

ECONOMIC DIGEST

Vol.17 No.2 A joint publication of the Connecticut Department of Labor & the Connecticut Department of Economic and Community Development

FEBRUARY 2012

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In December...

Nonfarm Employment

Connecticut 1,627,800
 Change over month +0.04%
 Change over year +0.6%

United States 131,900,000
 Change over month +0.15%
 Change over year +1.3%

Unemployment Rate

Connecticut 8.2%
 United States 8.5%

Consumer Price Index

United States 225.7
 Change over year 3.0%

Connecticut's Bioscience Industry: An Update

By Stan McMillen, Ph.D., Managing Economist (Stan.McMillen@ct.gov) and Mark R. Prислоe, Associate Economist (Mark.Prислоe@ct.gov), DECD

The “Bioscience Connecticut” initiative that emerged in May 2011 is an \$864 million investment that intends to make the University of Connecticut’s Health Center (UCHC) a hub of research and clinical work in bioscience. This initiative reinforces the state’s ongoing and renewed commitment to make Connecticut a leader in the bioscience industry.¹ The “Bioscience Connecticut” initiative anticipates creating 3,000 jobs annually from 2012 through 2018 in the construction of a new patient tower and ambulatory care facility and renovations to existing research facilities. The plan estimates the creation of 16,400 jobs through 2037, a doubling of federal and industry research grants, as well as increased access to high quality health care, increased medical and dental school enrollments (+30%) and an increase in the number of primary and specialty care clinicians to meet forecasted workforce shortages and increased demand for healthcare services.²

In September 2011, Governor Malloy announced Jackson Laboratory’s decision to launch a \$1.1 billion dollar project on the UCHC campus. Jackson Laboratory (JAX) is an independent, nonprofit

biomedical research institution and National Cancer Institute-designated Cancer Center based in Bar Harbor, Maine with a facility in Sacramento, California and a total U.S. workforce of 1,400. Their Connecticut facility would create 300 direct jobs within 10 years and 600 direct jobs and an estimated 6,800 jobs in all sectors over 20 years. This includes “spin-off” firms that locate throughout the state and become part of the collaboration among UConn, Yale and Jackson’s new Laboratory for Genomic Medicine to accelerate “the development of new medical treatments tailored to each patient’s unique genetic makeup.”³

This new science of “personalized medicine” is the subject of an in-depth report by Price Waterhouse Coopers (PwC) that observes: “The science of genomics [the study of an organism’s genes] and proteomics [the study of the proteins that genes create] has the potential to personalize healthcare, enabling providers to match drugs to patients based on their genetic profiles, identify who is susceptible to which health conditions, and determine how a given patient will respond to a particular therapy (a field known as pharmacogenomics).”⁴ The PwC authors note that personalized

Table 1: Bioscience Industry Definition

NAICS code	Industry Description
3254	Pharmaceutical and Medicine Manufacturing
334510	Electro-medical and Electro-therapeutic Apparatus Manufacturing
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
3391	Medical Equipment and Supplies Manufacturing
54138	Testing Laboratories (includes labs not involved in bioscience)
54171	Research and Development in the Physical, Engineering, and Life Sciences
6215	Medical and Diagnostic Laboratories

The Connecticut Economic Digest is published monthly by the Connecticut Department of Labor, Office of Research, and the Connecticut Department of Economic and Community Development. Its purpose is to regularly provide users with a comprehensive source for the most current, up-to-date data available on the workforce and economy of the state, within perspectives of the region and nation.

The annual subscription is \$50. Send subscription requests to: *The Connecticut Economic Digest*, Connecticut Department of Labor, Office of Research, 200 Folly Brook Boulevard, Wethersfield, CT 06109-1114. Make checks payable to the Connecticut Department of Labor. Back issues are \$4 per copy. The Digest can be accessed free of charge from the DOL Web site. Articles from *The Connecticut Economic Digest* may be reprinted if the source is credited. Please send copies of the reprinted material to the Managing Editor. The views expressed by the authors are theirs alone and may not reflect those of the DOL or DECD.

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We would like to acknowledge the contributions of many DOL Research and DECD staff and Rob Damroth to the publication of the Digest.

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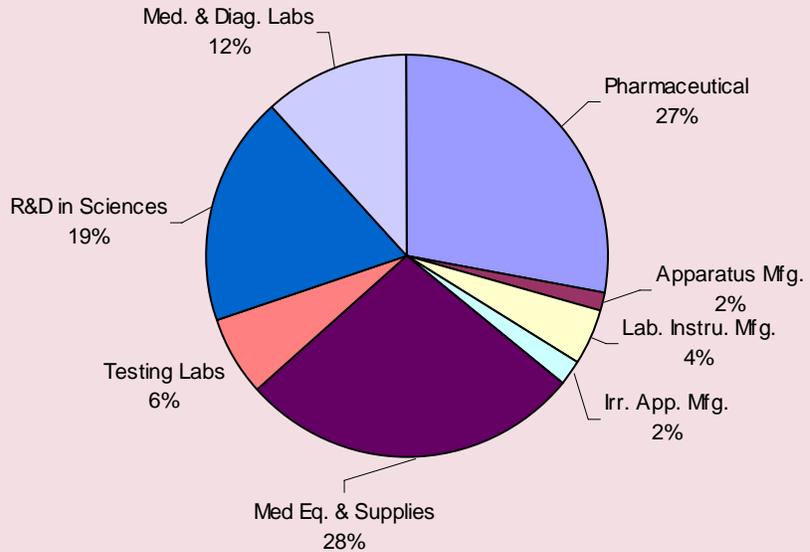
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Fig 1: Employment Composition of Connecticut's Bioscience Industry



medicine is “the right treatment for the right person at the right time.” The Bioscience Initiative and the co-located Jackson Lab facility will facilitate such research.

The boundaries of the emerging personalized medicine market are broadly defined and still fluid. For the purpose of defining Connecticut's current bioscience industry, we categorize it in the same North American Industry Classification System (NAICS) codes in Table 1 as in the May 2007 report (see footnote 1). Figure 1 displays the composition of the industry as we define it by subsector in terms of jobs.

Using this definition and understanding that other studies define the bioscience industry differently,⁵ it

is timely to review and update the status of the bioscience industry in Connecticut. The Census recently released the *2007 Economic Census* that provides a detailed portrait of the United States' private sector every five years (years ending in '2' and '7'). We use the recent data to track progress since 1997 where the relevant index in Figure 2 is 100. Figure 2 shows industry trends for the number of establishments, value of shipments and payroll and employment from 1997 through 2007.

Table 2 shows Connecticut's bioscience industry in 2007 was comprised of 692 establishments with \$3.8 billion in their value of shipments, an annual payroll of

Figure 2: Connecticut Bioscience Industry Growth (1997=100)

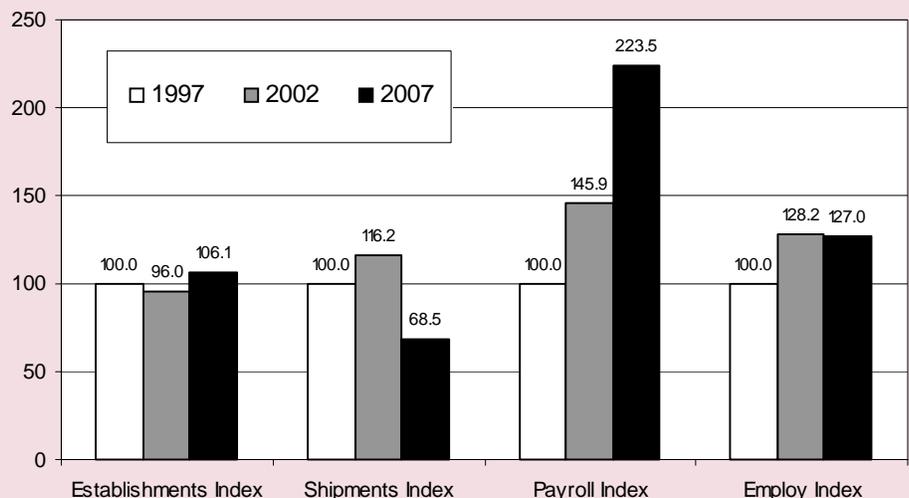


Table 2: Connecticut's 2007 Bioscience Industry Size by Sector

2007 NAICS code	Industry Description	Connecticut Statewide-2007			
		Establishments	Value of Shipments	Annual payroll	Paid Employees
3254	Pharmaceutical and medicine mfg	20	D	\$53,415,000	889
334510	Electromedical and electrotherapeutic apparatus manufacturing	13	\$234,306,000	\$41,790,000	669
334516	Analytical laboratory instrument manufacturing	17	\$394,373,000	\$126,893,000	963
334517	Irradiation apparatus manufacturing	6	D	\$33,511,000	501
3391	Medical equipment and supplies manufacturing	169	\$1,660,001,000	\$312,778,000	6,346
54138	Testing laboratories	91	\$211,545,000	\$87,714,000	1,611
54171	Physical, engineering, and biological research	186	\$472,758,000	\$2,113,160,000	17,024
6215	Medical and diagnostic laboratories	190	\$858,321,000	\$311,042,000	4,754
Totals		692	\$3,831,304,000	\$3,080,303,000	32,757

*Includes taxable and tax exempt establishments; D=Withheld to avoid disclosure
Source: 2007 Economic Census, 2011.

Table 3: 2009 Composition of the Connecticut Bioscience Industry

NAICS	Connecticut	Total Employment	Establishments	Employees				
				1-19	20-49	50-99	100-499	500+
3254	Pharmaceutical	413	18	12	4	0	2	0
334510	Apparatus Mfg.	835	16	10	1	2	1	0
334516	Lab. Instru. Mfg.	680	15	10	2	2	1	0
334517	Irr. App. Mfg.	306	6	3	2	0	1	0
3391	Med Eq. & Supplies	6,344	157	118	19	11	8	1
54138	Testing Labs	2,093	91	71	13	3	4	0
54171	R&D in Sciences	10,653	146	28	14	8	0	2
6215	Med. & Diag. Labs	5,010	184	136	31	10	5	2
Total		26,334	633	388	86	36	22	5

Source: U.S. Census Bureau, 2009 County Business Patterns

Table 4: Connecticut's Bioscience Industry Growth 2001-2010

NAICS Bioscience Total	All Employees	Number of Establishments	Total Wages (thousands)	Avg Annual Pay
2001	29,407	820	\$2,234,642	\$75,990
2002	29,397	847	\$2,140,503	\$72,814
2003	28,260	854	\$2,160,080	\$76,436
2004	27,821	869	\$2,219,186	\$79,767
2005	27,540	892	\$2,241,668	\$81,397
2006	27,484	896	\$2,366,267	\$86,096
2007	27,214	844	\$2,483,182	\$91,246
2008	27,076	870	\$2,505,344	\$92,530
2009	26,590	897	\$2,535,825	\$95,368
2010	25,836	912	\$2,169,328	\$83,965

Source: BLS, QCEW

Table 5: 2010 Composition of Connecticut's Bioscience Industry

NAICS		All Employees	Number of Establishments	Total Wages (thousands)	Average Annual Pay
3254	Pharmaceutical	7,225	36	\$978,514	\$135,428
334510	Apparatus Mfg.	404	15	\$27,725	\$68,698
334516	Lab. Instr. Mfg.	1,118	22	\$88,313	\$78,992
334517	Irr. App. Mfg.	506	10	\$40,311	\$79,613
3391	Med Eq. & Supplies	7,114	164	\$114,586	\$62,913
54138	Testing Labs	1,664	158	\$108,172	\$64,991
54171	R&D in Sciences	4,807	302	\$626,592	\$130,359
6215	Med. & Diag. Labs	2,998	205	\$185,115	\$61,741
Total		25,836	912	\$2,169,328	\$83,965

Source: BLS, QCEW

\$3.1 billion and employment of 32,757 people.

Table 3 shows the 2009 composition of Connecticut's bioscience industry according to the U.S. Census Bureau's *County Business Patterns*. About 75 percent are small businesses employing fewer than 50 workers. However, Connecticut is home to large bioscience companies including Bristol-Myers Squibb in Wallingford, Boehringer Ingelheim's headquarter facilities in Ridgefield and Pfizer's global research and development headquarters in Groton, as well as Achillion Pharmaceuticals, Rib-X Pharmaceuticals, and Genaissance Pharmaceuticals in New Haven. Research institutions include the University of Connecticut and Yale University.

The jobs difference between Tables 2 and 3 is primarily due to the recession of 2008-2010.

According to the 2007 Economic Census, the average annual wage for Connecticut's bioscience industry as we define it was \$94,035 while the national average was \$75,764, a 25% difference. Detailed data on payroll and annual average pay for the industry as a whole and its subsectors appear in Tables 4 and 5.⁶

While employment declined in Connecticut's bioscience industry, the number of establishments has increased. Annual average wages have increased while the wage bill (total wages) has declined as the industry consists of fewer workers. Table 5 displays a profile of Connecticut's bioscience subsectors in 2010.

In 2001, Ernst and Young ranked Connecticut seventh in the nation in the number of bioscience companies per capita operating in the state.⁷ The Biotechnology Industry Organization (BIO) and the Battelle Memorial Institute (Battelle) examined Connecticut's concentration of the bioscience industry as measured by its jobs location quotient (LQ). The LQ is the ratio of the state employment in an industry relative to total state employment divided by national employment in the same industry relative to total employment nationwide. An LQ > 1 indicates a disproportionate concentration.

The BIO-Battelle report notes: "Connecticut has a specialized and

--Continued on page 5--

--Continued from page 3--

diverse concentration of employment in the overall bioscience industry and in two of its subsectors: drugs and pharmaceuticals (LQ = 2.01), and medical devices and equipment (LQ = 1.73). Its research, testing and medical laboratories subsector is concentrated (LQ = 1.11) and growing.” Moreover, the report adds: “On a per capita basis, Connecticut ranks very high among states in terms of both academic bioscience R&D and NIH funding. Over the last six years, venture capital invested in Connecticut bioscience companies (\$991 million) and bioscience patents issued (2,615) both placed higher than its rank by population.”⁸ Table 4 shows the growth of the bioscience industry as we define it over the past decade based on data from the Bureau of Labor Statistics’ Quarterly Census of Employment and Wages (QCEW). While employment declined, the number of establishments increased.

Conclusion

Yale’s and UConn’s pathbreaking, world class research in bioscience, Connecticut’s \$100 million commitment to stem cell research,⁹ the proposed public-private \$2 billion investment in Jackson Labs and UConn’s new bioscience research

and clinical facilities portend a new era in Connecticut history. The groundwork has been laid and the news is out: Connecticut intends to be a world leader in bioscience and the emerging field of personalized medicine. With the cooperation and collaboration among industry, academia and the public sector, Connecticut is poised for exponential growth in bioscience. ■

¹ See : Stan, McMillen, “Connecticut’s Bioscience Industry: A Brief History,” *The Connecticut Economic Digest*, Vol. 12, No. 5, May 2007 and Mark Prisloe, “Connecticut Emerging as ‘Hot Spot’ for Bioscience and Information Technology,” *The Connecticut Economic Digest*, Vol. 7, No. 5, May 2002, pp. 4-5. For another overview of the industry and its contribution to the economy, see John Rappa, “Connecticut’s Bioscience Industry,” OLR Report 2011-R-0365, November 21, 2011, available from <http://www.cga.ct.gov/2011/rpt/2011-R-0365.htm>.

² Colleen Flanagan, “Governor Malloy: New Bioscience Connecticut Initiative Will Create Thousands of New Jobs, Sustain Economic Growth Going Forward, Spur Innovation in the Future,” Press Release, May 17, 2011. Available at <http://www.ct.gov/ecd/cwp/view.asp?a=1104&q=479708>.

³ Governor Dannel P. Malloy Press Release: “New Billion Dollar Jackson Lab Project Highlights Immediate Return on Investment in Bioscience Connecticut: Laboratory on UCHC

campus will strengthen CT’s Research Triangle – Storrs, Farmington, New Haven and points in between.” September 30, 2011. http://www.ct.gov/ecd/lib/ecd/press_releases/new_billion_dollar_jackson_lab_project.pdf.

⁴ PricewaterhouseCoopers, LLP, “The New Science of Personalized Medicine: Translating the Promise into Practice,” 2009, p. 7. Available from <http://www.pwc.com/us/en/healthcare/publications/personalized-medicine.jhtml>.

⁵ John Rappa’s study cited in footnote 1 and the Battelle study cited in footnote 8 include agricultural feedstock, chemicals and animal science. We think the core of personalized medicine lies in the sectors defined in Table 1. The broad category of ‘life sciences’ may include all the above sectors.

⁶ The differences between the Economic Census and QCEW numbers are due to sampling and non-sampling errors. State departments of labor collect QCEW data under mandated reporting and it is more accurate.

⁷ Ernst and Young LLP, *Focus on Fundamentals: The Biotechnology Report, 15th Annual Review*, November 2001.

⁸Biotechnology Industry Organization and Battelle, *State Bioscience Initiatives 2010: Connecticut*. Available at http://www3.bio.org/local/battelle2010/CONNECTICUT_profile.pdf.

⁹ See “Stem Cell Research: State Initiatives,” CRS Report for Congress, May 19, 2006.

GENERAL ECONOMIC INDICATORS

<i>(Seasonally adjusted)</i>	3Q	3Q	CHANGE		2Q
	2011	2010	NO.	%	2011
Employment Indexes (1992=100)*					
Leading	118.3	116.2	2.1	1.8	117.2
Coincident	102.2	102.1	0.1	0.1	102.6
General Drift Indicator (1986=100)*					
Leading	105.1	105.0	0.1	0.1	105.2
Coincident	107.6	106.9	0.7	0.7	108.0
Farmington Bank Business Barometer (1992=100)**	124.1	123.1	1.0	0.8	124.2
Philadelphia Fed's Coincident Index (July 1992=100)***	DEC	DEC			NOV
<i>(Not seasonally adjusted)</i>	2011	2010			2011
Connecticut	158.5	154.1	4.4	2.8	157.8
United States	154.9	150.5	4.4	2.9	154.4

Sources: *The Connecticut Economy, University of Connecticut **Farmington Bank ***Federal Reserve Bank of Philadelphia

The Connecticut Economy’s **General Drift Indicators** are composite measures of the four-quarter change in three coincident (Connecticut Manufacturing Production Index, nonfarm employment, and real personal income) and four leading (housing permits, manufacturing average weekly hours, Hartford help-wanted advertising, and initial unemployment claims) economic variables, and are indexed so 1986 = 100.

The **Farmington Bank Business Barometer** is a measure of overall economic growth in the state of Connecticut that is derived from non-manufacturing employment, real disposable personal income, and manufacturing production.

The **Philadelphia Fed’s Coincident Index** summarizes current economic condition by using four coincident variables: nonfarm payroll employment, average hours worked in manufacturing, the unemployment rate, and wage and salary disbursements deflated by the consumer price index (U.S. city average).