

**The Economic Contribution of  
Current Tenants of the Emerging Technology Center and  
Baltimore City ETC Graduate Companies  
To the Baltimore City Economy**

**Prepared by:  
Shannon Lee, MPA  
Research Associate  
The Jacob France Institute  
University of Baltimore**



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The principal investigator for this report is David Stevens, the Executive Director of the Jacob France Institute at the University of Baltimore. He accepts full responsibility for the accuracy of the data presented, statements made, and conclusions reached.

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## Introduction and Summary

The Emerging Technology Center (ETC) retained the Jacob France Institute of the Merrick School of Business at the University of Baltimore (JFI) to analyze the economic impact of its current tenants and recent graduates on the Baltimore City economy. The key findings of this analysis are as follows:

- The ETC's 43 current tenants employ 285 workers in a variety of technology sectors. These firms directly generate an estimated \$65.4 million in economic activity in Baltimore City. When multiplier effects are included, the economic activity generated by these firms supports \$90.5 million in economic activity in Baltimore City, supports 461 jobs earning \$38.8 million in labor income, and generates \$2.5 million in combined state and local tax revenues; and
- Forty-eight of the ETC's 76 recent graduate companies are located in Baltimore City. These Baltimore City graduate companies employ 311 workers in a variety of technology sectors and directly generate an estimated \$108.5 million in economic activity in the City. When multiplier effects are included, the economic activity generated by these firms supports \$153.3 million in economic activity in Baltimore City, supports 656 jobs earning \$53.1 million in labor income, and generates \$3.6 million in combined state and local tax revenues.

**Table 1**  
**Emerging Technology Center Incubator**  
**Economic Impact of Current Tenants and City Graduates**  
**Economic Impacts of Operations**  
 (Jobs and 2014\$)

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
<b><u>Current Tenants</u></b>				
Economic Output (\$s)	\$65,429,257	\$10,668,430	\$14,367,188	\$90,464,874
Employment (# of Jobs)	285	76.5	99.6	461
Labor Income (\$s)	\$27,905,889	\$5,085,111	\$5,785,791	\$38,776,791
Average Labor Income per Job (\$s)	\$97,915	\$66,472	\$58,090	\$84,115
Fiscal Impact (\$s)	--	--	--	\$2,531,881
<b><u>Baltimore City Graduates</u></b>				
Economic Output (\$s)	\$108,529,474	\$25,429,167	\$19,352,529	\$153,311,170
Employment (# of Jobs)	311	210.6	134.1	655.7
Labor Income (\$s)	\$32,085,628	\$13,186,760	\$7,791,817	\$53,064,204
Average Labor Income per Job (\$s)	\$103,169	\$62,615	\$58,105	\$80,928
Fiscal Impact (\$s)	--	--	--	\$3,644,920

Source: JFI and IMPLAN

## ETC Current Tenants and Graduates – Firm Count and Employment

The ETC provided the JFI with data that included a list of current tenants and recent graduates between May 2012 and March 2014. Because this particular report quantifies economic contributions to the City, JFI only included data from graduates that are located in the City for this analysis.<sup>12</sup> The ETC provided data on the industry and employment of its current tenants and graduates. The ETC has a total of 49 current tenants and 76 recent graduate companies. Six current tenants and five recent graduates were omitted from this analysis because there was no information available on the employment of the firm. Of the remaining 71 graduate companies, 65 were located in Maryland and 48 were located in the City. The number of firms and their associated employment are presented in Table 2. Using the methodology described on page 13, the JFI analyzed the economic contribution of both ETC’s current tenants and recent graduates located in Baltimore City using the IMPLAN model.<sup>3</sup>

**Table 2**  
**Current Emerging Technology Center Incubator Tenants and Graduates By Sector**

Sector	<u>Current Tenants</u>		<u>Baltimore City Graduates</u>	
	# of Companies	# of Employees	# of Companies	# of Employees
<b>Total</b>	<b><u>43</u></b>	<b><u>285</u></b>	<b><u>48</u></b>	<b><u>311</u></b>
Manufacturing	10	41	4	27
Retail Trade	1	4	0	0
Information	2	8	7	37
Finance & Insurance	1	13	0	0
Professional				
Scientific and Technical Services	26	193	35	199
Administrative & Waste Services	3	26	0	0
Educational Services	0	0	2	48

Source: ETC

<sup>1</sup> All ETC current tenants are located in Baltimore City.

<sup>2</sup> When data on the location of the graduates was missing, the JFI identified the address of the firms using company websites, commercial databases, and data available on the internet.

<sup>3</sup> IMPLAN is one of the most widely used input-output models for economic impact analysis. For more information on the model, see [www.implan.com](http://www.implan.com)

## Economic Impact of Current ETC Tenants

As presented in Table 3, the ETC's 49 current tenants employ 285 workers and directly generate an estimated \$65.4 million in economic activity in Baltimore City. When multiplier effects are included, the economic activity generated by these firms supports \$90.4 million in economic activity in Baltimore City, supports 461 jobs earning \$38.8 million in labor income, and generates \$2.5 million in combined state and local tax revenues.

**Table 3**  
**Emerging Technology Center Incubator**  
**Economic Impact of Current Tenants**  
 (Jobs and 2014\$)

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Economic Output (\$s)	\$65,429,257	\$10,668,430	\$14,367,188	\$90,464,874
Employment (# of Jobs)	285	76.5	99.6	461
Labor income (\$s)	\$27,905,889	\$5,085,111	\$5,785,791	\$38,776,791
Average Labor Income per Job (\$s)	\$97,915	\$66,472	\$58,090	\$84,115
Fiscal Impact (\$s)	--	--	--	\$2,531,881

Source: JFI and IMPLAN

The output impacts of the operations of the ETC current tenants are presented by sector in Table 4, the employment impacts by sector in Table 5 and the labor income impacts are presented in Table 6. As presented in these tables, the impacts of the ETC current tenants are concentrated in the professional scientific and technical services and manufacturing sectors of the Baltimore City economy.

**Table 4**  
**Economic Output Impact of**  
**Current Emerging Technology Center Incubator Tenants**  
**By Sector**

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
<b>Total</b>	<b><u>\$65,429,257</u></b>	<b><u>\$10,668,430</u></b>	<b><u>\$14,367,188</u></b>	<b><u>\$90,464,874</u></b>
Natural Resources	\$0	\$42	\$270	\$311
Mining	\$0	\$847	\$710	\$1,557
Utilities	\$0	\$450,647	\$396,901	\$847,548
Construction	\$0	\$221,249	\$90,062	\$311,311
Manufacturing	\$25,246,860	\$317,303	\$266,907	\$25,831,070
Wholesale Trade	\$0	\$386,224	\$245,728	\$631,952
Retail Trade	\$412,058	\$45,540	\$845,745	\$1,303,343
Transportation & Warehousing	\$0	\$407,855	\$244,078	\$651,933
Information	\$4,605,424	\$1,164,745	\$237,681	\$6,007,849
Finance & Insurance	\$4,352,107	\$1,204,975	\$1,292,315	\$6,849,398
Real Estate	\$0	\$1,184,127	\$3,304,739	\$4,488,866
Professional Scientific & Technical Services	\$29,383,600	\$2,471,346	\$524,123	\$32,379,069
Management of Companies	\$0	\$277,416	\$14,242	\$291,658
Administrative & Waste Services	\$1,429,208	\$1,617,374	\$345,048	\$3,391,629
Educational Services	\$0	\$8,702	\$754,673	\$763,375
Health & Social Services	\$0	\$169	\$3,603,450	\$3,603,619
Arts, Entertainment & Recreation	\$0	\$149,715	\$257,579	\$407,294
Accommodation & Food Services	\$0	\$384,384	\$968,191	\$1,352,575
Other Services	\$0	\$208,169	\$719,693	\$927,863
Government	\$0	\$167,600	\$255,054	\$422,654

Source: JFI and IMPLAN

**Table 5**  
**Employment Impact of the**  
**Current Emerging Technology Center Incubator Tenants**  
**By Sector**

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
<b><u>Total</u></b>	<b><u>285</u></b>	<b><u>77</u></b>	<b><u>100</u></b>	<b><u>461</u></b>
Natural Resources	0	0	0	0
Mining	0	0	0	0
Utilities	0	0	0	1
Construction	0	1	0	2
Manufacturing	41	1	1	42
Wholesale Trade	0	2	1	3
Retail Trade	4	1	12	17
Transportation & Warehousing	0	3	2	5
Information	8	4	1	13
Finance & Insurance	13	4	4	21
Real Estate	0	6	4	10
Professional Scientific & Technical Services	193	14	3	209
Management of Companies	0	2	0	2
Administrative & Waste Services	26	28	5	59
Educational Services	0	0	7	8
Health & Social Services	0	0	30	30
Arts, Entertainment & Recreation	0	2	5	7
Accommodation & Food Services	0	6	14	19
Other Services	0	2	9	11
Government	0	1	2	3

Source: JFI and IMPLAN

**Table 6**  
**Labor Income Impact of the**  
**Current Emerging Technology Center Incubator Tenants**  
**By Sector**

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
<b>Total</b>	<b><u>\$27,905,889</u></b>	<b><u>\$5,085,111</u></b>	<b><u>\$5,785,791</u></b>	<b><u>\$38,776,791</u></b>
Natural Resources	\$0	\$32	\$206	\$238
Mining	\$0	\$235	\$192	\$427
Utilities	\$0	\$90,998	\$80,724	\$171,722
Construction	\$0	\$118,071	\$35,399	\$153,470
Manufacturing	\$4,595,984	\$62,118	\$33,307	\$4,691,410
Wholesale Trade	\$0	\$151,143	\$96,162	\$247,304
Retail Trade	\$196,081	\$24,376	\$450,598	\$671,055
Transportation & Warehousing	\$0	\$244,095	\$128,466	\$372,561
Information	\$755,087	\$484,114	\$85,688	\$1,324,888
Finance & Insurance	\$1,256,341	\$497,927	\$441,423	\$2,195,692
Real Estate	\$0	\$205,404	\$131,440	\$336,843
Professional Scientific & Technical Services	\$20,171,010	\$1,495,554	\$311,366	\$21,977,931
Management of Companies	\$0	\$121,308	\$6,228	\$127,536
Administrative & Waste Services	\$931,385	\$1,074,467	\$198,091	\$2,203,943
Educational Services	\$0	\$5,955	\$511,142	\$517,097
Health & Social Services	\$0	\$88	\$2,178,189	\$2,178,277
Arts, Entertainment & Recreation	\$0	\$88,867	\$112,898	\$201,765
Accommodation & Food Services	\$0	\$169,021	\$429,306	\$598,327
Other Services	\$0	\$144,289	\$427,022	\$571,311
Government	\$0	\$107,048	\$127,945	\$234,993

Source: JFI and IMPLAN



## Economic Impact of ETC Graduates

As presented in Table 7, the 48 ETC graduate companies located in Baltimore City employ 311 workers and directly generate an estimated \$108.5 million in economic activity in the City. When multiplier effects are included, the economic activity generated by these firms supports \$153.3 million in economic activity in Baltimore City, supports 656 jobs earning \$53 million in labor income, and generates \$3.5 million in combined state and local tax revenues.

**Table 7**  
**Emerging Technology Center Incubator**  
**Economic Impact of Baltimore City Graduates**  
 (Jobs and 2014\$)

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Economic Output (\$s)	\$108,529,474	\$25,429,167	\$19,352,529	\$153,311,170
Employment (# of Jobs)	311	210.6	134.1	655.7
Labor Income (\$s)	\$32,085,628	\$13,186,760	\$7,791,817	\$53,064,204
Average Labor Income per Job (\$s)	\$103,169	\$62,615	\$58,105	\$80,928
Fiscal Impact (\$s)	--	--	--	\$3,544,593

Source: JFI and IMPLAN

The output impacts of the operations of the ETC's Baltimore City graduates are presented by sector in Table 8, the employment impacts by sector in Table 9 and the labor income impacts are presented in Table 10. As presented in these tables, the impacts of the recent ETC graduate companies located in Baltimore City are concentrated in the professional scientific and technical services, manufacturing, real estate, educational services, and administrative and waste services sectors of the Baltimore City economy.

**Table 8**  
**Economic Output Impact of**  
**Emerging Technology Center Incubator Graduates**  
**By Sector**

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
<b><u>Total</u></b>	<b><u>\$108,529,474</u></b>	<b><u>\$25,429,167</u></b>	<b><u>\$19,352,529</u></b>	<b><u>\$153,311,170</u></b>
Natural Resources	\$0	\$89	\$363	\$452
Mining	\$0	\$1,277	\$959	\$2,235
Utilities	\$0	\$477,575	\$536,119	\$1,013,694
Construction	\$0	\$340,392	\$121,322	\$461,714
Manufacturing	\$32,060,602	\$623,477	\$359,964	\$33,044,043
Wholesale Trade	\$0	\$781,764	\$332,558	\$1,114,322
Retail Trade	\$0	\$23,780	\$1,137,766	\$1,161,546
Transportation & Warehousing	\$0	\$919,016	\$327,834	\$1,246,850
Information	\$54,247,405	\$3,639,160	\$320,172	\$58,206,737
Finance & Insurance	\$0	\$2,268,061	\$1,738,344	\$4,006,405
Real Estate	\$0	\$1,722,946	\$4,454,042	\$6,176,988
Professional Scientific & Technical Services	\$16,688,845	\$6,045,841	\$705,388	\$23,440,074
Management of Companies	\$0	\$616,954	\$19,205	\$636,159
Administrative & Waste Services	\$0	\$5,831,897	\$464,895	\$6,296,792
Educational Services	\$5,532,621	\$45,424	\$1,008,454	\$6,586,499
Health & Social Services	\$0	\$567	\$4,863,234	\$4,863,801
Arts, Entertainment & Recreation	\$0	\$413,170	\$346,230	\$759,400
Accommodation & Food Services	\$0	\$878,472	\$1,304,128	\$2,182,599
Other Services	\$0	\$388,097	\$967,874	\$1,355,971
Government	\$0	\$411,209	\$343,679	\$754,888

Source: JFI and IMPLAN

**Table 9**  
**Employment Impact of the**  
**Emerging Technology Center Incubator Graduates**  
**By Sector**

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
<b><u>Total</u></b>	<b><u>311</u></b>	<b><u>211</u></b>	<b><u>134</u></b>	<b><u>656</u></b>
Natural Resources	0	0	0	0
Mining	0	0	0	0
Utilities	0	0	1	1
Construction	0	2	1	3
Manufacturing	27	2	1	30
Wholesale Trade	0	4	2	5
Retail Trade	0	0	16	17
Transportation & Warehousing	0	7	3	10
Information	116	15	1	132
Finance & Insurance	0	7	6	13
Real Estate	0	8	5	13
Professional Scientific & Technical Services	120	33	4	156
Management of Companies	0	3	0	3
Administrative & Waste Services	0	103	7	110
Educational Services	48	1	10	58
Health & Social Services	0	0	40	40
Arts, Entertainment & Recreation	0	6	7	12
Accommodation & Food Services	0	13	19	31
Other Services	0	5	12	17
Government	0	3	2	6

Source: JFI and IMPLAN

**Table 10**  
**Labor Income Impact of the**  
**Emerging Technology Center Incubator Graduates**  
**By Sector**

Item	Direct Impact	Indirect Impact	Induced Impact	Total Impact
<b>Total</b>	<b><u>\$32,085,628</u></b>	<b><u>\$13,186,760</u></b>	<b><u>\$7,791,817</u></b>	<b><u>\$53,064,204</u></b>
Natural Resources	\$0	\$66	\$277	\$343
Mining	\$0	\$365	\$259	\$624
Utilities	\$0	\$97,147	\$109,038	\$206,185
Construction	\$0	\$181,635	\$47,700	\$229,335
Manufacturing	\$3,164,369	\$138,236	\$44,908	\$3,347,513
Wholesale Trade	\$0	\$305,931	\$130,141	\$436,072
Retail Trade	\$0	\$12,732	\$606,182	\$618,914
Transportation & Warehousing	\$0	\$566,444	\$172,581	\$739,024
Information	\$13,659,873	\$1,768,534	\$115,346	\$15,543,753
Finance & Insurance	\$0	\$804,645	\$593,787	\$1,398,432
Real Estate	\$0	\$295,837	\$178,059	\$473,896
Professional Scientific & Technical Services	\$11,533,963	\$3,612,832	\$419,079	\$15,565,874
Management of Companies	\$0	\$269,781	\$8,398	\$278,179
Administrative & Waste Services	\$0	\$3,913,285	\$266,893	\$4,180,178
Educational Services	\$3,727,423	\$31,966	\$683,036	\$4,442,425
Health & Social Services	\$0	\$295	\$2,939,556	\$2,939,851
Arts, Entertainment & Recreation	\$0	\$260,769	\$151,761	\$412,530
Accommodation & Food Services	\$0	\$387,673	\$578,255	\$965,928
Other Services	\$0	\$275,943	\$574,210	\$850,153
Government	\$0	\$262,647	\$172,349	\$434,996

Source: JFI and IMPLAN

## Methodology

The JFI analyzed the economic impact of both the current ETC tenants and its graduate companies located in Baltimore City using the methodology laid out in the November 2007 *Maryland Incubator Impact Analysis and Evaluation of Additional Incubator Capacity* report released by the Maryland Technology Development Corporation.<sup>4</sup> The JFI analyzed the economic activity generated by the tenant companies located in the incubator and graduate companies located in Baltimore City.<sup>5</sup> The ETC provided data on the employment and sector of its current tenants and employment, sector and location of its graduates. This data was analyzed using the IMPLAN input-output model, one of the most widely used models in the nation and the same model used in the TEDCO study.<sup>6</sup> The IMPLAN model can be used to estimate economic activity based on either company revenues or employment. As the revenues of the current and graduate companies were not known, this analysis was based on their reported employment; and IMPLAN can then estimate revenues based on average revenues per employee using City and national data.<sup>7</sup>

This report employed the IMPLAN economic model<sup>8</sup> to estimate the economic activity generated by and economic impact of the tenant companies located ETC's current incubators as well as its graduate companies located in Baltimore City. This analysis focuses on three measures of economic impact: economic output (a figure similar to business volume); employment; and labor income (including salaries and wages, benefits and self employment income). Four measures of the economic activity and impact of the incubator are included in this report:

- 1) Direct effects, which represent the change in economic activity being analyzed – in this case the employment and estimated revenues of tenant and graduate companies;
- 2) Indirect effects, which represent the changes in inter-industry purchases, for example the purchase of goods or services to support company operations, in response to the change in demand from the directly affected industries;
- 3) Induced effects, which represent the changes in spending from households as income and population increase due to changes in production; and
- 4) Total effects, which are the combined total of direct, indirect and induced effects.

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<sup>4</sup> See "Maryland Incubator Impact Analysis and Evaluation of Additional Incubator Capacity" November 2007. <http://tedco.md/>

<sup>5</sup> This analysis does not attempt to address the issue of the role of the ETC in creating these companies. It was outside of the scope of this analysis to determine the extent to which the incubator facilitated the start-up or growth of these companies. This analysis is simply of the jobs located in the current ETC incubator facilities or graduate companies located in the City of Baltimore. Because the number of these jobs that would have existed in the City without the incubator is unknown, this analysis can be viewed as measuring the linkages between these companies and the larger City economy – not a true economic impact analysis, where the economic activity would need to be net, new and incremental. Because the City has traditionally lagged surrounding jurisdictions in the level of high technology business activity, it can be assumed that the ETC's start up support services, affordable rent levels and relationship with the major City universities that are the core generators of technology, have all contributed to the decision of these companies to locate in the City.

<sup>6</sup> See <http://www.implan.com> for a description of the model.

<sup>7</sup> The extent to which the reliance on estimated revenues based on employment biases this analysis is unknown. While younger, early stage companies in an incubator would generally have lower revenues per employee than more mature firms, they may also have higher levels of expenditures as they spend investment capital to develop their products and services. Thus, the level of potential bias is an area for future research.

<sup>8</sup> All impact figures are in year 2014 dollars and totals may not sum due to rounding.

An input-output analysis examines the relationships among businesses, and among businesses and final consumers. Input-output analysis is based on the use of multipliers, which describe the response of an economy to a change in demand or production. Multipliers measure the effects on an economy from a source of economic activity, in this case the revenues and employment of ETC's tenant and graduate companies. The economic activity generated in a region is greater than the simple total of spending associated with the event or activity being studied. This is because as this money is earned it is, in turn, spent, earned and re-spent by other businesses and workers in the regional economy through several successive cycles. However, the spending in each successive cycle is less than in the preceding cycle because a certain portion of spending "leaks" out of the economy in each round of spending. Leakages occur through purchases of goods or services from outside of the region. The multipliers used capture the effects of these multiple rounds of spending.