Semiconductor and Other Electronic Component Manufacturing	2,590	\$61,529	\$21,320	<b>53.0%</b>	101.7%	50.8%	10.3%	23.1%	18.9%	17.5%	7.1%
6	5416	Management, Scientific, and Technical Consulting Services	8,221	\$133,191	\$43,548	<b>48.6%</b>	36.5%	12.6%	11.7%	5.4%	1.8%	4.7%	4.2%
7	3364	Aerospace Product and Parts Manufacturing	4,015	\$120,097	\$31,032	<b>34.8%</b>	19.0%	17.5%	25.7%	10.6%	13.1%	9.5%	12.2%
8	5172	Wireless Telecommunications Carriers (except Satellite)	1,109	\$213,556	\$50,499	<b>31.0%</b>	28.7%	26.6%	16.7%	4.6%	-1.3%	3.3%	4.7%
9	3353	Electrical Equipment Manufacturing	5,227	\$216,141	\$49,502	<b>29.7%</b>	1.9%	34.4%	30.4%	2.1%	3.5%	7.9%	3.3%
10	3241	Petroleum and Coal Products Manufacturing	1,252	\$433,100	\$95,837	<b>28.4%</b>	60.8%	6.0%	13.3%	3.9%	4.3%	3.5%	3.5%
11	3341	Computer and Peripheral Equipment Manufacturing	472	\$78,347	\$16,894	<b>27.5%</b>	45.1%	25.0%	14.1%	13.7%	7.9%	6.0%	2.5%
12	5171	Wired Telecommunications Carriers	8,015	\$251,063	\$49,184	<b>24.4%</b>	20.7%	7.3%	15.4%	10.9%	11.1%	7.4%	5.6%
13	2211	Electric Power Generation, Transmission and Distribution	5,859	\$611,204	\$115,526	<b>23.3%</b>	19.1%	19.7%	21.3%	13.7%	11.9%	11.0%	9.9%
14	5182	Data Processing, Hosting, and Related Services	2,132	\$93,463	\$15,078	<b>19.2%</b>	-5.9%	24.1%	11.9%	8.1%	12.7%	8.0%	5.7%
15	5511	Management of Companies and Enterprises	40,929	\$127,225	\$19,757	<b>18.4%</b>	9.2%	9.0%	9.0%	-0.4%	-0.1%	2.6%	1.3%
16	3339	Other General Purpose Machinery Manufacturing	10,966	\$104,898	\$15,594	<b>17.5%</b>	12.6%	24.7%	20.0%	5.9%	6.1%	10.9%	9.1%
17	4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	8,679	\$187,440	\$25,989	<b>16.1%</b>	15.4%	1.4%	0.0%	12.8%	11.8%	3.2%	2.3%
18	5112	Software Publishers	597	\$216,217	\$23,721	<b>12.3%</b>	-9.6%	-12.4%	-0.3%	2.8%	-1.3%	-5.9%	0.8%
19	5413	Architectural, Engineering, and Related Services	14,978	\$121,515	\$12,403	<b>11.4%</b>	13.6%	22.3%	19.6%	9.7%	9.7%	12.6%	12.4%
20	3332	Industrial Machinery Manufacturing	3,287	\$119,627	\$12,001	<b>11.2%</b>	-3.7%	18.0%	11.1%	20.2%	7.8%	17.1%	12.4%
21	5417	Scientific Research and Development Services	3,733	\$145,710	\$14,001	<b>10.6%</b>	2.6%	13.4%	13.4%	10.6%	4.5%	5.5%	4.8%
22	3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	104	\$426,491	\$38,367	<b>9.9%</b>	5.2%	-0.3%	13.1%	18.1%	14.2%	4.2%	-0.7%
23	3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	2,837	\$198,968	\$17,489	<b>9.6%</b>	20.7%	11.3%	20.1%	0.5%	6.3%	8.5%	4.6%
24	5415	Computer Systems Design and Related Services	14,400	\$140,890	\$11,635	<b>9.0%</b>	8.5%	9.3%	8.1%	4.5%	2.2%	4.3%	4.0%
25	3333	Commercial and Service Industry Machinery Manufacturing	1,484	\$101,099	\$7,196	<b>7.7%</b>	9.6%	13.3%	3.7%	3.6%	5.4%	7.1%	3.1%

Note: This table is ranked by NEO high-tech productivity change, 2004-2009. Six industries are suppressed (Appendix 2).

All data are inflated to 2009 dollars.

Source: Moody's Economy.com

## **Productivity Growth in NEO's High-Tech Industries: 2004-2009**

- 31 high-tech industries had higher productivity in 2009 than in 2004 (Six industries are suppressed in Table 11).
- 17 industries in NEO, each with employment over 1,000, experienced a double-digit growth in productivity.

# Table 12. Productivity Growth in NEO's High-Tech Industries: 2008-2009 (In Thousands of 2009 Dollars)

Rank	NAICS	Industry Description	NEO		% Productivity Change, 2004-2009				Productivity Change, 2008-2009				
			Employment 2009	Productivity 2009	NEO	Rem OH	Rem MW	US	Prod. Change	NEO %	Rem OH %	Rem MW %	US %
1	3369	Other Transportation Equipment Manufacturing	89	\$302,412	152.4%	124.7%	-1.2%	11.1%	\$182,603	<b>53.2%</b>	36.7%	30.9%	25.6%
2	5612	Facilities Support Services	1,731	\$113,126	78.0%	4.2%	96.8%	26.9%	\$49,555	<b>29.2%</b>	-24.5%	12.0%	0.9%
3	3344	Semiconductor and Other Electronic Component Manufacturing	2,590	\$61,529	53.0%	101.7%	50.8%	10.3%	\$21,320	<b>23.1%</b>	18.9%	17.5%	7.1%
4	3332	Industrial Machinery Manufacturing	3,287	\$119,627	11.2%	-3.7%	18.0%	11.1%	\$12,001	<b>20.2%</b>	7.8%	17.1%	12.4%
5	5191	Other Information Services	570	\$123,623	-53.3%	51.6%	96.9%	6.4%	\$140,981	<b>19.7%</b>	3.8%	6.1%	6.5%
6	3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	104	\$426,491	9.9%	5.2%	-0.3%	13.1%	\$38,367	<b>18.1%</b>	14.2%	4.2%	-0.7%
7	2211	Electric Power Generation, Transmission and Distribution	5,859	\$611,204	23.3%	19.1%	19.7%	21.3%	\$115,526	<b>13.7%</b>	11.9%	11.0%	9.9%
8	3341	Computer and Peripheral Equipment Manufacturing	472	\$78,347	27.5%	45.1%	25.0%	14.1%	\$16,894	<b>13.7%</b>	7.9%	6.0%	2.5%
9	4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	8,679	\$187,440	16.1%	15.4%	1.4%	0.0%	\$25,989	<b>12.8%</b>	11.8%	3.2%	2.3%
10	3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	5,586	\$92,457	65.2%	42.0%	24.0%	4.3%	\$36,491	<b>11.1%</b>	7.8%	4.7%	-0.7%
11	5171	Wired Telecommunications Carriers	8,015	\$251,063	24.4%	20.7%	7.3%	15.4%	\$49,184	<b>10.9%</b>	11.1%	7.4%	5.6%
12	3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	1,350	\$51,311	-3.8%	9.8%	16.2%	15.7%	-\$2,038	<b>10.9%</b>	14.0%	3.9%	2.7%
13	5417	Scientific Research and Development Services	3,733	\$145,710	10.6%	2.6%	13.4%	13.4%	\$14,001	<b>10.6%</b>	4.5%	5.5%	4.8%
14	3364	Aerospace Product and Parts Manufacturing	4,015	\$120,097	34.8%	19.0%	17.5%	25.7%	\$31,032	<b>10.6%</b>	13.1%	9.5%	12.2%
15	5413	Architectural, Engineering, and Related Services	14,978	\$121,515	11.4%	13.6%	22.3%	19.6%	\$12,403	<b>9.7%</b>	9.7%	12.6%	12.4%
16	5182	Data Processing, Hosting, and Related Services	2,132	\$93,463	19.2%	-5.9%	24.1%	11.9%	\$15,078	<b>8.1%</b>	12.7%	8.0%	5.7%
17	3339	Other General Purpose Machinery Manufacturing	10,966	\$104,898	17.5%	12.6%	24.7%	20.0%	\$15,594	<b>5.9%</b>	6.1%	10.9%	9.1%
18	8112	Electronic and Precision Equipment Repair and Maintenance	997	\$55,780	-3.0%	0.0%	-2.2%	3.8%	-\$1,720	<b>5.8%</b>	6.7%	-0.6%	4.2%
19	5416	Management, Scientific, and Technical Consulting Services	8,221	\$133,191	48.6%	36.5%	12.6%	11.7%	\$43,548	<b>5.4%</b>	1.8%	4.7%	4.2%
20	5172	Wireless Telecommunications Carriers (except Satellite)	1,109	\$213,556	31.0%	28.7%	26.6%	16.7%	\$50,499	<b>4.6%</b>	-1.3%	3.3%	4.7%
21	5415	Computer Systems Design and Related Services	14,400	\$140,890	9.0%	8.5%	9.3%	8.1%	\$11,635	<b>4.5%</b>	2.2%	4.3%	4.0%
22	3241	Petroleum and Coal Products Manufacturing	1,252	\$433,100	28.4%	60.8%	6.0%	13.3%	\$95,837	<b>3.9%</b>	4.3%	3.5%	3.5%
23	3333	Commercial and Service Industry Machinery Manufacturing	1,484	\$101,099	7.7%	9.6%	13.3%	3.7%	\$7,196	<b>3.6%</b>	5.4%	7.1%	3.1%
24	3255	Paint, Coating, and Adhesive Manufacturing	4,338	\$166,866	-4.2%	-13.1%	0.9%	7.3%	-\$7,348	<b>2.9%</b>	-2.1%	4.9%	3.9%
25	3251	Basic Chemical Manufacturing	4,313	\$259,527	-1.0%	-2.6%	20.3%	30.7%	-\$2,530	<b>2.9%</b>	6.8%	5.6%	2.8%
26	5112	Software Publishers	597	\$216,217	12.3%	-9.6%	-12.4%	-0.3%	\$23,721	<b>2.8%</b>	-1.3%	-5.9%	0.8%
27	3353	Electrical Equipment Manufacturing	5,227	\$216,141	29.7%	1.9%	34.4%	30.4%	\$49,502	<b>2.1%</b>	3.5%	7.9%	3.3%
28	3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	2,837	\$198,968	9.6%	20.7%	11.3%	20.1%	\$17,489	<b>0.5%</b>	6.3%	8.5%	4.6%
29	3259	Other Chemical Product and Preparation Manufacturing	2,654	\$150,035	-8.3%	-11.8%	7.8%	24.2%	-\$13,519	<b>0.0%</b>	4.5%	4.9%	5.8%

Note: This table is ranked by NEO high-tech productivity change, 2008-2009. Six industries are suppressed (Appendix 2).

All data are inflated to \$2009.

Source: Moody's Economy.com

## **Productivity Growth in NEO's High-Tech Industries: 2008-2009 (In Thousands of 2009 Dollars)**

- At least 10 large industries with employment above 1,000 each, experienced a double-digit growth in productivity in 2008-2009 (Table 12).
- 11 more large industries grew their productivity by at least 2% in 2008-2009.
- Growth of NEO productivity in 2008-2009 was also accompanied by large employment losses.

## **Appendix 1: NEO region includes 21 OH counties**

- Ashland
- Ashtabula
- Carroll
- Columbiana
- Crawford
- Cuyahoga
- Erie
- Geauga
- Holmes
- Huron
- Lake
- Lorain
- Mahoning
- Medina
- Portage
- Richland
- Stark
- Summit
- Trumbull
- Tuscarawas
- Wayne

## Appendix 2: Technical Note

- Some of the data in our analysis are suppressed. Federal and state regulations prohibit publishing data in a way that might make individual businesses identifiable. This leads to two types of data suppression. When a few businesses account for a high proportion of industry employment in an area or when industry employment in an area is low, data about that industry in the area are suppressed (primary suppression). Primary data suppression alone may not protect a business' identity. Data for the same industry in another county may be suppressed so that county totals will not equal the totals of higher levels units (secondary suppression). Bureau of Labor Market Information, Office of Workforce Development, Ohio Department of Job and Family Services:  
<http://lmi.state.oh.us/asp/sb/> U.S. Bureau of Labor Statistics information about confidentiality is at:  
<http://www.bls.gov/bls/confidentiality.htm>