


THE ECONOMIC IMPACT OF THE UNIVERSITY SYSTEM OF MARYLAND

A Fiscal Perspective | FY 2011

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EXECUTIVE SUMMARY

Background

The University System of Maryland (USM or system) commissioned the Jacob France Institute (JFI) to study the economic impact of USM on the Maryland economy. Similar analyses were conducted in 1994, 1998, and 2002. The earlier studies and this latest one provide ample evidence of the system's significant contribution to the health of the state's economy. The goal of this analysis is to quantify the system's contribution to the state's economy and measure it against the state's investment in the system.

The 2012 Report

This study provides an in-depth analysis of the system's impact in three key areas:

- The system's economic and fiscal impacts on the state as measured by the increased earnings of and taxes paid by system graduates, and new spending attracted—by top-quality research and educational capabilities—into Maryland from sources such as federal research support and out-of-state students
- The system's contribution to workforce development including its ability to produce graduates in areas of workforce shortages and its accessibility to workers who are upgrading their skills or changing careers
- The system's contribution to the economic development through its research, partnerships with the private sector, and technology transfer

It should be noted that the system's estimated fiscal impact (first item above) is very conservative in that it does not account for graduates whose earnings information was not available to the state (e.g., federal employees, self-employed persons, and Maryland residents commuting out of state).

Earnings, Economic, and Fiscal Impact

The system's fiscal impact was estimated by a detailed analysis of three representative USM graduating classes: 1986, 1989, and 1996. Actual earnings information of the graduates was examined and compared to the estimated earnings of persons with the next lower level of educational attainment. Using this earnings information, the difference in the actual average earnings of the respective graduates—the incremental increase in earnings when moving from one degree level to the next—was determined. For example:

- The average earnings of a 1986 University System of Maryland *bachelor's degree recipient* in 2010 were $85,830, with incremental earnings of $53,482 more than a person whose highest level of educational attainment was a high school degree.
- The average 2011 earnings for 1986 *master's degree recipients* were $84,147, a level of earnings $3,296 below the earnings of the average USM bachelor's degree recipient.
- The average 2011 earnings for 1986 *doctoral degree recipients* were $100,558, with incremental earnings of $16,411 more than the average USM master's degree recipient.

- The average 2011 earnings for a 1986 *professional school graduate* were $169,983 with incremental earnings of $82,541 more than the average USM bachelor's degree recipient.

Similar incremental increases are found for both the 1989 and 1996 cohorts of USM graduates. The cumulative impact of these increased earnings on state revenues is considerable. Over the course of their working lives, the 1986, 1989, and 1996 graduates will have increased earnings, and pay increased taxes, as follows:

- For 1986 graduates, estimated lifetime incremental earnings will be $12.0 billion, generating $796.3 million in additional Maryland income and sales taxes.
- For 1989 graduates, estimated lifetime incremental earnings will be $13.3 billion, generating $883.8 million in additional Maryland income and sales taxes.
- For 1996 graduates, estimated lifetime incremental earnings will be $17.4 billion, generating $1.2 billion in additional Maryland income and sales taxes.

In addition to increasing state tax revenues, the incremental earnings of USM graduates have multiplier effects; when the earnings are spent, other economic activities are supported that result in jobs:

- Economic activity generated by the lifetime incremental earnings of 1986 graduates will support an average of 2,527 annual jobs, earning nearly $4.0 billion in salaries and wages, and resulting in a total of almost $1.1 billion in additional state taxes.
- Economic activity generated by the lifetime incremental earnings of 1989 graduates will support an average of 2,919 annual jobs, earning $4.4 billion in salaries and wages, and resulting in a total of $1.2 billion in additional state taxes.
- Economic activity generated by the lifetime incremental earnings of 1996 graduates will support an average of 3,910 annual jobs, earning $5.9 billion in salaries and wages, and resulting in a total of $1.6 billion in additional state taxes.

The system also contributes to Maryland's economic base by attracting students and spending into Maryland from outside of the state. This spending, too, is subject to multiplier effects. Three sources of out-of-state spending were considered in this report:

- Non-resident student tuition and living expenditures
- Federal government-sponsored grants to USM institutions to perform research, training, or other services
- Out-of-state visitors to USM institutions

In 2011, these three sources contributed the following to the state's economy:

- $1.8 billion in out-of-state spending associated with USM
- $3.7 billion in economic activity in the state, supporting 30,098 jobs earning $1.16 billion
- $48.2 million in state income and sales taxes

A comparison of the positive economic impact of USM to state appropriations for the system demonstrates the soundness of the state's investment, with the results being as follows:

- The ratio of state revenue to state cost for the 1986 cohort of USM graduates is 3.1 to 1. That is, the state receives $3.10 in revenue for each $1 invested.
- Using the discounted present value of future tax revenues, the state revenue/cost ratio for the 1986 cohort of USM graduates is 1.8, with the state receiving $1.80 in revenue for each $1 invested.
- The revenue/cost ratios for the 1989 cohort were lower—due to higher levels of state appropriations, but the net fiscal return to the state remains positive at $2.50 for every $1 invested in undiscounted terms and $1.50 for every $1 invested in discounted terms. The revenue/cost ratios for the 1996 cohort was $2.70 for every $1 invested in undiscounted terms and $1.60 for every $1 invested in discounted terms.
- The three cohorts analyzed generated on average between $24 million and $35 million in state income and sales taxes from the increased earnings of graduates and the economic impacts associated with this increased earnings. Assuming $25 million in additional state income and sales taxes per graduating class, the total increase in state income and sales taxes generated by employed USM graduates in Maryland totals $1.1 billion, an amount that exceeds the state appropriation to the system.

. . . the overall increase in state income and sales taxes generated by employed USM graduates in Maryland, extrapolated from the analysis of the three cohorts used in this study, totals $1.1 billion annually, an amount that exceeds the state's appropriation to the system.

Workforce Development

Maryland has the distinction of having one of the most well-educated resident populations in the nation. The presence of the University System of Maryland makes a significant contribution to Maryland's competitiveness in terms of its highly qualified workforce, which enables businesses to compete more effectively regionally, nationally, and globally. In 2011, among Maryland's four-year degree-granting institutions, USM accounts for the following:

- 69 percent of total enrollment
- 68 percent of full-time undergraduates
- 87 percent of part-time undergraduates
- 62 percent of full-time graduate/professional students
- 63 percent of part-time graduate/professional students

In 2011, among all public and private four-year colleges and universities in Maryland, USM provides:

- 74 percent of total bachelor's degrees awarded
- 55 percent of all master's degrees awarded
- 62 percent of all doctoral degrees awarded
- 88 percent of all professional degrees awarded

Economic Development

The system is a core element of Maryland's academic and scientific infrastructure, containing three of the four primary research universities in the state and playing a vital role in the generation of new technologies, basic research, and the commercialization of research discoveries in Maryland. Some measures of the economic development impact of USM are:

- USM generates $1.1 billion in the academic research and development expenditures.
- USM generated 224 invention disclosures, 124 new patent applications, and 77 patents issued in FY 2011.
- Maryland's four USM research parks host 117 tenants with 3,198 employees and its seven incubators host 72 tenant companies with 873 employees.
- USM has established a strategic goal to help create 325 new companies over 10 years and has had significant impact on the development of 51 companies.

USM has had significant impact on the development of 51 startup companies from July 2011 to June 2012.

Conclusion

The system contributes to the state's economy in a variety of ways. It enhances the skills of its students, significantly increasing their opportunities in the workplace; the increased earnings of USM graduates generate additional state revenues; it is a source of educated and skilled workers for Maryland employers; it provides valuable services to businesses; it generates new technologies through research and development; and it contributes to the quality of life in Maryland through its community service activities. USM's positive economic impact on the state of Maryland considerably exceeds the state's investment in the system.

INTRODUCTION

This report is an update of the 2002 "Economic Impact of the University System of Maryland: A Fiscal Perspective," which analyzed the economic and fiscal impacts of the University System of Maryland on the state's economy. This report offers a conservative estimate of the contributions made by USM to the Maryland economy. The report examines economic and fiscal impacts that can be traced directly to the system through its education, research, and public service mission. In updating the 2002 study, this analysis tracks the earnings of the same two cohorts of USM graduates, the 1986 and 1989 graduating classes, and adds a third cohort of 1996 graduates. This report also provides a new analysis of the in-state employment of two additional recent cohorts of graduates, from the 2006 and 2009 graduating classes, analyzing the number of each of these more recent cohorts of graduates that are employed in Maryland.

USM impacts the state of Maryland in numerous ways: The system is a source of economic activity; it enhances the skills and education of its students; it is a source of educated and skilled workers for Maryland employers; it provides valuable services to new and expanding businesses; it generates new technologies through research and development; and it contributes to the quality of life in Maryland through its community service activities.

This report takes an in-depth look at the economic impact of USM in four key areas:

- the economic and fiscal impact of the system using a "human capital" approach
- the workforce development role of the system
- the economic development impact of the system
- the community service impact of the system

The human capital methodology used to measure the fiscal impact deserves explanation. This approach was first used by economist Barry Bluestone to analyze the economic impact of the University of Massachusetts, Boston on the State of Massachusetts[1] and was adapted by the JFI of the University of Baltimore in its 1994 and 1998 studies of the economic impact of the system on the state of Maryland.[2]

The human capital model differs from the traditional American Council on Education-Caffrey and Isaacs model,[3] which treats a university as a source of revenues and spending in an economy and only measures the impact of university spending. In contrast, the human capital model treats a university as a source of investment, and calculates the impact of the public's investment by examining the most important outcome of higher education—better educated, more skilled workers. Specifically, this model compares the state's expenditures on higher education to the tax revenues derived from the increased earnings power of its graduates.

In addition to USM's economic and fiscal impacts on Maryland, two additional analyses were conducted. The workforce development impact of USM is presented in Section 2.0, and the business and economic development impact of the system is presented in Section 3.0.

SECTION 1.0

THE ECONOMIC AND FISCAL IMPACT OF THE UNIVERSITY SYSTEM OF MARYLAND (USM)

Measuring USM's economic and fiscal impact on the state using the human capital approach involves the following steps:

- The earnings of a cohort of USM graduates are derived for each year after graduation from a database of state employment and earnings maintained by the JFI .[4]
- These earnings are compared to estimates of what the graduates would have earned had they not obtained a degree. The difference is the incremental earnings effect of their degree.
- The increased economic activity and state revenues derived from the incremental earnings are then calculated.
- The increased economic activity and state revenues attributable to the expenditures of out-of-state students and visitors, and of grants originating out of state, are also calculated by modeling the economic activity these expenditures generate.
- The total increased state revenues are then compared to the state's cost of producing the graduates, to determine the net fiscal impact of the state's investment.

These steps were conducted for three representative classes of USM: 1986, 1989, and 1996. Incremental earnings of these graduates were determined by making the following comparisons for each of the three graduating classes:

1. The earnings of bachelor's degree recipients are compared to the estimated earnings of a person with only a high school diploma.
2. The earnings of master's degree recipients are compared to the earnings of USM graduates with only a bachelor's degree.
3. The earnings of doctoral degree recipients are compared to the earnings of USM graduates with a master's degree.
4. The earnings of professional degree recipients are compared to the earnings of USM graduates with only a bachelor's degree.

In analyzing the incremental increase in earnings, three data sources were used:

1. USM provided information on all graduates in the 1986, 1989, and 1996 academic years.
2. The Maryland Department of Labor, Licensing, and Regulation (DLLR) provided longitudinal data on earnings in Maryland by these graduates, excluding the self-employed, independent contractors, and federal workers.
3. Income for individuals with a high school degree were estimated using two census-related sources:

a. For pre-2000 earnings, the Maryland 1990 U.S. Bureau of the Census Five-Percent Public Use Micro Sample Data, which identified more than 17,000 Maryland residents for whom a high school diploma represented the highest level of educational attainment, were analyzed.[5]

b. For post-2000 earnings, data on earnings for persons with only a high school diploma by age were available from the U.S. Bureau of the Census American Community Survey. For each cohort, the comparison group was the average of the earnings for employed persons of the age of each cohort of bachelor's degree recipients in each year analyzed.

These three data sources made it possible to identify average earnings for each step of educational attainment for the three cohorts. Individual incremental incomes for all the graduates of a cohort holding a particular degree were then calculated and aggregated. Thus, the actual earnings for the three cohorts of USM graduates can be compared to their estimated incomes had they not attended a USM institution.

It is important to note some exclusions from this analysis. The DLLR data on earnings only includes persons working in Maryland in positions covered by unemployment insurance. Therefore, the earnings of USM graduates who are self-employed workers, independent contractors, federal workers, or out-of-state commuters are not included in the report. Given the integrated nature of the regional employment market, with high levels of commuting from Maryland to Washington, D.C., and Northern Virginia, and the high concentration of federal government employment in Maryland, this is likely to significantly undercount the post-graduation earnings for each cohort.

It is also important to note that the earnings data used were available through 2011. As a result, 25 years of actual earnings were used for the 1986 cohort, 22 years of actual earnings were used for the 1989 cohort, and 15 years of actual earnings were used for the 1996 cohort. Forecasts were made to estimate lifetime earnings. In forecasting future cohort earnings, the following conservative assumptions were made:

- All graduates were assumed to work until the age of 66.[6] Bachelor's degree recipients work for 44 years, master's degree recipients for 41 years, doctorate degree recipients for 39 years, and professional school graduates for 40 years.
- All historical cohort earnings were converted into year 2011 dollars.
- For the future years in which actual earnings data were unavailable, the earnings of each level of higher educational attainment were assumed to increase by 4 percent annually in constant dollar terms,[7] while earnings for high school graduates was projected to remain flat in constant dollar terms.
- In cases where the earnings for a cohort of graduates were lower than that of the preceding comparison (next lower) level of educational attainment, the gains from achieving that level of educational attainment were assumed to be $0—i.e. there are no negative returns (losses) to education.
- It is assumed that cohort graduates begin to work the year after they graduate. Given that many students graduate in the fall and summer, this is likely to undercount post-graduation earnings.
- Over the projection period, the pool of employed graduates is assumed to shrink by 2 percent per year due to graduates leaving the state; leaving the workforce; or becoming self-employed, independent contractors, or federal employees.
- Because the income flows estimated take place well into the future, discounting was used to estimate the present value of all projected income flows. Discounting is a technique used in financial analysis to equate the value of a dollar received in some future period with today's dollars.

1.1 The Incremental Earnings of USM Graduates

Figures 1 through 4 are graphical representations of the average incremental earnings for the 1986 cohort of University System of Maryland graduates. The average earnings and the incremental earnings effect of each of the four degree levels are as follows:[8]

FIGURE 1—THE AVERAGE EARNINGS OF A 1986 UNIVERSITY SYSTEM OF MARYLAND BACHELOR'S DEGREE RECIPIENT IN 2010[9] WERE $85,830, WITH INCREMENTAL EARNINGS OF $53,482 MORE THAN A PERSON WHOSE HIGHEST LEVEL OF EDUCATIONAL ATTAINMENT WAS A HIGH SCHOOL DEGREE.

FIGURE 1: Individual Incremental Earnings
1986 Cohort - Bachelor's vs. High School Graduate Earnings

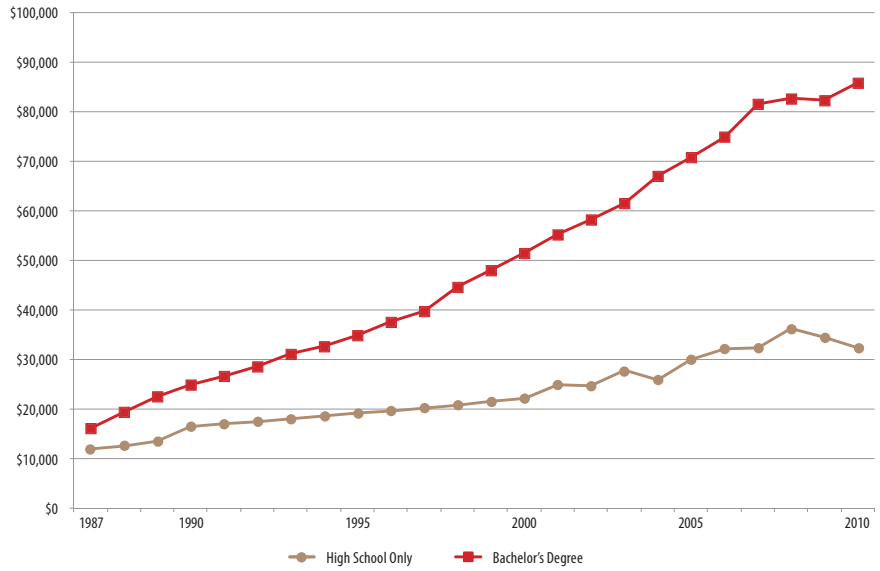
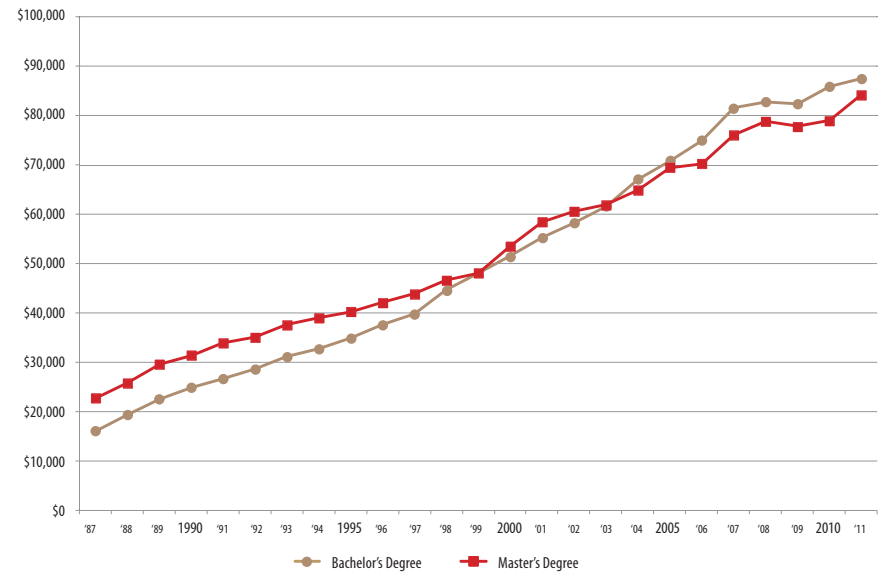


FIGURE 2—THE AVERAGE 2011 EARNINGS FOR 1986 MASTER'S DEGREE RECIPIENTS WERE $84,147, A LEVEL OF EARNINGS $3,296 BELOW THE EARNINGS OF THE AVERAGE USM BACHELOR'S DEGREE RECIPIENT.[10]

FIGURE 2: Individual Incremental Earnings
1986 Cohort - Master's vs. Bachelor's Graduate Earnings



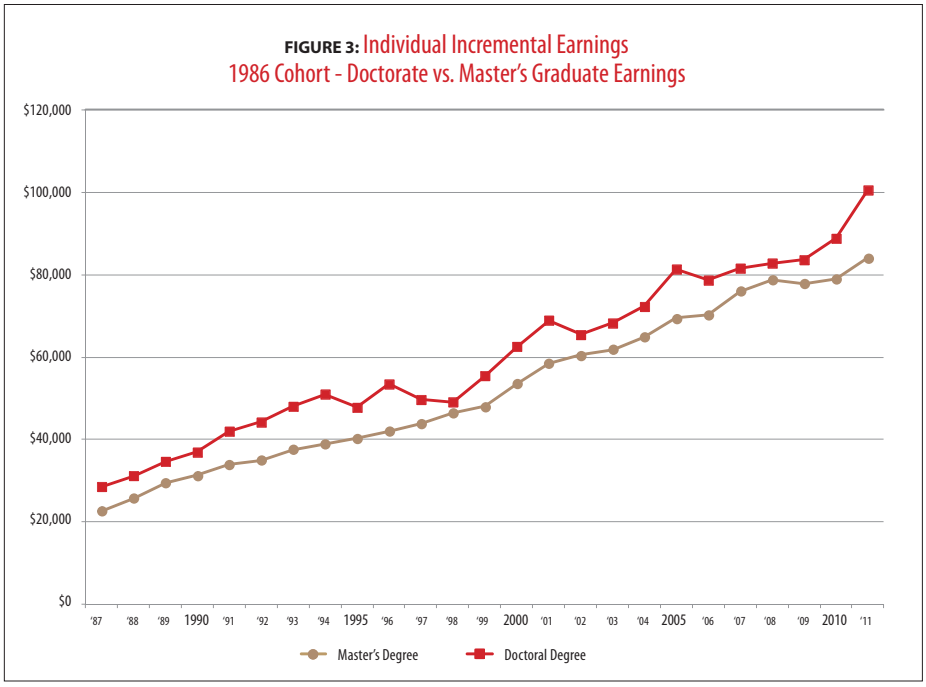


FIGURE 3—THE AVERAGE 2011 EARNINGS FOR 1986 DOCTORAL DEGREE RECIPIENTS WERE $100,558, WITH INCREMENTAL EARNINGS OF $16,411 MORE THAN THE AVERAGE USM MASTER'S DEGREE RECIPIENT.

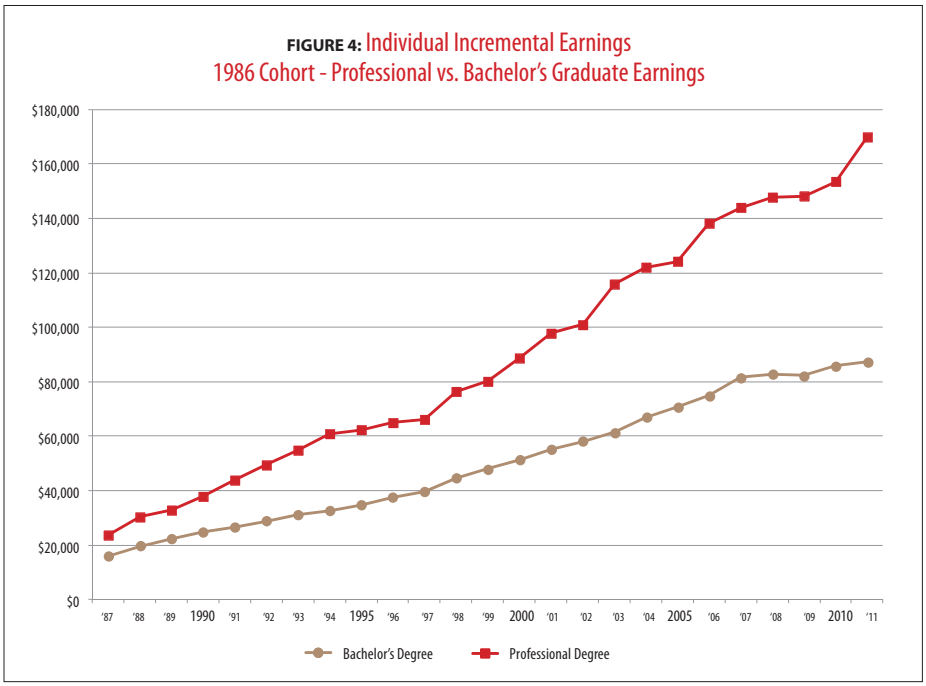


FIGURE 4—THE AVERAGE 2011 EARNINGS FOR A 1986 PROFESSIONAL SCHOOL GRADUATE WERE $169,983, WITH INCREMENTAL EARNINGS OF $82,541 MORE THAN THE AVERAGE USM BACHELOR'S DEGREE RECIPIENT.

Figures 5 through 8 are graphical representations of the average incremental earnings for the 1989 cohort of University System of Maryland graduates.

FIGURE 5—THE AVERAGE EARNINGS OF A 1989 UNIVERSITY SYSTEM OF MARYLAND BACHELOR'S DEGREE RECIPIENT IN 2010[11] WERE $80,212, WITH INCREMENTAL EARNINGS OF $44,928 MORE THAN A PERSON WHOSE HIGHEST LEVEL OF EDUCATIONAL ATTAINMENT WAS A HIGH SCHOOL DEGREE.

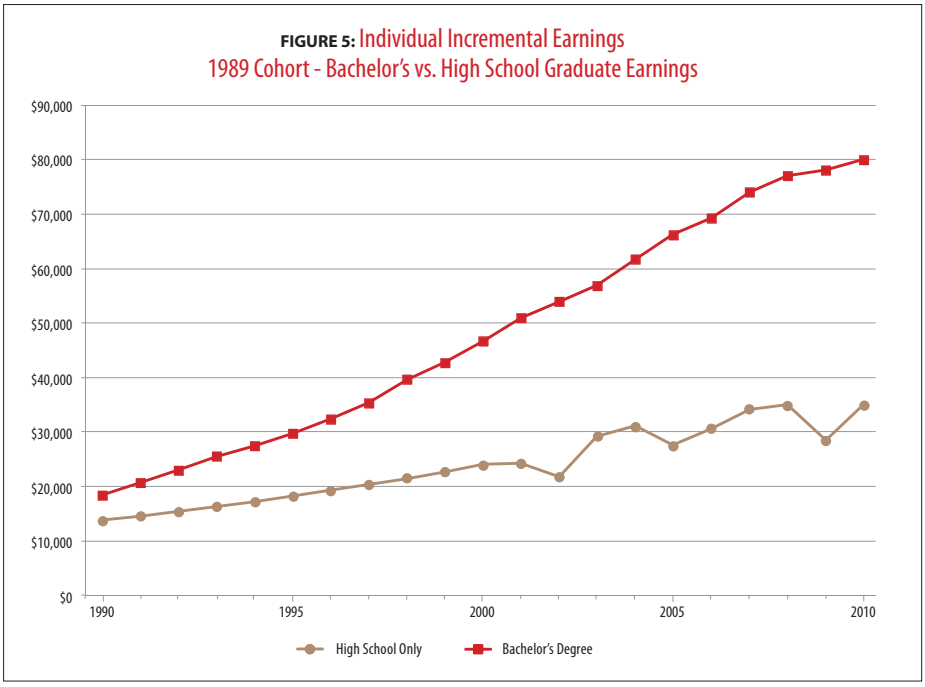


FIGURE 6—THE AVERAGE 2011 EARNINGS FOR 1989 MASTER'S DEGREE RECIPIENTS WERE $87,029, A LEVEL OF EARNINGS $3,945 ABOVE THE EARNINGS OF THE AVERAGE USM BACHELOR'S DEGREE RECIPIENT.

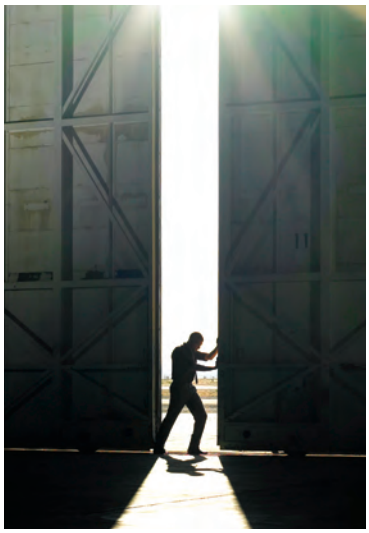


FIGURE 7: Individual Incremental Earnings
1989 Cohort - Doctorate vs. Master's Graduate Earnings

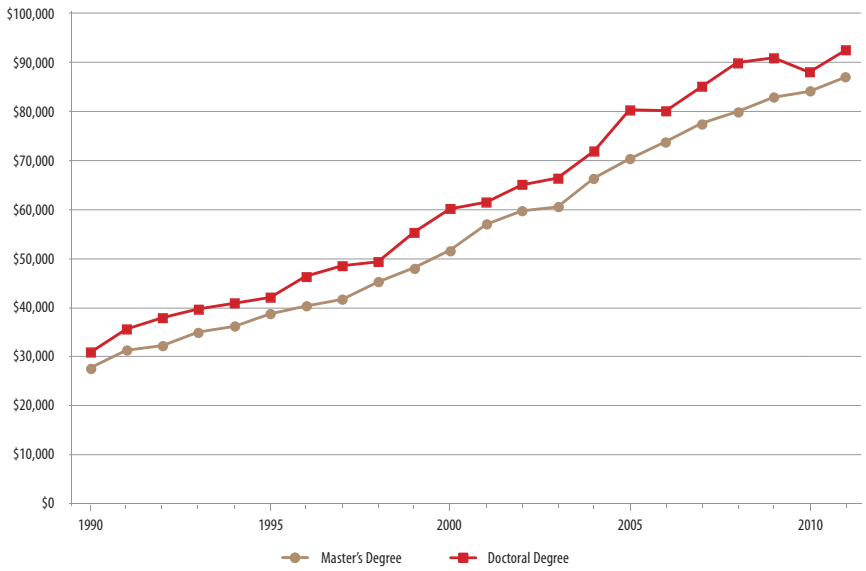


FIGURE 7—THE AVERAGE 2011 EARNINGS FOR 1989 DOCTORAL DEGREE RECIPIENTS WERE $92,585, WITH INCREMENTAL EARNINGS OF $5,556 MORE THAN THE AVERAGE USM MASTER'S DEGREE RECIPIENT.

FIGURE 8: Individual Incremental Earnings
1989 Cohort - Professional vs. Bachelor's Graduate Earnings

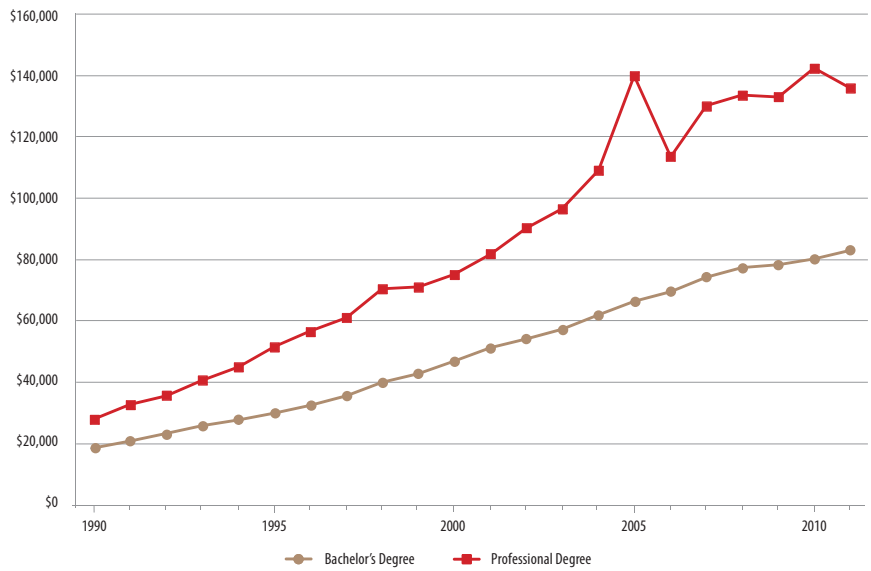


FIGURE 8—THE AVERAGE 2011 EARNINGS FOR A 1989 PROFESSIONAL SCHOOL GRADUATE WERE $135,889, WITH INCREMENTAL EARNINGS OF $52,805 MORE THAN THE AVERAGE USM BACHELOR'S DEGREE RECIPIENT.

Figures 9 through 12 are graphical representations of the average incremental earnings for the 1996 cohort of University System of Maryland graduates.

FIGURE 9—THE AVERAGE EARNINGS OF A 1996 UNIVERSITY SYSTEM OF MARYLAND BACHELOR'S DEGREE RECIPIENT IN 2010[12] WERE $70,197, WITH INCREMENTAL EARNINGS OF $37,849 MORE THAN A PERSON WHOSE HIGHEST LEVEL OF EDUCATIONAL ATTAINMENT WAS A HIGH SCHOOL DEGREE.

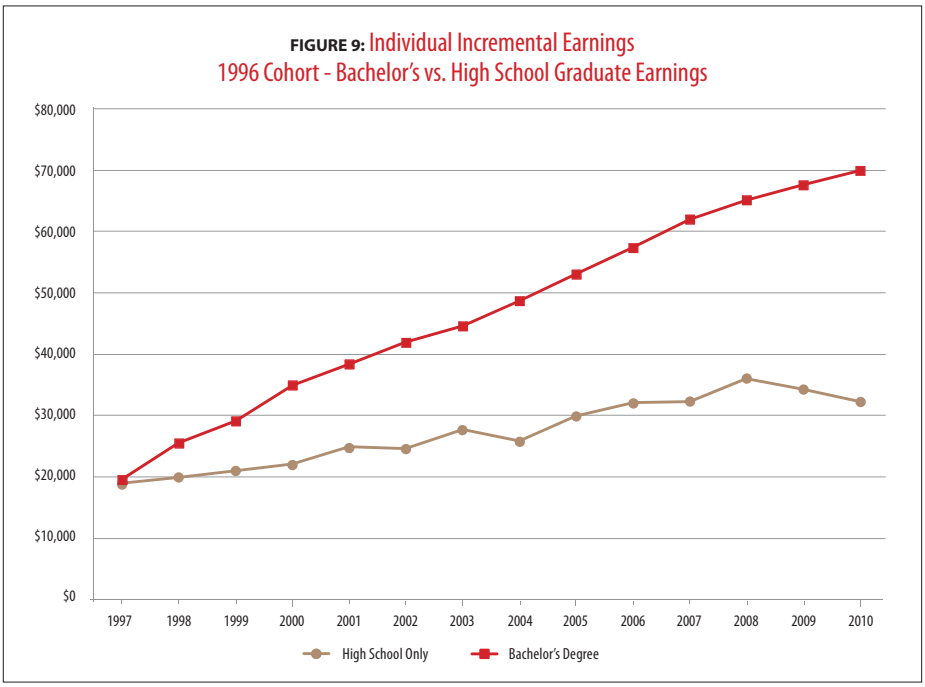


FIGURE 10—THE AVERAGE 2011 EARNINGS FOR 1996 MASTER'S DEGREE RECIPIENTS WERE $79,778, A LEVEL OF EARNINGS $7,270 ABOVE THE EARNINGS OF THE AVERAGE USM BACHELOR'S DEGREE RECIPIENT.

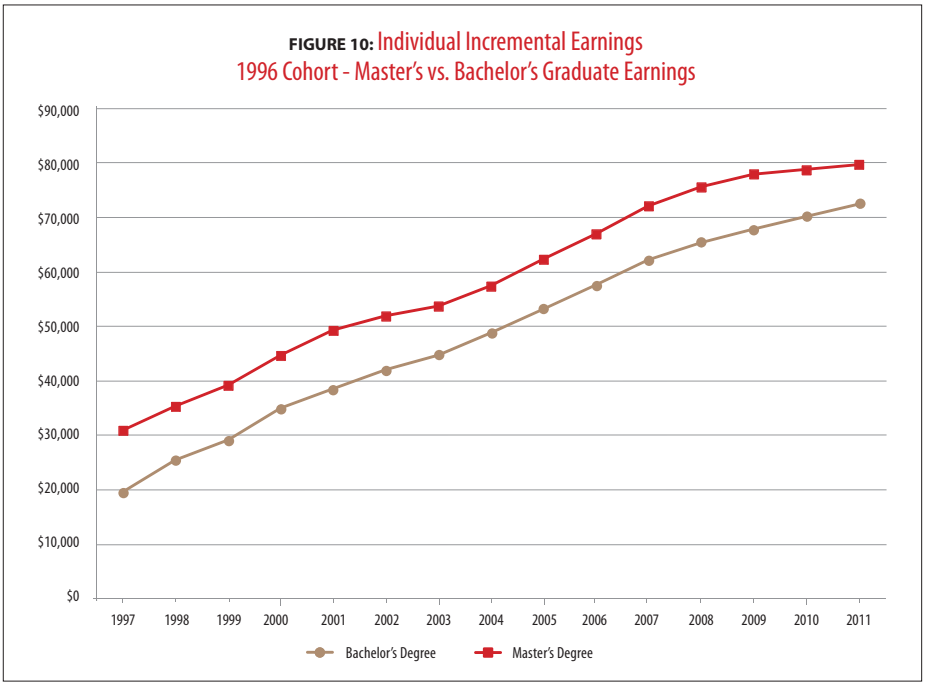


FIGURE 11—THE AVERAGE 2011 EARNINGS FOR 1996 DOCTORAL DEGREE RECIPIENTS WERE $94,358, WITH INCREMENTAL EARNINGS OF $14,580 MORE THAN THE AVERAGE USM MASTER'S DEGREE RECIPIENT.

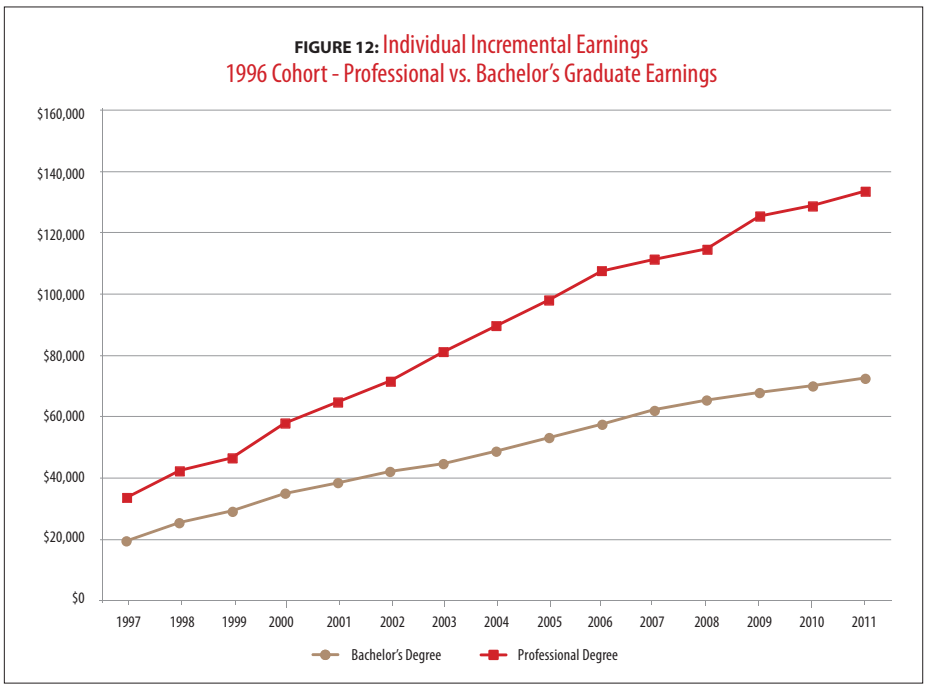


FIGURE 12—THE AVERAGE 2011 EARNINGS FOR A 1996 PROFESSIONAL SCHOOL GRADUATE WERE $133,523, WITH INCREMENTAL EARNINGS OF $61,014 MORE THAN THE AVERAGE USM BACHELOR'S DEGREE RECIPIENT.

The education-based, incremental earnings of the 1986, 1989, and 1996 cohorts of graduates described above will continue over their entire working lives. The graduates will benefit from this additional income, and the state will benefit from the increased economic activity, income taxes, and sales taxes supported by this income.[13] The lifetime increased earnings and the increased state income and sales tax revenues were estimated for each of the three cohorts of graduates analyzed and are shown in **Table 1**.

The average individual lifetime earnings and additional state income and sales taxes paid by the 1986 cohort of graduates are as follows:

- A 1986 USM bachelor's degree recipient can expect to earn nearly $2.7 million in additional income over his/her lifetime ($1.5 million in discounted terms). The average bachelor's degree recipient will pay $180,667 in additional state income and sales taxes over his/her lifetime ($100,822 in discounted terms).

- A 1986 USM master's degree recipient can expect to earn $114,603 in additional income over his/her lifetime ($101,361 in discounted terms) and pay more than $7,335 in additional state income and sales taxes over his/her lifetime ($6,487 in discounted terms).

- A 1986 USM doctoral degree recipient can expect to earn $567,161 in additional income over his/her lifetime ($363,675 in discounted terms) and pay more than $37,436 in additional state income and sales taxes over his/her lifetime ($23,878 in discounted terms).

- A 1986 USM professional degree recipient can expect to earn almost $2.9 million in additional income over his/her lifetime ($1.7 million in discounted terms) and pay $190,945 in additional state income and sales taxes over his/her lifetime ($114,835 in discounted terms).

The average individual lifetime earnings and additional state income and sales taxes paid by the 1989 cohort of graduates are as follows:

- A 1989 USM bachelor's degree recipient can expect to earn $2.8 million in additional income over his/her lifetime ($1.6 million in discounted terms). The average bachelor's degree recipient will pay $188,909 in additional state income and sales taxes over his/her lifetime ($104,826 in discounted terms).

- A 1989 USM master's degree recipient can expect to earn $170,695 in additional income over his/her lifetime ($145,246 in discounted terms) and pay more than $10,967 in additional state income and sales taxes over his/her lifetime ($9,324 in discounted terms).

- A 1989 USM doctoral degree recipient can expect to earn $298,875 in additional income over his/her lifetime ($202,510 in discounted terms) and pay more than $19,639 in additional state income and sales taxes over his/her lifetime ($13,241 in discounted terms).

- A 1989 USM professional degree recipient can expect to earn more than $2.3 million in additional income over his/her lifetime ($1.4 million in discounted terms) and pay $153,902 in additional state income and sales taxes over his/her lifetime ($95,233 in discounted terms).

The average individual lifetime earnings and additional state income and sales taxes paid by the 1996 cohort of graduates are as follows:

- A 1996 USM bachelor's degree recipient can expect to earn $3.4 million in additional income over his/her lifetime ($1.9 million in discounted terms). The average bachelor's degree recipient will pay $228,554 in additional state income and sales taxes over his/her lifetime ($124,908 in discounted terms).

- A 1996 USM master's degree recipient can expect to earn $503,545 in additional income over his/her lifetime ($157,385 in discounted terms) and pay more than $33,135 in additional state income and sales taxes over his/her lifetime ($13,407 in discounted terms).

- A 1996 USM doctoral degree recipient can expect to earn $700,571 in additional income over his/her lifetime ($423,760 discounted terms) and pay more than $46,397 in additional state income and sales taxes over his/her lifetime ($27,954 in discounted terms).

- A 1996 USM professional degree recipient can expect to earn almost $3.3 million in additional income over his/her lifetime ($2.0 million in discounted terms) and pay $217,399 in additional state income and sales taxes over his/her lifetime ($132,328 in discounted terms).

TABLE 1

Individual Incremental Lifetime Earnings and Taxes Paid 1986, 1989, and 1996 Cohorts of USM Graduates, By Type of Degree

(Non-Discounted and Discounted Dollars)

TYPE OF DEGREE	EARNINGS (U.S. $)		TAX IMPACT (U.S. $)	
	NON-DISCOUNTED	DISCOUNTED	NON-DISCOUNTED	DISCOUNTED
1986 COHORT				
BACHELOR'S	$2,716,639	$1,522,407	$180,667	$100,822
MASTER'S	114,603	101,361	7,335	6,487
DOCTORATE	567,161	363,675	37,436	23,878
FIRST PROFESSIONAL	2,883,530	1,741,637	190,945	114,835
1989 COHORT				
BACHELOR'S	2,831,664	1,576,954	188,909	104,826
MASTER'S	170,695	145,246	10,967	9,324
DOCTORATE	298,875	202,510	19,639	13,241
FIRST PROFESSIONAL	2,323,178	1,443,806	153,902	95,233
1996 COHORT				
BACHELOR'S	3,407,581	1,882,541	228,544	124,908
MASTER'S	503,545	157,385	33,135	13,407
DOCTORATE	700,571	423,760	46,397	27,954
FIRST PROFESSIONAL	3,286,436	2,009,363	217,399	132,328

SOURCE: USM, DLLR, JFI

1.2 Total Cohort Incremental Earnings of and Taxes Paid by USM Graduates

The additional earnings of USM graduates working in Maryland are earned and spent in the Maryland economy. The increase in individual incomes can be aggregated for each of the three cohorts to estimate the total increase in earnings, and the resulting increase in economic activity in the state attributable to each cohort. The results for the three cohorts are presented in **Table 2** and are as follows:

- The 1986 cohort of USM graduates will earn $12.0 billion in additional income over their lifetimes ($7.2 billion in discounted terms). The 1986 graduates will pay $796.3 million in additional Maryland income and sales taxes ($471.3 million in discounted 2011 dollars).
- The 1989 cohort of USM graduates will earn $13.3 billion in additional income over their lifetimes ($7.9 billion in discounted terms) and will pay nearly $883.8 million in additional Maryland income and sales taxes ($521.8 million in discounted 2011 dollars).
- The 1996 cohort of USM graduates will earn $17.4 billion in additional income over their lifetimes ($10.3 billion in discounted terms) and will pay nearly $1.2 billion in additional Maryland income and sales taxes ($682.5 million in discounted 2011 dollars).

TABLE 2

Total Cohort Lifetime Earnings and Taxes Paid 1986, 1989, and 1996 Cohorts of USM Graduates, By Type of Degree

(Non-Discounted and Discounted Dollars)

TYPE OF DEGREE	EARNINGS (U.S. $)		TAX IMPACT (U.S. $)	
	NON-DISCOUNTED	DISCOUNTED	NON-DISCOUNTED	DISCOUNTED
1986 COHORT	$12,026,774,414	$7,153,346,811	$796,268,711	$471,289,080
BACHELOR'S	11,034,420,401	6,489,279,767	731,114,961	427,913,639
MASTER'S	132,691,093	118,219,088	8,492,230	7,566,022
DOCTORATE	48,417,097	34,121,593	3,166,458	2,220,053
FIRST PROFESSIONAL	811,245,823	511,726,363	53,495,061	33,589,366
1989 COHORT	13,304,678,826	7,890,002,620	883,828,711	521,753,089
BACHELOR'S	12,407,676,744	7,259,419,301	825,029,934	480,625,715
MASTER'S	226,475,765	195,926,397	14,536,483	12,567,075
DOCTORATE	25,977,139	18,799,920	1,695,668	1,221,655
FIRST PROFESSIONAL	644,549,178	415,857,002	42,566,626	27,338,644
1996 COHORT	17,359,375,203	10,276,407,372	1,159,029,472	682,461,547
BACHELOR'S	15,986,317,441	9,296,064,320	1,060,498,794	613,894,393
MASTER'S	432,491,321	374,893,224	36,606,901	28,896,304
DOCTORATE	68,847,732	43,683,371	$4,538,780	2,867,155
FIRST PROFESSIONAL	871,718,709	561,766,458	57,384,997	36,803,695

SOURCE: USM, DLLR, JFI

1.3 The Economic Impact of USM Graduates on Maryland

The 1996 cohort of University System of Maryland graduates will generate $21.8 billion in economic activity over their estimated work life. In turn, this economic activity translates to $1.6 billion in additional state income and sales taxes.

The incremental earnings of University System of Maryland graduates working in Maryland are more than just a source of new state revenues; they also are a source of new economic activity in the state. This activity has multiplier effects as the incremental earnings are spent and then re-spent by other businesses and individuals in the state economy. However, because of economic "leakages" due to taxes and out-of-state spending, these multiplier effects do not continue infinitely. This analysis estimates the multiplier effects using the Regional Input-Output Modeling System (RIMS II) economic model developed by the U.S. Bureau of Economic Analysis.

The RIMS II model allows the estimation of three economic impacts: economic output (a measure similar to gross domestic product that measures economic activity in the state), employment, and earnings. The economic impacts of the incremental earnings of the 1986, 1989, and 1996 cohorts of system graduates are shown in **Tables 3**, **4,** and **5**.[14] It is important to note that these figures represent the impacts of only the three cohorts studied. The actual economic impacts on the state would be the aggregate effect of all USM graduates working in Maryland.

As presented in **Table 3**, the 1986 cohort of University System of Maryland graduates will generate $14.7 billion in economic activity over their estimated work life ($8.7 billion in discounted terms). The economic activity generated by these incremental earnings supports an average of 2,527 annual jobs earning $4.0 billion in salaries and wages. In turn, these incremental earnings, salaries, and wages will generate a total of $1.1 billion in additional state income and sales taxes ($627 million in discounted terms).

As presented in **Table 4**, the 1989 cohort of University System of Maryland graduates will generate $16.2 billion in economic activity over their estimated work life ($9.6 billion in discounted terms). The economic activity generated by these incremental earnings supports an average of 2,919 annual jobs earning $4.4 billion in salaries and wages. In turn, these incremental earnings, salaries, and wages will generate a total of $1.2 billion in additional state income and sales taxes ($694 million in discounted terms).

As presented in **Table 5**, the 1996 cohort of University System of Maryland graduates will generate $21.8 billion in economic activity over their estimated work life ($12.9 billion in discounted terms). The economic activity generated by these incremental earnings supports an average of 3,910 annual jobs earning $5.9 billion in salaries and wages. In turn, these incremental earnings, salaries, and wages will generate a total of $1.6 billion in additional state income and sales taxes ($924 million in discounted terms).

TABLE 3

Statewide Economic Impact of Incremental Income Earned by 1986 USM Cohort by Year, Selected Years

YEAR	OUTPUT	EARNINGS	EMPLOYMENT (# OF JOBS)	FISCAL
1987	$100,069,427	$27,125,527	758	$6,980,848
1988	132,403,773	35,890,303	1,003	9,236,494
1989	151,534,312	41,075,962	1,147	10,571,042
1990	135,106,861	36,623,021	1,023	9,425,062
1991	144,047,899	39,046,642	1,091	10,048,789
1992	151,689,708	41,118,085	1,149	10,581,882
1993	166,400,684	45,105,746	1,260	11,608,120
1994	172,902,222	46,868,099	1,309	12,061,668
1995	185,403,278	50,256,724	1,404	12,933,742
1996	193,297,321	52,396,539	1,464	13,484,431
1997	200,030,731	54,221,744	1,515	13,954,154
1998	231,779,017	62,827,659	1,755	16,168,916
1999	243,781,675	66,081,185	1,846	17,006,222
2000	264,110,040	71,591,535	2,000	18,424,330
2001	266,610,672	72,269,374	2,019	18,598,774
2002	280,552,751	76,048,612	2,124	19,571,375
2003	273,968,999	74,263,974	2,075	19,112,092
2004	317,877,971	86,166,251	2,407	22,175,184
2005	302,894,331	82,104,679	2,294	21,129,924
2006	305,277,330	82,750,632	2,312	21,296,163
2007	333,525,037	90,407,655	2,526	23,266,724
2008	306,420,650	83,060,548	2,320	21,375,921
2009	307,757,916	83,423,037	2,330	22,576,214
2010	329,233,550	89,244,374	2,493	24,151,604
2011	333,028,301	90,273,006	2,522	24,429,975
2015	387,218,169	104,962,095	2,932	28,405,185
2020	457,975,507	124,142,079	3,468	33,595,734
2025	532,704,490	144,398,646	4,034	39,077,633
2030	568,913,887	154,213,821	4,308	41,733,847
TOTAL	$14,685,894,237	$3,980,862,331		$1,059,833,654
		AVERAGE ANNUAL EMPLOYMENT	2,527	
DISCOUNTED TOTAL				
TOTAL	$8,734,951,791	$2,367,757,795		$627,285,766

SOURCE: USM, DLLR, JFI

TABLE 4

Statewide Economic Impact of Incremental Income Earned by 1989 USM Cohort by Year, Selected Years

YEAR	OUTPUT	EARNINGS	EMPLOYMENT (# OF JOBS)	FISCAL
1990	$114,433,416	$31,019,131	905	$7,982,881
1991	129,098,347	34,994,311	1,021	9,005,907
1992	136,567,325	37,018,905	1,080	9,526,944
1993	153,088,675	41,497,299	1,210	10,679,474
1994	156,537,525	42,432,168	1,238	10,920,066
1995	173,971,547	47,157,958	1,375	12,136,264
1996	180,134,089	48,828,420	1,424	12,566,164
1997	189,910,361	51,478,445	1,501	13,248,157
1998	218,538,057	59,238,471	1,728	15,245,226
1999	225,034,428	60,999,423	1,779	15,698,413
2000	240,358,693	65,153,327	1,900	16,767,435
2001	268,587,517	72,805,231	2,123	18,736,679
2002	303,820,533	82,355,742	2,402	21,194,536
2003	253,713,448	68,773,361	2,006	17,699,063
2004	274,124,232	74,306,053	2,167	19,122,921
2005	334,759,430	90,742,258	2,646	23,352,835
2006	308,987,343	83,756,294	2,443	21,554,973
2007	309,762,807	83,966,497	2,449	21,609,070
2008	312,107,324	84,602,018	2,467	21,772,623
2009	359,909,267	97,559,551	2,845	26,401,884
2010	320,521,425	86,882,804	2,534	23,512,508
2011	325,736,873	88,296,540	2,575	23,895,098
2015	381,254,100	103,345,432	3,014	27,967,678
2020	459,429,751	124,536,277	3,632	33,702,414
2025	541,547,172	146,795,606	4,281	39,726,306
2030	599,681,555	162,553,922	4,741	43,990,873
2033	652,682,328	176,920,687	5,160	47,878,854
TOTAL	$16,246,343,314	$4,403,848,691		$1,176,376,015
		AVERAGE ANNUAL EMPLOYMENT	2,919	

DISCOUNTED TOTAL

TOTAL	$9,634,482,199	$2,611,590,867		$694,453,362

SOURCE: USM, DLLR, JFI

TABLE 5

Statewide Economic Impact of Incremental Income Earned by 1996 USM Cohort By Year, Selected Years

YEAR	OUTPUT	EARNINGS	EMPLOYMENT (# OF JOBS)	FISCAL
1997	$79,644,550	$21,589,015	630	$5,556,008
1998	144,402,018	39,142,632	1,142	10,073,492
1999	173,099,521	46,921,580	1,368	12,075,432
2000	228,204,243	61,858,656	1,804	15,919,540
2001	228,984,304	62,070,105	1,810	15,973,957
2002	259,875,333	70,443,645	2,054	18,128,917
2003	243,374,897	65,970,921	1,924	16,977,846
2004	296,549,095	80,384,694	2,344	20,687,280
2005	284,024,776	76,989,764	2,245	19,813,583
2006	290,481,661	78,740,013	2,296	20,264,016
2007	316,756,604	85,862,285	2,504	22,096,957
2008	300,058,198	81,335,897	2,372	20,932,076
2009	328,004,752	88,911,287	2,593	22,881,629
2010	349,851,888	94,833,327	2,766	24,405,686
2011	353,908,159	95,932,848	2,798	24,688,652
2015	421,023,985	114,125,738	3,328	29,370,655
2020	508,153,842	137,743,773	4,017	37,276,669
2025	599,639,589	162,542,547	4,740	43,987,794
2030	696,332,361	188,752,773	5,505	51,080,891
2035	799,128,172	216,617,333	6,318	58,621,689
2040	833,060,990	225,815,402	6,586	61,110,901
TOTAL	$21,764,398,495	$5,899,611,745		$1,572,017,708
		AVERAGE ANNUAL EMPLOYMENT	3,910	
DISCOUNTED TOTAL				
TOTAL	$12,861,867,305	$3,486,428,694		$924,579,834

SOURCE: USM, DLLR, JFI

1.4 The Economic and Fiscal Impact of USM on Maryland's Economy—Effect of Expenditures Originating from Out of State

These three sources of spending total $1.8 billion in out-of-state supported economic activity associated with USM . . . this spending creates a total of $3.7 billion in economic activity in the state and supports 30,098 jobs earning nearly $1.2 billion in FY 2011.

In addition to the economic effects of the incremental earnings of University System of Maryland graduates discussed above, the system contributes to Maryland's economic base by attracting students and spending from outside of the state. This spending is also subject to multiplier effects. Three sources of out-of-state spending were considered in this analysis:

- Non-resident student spending comprising the tuition[15] and estimated living expenditures[16] of out-of-state and international students attracted to Maryland by the high quality of USM institutions
- Non-Maryland sponsored research consisting of federal government grants to USM research centers, faculty, or staff to perform research, training, or other services
- Spending by out-of-state visitors to USM institutions[17]

These three sources of spending total $1.8 billion in out-of-state supported economic activity associated with USM. As shown in Table 6, this spending creates a total of $3.7 billion in economic activity in the state and supports 30,098 jobs earning nearly $1.2 billion in FY 2011. These economic impacts occur in addition to the increases in economic activity associated with the incremental earnings of system graduates. These activities generate an estimated $48.2 million in state income and sales taxes.

TABLE 6
Economic Base Approach Economic Impact (FY 2011)

ITEM	DIRECT IMPACTS	ECONOMIC IMPACT		
		OUTPUT	EARNINGS	EMPLOYMENT
TOTAL	$1,820,120,560	$3,685,234,829	$1,162,770,526	30,098
NON-RESIDENT STUDENT				
TUITION AND FEES	392,177,592	821,415,967	275,779,283	6,697
STUDENT COST OF LIVING	439,700,681	807,226,693	203,754,437	6,436
FEDERAL GRANTS AND CONTRACTS	917,648,614	1,922,015,022	645,290,505	15,671
OUT-OF-STATE VISITORS	70,593,673	134,577,146	37,946,300	1,293

SOURCE: USM, JFI, U.S. BUREAU OF ECONOMIC ANALYSIS

1.5 The Economic Impact of USM Construction Expenditures

The University System of Maryland also generates economic activity through its spending on construction and capital improvements. As presented in **Table 7**, USM has spent between $59.9 million and $241.5 million annually on construction projects over the last five fiscal years. These construction expenditures were generated by the member institutions and do not include any state General Obligation bond fund expenditures. These expenditures have generated between $121.9 and $491.3 million in state economic activity and have supported between 908 and 3,619 jobs. State income and sales tax revenues range from $1.6 to $6.4 million.

TABLE 7

Economic Impact of USM Construction Spending

ITEM	FY2008	FY2009	FY2010	FY2011	FY2012
USM CONSTRUCTION SPENDING	$153,451,844	$59,930,604	$241,497,614	$208,684,626	$156,513,957
ECONOMIC IMPACT					
OUTPUT	312,151,741	121,910,835	491,254,446	424,506,266	318,380,691
EMPLOYMENT COMPENSATION	96,582,591	37,720,322	151,998,598	131,346,104	98,509,885
EMPLOYMENT	2,361	908	3,619	3,074	2,253
ESTIMATED STATE REVENUES[1]	4,037,000	1,577,000	6,354,000	5,490,000	4,118,000

[1]STATE INCOME AND SALES TAXES ONLY. SOURCE: USM, JFI, RIMS II

1.6 The Fiscal Impact of USM

In terms of return on investment, for the 1996 cohort of USM graduates, the state receives $2.70 in revenue for every $1 invested.

The increased income and associated economic impacts of University System of Maryland graduates are an important source of economic activity for Maryland. However, a central goal of this analysis is to compare the state subsidies received by the system to the state revenues derived from the increased earnings of USM graduates. This is done in two analyses.

The first analysis, which is presented in **Table 8**, compares the state subsidy[18] received by the average USM graduate to the incremental tax revenues derived from each graduate. As presented in Table 8, the average state subsidy for a 1986 bachelor's degree recipient is $22,785 while the increase in state revenues is $176,271 for a revenue/cost ratio of 7.7 to 1. The revenue/cost ratio for a 1986 master's degree recipient was 0.6 to 1, for a doctoral degree recipient it was 1.4 to 1, and for a professional degree recipient it was 10.7 to 1. The revenue/cost ratios for the 1989 cohort of graduates ranged from a low of 0.6 to 1 for a doctoral degree recipient to 6.9 to 1 for a professional degree recipient. The revenue/cost ratios for the 1996 cohort of graduates ranged from a low of 1.3 to 1 for a doctoral degree recipient to 9.7 to 1 for a professional degree recipient.

TABLE 8

Fiscal Impact of USM Per Student Revenues and Costs

ITEM	BACHELOR'S	MASTER'S	DOCTORATE	PROFESSIONAL
1986 COHORT				
INCREASE IN TAX REVENUES	$176,271	$7,335	$37,436	$190,945
STATE PER STUDENT TAX SUBSIDY	22,785	13,057	27,337	17,789
REVENUE/COST RATIO	7.7	0.6	1.4	10.7
1989 COHORT				
INCREASE IN TAX REVENUES	181,848	10,967	19,639	153,902
STATE PER STUDENT TAX SUBSIDY	28,979	15,282	35,366	22,310
REVENUE/COST RATIO	6.3	0.7	0.6	6.9
1989 COHORT				
INCREASE IN TAX REVENUES	217,370	33,135	46,397	217,399
STATE PER STUDENT TAX SUBSIDY	29,499	14,867	36,846	22,321
REVENUE/COST RATIO	7.4	2.2	1.3	9.7

SOURCE: USM, JFI

The revenue/cost figures in Table 8 above include only the income and subsidy received by graduates appearing in the DLLR data. This analysis overestimates the actual revenue benefits to the state because it does not include the subsidy costs for USM graduates who leave Maryland. Nor does that analysis include the multiplier effects of the incremental income derived from a USM degree. Several steps were undertaken to derive a more complete estimate of the state revenue/cost ratio for the University System of Maryland. The state subsidy for each cohort of students was increased to reflect the effects of graduates not appearing in the DLLR data.[19] The total number of graduates in each degree cohort was multiplied by the average subsidy received per degree type for each cohort of graduates to derive a total cohort subsidy. State revenue estimates were also increased to include the economic multiplier effects. These adjustments make it possible to compare the total cost of each cohort to the economic benefits derived from each cohort. This provides the most complete measure of the fiscal revenue/cost ratio for the University System of Maryland. The results of this analysis are presented in **Table 9** using both aggregate and discounted tax revenues and are as follows:

- The state fiscal revenue/cost ratio for the 1986 cohort of USM graduates is 3.1 to 1, signifying that the state receives $3.10 in revenue for each $1 invested. Using the discounted present value of future tax revenues, the state fiscal revenue/cost ratio for the 1986 cohort of USM graduates is 1.8 to 1, signifying that the state receives $1.80 in revenue for each $1 invested.
- The revenue/cost ratio for the 1989 cohort was lower, due to higher levels of state appropriations, but the net fiscal return to the state remains positive at $2.50 for every $1 invested in undiscounted terms and $1.50 for every $1 invested in discounted terms.
- The revenue/cost ratio for the 1996 cohort was $2.70 for every $1 invested in undiscounted terms and $1.60 for every $1 invested in discounted terms.

TABLE 9

Fiscal Impact of USM Cohort Costs and Benefits, Including Multiplier Effects and Attrition

ITEM	1986 COHORT	1989 COHORT	1996 COHORT
INCREASE IN TAX REVENUES	$1,059,833,654	$1,176,376,015	$1,572,017,708
STATE COHORT SUBSIDY	340,112,606	473,618,798	576,639,485
REVENUE/COST RATIO	3.1	2.5	2.7

SOURCE: USM, JFI

The tax benefits computed above do not include any tax effects from the contributions of USM institutions to Maryland's economic base described in Section 2.4 and Table 6 of this report. Thus, the fiscal and economic benefits to the state are even greater than presented above.

SECTION 2.0

THE WORKFORCE DEVELOPMENT IMPACT OF THE UNIVERSITY SYSTEM OF MARYLAND

The economic impacts of the system are both significant and important, but are not the only impacts that the system has on the state of Maryland. The primary impact is through the educational training and services the system provides. Universities are vital in providing a workforce with the training and skills required by the business community, particularly with the growing importance of advanced technology in today's market. According to the Maryland Governor's Workforce Investment Board, 38 percent of projected Maryland job openings for the 2008–2018 period are "high-skill jobs," which require at least a bachelor's degree.[20]

According to the Jacob France Institute's 2011 annual Maryland Business Climate Survey,[21] 38 percent of surveyed firms in Maryland experienced worker shortages, with 18 percent of firms reporting difficulty in finding sales or marketing personnel, 8 percent reporting difficulty in finding managers, and 9 percent reporting difficulty in finding engineers or scientists. Firms were asked to rate the effectiveness of Maryland's educational institutions in providing a skilled and educated workforce:

- Fifty-one percent of firms rated four-year colleges and universities as good and 36 percent rated them as excellent.
- Forty-eight percent of firms rated Maryland's graduate and professional schools as good and 36 percent rated them as excellent.

2.1 Importance of Higher Education

In addition to the earnings impacts described in the previous section, the University System of Maryland also improves Maryland's competitiveness by providing a better-educated local workforce. By preparing new entrants to the workforce, as well as providing the ability to upgrade the skill set and training of the existing workforce, institutions of higher education are essential in ensuring the high-quality, highly skilled workforce that is of critical importance to Maryland's economic competitiveness. The presence of highly educated and skilled workers in an area creates an "industrial competitive advantage" that enables businesses to compete more effectively regionally, nationally, and globally.

Maryland has the distinction of having one of the most well-educated resident populations in the nation. According to the Bureau of the Census' 2011 American Community Survey, 36.8 percent of Maryland's population that is 25 years and older has completed a bachelor's degree or higher. By comparison, this percentage across the United States is 28.5 percent. This places Maryland third in educational attainment compared to all 50 states and the District of Columbia. According to the Maryland Department of Business and Economic Development:[22]

- Maryland has the highest concentration of employed doctoral scientists and engineers. The state ranks first in employed doctoral scientists and engineers per 100,000 employed workers. Maryland also ranks first in mathematical sciences, first in biological sciences, first in health, and third in physical sciences.
- Maryland ranks second in the percentage of professional and technical workers (26.1 percent) in the workforce.

- Maryland ranks second in the percentage of the population age 25 and above with a bachelor's degree or higher (36.9 percent) and second also in the percentage with a graduate or professional degree (16.5 percent).

The presence of the University System of Maryland contributes to this competitive advantage in industries that are vital for Maryland's future.

2.1.1 USM's High Quality

The quality of USM institutions allows them to attract increasing numbers of top students. The system's highly recognized universities provide the most current and technology-driven education and training. Examples of this national recognition include:

- *U.S. News & World Report* ranked the University of Maryland, College Park (UMCP) among the top 25 national, public universities in 2011. Among all of the ranking surveys, UMCP had 30 programs overall in the magazine's Top 10 rankings (undergraduate and graduate).

- According to the Academic Ranking of World Universities, which is maintained by the Shanghai Ranking Consultancy, UMCP ranks 38 among the world's research universities in 2012. (UMCP is No. 13 among U.S. public universities, No. 29 among all U.S. universities).

- *U.S. News & World Report* ranks Salisbury University and Towson University as top public comprehensive universities in the north. Salisbury and Towson also ranked in the top 50 regional public and private universities.

- The National Security Agency and the Department of Homeland Security named Bowie State University a National Center for Academic Excellence in Information Assurance Education.

- The University of Maryland, Baltimore's School of Nursing is ranked 11th among all U.S. public and private graduate nursing programs, according to *U.S. News & World Report*.

It is clear from these national and international rankings that USM has a strong reputation for high-quality educational programs and research.

2.2 USM's Role in Maryland Higher Education

Increasing the number of well-educated residents in Maryland is a key goal of USM. In 2011, the system accounted for more than two-thirds (69 percent) of the total enrollment of Maryland's four-year degree-granting institutions, including 68 percent of the state's full-time undergraduate enrollment; 87 percent of part-time undergraduate enrollment; and 62 percent and 63 percent, respectively, of both the full-time and part-time graduate/professional enrollment (see **Table 10**).

TABLE 10

USM's Share of Total Maryland Enrollment at Four-Year Degree-Granting Institutions, 2011 Enrollment Cycle

	ALL MARYLAND INSTITUTIONS	UNIVERSITY SYSTEM OF MARYLAND	PERCENT OF TOTAL	MORGAN & ST. MARY'S	PERCENT OF TOTAL	INDEPENDENT UNIVERSITIES	PERCENT OF TOTAL
FULL-TIME UNDERGRADUATE	116,063	78,723	67.8	7,865	6.8	29,475	25.4
PART-TIME UNDERGRADUATE	37,084	32,402	87.4	808	2.2	3,874	10.4
FULL-TIME GRADUATE/PROFESSIONAL	28,682	17,637	61.5	753	2.6	10,292	35.9
PART-TIME GRADUATE/PROFESSIONAL	42,791	26,845	62.7	584	1.4	15,362	35.9
TOTAL	224,620	155,607	69.3	10,010	4.5	59,003	26.3

SOURCE: MARYLAND HIGHER EDUCATION COMMISSION (MHEC)

2.2.1 Undergraduate Education – Degrees Awarded

As presented in **Table 11**, USM schools awarded 21,227 bachelor's degrees (74 percent of total bachelor's degrees awarded) in 2011. Of those degrees, 843 were in engineering, 1,393 were in computer science, 1,314 were in health, 1,289 were in biological sciences, 1,193 were in education, 2,554 were in social sciences, and 4,063 were in business. Of all the degrees awarded across the state in these fields, system schools graduated 67 percent of engineering majors, 60 percent of health majors, 76 percent of social science majors, 73 percent of biological science majors, 80 percent of business majors, 89 percent of computer science majors, and 83 percent of education majors.

TABLE 11

Bachelor's Degrees Awarded by USM and Other Four-Year Colleges and Universities in Maryland in 2011

	ALL MARYLAND INSTITUTIONS	UNIVERSITY SYSTEM OF MARYLAND	PERCENT OF TOTAL	MORGAN & ST. MARY'S	PERCENT OF TOTAL	INDEPENDENT UNIVERSITIES	PERCENT OF TOTAL
TOTAL DEGREES	47,879	32,439	68	1,494	3	13,946	29
TOTAL BACHELOR'S DEGREES	28,644	21,227	74	1,223	4	6,194	22
AGRICULTURE	186	186	100	0	0	0	0
ARCHITECTURE	91	66	73	25	27	0	0
AREA STUDIES	152	128	84	3	2	21	14
BIO SCIENCES	1,776	1,289	73	99	6	388	22
BUSINESS	5,086	4,063	80	162	3	861	17
COMMUNICATIONS	1,772	1,458	82	90	5	224	13
COMPUTER SCIENCE	1,571	1,393	89	20	1	158	10
EDUCATION	1,433	1,193	83	54	4	186	13
ENGINEERING	1,265	843	67	90	7	332	26
ENGLISH	998	683	68	70	7	245	25
HEALTH	2,186	1,314	60	68	3	804	37
HISTORY	718	549	76	28	4	141	20
HUMAN SCIENCES	302	224	74	36	12	42	14
HUMANITIES	373	203	54	0	0	170	46
INTERDISCIPLINARY STUDIES	573	341	60	8	1	224	39
LANGUAGES	339	251	74	14	4	74	22
LAW	163	112	69	--	--	51	31
LIBRARY SCIENCE	--	--	--	--	--	--	--
MATHEMATICS	336	235	70	26	8	75	22
PHYSICAL SCIENCES	405	281	69	19	5	105	26
PSYCHOLOGY	2,020	1,488	74	123	6	409	20
PUBLIC AFFAIRS	510	328	64	34	7	148	29
RECREATION	657	605	92	0	0	52	8
SECURITY & PROTECTIVE SERVICES	429	427	100	0	0	2	0
SOCIAL SCIENCES	3,348	2,554	76	179	5	615	18
THEOLOGY	345	109	32	13	4	223	65
VISUAL & PERFORMING ARTS	1,436	769	54	62	4	605	42

SOURCE: MHEC

2.2.2 Graduate Education – Degrees Awarded

As presented in **Table 12**, the University System of Maryland offers master's degrees in 28 areas. USM institutions awarded more than half (55 percent) of all master's degrees given by all public and private universities in Maryland in FY2011. The system accounted for 32 percent of graduate biological science degrees awarded, 51 percent of graduate health degrees, 64 percent of graduate computer science degrees, 47 percent of graduate engineering degrees, and 73 percent of graduate business degrees in Maryland. The system also awarded 100 percent of all graduate degrees in several programs, including agriculture, library sciences, and natural resources.

TABLE 12

Master's Degrees Awarded by USM and Other Four-Year Colleges and Universities in Maryland in 2011

	ALL MARYLAND INSTITUTIONS	UNIVERSITY SYSTEM OF MARYLAND	PERCENT OF TOTAL	MORGAN & ST. MARY'S	PERCENT OF TOTAL	INDEPENDENT UNIVERSITIES	PERCENT OF TOTAL
TOTAL DEGREES	47,879	32,439	68	1,494	3	13,946	29
TOTAL MASTER'S DEGREES	16,584	9,201	55	239	1	7,144	43
AGRICULTURE	31	31	100	0	0	0	0
ARCHITECTURE	50	25	50	25	50	0	0
AREA STUDIES	17	13	76	4	24	0	0
BIO SCIENCES	639	202	32	2	0	435	68
BUSINESS	4,676	3,429	73	33	1	1,214	26
COMMUNICATIONS	148	65	44	3	2	80	54
COMPUTER SCIENCE	1,345	856	64	0	0	489	36
EDUCATION	3,077	1,313	43	44	1	1,720	56
ENGINEERING	894	419	47	16	2	459	51
ENGLISH	195	75	38	4	2	116	59
HEALTH	1,780	916	51	46	3	818	46
HISTORY	55	32	58	2	4	21	38
HUMAN SCIENCES	26	5	19	0	0	21	81
HUMANITIES	143	20	14	0	0	123	86
INTERDISCIPLINARY STUDIES	272	163	60	3	1	106	39
LANGUAGES	12	8	67	0	0	4	33
LAW	126	67	53	0	0	59	47
LIBRARY SCIENCE	149	149	100	0	0	0	0
MATHEMATICS	117	41	35	2	2	74	63
NATURAL RESOURCES	32	32	100	0	0	0	0
PHYSICAL SCIENCES	189	54	29	0	0	135	71
PSYCHOLOGY	279	165	59	0	0	114	41
PUBLIC AFFAIRS	870	764	88	43	5	63	7
RECREATION	28	18	64	0	0	10	36
SECURITY & PROTECTIVE SERVICES	55	38	69	0	0	17	31
SOCIAL SCIENCES	890	166	19	7	1	717	81
THEOLOGY	196	16	8	0	0	180	92
VISUAL & PERFORMING ARTS	293	119	41	5	2	169	58

SOURCE: MHEC

2.2.3 Doctoral Education – Degrees Awarded

As presented in **Table 13**, system schools accounted for 62 percent of all doctoral degrees awarded by public and private colleges and universities in Maryland in 2011. University System of Maryland schools issued 35 percent of biological science doctoral degrees, 78 percent of the doctoral mathematics degrees, 73 percent of the doctoral physical science degrees, 89 percent of the doctoral computer science degrees, and 68 percent of the doctoral engineering degrees. Additionally, system schools awarded 100 percent of doctoral degrees in several programs in 2011, including agriculture, architecture, communications, human sciences, library sciences, natural resources, public affairs, and recreation.

TABLE 13

Doctoral Degrees Awarded by USM and Other Four-Year Colleges and Universities in Maryland in 2011

	ALL MARYLAND INSTITUTIONS	UNIVERSITY SYSTEM OF MARYLAND	PERCENT OF TOTAL	MORGAN & ST. MARY'S	PERCENT OF TOTAL	INDEPENDENT UNIVERSITIES	PERCENT OF TOTAL
TOTAL DEGREES	47,879	32,439	68	1,494	3	13,946	29
TOTAL DOCTORAL DEGREES	1,265	788	62	32	3	445	35
AGRICULTURE	17	17	100	0	0	0	0
ARCHITECTURE	3	3	100	0	0	0	0
AREA STUDIES	14	11	79	0	0	3	21
BIO SCIENCES	252	88	35	1	0	163	65
BUSINESS	23	17	74	6	26	0	0
COMMUNICATIONS	9	9	100	0	0	0	0
COMPUTER SCIENCE	56	50	89	0	0	6	11
EDUCATION	97	77	79	8	8	12	12
ENGINEERING	208	141	68	5	2	62	30
ENGLISH	14	10	71	2	14	2	14
HEALTH	107	36	34	4	4	67	63
HISTORY	17	9	53	2	12	6	35
HUMAN SCIENCES	4	4	100	0	0	0	0
HUMANITIES	4	0	0	0	0	4	100
INTERDISCIPLINARY STUDIES	40	36	90	0	0	4	10
LANGUAGES	23	13	57	0	0	10	43
LIBRARY SCIENCE	1	1	100	0	0	0	0
MATHEMATICS	45	35	78	0	0	10	22
NATURAL RESOURCES	1	1	100	0	0	0	0
PHYSICAL SCIENCES	111	81	73	0	0	30	27
PSYCHOLOGY	35	27	77	4	11	4	11
PUBLIC AFFAIRS	23	23	100	0	0	0	0
RECREATION	3	3	100	0	0	0	0
SOCIAL SCIENCES	90	56	62	0	0	34	38
THEOLOGY	12	4	33	0	0	8	67
VISUAL & PERFORMING ARTS	56	36	64	0	0	20	36

SOURCE: MHEC

2.2.4 Professional Education – Degrees Awarded

As presented in **Table 14**, USM schools accounted for 88 percent of all professional degrees awarded by four-year public and private colleges and universities in Maryland. The University of Maryland, Baltimore and the University of Baltimore are the only two schools in Maryland that offer a professional law degree. The University of Maryland, Baltimore is one of two four-year colleges and universities in Maryland that offers a professional degree in medicine, and is the only school to offer professional degrees in pharmacy and dentistry. USM institutions accounted for all professional law degrees awarded and 82 percent of all health-related professional degrees awarded, including 60 percent of medical degrees and all dentistry and pharmacy degrees awarded. These professional degrees awarded by USM have a significant impact on the state's economy by providing advanced candidates for numerous high-wage occupations for which there is great demand by Maryland businesses, nonprofits, and government.

TABLE 14

Professional Degrees Awarded by USM and Other Four-Year Colleges and Universities in Maryland in 2011

INSTITUTIONS	ALL MARYLAND	UNIVERSITY SYSTEM OF MARYLAND	PERCENT OF TOTAL	MORGAN & ST. MARY'S	PERCENT OF TOTAL	INDEPENDENT UNIVERSITIES	PERCENT OF TOTAL
TOTAL DEGREES	47,879	32,439	68	1,494	3	13,946	29
TOTAL PROFESSIONAL DEGREES	1,386	1,223	88	0	0	163	12
BUSINESS (DOCTORATE OF MANAGEMENT)	55	55	100	0	0.0	0	0
HEALTH	708	579	82	0	0.0	129	18
DENTISTRY	128	128	100	0	0.0	0	0
MEDICINE	250	150	60	0	0.0	100	40
PHARMACY	147	147	100	0	0.0	0	0
LAW	589	589	100	0	0.0	0	0
THEOLOGY	23	0	0	0	0.0	23	100

SOURCE: MHEC

2.3 Occupational Demand for USM Graduates

USM institutions alone met 60 percent of the demand for computer science occupations, 69 percent of the projected occupational demand for educational occupations, and 89 percent of the demand for engineering occupations, and all of current demand in a variety of fields ranging from business to health to law.

USM plays a vital role in providing the workers needed by the public and private sector in Maryland. The Maryland Department of Labor, Licensing and Regulation (DLLR) prepares projections of the demand for workers by occupation for a 10-year period.[23] Data on the educational requirements of these occupations is also available from DLLR. Based on these occupational demand projections and recent USM graduation data, Table 14 compares University System of Maryland graduates to estimated occupational openings for key degree areas.[24]

As presented in **Table 15**, the University System of Maryland is a vital component of the Maryland workforce development system and meets or exceeds the total level of projected annual occupational demand in a number of key areas. USM institutions alone met 60 percent of the demand for computer science occupations, 69 percent of the projected occupational demand for education occupations, 89 percent of the demand for engineering occupations, and all of current demand in a variety of fields ranging from business to health to law. It is vitally important to note that these DLLR occupational demand projections are for the 2010–2020 period and were significantly impacted by the current recession. As a result, the projected levels of employment growth and occupational demand are suppressed from past periods. The future level of employment growth and occupational demands will depend on the timing and strength of the national and state economic recovery.

TABLE 15
Occupational Demand of USM Graduates in Selected Occupations

OCCUPATIONAL CATEGORY	MARYLAND OCCUPATIONAL DEMAND	USM GRADUATES 2011	GRADUATES AS A % OF DEMAND
BUSINESS	5,145	7,564	147
EDUCATION	3,731	2,583	69
SOCIAL SCIENCES/GOVERNMENT/PLANNING	1,644	3,891	237
HEALTH	2,530	2,845	112
PHYSICAL/BIOLOGICAL SCIENCES	1,274	1,995	157
COMPUTER SCIENCES	3,810	2,299	60
ENGINEERING	1,573	1,403	89
LAW	406	768	189
AGRICULTURAL SCIENCE	109	234	216

SOURCE: DLLR, USM

2.4 In-State Employment of the 2006 and 2009 Cohorts of USM Graduates

Many USM graduates remain in Maryland to work, providing a skilled and educated workforce for the state's business, nonprofit, and government employer community. In order to better describe the role of USM in meeting Maryland's demand for educated and skilled workers, the JFI prepared an analysis of the in-state employment rate of two more recent cohorts of USM graduates, the graduating classes of 2006 and 2009. The JFI measured the in-state employment level by degree type and area. This analysis includes the workers covered by unemployment insurance described above, as well as federal workers identified through JFI matching with Federal Office of Personnel Management data. However, self-employed graduates are not included in this analysis.

TABLE 16

In-State Employment of 2006 Cohort of Graduates, By Degree

	% EMPLOYED IN 2007				% EMPLOYED IN 2011			
	BACHELOR'S	MASTER'S	DOCTORATE	PROFESSIONAL	BACHELOR'S	MASTER'S	DOCTORATE	PROFESSIONAL
TOTAL	59	51	34	56	56	48	31	52
AGRICULTURE	51	21	13	--	46	17	19	--
ARCHITECTURE	44	42	0	--	53	42	0	--
AREA STUDIES	46	40	67	--	46	20	50	--
BIO SCIENCES	55	39	34	--	47	37	32	--
BUSINESS	56	37	11	47	53	35	11	43
COMMUNICATIONS	60	33	25	--	57	33	25	--
COMPUTER SCIENCE	53	37	18	--	51	36	18	--
EDUCATION	75	79	51	--	72	75	53	--
ENGINEERING	50	34	36	--	47	34	30	--
ENGLISH	57	62	38	--	56	60	19	--
HEALTH	72	74	33	50	70	69	29	47
HUMANITIES	57	89	25	--	49	95	38	--
INTERDISCIPLINARY STUDIES	55	48	56	--	51	46	56	--
LANGUAGES	52	57	20	--	51	48	20	--
LAW	57	53	--	62	53	42	--	57
LIBRARY SCIENCE	--	42	50	--	--	36	50	--
MATHEMATICS	61	48	13	--	57	52	9	--
PHYSICAL SCIENCES	55	35	32	--	51	37	27	--
PSYCHOLOGY	61	65	50	--	56	61	42	--
PUBLIC AFFAIRS	82	36	50	--	82	33	50	--
RECREATION	68	0	--	--	61	0	--	--
SOCIAL SCIENCES	59	65	25	--	53	62	20	--
VISUAL & PERFORMING ARTS	67	52	34	--	63	45	31	--

SOURCE: USM, JFI

As presented in **Table 16**, 59 percent of graduates who received an undergraduate degree in 2006, 51 percent of graduates who received a master's degree, 34 percent of graduates who received a doctorate, and 56 percent of graduates who received a professional degree were employed in Maryland in the year immediately after graduation, and these in-state employment figures declined only marginally in the most recent year available, 2011. As presented in **Table 17**, 63 percent of graduates who received an undergraduate degree in 2009, 52 percent of graduates who received a master's degree, 34 percent of graduates who received a doctorate, and 58 percent of graduates who received a professional degree were employed in Maryland in the year immediately after graduation. These in-state employment figures declined only marginally in the most recent year available, 2011. In key degree areas, such as computer sciences, engineering, health, and physical sciences, half or more of undergraduates found employment in Maryland upon graduation.

TABLE 17

In-State Employment of 2009 Cohort of Graduates, By Degree

	% EMPLOYED IN 2010				% EMPLOYED IN 2011			
	BACHELOR'S	MASTER'S	DOCTORATE	PROFESSIONAL	BACHELOR'S	MASTER'S	DOCTORATE	PROFESSIONAL
TOTAL	63	52	34	58	52	43	24	45
AGRICULTURE	49	31	28	--	40	24	11	--
ARCHITECTURE	58	39	0	--	37	29	0	--
AREA STUDIES	75	86	80	--	55	71	40	--
BIO SCIENCES	62	48	31	--	45	34	19	--
BUSINESS	59	38	19	--	47	30	13	--
COMMUNICATIONS	64	50	40	--	50	36	10	--
COMPUTER SCIENCE	57	42	16	--	49	36	9	--
EDUCATION	81	75	47	--	72	67	38	--
ENGINEERING	55	33	23	--	45	28	16	--
ENGLISH	65	64	30	--	53	57	27	--
HEALTH	72	73	60	46	64	62	50	36
HUMANITIES	59	74	25	--	37	63	0	--
INTERDISCIPLINARY STUDIES	53	84	70	--	46	63	40	--
LANGUAGES	61	69	0	--	48	59	0	--
LAW	38	57	--	67	33	37	--	52
LIBRARY SCIENCE	--	40	50	--	--	28	0	--
MATHEMATICS	59	32	26	--	48	24	26	--
PHYSICAL SCIENCES	66	28	34	--	47	30	19	--
PSYCHOLOGY	64	63	32	--	52	52	32	--
PUBLIC AFFAIRS	88	43	50	--	63	30	50	--
RECREATION	82	100	--	--	68	100	--	--
SOCIAL SCIENCES	64	67	27	--	50	54	19	--
VISUAL & PERFORMING ARTS	71	58	34	--	53	41	16	--

SOURCE: USM, JFI

SECTION 3.0

THE BUSINESS AND ECONOMIC DEVELOPMENT IMPACT OF THE UNIVERSITY SYSTEM OF MARYLAND

The state of Maryland has recognized the important role of university technology in its economic development strategic plan, "Charting Maryland's Economic Path: Discovery, Diversity & Opportunity." The plan acknowledges that in order to position Maryland for growth, the state must accelerate efforts to sustain a knowledge-dependent, global, entrepreneurial economy that is driven by innovation. Additionally, the plan recognizes the need to build on and protect the leading drivers of economic growth, particularly in industries such as information technology, life sciences, and federal and military-related economic activity.

The University System of Maryland continues to serve as an important engine for growth for state and local economies through its research and development activities, the transfer of technology to the private sector, the creation of companies based on university-developed technology, and direct assistance to existing businesses.

3.1 USM Research, Development, and Technology Transfer Activities

The University System of Maryland is a core element of Maryland's academic and scientific infrastructure. USM includes three of the four major research universities in the state, and plays a vital role in the generation of new technologies, basic research, and the commercialization of research discoveries in Maryland.

3.1.1 USM's Role in Maryland Research and Development

In 2010, the system had $996 million in total research and development expenditures. This number grew to more than $1.15 billion in 2011, which is a growth rate of 19.4 percent from 2010 to 2011.

USM institutions form the core of Maryland's academic research infrastructure. As presented in **Table 18**, in 2010 the system had $996 million in total research and development expenditures. This number grew to more than $1.15 billion in 2011, which is a growth rate of 19.4 percent from 2010 to 2011.

TABLE 18

Total Research and Development Expenditures by USM Institutions, 2010-2011

(Millions of Dollars)

	2010	2011
TOTAL	$965.7	$1,153.3
UM, COLLEGE PARK	405.5	453.5
UM, BALTIMORE	400.6	520.7
UM, BALTIMORE COUNTY	81.9	91.7
UM CENTER FOR ENVIRONMENTAL SCIENCE	42.7	50.0
TOWSON UNIVERSITY	18.1	17.9
UM EASTERN SHORE	8.7	8.7
UNIVERSITY OF BALTIMORE	4.7	6.6
BOWIE STATE UNIVERSITY	1.7	1.9
SALISBURY UNIVERSITY	1.1	1.8
UM UNIVERSITY COLLEGE	0.5	0.3
COPPIN STATE UNIVERSITY	0.3	0.1

SOURCE: USM

The Association of University Technology Managers (AUTM)[25] tracks the research and technology transfer activities at major research universities. Data were available for USM and for Johns Hopkins (both the university and the Applied Physics Lab), and USM provided detailed data for the three principal USM research institutions: the University of Maryland, Baltimore; the University of Maryland, Baltimore County; and the University of Maryland, College Park.

As demonstrated in **Table 19**, the three major University System of Maryland research universities generated $1.1 billion of the $3.7 billion in university research and development expenditures occurring at the top research universities in Maryland in FY 2011. In 2011, the University System of Maryland accounted for almost one-fourth of all federally sponsored R&D expenditures in Maryland, and for 46 percent of all industry R&D expenditures. It is important to note that the Applied Physics Lab of Johns Hopkins University, which does contract research and testing primarily for government clients and not academic research, substantially increases the Johns Hopkins University figures.

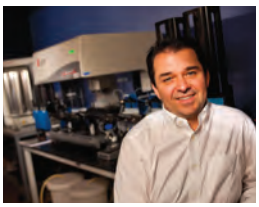
TABLE 19

Research Expenditures in FY 2011 by USM and Johns Hopkins University

(Millions of Dollars)

2011	TOTAL RESEARCH EXPENDITURE	PERCENT OF TOTAL	FEDERAL-SPONSORED EXPENDITURE	PERCENT OF TOTAL	INDUSTRY-SPONSORED EXPENDITURE	PERCENT OF TOTAL
TOTAL	$3,660.5	100	$2,956.9	100	$241.2	100
UNIVERSITY SYSTEM OF MARYLAND	1,065.9	29	712.3	24	111.3	46
UM, COLLEGE PARK	453.5	12	346.2	12	13.1	5
UM, BALTIMORE	520.7	14	304.9	10	97.5	40
UM, BALTIMORE COUNTY	91.7	3	61.2	2	0.6	0
JOHNS HOPKINS UNIVERSITY	1,517.9	41	1,177.9	40	119.9	50
JOHNS HOPKINS UNIVERSITY APL	1,076.7	29	1,066.7	36	10.0	4

SOURCE: USM, AUTM



3.1.2 USM's Role in New Technology Development

In 2011, the University System of Maryland generated 224 invention disclosures, 124 new patent applications, and 77 U.S. patents.

As presented in **Table 20**, the University System of Maryland is an important generator of technology that can be commercialized. After a technology is developed through research at a university, the first phase of the commercialization process is the filing of an invention disclosure. If a technology is then considered to have commercial potential, the university may seek to protect its intellectual property rights over the technology by filing for a patent. For a patent to be awarded, the technology must be judged to be novel, non-obvious, and useful.

The number of invention disclosures, patent applications filed, and patents awarded can all serve as indicators of the number of commercializable technologies being developed by universities in Maryland. In 2011, the University System of Maryland generated 224 invention disclosures, 124 new patent applications, and 77 U.S. patents.

TABLE 20
Patenting/Disclosure Activity in FY 2011 by USM and Johns Hopkins University

	INVENTION DISCLOSURES	PERCENT OF TOTAL	NEW PATENT APPLICATIONS FILED	PERCENT OF TOTAL	U.S. PATENTS ISSUED	PERCENT OF TOTAL
TOTAL	880	100	751	100	148	100
UNIVERSITY SYSTEM OF MARYLAND	224	25	124	17	77	52
UM, COLLEGE PARK	113	13	62	8	38	26
UM, BALTIMORE	88	10	43	6	30	20
UM, BALTIMORE COUNTY	23	3	19	3	9	6
JOHNS HOPKINS UNIVERSITY	409	46	577	77	58	39
JOHNS HOPKINS UNIVERSITY APL	247	28	50	7	13	9

SOURCE: USM, AUTM

3.1.3 USM's Role in Technology Transfer

A principal economic development contribution of a research university is the commercialization of university technologies and discoveries. Once a new technology is developed in a university, it is often licensed to a private sector firm to then be developed into a product. Universities can offer companies either exclusive or non-exclusive rights to then develop those particular technologies.

The AUTM collects information annually on the licensing activities of major research universities. The number of licenses and options executed, the number of active licenses and options generating revenue, and the royalty payments received can all serve as indicators of the levels of actual technology commercialization occurring at a university. As seen in **Table 21**, USM universities generated $1.3 million in licensing royalties in 2011, with 148 licenses and options generating revenues, and executed 29 licenses and options in 2011. According to AUTM data, from 2006 to 2011, a total of 35 startup companies—36 percent of the total number of startups formed by Maryland's major research universities—have been formed based on technology developed at USM institutions (See **Table 22**). The startup company data from AUTM presented in Table 21 only include companies formed to commercialize university technology. Since July 2011, USM has been tracking the companies formed based on the licensing of intellectual property (defined by USM as Tier 1 companies) or the companies' receipt of significant business mentoring from the institutions (defined as Tier 2 companies) as part of its strategic goal to help create 325 new companies over 10 years. Based on this tracking system data, USM had significant impact on the development of 51 companies from July 2011 to June 2012.

TABLE 21

Technology Transfer Activity in FY 2011 by USM and Johns Hopkins University

(Number of Licenses/Options and Thousands of Dollars)

	GROSS LICENSE INCOME RECEIVED $1,000'S	PERCENT OF TOTAL	LICENSE/ OPTIONS GENERATING REVENUE	PERCENT OF TOTAL	LICENSES AND OPTIONS EXECUTED	PERCENT OF TOTAL
TOTAL	17,988	100	421	100	214	100
UNIVERSITY SYSTEM OF MARYLAND	1,299	7	148	35	29	14
UM, COLLEGE PARK	717	4	93	22	14	7
UM, BALTIMORE	386	2	46	11	14	7
UM, BALTIMORE COUNTY	197	1	9	2	1	0
JOHNS HOPKINS UNIVERSITY	15,285	85	249	59	159	74
JOHNS HOPKINS UNIVERSITY APL	1,404	8	24	6	26	12

SOURCE: USM, AUTM

TABLE 22

Startup Companies Formed by USM and Johns Hopkins University

	2006	2007	2008	2009	2010	2011	TOTAL	% OF TOTAL
TOTAL	8	12	18	19	21	18	96	100
UNIVERSITY SYSTEM OF MARYLAND	2	7	5	7	8	6	35	36
UM, COLLEGE PARK	2	7	3	*	4	2		
UM, BALTIMORE	0	0	2	*	2	3		
UM, BALTIMORE COUNTY	0	0	0	*	2	1		
JOHNS HOPKINS UNIVERSITY	6	4	12	10	11	11	54	56
JOHNS HOPKINS UNIVERSITY APL	-	1	1	2	2	1	7	7

*THE AUTM SURVEY DID NOT HAVE INDIVIDUAL UNIVERSITY DATA FOR USM INSTITUTIONS FOR 2009. SOURCE: USM, AUTM

3.2 Assistance and Support for Business

In addition to directly influencing Maryland's economic development through research and commercialization activities, the students, faculty, and staff of the University System of Maryland promote economic development in the state by providing technical assistance and support to businesses. There are numerous formal and informal ways in which these three groups interact with businesses. It is impossible to list the depth and extent of these actions.

Several programs sponsored by individual USM institutions will be described. These represent the system's core efforts to aid businesses in entrepreneurship and business formation, provide small business assistance, and provide technical assistance and training. These programs in particular have been chosen to showcase their significant impact on Maryland businesses and economic development.

3.2.1 Assistance in Entrepreneurship and Business Formation

Maryland's four USM research parks host 117 tenants with 3,198 employees and its seven business incubators host 72 tenant companies with 873 employees.

USM institutions play a vital role in assisting entrepreneurship in Maryland. Promoting business formation is a central element in any state's economic development strategy. According to the Corporation for Enterprise and Development's Assets and Opportunity Scorecard, Maryland ranks 24th nationally in the rate of new business formation.[26] The universities within the system support the state's success in business development through several different programs geared to entrepreneurship and startup companies, including TowsonGlobal, Maryland Hawk Corporation, the Allegany Business Center, and bwtech@UMBC.

Several USM institutions operate business incubators geared toward assisting in the start up of new companies or research parks to help retain expanding or recruit new businesses.

- Bowie State University operates the B**owie Business Innovation Center** (Bowie BIC), opened in 2012 with the mission to spur economic development and retain business growth in the Bowie community. It provides an integrated business development platform including mentoring, networking, and access to facilities, which help accelerate the establishment, growth, and graduation of innovative, growth-oriented firms. In addition, Bowie BIC provides enhanced learning opportunities for Bowie State University students through experiential internship programs and entrepreneurship activities. There are currently four clients (two residents and two affiliates/non-residents).

- **TowsonGlobal** is Towson University's business incubator that helps entrepreneurs learn how to compete in the global economy, both at home and abroad. TowsonGlobal provides businesses a wide range of support including: high-quality, affordable office facilities; business counseling; mentoring; networking assistance; workshops; and other educational forums.

- The University of Maryland Eastern Shore has an affiliated foundation, the **Maryland Hawk Corporation**, which provides economic development support for expanding and startup firms. The Maryland Hawk Corporation pursues grant and contract opportunities from which the university is excluded from participation.

- The **Allegany Business Center at Frostburg State University** (ABC@FSU) is a 56-acre parcel of land located on the FSU campus designated for a technology park. Businesses can design and construct their individual buildings to meet their specific needs. The university maintains its close connection to the community through these types of regional economic and workforce development efforts.

- **bwtech@UMBC Research and Technology Park** is a 71-acre community that hosts 86 tenants (including 80 companies and two federal laboratories) and 14 affiliate companies and organizations. The park consists of eight buildings with approximately 500,000 square feet of high-quality, affordable office and laboratory space, and is a leading generator of jobs and income for the region. The Incubator and Accelerator provide flexible leasing terms and business support services to early-stage technology and bioscience companies. The five-building research park hosts more-established research and technology companies and Class A office space in a suburban environment with free surface parking.

All bwtech@UMBC companies and employees have access to UMBC campus amenities and enjoy the strategic location only minutes away from BWI Thurgood Marshall Airport, downtown Baltimore, and the federal agencies located in the Washington, D.C., corridor. The location, coupled with the opportunity to collaborate with the talented students and faculty of UMBC's nationally recognized science and engineering programs, makes bwtech@UMBC an ideal location for technology, bioscience, and research organizations at all stages of development. bwtech@UMBC offers several distinctive programs for technology, bioscience, and research organizations, including the following:

- *The Life-science and Technology Incubator Program:* The bwtech@UMBC incubator program offers high-potential, early-stage companies space, business advisory services, and access to the resources and capital that enable companies to commercialize their technologies and succeed in the marketplace. Startup companies engaged in research and development activities geared toward commercialization of innovative products and/or services are eligible for admission to the program. Both wet laboratory and office space are available at affordable rates with flexible leasing terms.

- *Advantage Incubator:* The Advantage Incubator@bwtech provides a unique, innovative approach to business incubation for small disadvantaged businesses that have substantial business activities in technology-related state and federal contracting and procurement. The incubator is located in a Class A office suite at the bwtech@UMBC Research Park. In addition to the benefits associated with being located in a fed-

eral HUBZone and state Enterprise Zone, Advantage Incubator clients have access to specialized business mentoring and support services that target the needs of women-, minority-, or veteran-owned companies.

The Advantage Incubator is located with The CYNC, a unique partnership between UMBC and Northrop Grumman that endeavors to develop cyber technology companies that can protect the nation from a growing range of cyber threats. The program was specially developed for companies developing situational awareness/visualization, sensors, processing, workflow management, and modeling and simulation technologies.

Companies selected are eligible to receive "scholarships" to the incubator. With these programs, bwtech@UMBC has 27 resident incubator, CYNC, and non-incubator cyber companies, creating a rich ecosystem of companies that are addressing some of the nation's most pressing technological need. The CYNC Program enrolls five companies.

- *Clean Energy Incubator:* A joint venture with the Maryland Clean Energy Center, the Maryland Clean Energy Technology Incubator@bwtech is housed in 18,000 square feet of office and wet lab space in the biotechnology building on UMBC's South Campus. The new program is for existing and future client companies working in fields related to clean energy technologies and will provide business services tailored for the special needs of these companies. These services will include market assessment, business planning, networking, a part-time entrepreneur in residence, and an advisory board composed of experienced researchers and executives in the field.

- *Accelerator Program:* The Accelerator Program is for graduates of the Incubator Program and technology companies beyond the startup phase. The Accelerator can offer office and wet lab space and university amenities at competitively priced rates. Preference is given to companies interested in collaborating with UMBC or expanding into the bwtech@UMBC Research Park.

- The University of Maryland, College Park operates two business incubators:

  - The Technology Advancement Program (TAP) is Maryland's oldest university-based incubator. For more than 20 years, TAP has helped entrepreneurs build some of the most successful technology companies in Maryland. Incubator graduates include Digene and Martek Biosciences. TAP offers furnished offices and flexible lab space as well as other benefits and services that can only be found at a technology business incubator situated on the campus of one of the nation's top research universities.

  - The Maryland International Incubator (MI2) is a collaboration between the University of Maryland, College Park and the Maryland Department of Business and Economic Development to connect Maryland and international companies for successful joint ventures through a targeted array of business services, state-of-the-art facilities, and world-class resources.

- UMCP has also developed the University of Maryland Research Park, which is Maryland's largest research park, and when fully built out will encompass 2 million square feet and employ an estimated 6,500 people. The park is currently home to 14 federal, nonprofit, and private sector tenants with 1,915 employees.

- University of Maryland, Baltimore has developed and operates the **University of Maryland BioPark**. Located in West Baltimore, the BioPark is a university-associated research park that accelerates biotechnology commercialization and economic development in the surrounding community and throughout the region. Developed in 2003, the park has:

- built and maintained strong community support
- acquired 12 acres of land
- constructed two commercial research buildings, and a new state of Maryland Forensic Medical Center totaling 470,000 square feet and one parking garage with 638 parking spaces
- created 550 jobs
- generated $180 million in capital investment
- begun construction of a third multi-tenant building for the $200 million Proton Cancer Treatment Center. Completion of these projects will bring the totals to 658,000 square feet, $255 million in capital investment, and 700 jobs created

Four of the 12 USM institutions operate research parks and four institutions operate seven incubators. These research parks and incubators offer access to university research, faculty, and students to the tenants and offer the universities access to private sector knowledge, technology, and capabilities to the benefit of both. As presented in **Table 23**, Maryland's four USM research parks host 117 tenants with 3,198 employees and its seven incubators host 72 tenant companies with 873 employees.

TABLE 23

USM Research Parks and Incubator Tenants and Estimated Impact

CAMPUS	PARK/INCUBATOR	NUMBER OF TENANTS	NUMBER OF EMPLOYEES
RESEARCH PARKS		117	3,198
FROSTBURG	ALLEGANY BUSINESS CENTER	4	213
UM, BALTIMORE	UMB BIOPARK	31	660
UM, BALTIMORE COUNTY	BWTECH	68	410
UM, COLLEGE PARK	M SQUARE	14	1,915
INCUBATORS		72	873
BOWIE	BOWIE BUSINESS INNOVATION CENTER	5	9
TOWSON	TOWSON GLOBAL	11	49
UM, BALTIMORE COUNTY	3 INCUBATORS AND AN ACCELERATOR	33	697
UM, COLLEGE PARK	TECHNOLOGY ADVANCEMENT PROGRAM	12	98
	MARYLAND INTERNATIONAL INCUBATOR	11	20

SOURCE: USM

3.2.2 Small Business Assistance

While the formation of new businesses is important to create new technologies and jobs, small businesses are already established and have the potential to grow and add new jobs. Several USM universities provide assistance to Maryland's small businesses, for example:

- The Maryland S**mall Business Development Center Network** (SBDC) of UMCP assists entrepreneurs in establishing, managing, and expanding their businesses through six regional offices in the state. In 2011, Maryland SBDC clients generated more than $217 million in tax revenue and helped create 1,754 jobs.[27] This SBDC network has satellite offices located at other USM institutions, namely the University of Baltimore, Salisbury University, and Frostburg State University.

- The **Salisbury University subcenter** of the Maryland Small Business Development Center Network is a partnership between the U.S. Small Business Administration and UMCP. This partnership links private enterprise, government, higher education, and local economic development organizations to provide management training and technical assistance to Maryland's small businesses. This particular regional office offers assistance to more than 400 clients annually. The Maryland network is a part of a national SBDC network that delivers assistance to strengthen small- and medium-size businesses, thereby contributing to the growth of local, state, and national economies. The Salisbury University SBDC provides counseling, training, and a resource library to small business enterprise.

- The University of Baltimore operates the **Central Region SBDC**, one of six regions that comprise the Maryland SBDC Network. In FY 2011 the Central Region SBDC counseled 833 clients, assisted with 34 business starts, helped client businesses to increase their sales by $42 million and create or retain 961 jobs, and helped 146 companies raise $24.1 million in new capital.

- **Frostburg State University** is also committed to community outreach projects in Hagerstown and Frederick via its involvement in the area's SBDC. FSU's College of Business faculty members are working closely with the city of Hagerstown to help structure a small business incubator. It will be located adjacent to the University System of Maryland at Hagerstown center, one of USM's two regional centers.

3.2.3 Technical Assistance and Training

Maryland businesses also benefit from several programs created by USM institutions that are specifically chartered to provide training and technical assistance to businesses. These programs include, but are not limited to the following:

- Coppin State University supports economic development in Maryland by improving the technology skill sets and access to educational opportunities to the citizens of West Baltimore with the establishment of the **Coppin Heights-Rosemont Family Computer Center**. This center provides broadband access and employment-related training/education programs designed to create jobs and promote the education and health for 35,000 residents in West Baltimore.

- The University of Maryland, College Park's **Office of Technology Commercialization** is the university's principal technology transfer office, the system's first, which provides management, advice, and support to faculty technology commercialization efforts.

- **Maryland Technology Enterprise Institute** based at the University of Maryland, College Park is a comprehensive program that includes the TAP incubator, the Maryland Industrial Partnerships Program (MIPS) that funds faculty-industry projects across USM, a manufacturing extension partnership, an industry bioprocess center, and other programs.

- **MIPS** accelerates the commercialization of technology in Maryland by jointly funding collaborative R&D projects between companies and USM faculty. Through MIPS, Maryland firms have the opportunity to leverage their research and development funds and gain access to the creative talents and extensive research base of the system. MIPS matching funds are awarded on a competitive basis for projects based on proposals submitted jointly by Maryland companies and researchers from any of the 12 system institutions. Celebrating its 25th anniversary in 2012, MIPS has generated a total of $161.4 million in research interactions between USM institutions and Maryland technology companies (**see Table 24**).

TABLE 24

Total MIPS Projects and Funding

	MIPS PROJECTS	COMPANY FUNDING	COMPANY FUNDING	TOTAL IN-KIND	FUNDING
TOTAL MIPS	1,032	$37,000,763	$21,709,553	$102,698,863	$161,409,179
UM, COLLEGE PARK	625	20,592,769	13,167,869	70,189,015	103,949,653
UM, BALTIMORE	182	7,840,330	4,445,577	16,009,902	28,295,809
UM, BALTIMORE COUNTY	108	4,099,063	2,278,601	9,384,330	15,761,994
UMBI*	26	1,023,306	453,000	1,369,452	2,845,758
UM EASTERN SHORE	21	1,045,912	160,643	2,460,119	3,666,674
UMCES	19	667,050	226,666	906,181	1,799,897
JOHNS HOPKINS	17	581,980	429,223	564,230	1,575,433
TOWSON UNIVERSITY	10	315,602	142,575	673,190	1,131,367
SALISBURY UNIVERSITY	6	114,691	74,294	147,074	336,059
FROSTBURG STATE UNIVERSITY	5	251,418	50,000	471,000	772,418
MORGAN STATE UNIVERSITY	5	191,309	67,144	161,634	420,087
BOWIE STATE UNIVERSITY	3	88,893	64,120	203,450	356,463
FED-MIPS	2	92,063	103,000	0	195,063
UM UNIVERSITY COLLEGE	2	45,891	39,544	118,660	204,095
MORGAN STATE UNIVERSITY	1	50,486	7,297	40,626	98,409

* THE UNIVERSITY OF MARYLAND BIOTECHNOLOGY INSTITUTE, OR UMBI, IS A FORMER USM INSTITUTION.

SOURCE : MIPS

- The University of Maryland, Baltimore County **Office of Technology Development** assists the UMBC community in all phases of intellectual property protection and commercialization, including evaluating disclosed inventions for patentability and market potential; filing patent applications, copyright, and trademark registrations; reviewing and negotiating material transfer agreements and non-disclosure agreements related to UMBC technologies; negotiating technology licenses; and assisting entrepreneurial faculty in new company formation. For FY 2011, the Office of Technology Development received 23 invention disclosures and filed 32 U.S. patent applications (including 12 U.S. utility and 20 provisional applications). UMBC inventors were issued nine U.S. patents and two non-U.S. patents in 2011, and nine U.S. patents and three non-U.S. patents in 2010.

- The University of Maryland, Baltimore **Office of Technology Transfer** (OTT) supports the university's mission to encourage innovation and disseminate knowledge by licensing innovations developed by faculty, students, and staff. It provides services that include evaluating, patenting, and licensing intellectual property developed in the university. For FY 2011, the office received 88 invention disclosures and filed 43 U.S. patent applications.

SECTION 4.0

PUBLIC SERVICE, EDUCATIONAL, CULTURAL, AND COMMUNITY CONTRIBUTIONS

Beyond the primary role that the University System of Maryland plays in creating a skilled and educated workforce, USM's institutions are active in improving the quality of life for residents, community groups, and a variety of others within the state. Each of the member institutions operates a number of programs, centers, and groups that focus on assisting local government; assisting primary and secondary education; hosting and providing cultural, educational, sporting, and public and community health events and programs; and providing community and volunteer service. This community outreach is consistent with USM's commitment to achieving and sustaining national distinction as a community-engaged system. A selection of the various community programs offered by USM institutions that were identified by each in the campus survey conducted are presented below.

4.1 Commitment to Volunteer and Community Outreach

The faculty, staff, and students of the University System of Maryland are an important source of volunteer labor to community charitable and nonprofit organizations. The member institutions have several programs where their faculty, students, and staff can get involved in community service and outreach. Some examples of these programs are as follows:

BOWIE STATE UNIVERSITY (BSU)

The **Department of Accounting** annually provides assistance to students and senior citizens in the community to prepare their income taxes.

The Division of Administration and Finance holds Shred Day for BSU and surrounding communities approximately twice a year, which allows for the safe disposal and destruction of sensitive materials.

SALISBURY UNIVERSITY

Sea Gull Century: Salisbury University sponsors a 100-mile or 100-kilometer bike ride event for more than 6,000 people, which contributes a significant amount of money for various charitable and nonprofit organizations such as Women Supporting Women, Habitat for Humanity, and the Alzheimer's Association. The Leukemia & Lymphoma Society's Team in Training, for example, had 161 riders from seven states that raised $430,000 for the society. The Sea Gull Century is Wicomico County's largest one-day tourism event and has an estimated annual economic impact on the Lower Shore of $2.5 million.

The Big Event: More than 1,000 students participate in this community service project annually. Hundreds of Salisbury students help university neighbors with household chores such as raking leaves, cleaning attics, and painting. In 2011, they also cleaned municipal areas including the Salisbury City Park, Downtown Plaza, Salisbury Zoological Park, and the Fruitland Little League Complex, assisting at 85 job sites in all.

TOWSON UNIVERSITY (TU)

The Big Event is held annually in April with a goal of getting TU students to give back to the local community. In 2011, TU had more than 700 students participate in various events from helping local homeowners, to cleaning up streams in Dundalk, to working with the Towson Chamber of Commerce to clean up uptown Towson. The Big Event is organized by two student leaders and a committee of students who plan the fundraising, logistics, service sites, evaluations, and marketing.

UNIVERSITY OF MARYLAND, COLLEGE PARK (UMCP)

Terps for Change engaged 140 volunteers completing 2,948 service hours working with eight community partners in Prince George's County and Washington, D.C.

Good Neighbor Day, an annual cross-campus service project and renewed commitment by the UMCP community to be a good neighbor to the city of College Park. The focus of the event is cleanup efforts that contribute to a great quality of life for all residents and a celebration of being a good neighbor, every day of the year.

UNIVERSITY OF MARYLAND EASTERN SHORE (UMES)

Volunteer Income Tax Assistance (VITA) is a program sponsored by the Internal Revenue Service to assist low-income taxpayers with free tax preparation. UMES hosts VITA in Somerset County.

4.2 Government and Community Service

Faculty and staff in the University System of Maryland donate countless hours of volunteer time to state, county, and local governments, and to various official boards and communities. Their expertise is applied to addressing economic, social, and other public policy issues impacting Maryland and its diverse communities. A partial listing of the local, regional, and state government; nonprofit; and other boards and committees on which University System of Maryland administrators, faculty, and staff serve is presented in **Table 25** on page 48.

In addition to the faculty and staff participation on numerous boards and organizations listed above, many campuses have formal programs to assist state and local government. A partial list:

UNIVERSITY OF BALTIMORE

The University of Baltimore provided **election judge training** in the Baltimore City 2011 mayoral primary and general elections, in addition to the 2012 presidential primary election.

The University of Baltimore's **Schaefer Center for Public Policy** is the official provider of Managing for Results training for the state of Maryland. The center's mission is to serve the public and nonprofit sectors of Maryland by conducting program evaluations, performing policy analysis, engaging in survey research, and conducting management training programs. The emphasis of the Schaefer Center is on applying the knowledge of the university community to real-world issues. Recent work performed includes: the 2011 Baltimore City Citizens Satisfaction Survey, Maryland Department of Health and Hygiene–Lyme Disease Prevention Study, and the Calvert County Community Health Assessment Priority Areas Analysis. The center also hosts

TABLE 25

Selected State and Local Government or Nonprofit Boards, Panels, or Commissions on which University System of Maryland Faculty and Staff Serve

ECONOMIC AND WORKFORCE DEVELOPMENT

- BALTIMORE WORKFORCE INVESTMENT BOARD
- GREATER BALTIMORE COMMITTEE
- GREATER TOWSON COMMITTEE
- BALTIMORE COUNTY BUSINESS ADVISORY GROUP
- HARFORD COUNTY CHAMBER OF COMMERCE
- SALISBURY AREA CHAMBER OF COMMERCE
- PRINCESS ANNE CHAMBER OF COMMERCE
- GREATER SALISBURY COMMITTEE
- MARYLAND INDUSTRIAL PARTNERSHIPS
- CATONSVILLE CHAMBER OF COMMERCE
- MARYLAND CHAMBER OF COMMERCE
- NATIONAL ASSOCIATION OF SEED AND VENTURE FUNDS
- MARYLAND VENTURE AUTHORITY

EDUCATION

- BALTIMORE CITY COMMUNITY COLLEGE FOUNDATION
- MARYLAND EDUCATION ENTERPRISE CONSORTIUM BOARD
- BALTIMORE COLLEGETOWN NETWORK GOVERNING BOARD
- PRINCE GEORGE'S COMMUNITY COLLEGE IT ADVISORY BOARD
- EDUCATOR EFFECTIVENESS COUNCIL

OTHER, SOCIAL

- UNITED WAY OF MARYLAND
- NAACP SOMERSET COUNTY
- NAACP—WICOMICO COUNTY AFFILIATE
- NAACP—ALLEGANY COUNTY
- MARYLAND STATE BOARD OF EDUCATION

HEALTH-RELATED ISSUES

- ST. AGNES HEALTHCARE FOUNDATION
- ALZHEIMER'S ASSOCIATION
- LEUKEMIA & LYMPHOMA SOCIETY
- MARYLAND COMMISSION ON AUTISM
- THE ULMAN CANCER FUND
- MARYLAND DEPARTMENT OF AGING EVIDENCE-BASED PROGRAMS ADVISORY BOARD
- EASTERN SHORE SCHOOL BASED MENTAL HEALTH COALITION
- MARYLAND HEALTH CARE COMMISSION
- MARYLAND PHARMACISTS ASSOCIATION
- MARYLAND STATE ANATOMY BOARD
- MARYLAND PUBLIC HEALTH ASSOCIATION
- MARYLAND AREA HEALTH EDUCATION CENTER
- PRINCE GEORGE'S COUNTY HOSPITAL AUTHORITY

ENVIRONMENTAL POLICY

- MARYLAND COMMISSION ON CLIMATE CHANGE
- MARYLAND GOVERNOR'S CHESAPEAKE BAY CABINET
- CHESAPEAKE RESEARCH CONSORTIUM BOARD OF DIRECTORS
- CHESAPEAKE BAY FOUNDATION BOARD OF TRUSTEES
- MARYLAND COASTAL BAY FOUNDATION
- MARYLAND CLEAN ENERGY ADVISORY BOARD

OTHER, GOVERNMENT AGENCIES

- MARYLAND DEPARTMENT OF PLANNING
- FROSTBURG HOUSING AUTHORITY
- U.S. DEPARTMENT OF HOMELAND SECURITY ACADEMIC ADVISORY COUNCIL
- U.S. PRESIDENT'S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY

SOURCE : USM

a variety of conferences and educational programs to advance public administration and public service in Maryland and beyond.

The **University of Baltimore's Baltimore Neighborhood Indicators Alliance–Jacob France Institute (BNIA-JFI)** is an organization consisting of diverse groups committed to promoting, supporting, and helping people make better decisions using accurate, reliable, and accessible data and indicators to improve the quality of life in Baltimore City neighborhoods. This unique alliance builds on and coordinates the related work of citywide nonprofit organizations, city and state government agencies, neighborhoods, foundations, businesses, and universities to support and strengthen the principle and practice of well-informed decision making for change toward strong neighborhoods, improved quality of life, and a thriving city. BNIA-JFI staff serve on several of the Baltimore City mayor's committees and provide research support to several city and state government agencies.

4.3 Community Development

The University System of Maryland is dedicated to improving the communities surrounding each of its campuses. USM member institutions often participate in community development activities designed to strengthen and stimulate community, economic, and educational development in Maryland's communities and neighborhoods. A sample of the various community development engagements:

COPPIN STATE UNIVERSITY (CSU)

Coppin works with the **Coppin Heights Community Development Corporation (CHCDC)**, a 501 (c) (3) not-for-profit organization established in 1995 by CSU to advance the broader community improvement/neighborhood revitalization agenda for the Greater Coppin Heights/Rosemont Community. The primary mission of the CHCDC is to stimulate economic development within the neighborhoods immediately adjacent to the university by promoting affordable housing development, social, economic, and educational initiatives. The CHCDC provides homeownership, economic development, and neighborhood improvement services to the community.

FROSTBURG STATE UNIVERSITY (FSU)

Frostburg State University has also helped to revitalize downtown Frostburg's historic Main Street by tying its academic and community service mission to the local community. Specifically, FSU is a partner with the **Allegany Arts Council at Mountain City Traditional Arts**, a space dedicated to the historical documentation, education, and perpetuation of Appalachian art and cultural heritage, as well as a place for local artisans to demonstrate, exhibit, and sell their work. Also on Main Street, the FSU Center for Creative Writing is prominently located to provide a venue for seminars and events for writers of all ages. In addition, FSU has worked closely with the city of Frostburg and the Maryland Department of Housing and Community Development in the renovation of the historic Lyric Theatre Building, where the FSU Foundation, Alumni Association, and Bobcat Bookstore are now located.

TOWSON UNIVERSITY

The **Cherry Hill Learning Zone** began in 2005 as a partnership between Towson University, Baltimore City Government, the Baltimore City Public School System, and neighborhood organizations in the Cherry Hill community of south Baltimore. This initiative aims to build upon the strengths of the community, meet its needs and nurture its economic, community, and educational development potential. TU provides services and resources to achieve these goals and to support individual and community success. Projects and programs offered by TU students, faculty, and staff address community-identified needs including student academic performance, health and nutrition, adolescent pregnancy, and more.

Since TU began its partnership with Cherry Hill, 50 percent of the schools no longer need corrective action. Numerous community members have been helped by tutoring and health programs in the community. In addition, Towson University faculty, staff, and students raised more than $2,000 in financial and in-kind contributions as part of a holiday fundraising effort benefitting residents of Cherry Hill.

UNIVERSITY OF BALTIMORE

Baltimore Data Day: BNIA-JFI hosts the annual one-day conference dedicated to helping communities expand their capacity to use technology and data to advance their goals. Community leaders, nonprofit organizations, civic and faith-based institutions, and governmental entities come together to see the latest trends in community-based data, technology, and tools and learn how other groups are using data to support and advance constructive change. Baltimore Data Day is structured around a series of "how to" interactive workshops in which people who work with data will explain what they do, explore data sources, and guide participants on gathering and using data.

4.4 Programs for Underrepresented Populations

The University System of Maryland recognizes the need to serve underrepresented populations and does so through a variety of programs designed to provide assistance to Maryland minority residents and communities in need. The system also acknowledges and supports successful minority business owners in the state and local communities. Additionally, many of the member universities are represented by their faculty and staff at NAACP local chapters, indicating the member universities are keenly aware of the needs of minority communities. Some examples of outreach programs:

BOWIE STATE UNIVERSITY

As part of a **National Minority Male Health Project**, Bowie State works to address issues of health for a population that faces barriers to access to medical care. The project provides education and intervention activities in community settings including local churches and barber shops. Comprehensive health screenings, including diabetes, blood pressure, cholesterol, carotid ultrasound scan, echocardiogram, weight, BMI, and PSA are provided. The program has been able to identify men who had dangerously high blood pressure and get them to a doctor for services.

UNIVERSITY OF MARYLAND, COLLEGE PARK

Latino Advocate Program: Thirty students from Parkdale High School are brought to campus for mentoring; as well as 22 students from Northwestern High School, with ongoing outreach to the Langley Park community through partnership with the YMCA.

UNIVERSITY OF MARYLAND UNIVERSITY COLLEGE (UMUC)

Top 100 MBE Program: UMUC sponsors an event to honor select minority- or women-owned businesses in the D.C. metro area.

4.5 Support for Primary and Secondary Education

The University System of Maryland is active in efforts to improve primary and secondary education in Maryland. While earning their degrees, many students work with local schools. The following is a sample of programs:

4.5.1 Reading-Focused Initiatives

FROSTBURG STATE UNIVERSITY

FSU participates in Western Maryland's **Read to Succeed Program**, which works to strengthen local students' reading and writing abilities by providing free tutorial services. For 2010-2011, 53 FSU student volunteers engaged in one-on-one mentoring sessions five times per week with an average of 30 local K-8 students at the university and in the city of Cumberland. These student volunteers served a total of 1,443 hours. The results of pre- and post-testing showed that the tutored students' reading skills increased by an average of 6.4 percent.

4.5.2 Science, Technology, Engineering, and Mathematics (STEM) Initiatives

TOWSON UNIVERSITY

The **Hackerman Academy of Mathematics and Science**, established in 2006 with a $1 million gift, is housed in the university's Fisher College of Science and Mathematics. It is led by former NASA astronaut Donald Thomas. Its mission is to encourage students in grades K-12 to pursue careers in STEM fields, as well as to provide training for teachers in these fields. The Hackerman Academy also partners with the Maryland Science Center to sponsor lectures and programming for teachers and students.

UNIVERSITY OF MARYLAND EASTERN SHORE

Eight UMES undergraduates who were involved in research across campus attended the **Fourth Annual Innovative STEM Conference** at Morgan State University in Baltimore. While there, representatives from UMES presented two workshops to high school students to encourage them to pursue careers in STEM-related fields. They also served as judges for two days, rating high school, undergraduate, and graduate research projects for scholarship awards.

4.5.3 Teaching-Focused Initiatives

TOWSON UNIVERSITY

The **Teacher Academy of Maryland (TAM)** is a Career and Technology Education program of study that seeks to increase the number of teacher candidates in middle and high schools. Interested students can join the Future Educators Association. The TAM program begins in 10th grade and is a four-course sequence that ends in 12th grade. TU is the affiliate university for TAM and implements professional development opportunities for TAM educators.

4.5.4 General Education Initiatives

COPPIN STATE UNIVERSITY

Urban Education Corridor (UEC) (Rosemont Elementary/Middle School and Coppin Academy High School): Coppin State University has established a number of partnerships with Baltimore City Public Schools to address K-8 educational inequities and improve the educational outcomes of students. Currently, UEC is based on a partnership between CSU and Rosemont Elementary/Middle School and the Coppin Academy. Since 1996, Rosemont has been transformed from one of the lowest-performing schools in the city school system into one of the highest and has posted the top scores in reading in Baltimore, with all classes exceeding state standards in reading and math. The university is the only higher education institution in Maryland to locate a public high school on its campus while serving as the operator. Coppin Academy, a Baltimore City Public Charter High School, graduated its first class in May 2009. One hundred percent of the 74 seniors from the academy's inaugural graduation class passed Maryland's High School Assessment exam. Ninety percent planned to attend a college or university.

UNIVERSITY OF MARYLAND, COLLEGE PARK

America Reads*America Counts (AR*AC) engaged 327 UMCP student mentors in this intensive service-learning experience on a weekly basis for at least one semester (164 participated both semesters; this is an increase of 20 percent in retention of mentors from fall to spring over last year). AR*AC mentors spent approximately 1,225 hours per week, or 36,750 hours last year, in the local community. AR*AC received the Campus Compact Award for Outstanding Campus-Community Partnership in the state of Maryland.

UNIVERSITY OF MARYLAND EASTERN SHORE

The Department of Social Sciences through its **National Society of Collegiate Scholars PACE** program partnered with the Somerset County Public Schools to establish a peer mentoring program in early 2013. The NSCS has at least 16 undergraduate students who have undergone training and will serve as mentors, role models, tutors, and provide assistance with enrichment and homework activities. The department has also furnished a letter of support as a supplementary document to the Somerset County Public Schools' application for the 21st Century Community Learning Grant to provide additional funding for the program.

4.6 Public Health Activities

The University System of Maryland operates several clinical and service programs that provide access to various health-related services to local, regional, and statewide residents. These programs and clinics are often associated with the particular health-related schools of USM, and are operated by students and faculty advisors. Some of the programs and clinics are listed below:

COPPIN STATE UNIVERSITY

Community Health Programs: CSU is engaged in a community health program that offers first-line health screening to the community. For the past 16 years, Coppin State has headed a community health center on its campus, providing medical care, including preventive services, for West Baltimore and ensuring training opportunities for its nursing students. In 2010, CSU expanded its health outreach to East Baltimore with the opening of the St. Frances Academy Health Center to the greater community. The center, like the clinic on the campus, is a fully serviced, community-based primary care facility offering immunizations, physical exams, and referrals for the "underserved." The nurse-managed nonprofit also treats chronic and acute health conditions and offers preventative dental care for infants. Invested in serving even the uninsured, the health center at St. Frances accepts payment on a sliding scale and guarantees that no child will ever be denied care because of a lack of insurance. In FY 2011, the Coppin Community Health Programs served 3,598 patients.

UNIVERSITY OF MARYLAND, BALTIMORE (UMB)

School of Dentistry: Through the Predoctoral Senior Dental Student Service Learning/Externship Program, supervised dental treatment is provided to a variety of populations at community and public health clinics, hospitals, and private practices. These experiences enhance the dental students' skills and future commitments to working with underserved populations. The class of 2012 (210 senior dental students) provided more than 19,000 hours of supervised dental treatment via 46 sites throughout Maryland and through this program during the 2011–2012 academic year.

School of Nursing: Sustaining a strong presence in the clinical arena is essential to the academic success of nursing students. Each year more than 600 entry-level nursing students complete 200,000 hours in 70 clinical facilities in the Maryland-D.C.-Virginia region. Licensed RNs completing master's and doctoral requirements perform 20,000 practice hours throughout the state and region in a variety of health care settings. The Governor's Wellmobile Program, a fleet of mobile medical clinics administered by the School of Nursing, provides episodic care, chronic disease management, prevention, and referrals to uninsured and underserved populations statewide. The program also serves as a clinical site for entry-level and advanced practice nursing students. People throughout the state, especially vulnerable populations who suffer from lack of access and health care disparities, benefit from the nursing care delivered by students and faculty members.

School of Medicine: Each class of approximately 160 medical students participates in two years of preclinical work and two years of clinical work with more than 1,000 preceptors in more than 100 sites throughout Maryland, to complete 3,200 hours per student of professional experience, which prepares them to become exemplary physicians. The medical students spend their third and fourth years in an 80-week combined clinical program that provides a strong grounding in clinical science with a progressive opportunity for primary patient care responsibility. The curriculum is designed to prepare the medical student for the increasing responsibility demanded by the specialty residency programs throughout the country. UMB graduates are highly competent primary care physicians, clinical specialists, and scholars in basic and clinical research, teaching, and academic administration.

4.7 Educational Events and Services

As regional centers for learning, USM institutions organize, host, and sponsor educational events of international, national, regional, or local concern. For example:

TOWSON UNIVERSITY

The Osher Lifelong Learning Institute offers adults aged 50 or older opportunities for continued learning, as well as programs for social and cultural enrichment. Since its inception, the Osher Institute has provided more than 500 adults with programming and opportunities at area retirement communities, senior centers, and several branches of the Baltimore County Public Library.

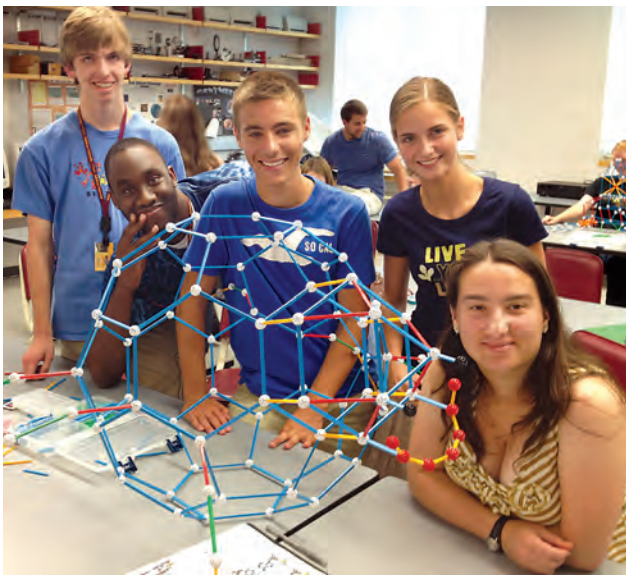
4.8 Summer Academic Programs

The University System of Maryland is dedicated to fostering educational development throughout the region via summer academic programs as a part of its commitment to community outreach. The following are a few examples of this type of outreach:

BOWIE STATE UNIVERSITY

BSU sponsors two summer camps to help middle and high school students to build knowledge of science concepts and to encourage them to pursue careers in computer science. Girls and boys, ages 12-17, participate in **Girls Who Will** and **Generation Innovation CPU Camp**.

Bowie State University hosts a six-week summer program in which Prince George's County high school students can earn college-level credit for various science courses at no cost. The **Pre-College Science Scholars Academy** accepts students during their sophomore year and continues with them through their senior year. The goal of the program is to increase the number of underrepresented students, specifically in Prince George's County, who major in science fields.



TOWSON UNIVERSITY

The **Center for STEM Excellence** provides outreach programs to Maryland's K-12 schools. One of its main components is the Baltimore Excellence in STEM Teaching (BEST) Program, founded with a grant from NASA. It offers training and mentoring opportunities to Baltimore teachers in order to strengthen STEM instruction throughout the metropolitan area. The BEST Program also includes a six-week summer research experience.

4.9 Environmental Programs

The University System of Maryland has embraced sustainability programs and encourages the exploration of alternative forms of renewable energy. USM's support of these sustainability and environmental goals has aided conservation efforts and contributes to the overall health of the environment and communities in which the member universities serve. Some examples are:

FROSTBURG STATE UNIVERSITY

Sustainable Energy Research Facility . This new facility, scheduled for occupancy in 2013, along with the university's ongoing exploration of alternative forms of energy production, including the Wind-Solar Energy Program, will quickly establish FSU as an important regional center for energy sustainable energy technologies and research.

UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE

The center participates in Chesapeake Bay Cabinet and BayStat for restoration of Chesapeake Bay.

UNIVERSITY OF MARYLAND, BALTIMORE COUNTY (UMBC)

UMBC's Sustainability Efforts are represented by an active recycling program, which includes creative outreach initiatives coordinated through a partnership between the Division of Student Affairs and Facilities Management office. Among these initiatives is an effort to engage the entire community in the annual, **RecycleMania** national competition.

The Student Government Association (SGA) sponsors four students each year to serve as **Sustainability Interns:** active contributors to the university's sustainability efforts, with an emphasis on student outreach and empowerment. In addition, the encouragement of student social entrepreneurs has produced benefits relating to sustainability. In 2012, a student team developed a proposal for a hydration station (an alternative to bottled water) in the Albin O. Kuhn Library's Retriever Learning Center, and won support from the SGA and the library administration to establish and supply the new station.

4.10 Sports and Entertainment Activities

Many of the participants in these activities engage in fundraisers or community outreach programs, such as educating youth about various sports, and athletes serving primary and secondary school students as mentors. Examples include:

UNIVERSITY OF MARYLAND, COLLEGE PARK

Sport Clubs: Men's ice hockey held two fundraisers and brought in more than $17,000 for the Wounded Warrior Project and more than $15,000 for the VetDogs program. The women's ice hockey club held its annual Pink at the Rink fundraiser and raised $400 for the Tyanna Foundation. It is a local charity started by five sisters who lost their mother to breast cancer and has raised more than $1 million to help local organizations; all of the funds raised in each city benefit a local breast center or breast health organization. Club Swim raised $1,490 for Maryland Special Olympics via the Polar Bear Plunge, as well as $600 for UMCP's Relay for Life, benefitting the American Cancer Society. Finally, the water polo club raised $5,200 for the varsity water polo program.

Y Sports Day with the Terps: Last April, Maryland Athletics partnered with the Y of Central Maryland for the first Y Sports Day with the Terps at the Weinberg Family Center Y in Baltimore. More than 70 student-athletes and coaches conducted skills development clinics for nearly 250 children from ages 4 to 17 in basketball, field hockey, football, gymnastics, golf, lacrosse, soccer, strength and conditioning, volleyball, and wrestling. More important, the kids were exposed to sports with which they might not be familiar.

Canned Food Drive: UMCP hosted two canned food drives, at a Maryland Madness event and a home football game. The university donated more than 5,000 pounds to the Capital Area Food Bank. Fifty student-athletes participated in the events.

UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

UMBC's NCAA Division I athletes demonstrate true commitment to the community via volunteerism and mentorship. The **Make a Difference Mentoring Program** pairs a UMBC student-athlete with an elementary school student to promote academic and personal growth.

An additional 25 student-athletes volunteer with the **Ride with Pride Program**, which pairs student-athletes with trainers to deliver horseback riding lessons for kids with disabilities.

UMBC Athletics collected and donated more than 100 pairs of gently worn shoes in partnership with **Soles4Souls**, a nonprofit organization that collects new and used shoes for impoverished people around the world.

For the last two years, UMBC student-athletes partnered with **College for Every Student (CFES)**, a nonprofit organization committed to raising the academic aspirations and performance of underserved youth. Athletes served as mentors, volunteered with CFES scholars for Arbutus Middle School Earth Day, and hosted middle school student-athletes for campus tours.

4.11 Cultural Activities

Cultural activities and events hosted by USM institutions are designed to expose and educate the community about the art and cultures of various ethnic groups, as well as promote awareness about vulnerable populations. Selected examples of these cultural activities include:

TOWSON UNIVERSITY

The **Asian Arts and Culture Center** is a self-supporting, nonprofit entity at Towson University. It promotes the art and cultures of Asia through outstanding programming designed to benefit students, faculty, artists, and the local and regional community. It was started in 1971 in TU's College of Fine Arts and Communication when local business owner Frank Roberts bequeathed his collection of Chinese and Japanese ivory carvings to the university. The collection now includes more than 1,000 pieces of art from China, Korea, Japan, India, Tibet, Nepal, Cambodia, Indonesia, and Thailand. The center also regularly features performances and exhibitions.

UNIVERSITY OF MARYLAND UNIVERSITY COLLEGE

The **Arts Program at UMUC** includes a permanent collection of Maryland artists and Asian art housed in the Leroy Merritt Center gallery, and features temporal art exhibitions, such as the Art of Joseph Sheppard. Additionally, it sponsors the Friends of the Arts program, which seeks donations to support the arts program at UMUC.

4.12 Community Impact Conclusion

The University System of Maryland makes important contributions to the cultural diversity and the quality of life in the state. In addition to the economic, fiscal, and workplace impacts discussed in this report, it is a part of USM's mission to promote community development and enrichment.

The system impacts statewide and local communities through a variety of activities and programs, which have been explained in detail in this section of the report. They show how the University System of Maryland directly contributes to improving the quality of life in the state and in local communities.

APPENDIX

Occupational Category and Corresponding Occupations

AGRICULTURAL
- AGRICULTURAL INSPECTORS
- ANIMAL SCIENTISTS
- CONSERVATION SCIENTISTS
- FOOD SCIENTISTS AND TECHNOLOGISTS
- FORESTERS
- SOIL AND PLANT SCIENTISTS
- VETERINARIANS

BIOLOGICAL/EARTH SCIENCES
- ATMOSPHERIC AND SPACE SCIENTISTS
- BIOCHEMISTS AND BIOPHYSICISTS
- BIOLOGICAL SCIENTISTS
- BIOLOGICAL TECHNICIANS
- CHEMISTS
- DIETITIANS AND NUTRITIONISTS
- ENVIRONMENTAL SCIENTISTS AND SPECIALISTS, INCLUDING HEALTH
- FORENSIC SCIENCE TECHNICIANS
- GEOSCIENTISTS, EXCEPT HYDROLOGISTS AND GEOGRAPHERS
- LIFE SCIENTISTS, ALL OTHER
- MATERIALS SCIENTISTS
- MICROBIOLOGISTS

NATURAL SCIENCES MANAGERS
- PHYSICAL SCIENTISTS, ALL OTHER
- PHYSICISTS
- ZOOLOGISTS AND WILDLIFE BIOLOGISTS

BUSINESS
- ACCOUNTANTS AND AUDITORS
- ACTUARIES
- ADVERTISING AND PROMOTIONS MANAGERS
- BUDGET ANALYSTS
- COMPLIANCE OFFICERS, EXCEPT AGRICULTURE, CONSTRUCTION, HEALTH AND SAFETY, AND TRANSPORTATION
- COST ESTIMATORS
- CREDIT ANALYSTS
- FINANCIAL ANALYSTS, EXAMINERS, MANAGERS AND SPECIALISTS, ALL OTHER
- INDUSTRIAL PRODUCTION MANAGERS
- INSURANCE UNDERWRITERS
- LOAN COUNSELORS
- LOGISTICIANS
- MANAGEMENT ANALYSTS
- MARKET RESEARCH ANALYSTS AND MARKETING SPECIALISTS
- MARKETING MANAGERS
- MEETING AND CONVENTION PLANNERS
- OPERATIONS RESEARCH ANALYSTS
- PERSONAL FINANCIAL ADVISORS
- PUBLIC RELATIONS MANAGERS
- PURCHASING MANAGERS
- SALES MANAGERS
- SALES REPRESENTATIVES
- SECURITIES, COMMODITIES, AND FINANCIAL SERVICES SALES AGENTS
- TAX EXAMINERS, COLLECTORS, AND REVENUE AGENTS

BUSINESS
- ACCOUNTANTS AND AUDITORS
- ACTUARIES
- ADVERTISING AND PROMOTIONS MANAGERS
- BUDGET ANALYSTS
- COMPLIANCE OFFICERS, EXCEPT AGRICULTURE, CONSTRUCTION, HEALTH AND SAFETY, AND TRANSPORTATION
- COST ESTIMATORS
- CREDIT ANALYSTS
- FINANCIAL ANALYSTS, EXAMINERS, MANAGERS AND SPECIALISTS, ALL OTHER
- INDUSTRIAL PRODUCTION MANAGERS
- INSURANCE UNDERWRITERS
- LOAN COUNSELORS
- LOGISTICIANS
- MANAGEMENT ANALYSTS
- MARKET RESEARCH ANALYSTS AND MARKETING SPECIALISTS
- MARKETING MANAGERS
- MEETING AND CONVENTION PLANNERS
- OPERATIONS RESEARCH ANALYSTS
- PERSONAL FINANCIAL ADVISORS
- PUBLIC RELATIONS MANAGERS
- PURCHASING MANAGERS
- SALES MANAGERS
- SALES REPRESENTATIVES
- SECURITIES, COMMODITIES, AND FINANCIAL SERVICES SALES AGENTS
- TAX EXAMINERS, COLLECTORS, AND REVENUE AGENTS

COMPUTER SCIENCE
- COMPUTER AND INFORMATION RESEARCH SCIENTISTS
- COMPUTER AND INFORMATION SYSTEMS MANAGERS
- COMPUTER OCCUPATIONS
- COMPUTER PROGRAMMERS
- COMPUTER SYSTEMS ANALYSTS
- DATABASE ADMINISTRATORS
- INFORMATION SECURITY ANALYSTS, WEB DEVELOPERS, AND COMPUTER NETWORK ARCHITECTS
- NETWORK AND COMPUTER SYSTEMS ARCHITECTS AND ADMINISTRATORS
- SOFTWARE DEVELOPERS, APPLICATIONS
- SOFTWARE DEVELOPERS, SYSTEMS SOFTWARE

EDUCATION
- ADULT LITERACY, REMEDIAL EDUCATION, AND GED TEACHERS AND INSTRUCTORS
- AGRICULTURAL SCIENCES TEACHERS, POSTSECONDARY
- EDUCATION ADMINISTRATORS
- GRADUATE TEACHING ASSISTANTS
- KINDERGARTEN TEACHERS, EXCEPT SPECIAL EDUCATION
- MIDDLE SCHOOL TEACHERS, EXCEPT SPECIAL AND VOCATIONAL EDUCATION
- POSTSECONDARY TEACHERS
- SECONDARY SCHOOL TEACHERS, EXCEPT SPECIAL AND VOCATIONAL EDUCATION
- SPECIAL EDUCATION TEACHERS
- TEACHERS AND INSTRUCTORS, ALL OTHER
- VOCATIONAL EDUCATION TEACHERS

ENGINEERS
- AEROSPACE ENGINEERS
- AGRICULTURAL ENGINEERS
- BIOMEDICAL ENGINEERS
- CHEMICAL ENGINEERS
- CIVIL ENGINEERS
- COMPUTER HARDWARE ENGINEERS
- ELECTRICAL ENGINEERS
- ELECTRONICS ENGINEERS, EXCEPT COMPUTER
- ENGINEERING MANAGERS
- ENGINEERS, ALL OTHER
- ENVIRONMENTAL ENGINEERS
- HEALTH AND SAFETY ENGINEERS, EXCEPT MINING SAFETY ENGINEERS AND INSPECTORS
- INDUSTRIAL ENGINEERS
- MARINE ENGINEERS AND NAVAL ARCHITECTS
- MATERIALS ENGINEERS
- MECHANICAL ENGINEERS
- NUCLEAR ENGINEERS

HEALTH
- AUDIOLOGISTS
- CHIROPRACTORS
- DENTISTS
- EPIDEMIOLOGISTS
- FAMILY AND GENERAL PRACTITIONERS
- HEALTH DIAGNOSING AND TREATING PRACTITIONERS
- HEALTHCARE PRACTITIONERS AND TECHNICAL WORKERS, INCLUDING GENETIC COUNSELORS
- INTERNISTS, GENERAL
- MEDICAL AND HEALTH SERVICES MANAGERS
- MEDICAL SCIENTISTS, EXCEPT EPIDEMIOLOGISTS
- OBSTETRICIANS AND GYNECOLOGISTS
- OCCUPATIONAL THERAPISTS
- OPTOMETRISTS
- PEDIATRICIANS, GENERAL
- PHARMACISTS
- PHYSICAL THERAPISTS
- PHYSICIAN ASSISTANTS
- PHYSICIANS AND SURGEONS
- PODIATRISTS
- PSYCHIATRISTS
- SURGEONS

LAW
- ARBITRATORS, MEDIATORS, AND CONCILIATORS LAWYERS

SOCIAL SCIENCE/GOVERNMENT
- CHILD, FAMILY, AND SCHOOL SOCIAL WORKERS
- COUNSELORS, ALL OTHER
- EDUCATIONAL, VOCATIONAL, AND SCHOOL COUNSELORS
- MARRIAGE AND FAMILY THERAPISTS
- MATHEMATICIANS
- MEDICAL AND PUBLIC HEALTH SOCIAL WORKERS
- MENTAL HEALTH AND SUBSTANCE ABUSE SOCIAL WORKERS
- MENTAL HEALTH COUNSELORS
- REHABILITATION COUNSELORS
- SOCIAL SCIENTISTS AND RELATED WORKERS
- SOCIAL WORKERS
- SOCIOLOGISTS
- STATISTICAL ASSISTANTS
- STATISTICIANS
- SURVEY RESEARCHERS
- URBAN AND REGIONAL PLANNERS

ENDNOTES

[1] Barry Bluestone, UMASS/Boston An Economic Impact Analysis, University of Massachusetts at Boston, 1993.

[2] David Stevens, Kristy Wilson Axeness, Liping Chen, Daniel Gerlowski, and Lyn Zhao, The Economic Importance of the University of Maryland System to the state of Maryland, the Jacob France Center, University of Baltimore, 1994; and Daniel Gerlowski and David Stevens, The Economic Impact of the University System of Maryland: A Fiscal Perspective, the Jacob France Center, University of Baltimore, 1998.

[3] John Caffery and Herbert Isaacs, Estimating the Impact of a College or University on the Local Economy, American Council on Education, 1971.

[4] The JFI maintains a database of employment and earnings of workers covered by unemployment insurance. Data on employment and on actual reported earnings are available for an almost 30-year time period. Data are available through the end of calendar 2011, with future earnings estimated based on the assumptions presented below. Employment and earnings data are for workers covered by unemployment insurance and excludes the earnings of USM graduates who are self-employed workers, independent contractors, federal civilian and military workers, or out-of-state commuters.

[5] See Daniel Gerlowski and David Stevens 1998 for a more complete description of the methodology used to estimate the earnings of high school graduates.

[6] There is substantial evidence that many workers remain in the workforce past the age of 66, making the assumption of working only through the age of 66 quite conservative.

[7] The assumption of 4 percent earnings growth was based on research conducted for the previous JFI reports and was maintained in this analysis in order to be consistent with the prior reports. The current economic downturn and projections of a slow recovery will impact projected earnings growth in the near to intermediate term; however, no alternative estimates are available at this time.

[8] These income figures are expressed in nominal dollars and are not adjusted for inflation.

[9] At the time of writing, ACS data on earnings by educational attainment were only available for 2010.

[10] The cause of this negative wage premium is unknown. It could be that master's degree recipients were concentrated in fields with lower earnings. It is also not known how many of the 1986 cohort of bachelor's degree recipients went on to earn an advanced degree in the 25 years since graduation. Because, according to the ACS, 16.5 percent of the Maryland workforce has an advanced degree it is likely that the earnings of this cohort of 1986 bachelors' degree recipients includes at least some persons who have gone on to earn an advanced degree.

[11] At the time of writing, ACS data on earnings by educational attainment were only available for 2010.

[12] At the time of writing, ACS data on earnings by educational attainment were only available for 2010.

[13] Income tax revenues are computed as incremental earnings multiplied by the state's income tax rate for each of the historical years analyzed and at the current rate for future earnings. Sales tax revenues are calculated as incremental earnings multiplied by 33 percent and then by the state's sales tax rate for each of the historical years analyzed and at the current rate for future earnings. Past JFI research found that approximately one-third of income is spent on items subject to the Maryland sales tax. Graduates will also pay a variety of other state and local taxes – but it was outside of the scope of this project to estimate all potential fiscal impacts. Thus, the tax figures can be viewed as very conservative estimates that are likely to undercount actual fiscal impacts at the State level and not include county fiscal impacts at all.

[14] All economic impact data are in 2011 dollars. Incremental earnings were adjusted to reflect disposable personal income before multipliers were applied. The multipliers for the household sector of the economy were employed.

[15] Estimates of tuition revenues from out-of-state students were provided by USM.

[16] The number of full-time out-of-state students enrolled in each USM institution was provided by USM. Average living expenses were based on financial aid estimates from each institution's website. The living expenses of part-time students are excluded from this analysis because it is not possible to know whether they live in Maryland or commute to a USM institution from out of state. The use of the living expenses of full-time students only provides a conservative estimate of the total economic impact of the system since the living, commuting, and educational purchases of part-time students are excluded.

[17] Each of the USM Institutions completed a survey on critical data for this report. They were asked to provide data on visitors. Visitor spending data were estimated based on prior JFI tourism and university studies.

[18] The state subsidy was derived dividing the state appropriation received by the USM by total enrollment for the years being analyzed in order to derive the state per student subsidy for each year of operation. This ignores differences between institutions and programs within institutions, but provides a reasonable estimate of the average cost of a USM student. These figures were then summed for each year for the number of years at a USM institution for each class of the two cohorts. Bachelor's degree recipients were assumed to spend four years at a USM institution, master's degree recipients two years, doctoral degree recipients five years, and professional degree recipients three years. All values are expressed in constant 2011 dollars.

[19] As described above, only a portion of USM graduates appeared in the DLLR data. Many graduates move out of state to find employment. Others may reside in Maryland but work in neighboring states, for employers (such as the federal government) not included in the DLLR data used, or are self employed or independent contractors (and, thus, also not in the DLLR data used). The omission of these latter types of graduates undercounts the actual incremental wage and related impacts of the USM. However, there was no means to obtain information on these graduates. Thus, the estimates presented here can be viewed as very conservative.

[20] http://www.gwib.maryland.gov/pub/pdf/gwibindicators2010.pdf.

[21] http://www.jacob-france-institute.org/wp-content/uploads/2012/01/BCS-2011-Annual.pdf.

[22] http://choosemaryland.org/factsstats/Pages/Rankings.aspx.

[23] These 10-year projections were converted into annual demand.

[24] The JFI grouped occupations into key educational clusters. See Appendix for a list of occupations by degree area. It is important to note that occupations can and often are filled by persons with a different degree type. This analysis is simply a high-level comparison of graduation data to occupational demand.

[25] Association of University Technology Managers, AUTM Licensing Survey: FY 2011.

[26] http://scorecard.assetsandopportunity.org/2012/measure/business-creation-rate?state=md

[27] Maryland Small Business Development Network, Annual Report 2011

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