

**Center for Applied Demography & Survey Research**  
**University of Delaware**

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# **The Economic Impact of Delaware State University**

**by**

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## **EXECUTIVE SUMMARY**

The Delaware State University (DSU) with the main campus in the city of Dover and satellite campuses in Wilmington and Georgetown, offers a wide range of under and graduate programs across five Academic Colleges and 21 Departments. With a strong emphasis on the STEM, Business, and Humanities, DSU enrolls an average of 4,328 students, out of which 3,993 are undergraduates. Students receive traditional classroom instruction, as well as online, and hands-on learning in labs, farm facilities, schools, etc.

Research at DSU is widespread ranging from developing new planting techniques and food varieties at the two farms owned by DSU and their labs to advanced physics research at the Optical Science Center for Applied Research (OSCAR). The Center houses the Center for Research and Education in Optical Sciences and Applications, funded by the National Science Foundation, and the Optics for Space Technology and Applied Research Center, which is funded by NASA (NASA-MIRO). Opportunities for research are plenty regardless of the student's choice of major.

The Center for Applied Demography & Survey Research at the University of Delaware conducted this research to determine the economic impact that Delaware State University has on the economy of the State. This research focused on the actual activity of the Delaware State University during the year 2016 and a simulation of its expected activity during 2018. In both cases without speculation about what could have happened in the absence of the University. Although the Delaware State University has funded this work, the author is solely responsible for its design and execution.

The following statements summarize the main results of the analysis:

- Delaware State University's total impact on the State of Delaware was a \$235 million increase in economic output in **2016**.
- Out of the \$235 million in additional output, about 65% came from DSU's direct spending (compensation, operations, and capital), the remaining 35% from constituent spending (including students and visitors.)
- Total employment within the state increased by 2,783 jobs and 2,625 in private non-farm jobs. **Out of these, 1,035 jobs were in Educational services and, importantly, 402 jobs in construction, the second most important industry impacted by DSU's economic activity.**
- In addition to employment, wages and salaries expanded by \$157 million and total compensation (including transfer, proprietors' income, etc.) reached \$203 million.
- Most of the large investments in research facilities were completed before 2016. Consequently, spending by DSU during 2016 did not include any large, special investment project. However, in 2018 DSU will begin the construction of a new residence hall through a system of public-private partnership. The private developer will invest about \$60 million into the new building during 2018-2019. Therefore, we have simulated what will be the economic impact of the building of the new facilities in addition to DSU's normal activity during 2018. For that simulation, we allocated \$25 million in investment for 2018 as we assume the largest part of the investment will occur in 2019.
- **Our model estimates that non-farm employment will increase by 2,873 jobs, while construction will add 619 new jobs during 2018.** As we have kept DSU regular spending at the same level than in 2016, the core of the higher economic impact will be in the construction industry.
- DSU impact on the state economy largely exceeds the numbers in this report. Many activities, which have an economic impact are not possible to value. Consequently, the results of the report should be considered a sound and conservative estimate.

## **THE DELAWARE STATE UNIVERSITY**

The Delaware State (DSU) received its name on July 1, 1993. Founded in 1891 as The Delaware College for Colored Students located on a 95-acre property north of Dover, the State capital. In 1893 and as there was a private Delaware College (now University of Delaware,) legislation was passed to change the initial name into the State College for Colored Students. That name lasted until 1947 when the school was renamed Delaware State College until 1993 when the final name came to life.

The college offered Baccalaureates in five lines of study in the early years: Agricultural, Chemical, Classical, Engineering, and Scientific, in line with the needs not only of the State but also of the whole country to support the ongoing agricultural and manufacturing revolutions. With the years, DSU has been changing and modernizing according to the needs of the society. Today, DSU offers 16 masters and five doctoral degree programs across five academic colleges and 21 departments.

DSU maintains the main site in Dover, on a 356-acre campus with modern facilities for research, classes, administration, student dormitories, and outdoor/indoor sports facilities. Two satellite campuses in the state expand DSU's capacity to offer education: one in Wilmington, with easy access to the Interstate I-95 highway, and the other in Georgetown. Through agreements with Delaware Technical & Community College, DSU offers to DTCC students who have achieved an Associate Degree to reach an accelerated Bachelor's Degree. DSU also owns two farm properties in Kenton and Smyrna. Importantly, the Airway Science Program has a fleet of planes based at the Delaware Air Park in Cheswold. DSU had a total enrollment of 4,336 students during the Fall of 2016.

## INTRODUCTION

DSU's School of Graduate Studies and Research offers 16 masters and five doctoral degree programs across five Colleges and 21 Departments, which also offer Bachelors on more than 70 Majors. Colleges are very diversified in their areas of academic concentration. For instance, the College of Agriculture and Related Services includes two Departments: the Department of Agriculture & Natural Resources and the Department of Human Ecology. The first focuses on the interrelationship of agriculture, the environment, wildlife, and humans; the second covers, not only topics about food and textiles but also early education through the Early Childhood Laboratory School. In there, graduate and undergraduate students in Education get a first-hand contact with child development theory, research, and its applications.

Similarly, other Colleges and Department have centers of emphasis that excel by themselves. Without exhausting DSU's list of special areas of research, outreach, and academic concentration, we should mention, as examples, two special areas: 1) the Optical Sciences Center for Applied Research (OSCAR), which is a major research center specializing in optical sciences and applications. The center quarters the Center for Research and Education in the Optical Sciences and Applications (CREOSA), an NSF-CREST center, and **Optics for Space Technology and Applied Research (O\*STAR) Center** funded by NASA MIRO program. Both centers, and fundamentally the later, attract the attention of young and future scientists with interest in space. 2) the Bachelor degree in Aviation offered by the College of Business with a major in Professional Pilot. Those that complete with all FAA and College requirements have the opportunity to interview with Piedmont Airlines, which has a partnership with DSU. The possibility of being hired by the regional airline also opens the opportunity, after five years of experience, of continuing the career in a major US airline company. As Piedmont states on its website: "Take your pilot career to the next level with a guaranteed path to American Airlines and industry-leading pay."

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DSU offers four Masters in Business Administration at the Wilmington campus: Master of Business Administration (MBA), Master of Public Administration (MPA), Master of Social Work (MSW), and Master of Science in Sport Administration (MSA). The location of the campus (close to the Interstate 95 highway,) offers the possibility of pursuing graduate education to those living along the corridor Philadelphia-Baltimore. At the same time, it offers Online Education in the same graduate programs. The same faculty that teaches in the classrooms do so online, and they are ready and willing to provide the support needed by the students.

In association with Delaware Technical & Community College, offers DTCC students who have earned an Associate Degree, the possibility to complete a Bachelor's Degree in a fast-track plan requiring just four more semesters. At the Georgetown campus, students can pursue a Bachelor in Social Work. Other 18 Bachelors degrees and a couple of Professional Certificates must be carried on at DSU's main campus. Figure 1 summarizes the degrees offered by DSU.

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**Figure 1 Degree Programs Offered by DSU**

	Bachelor	Cert.	Masters	Doctorate
<b>College of Agriculture and Related Sciences</b>				
Department of Agriculture and Natural Resources	X		X	
Department of Human Ecology	X		X	
<b>College of Arts, Humanities, and Social Sciences</b>				
Department of Art	X			
Department of English and Foreign Languages	X		X	
Department of History, Political Science, and Philosophy	X			
Department of Mass Communications	X			
Public Administration			X	
Department of Psychology				
Department of Sociology and Criminal Justice	X			
<b>College of Business</b>				
Department of Accounting, Economics, and Finance	X			
Department of Business Administration	X		X	
Department of Sports Management	X		X	
<b>College of Education, Health, and Public Policy</b>				
Department of Education	X		X	X
Department of Nursing	X			
Department of Public and Allied Health Sciences	X	X		
Department of Social Work	X		X	
<b>College of Mathematics, Natural Sciences, and Technology</b>				
Department of Biological Sciences	X		X	X
Department of Chemistry	X		X	X
Department of Computer & Information Sciences	X		X	
Department of Mathematical Sciences	X		X	X
Department of Physics and Engineering	X		X	X

## **WHAT IS AN ECONOMIC IMPACT ANALYSIS**

An **Economic Impact Analysis(EIA)** is the study of how the actions of different organizations like private companies or educational institutions, alter or affect the economy. The objective of EIA to forecast or to predict how policy changes, changes in production of goods and services, or changes in population, could expand or contract the overall economy or some of the macroeconomic components. Executives in government or legislators want to know how employment may change if the government increase spending on infrastructure or decide to increase/decrease income taxes. EIA simulates those policies using statistical and economic models and gives estimates of the impact on major economic variables.

Each model used for EIA necessarily reduces the intricacy of the human and technical relationships involved in different markets. The base of any model is the set of assumptions used in its construction and estimation. For instance, supply and demand in the labor market determine equilibrium values for wages and employment; predetermined individuals' consumption patterns help to estimate the demand in the goods market while government activity (spending and revenues) exert influence on the demand for goods and services by altering disposable personal income.

An efficient model for EIA represents those human and technical relationships in a set of equations and parameters. The modeler or analyst must apply logical rigor and economic theory to each of the assumptions governing those equations and parameters.

## **THE REMI PI+ MODEL**

The REMI PI+ Model is a dynamic forecasting and policy analysis tool of the economy of Delaware, capable of simulating and estimating causal relationships. Contrary to other models, especially Input-Output models (RIMS II, IMPLAN,) REMI incorporates several modeling approaches, combining the strengths of econometric, Input-Output, and dynamic

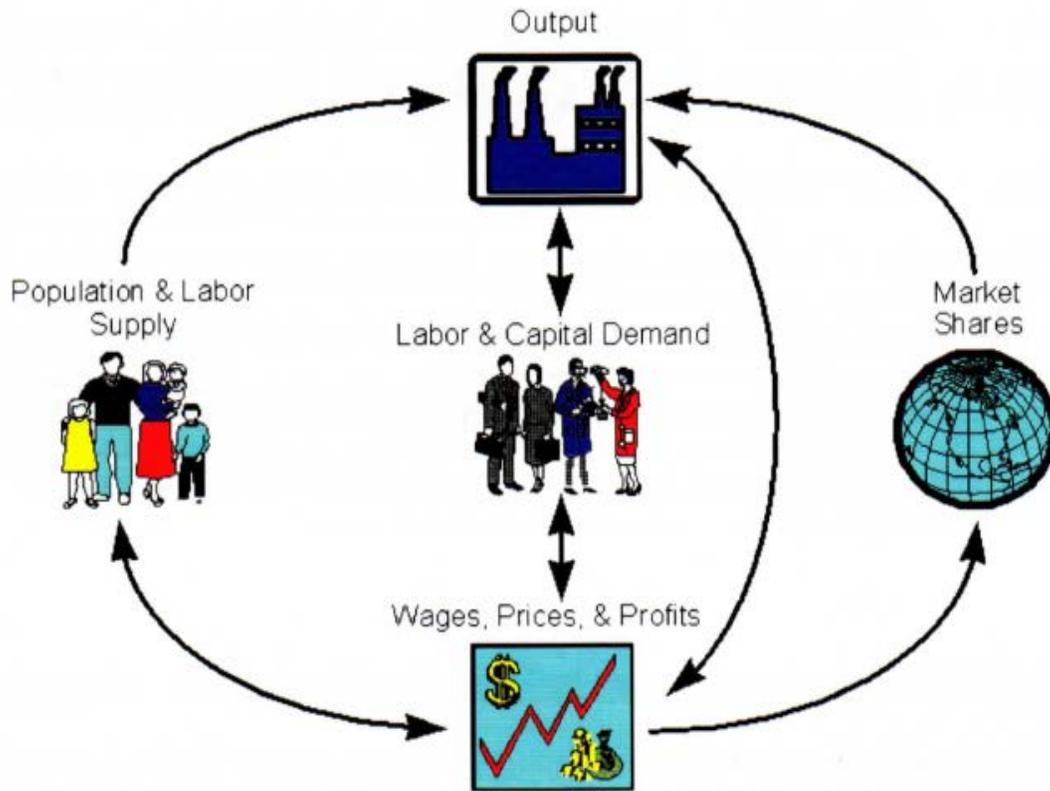
models while overcoming the limitations of each of them individually. The result is a comprehensive model that answers “what if...?” questions about the economy.

At its core, the REMI model incorporates the complete inter-industry relationships found in input-output models. REMI models are dynamic; they demonstrate economic changes over time, allowing firms and individuals to modify their behavior in response to changing economic conditions. General equilibrium economic theory is the basis for the modeling of those responses.

The REMI model used in this EIA is a regionalized version of a benchmarked national model. There are ten geographic sub-regions formed by counties, and aggregations of them, that account for all regional economic activity. The core region is the State of Delaware and its three counties. Salem County and the combination of Burlington, Camden, and Gloucester counties represent the State of New Jersey. Bucks, Montgomery, and Philadelphia counties (combined), and Delaware and Chester counties (combined) are the counties included from Pennsylvania. For Maryland, Cecil County, Harford County, and a combination of 10 counties in Maryland and Virginia complete the remaining part of the Delmarva peninsula. Although each sub-region is treated in the model as an independent, fully functioning economy, which interacts with other sub-region and the nation, for DSU EIA we are consolidating them into three regions: the State of Delaware, the rest of the Counties listed above, and the rest of the nation and World.

The model relays on usual economic assumptions: firms maximize profits and households maximize utility. In addition to Input-Output relationships, the model contains many equations that describe the structure of the economy in mathematically and statistical terms. Those equations belong to any of five major components or blocks: Output, Population & Labor Supply, Labor and Capital Demand, Market Share, and Wages, Prices, & Profits. The figure above illustrates how is the interaction within the five blocks.

Figure 2 – Illustration of block interactions within REMI PI+ model



Economic criteria define the equations within each block: business use labor, capital, and fuel as inputs to supply goods and services. Households and business provide inputs for production and demand goods and services. Equilibria in the different markets calculate wages, prices, and profits.

The REMI PI+ is a general equilibrium model with feedback, which means that describes the economy as it changes over time: variations in population, demographics, and wages exert influence over the labor supply. Changes in today's labor supply also affect that supply in future years. Those adjustments are not instantaneous and occur gradually, instead of statistically

jumping from one equilibrium to another. That characteristic is another of REMI's advantages versus Input-Output models.

The general equilibrium capacity of the model includes the multiplier effect through successive iterations and equilibria in other parts of the economy. Consequently, the multiplier effect is the cumulative impact of any change in the economy. As an example: a purchase of one dollar of retail sales will increase construction in 28 cents plus sales in manufacturing in 30 cents plus sales in utilities, etc. The summation of the different inputs in the dollar spent in retail could exceed that amount by several factors.

Figure 3 – How REMI Forecast the Effect of a Policy

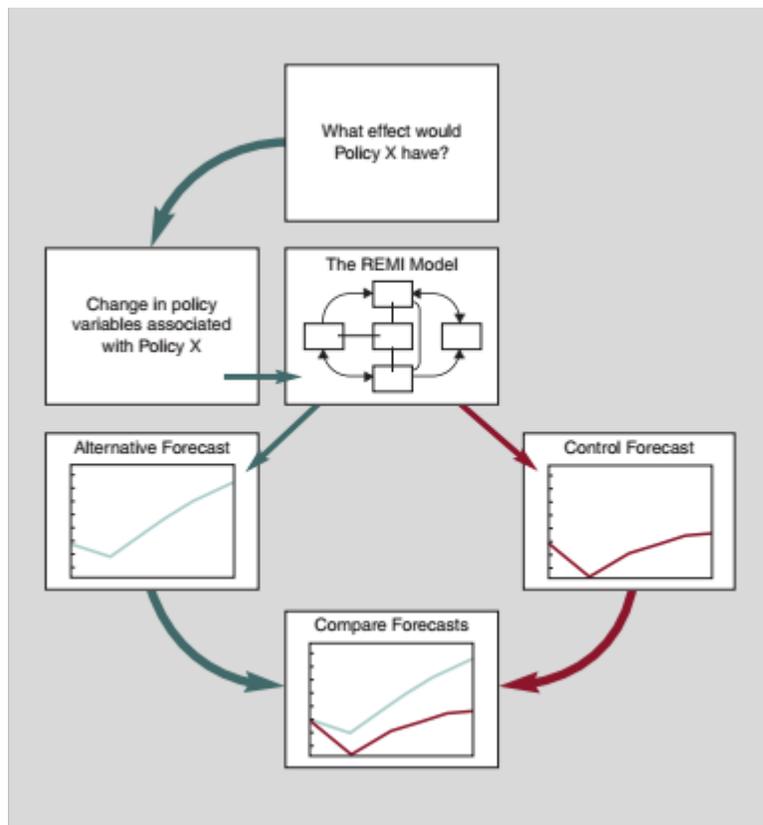


Figure 3 displays how REMI handles the calculations. REMI includes, by default, a Control Forecast. That forecast does not necessarily need to verify in the future as it acts only as a reference. When the policy modeler introduces a change in policy variables (input variables), the model simulates the results and stores them in the Alternative Forecast. Finally, REMI compares both, the Control and Alternative forecasts and the difference is the result of the change in Policy x.

In this report, we employ the REMI PI+ model to visualize and understand the economic effect of DSU on the economy of the State of Delaware. We cannot calculate and define all economic variables the DSU alters during a year. However, a summary of the main and key macroeconomic variables, which give an excellent picture of such impact, is reported in the corresponding section.

### **THE DSU DIRECT ECONOMIC IMPACT**

There are two general approaches to allocate DSU's expenditures to calculate its footprint and conduct an impact evaluation. One of them is to assume that DSU's expenditures match exactly those of a representative University as calculated by the Bureau of Economic Analysis (BEA.) A second approach is to use what in the industry is called "bill-of-goods impact allocation." The latter involves assigning every single expense made by DSU during the period of analysis to a North American Industry Classification System (NAICS) code. In that way, each dollar spent by DSU is accounted to the actual category and not to a national average of colleges and universities that not necessarily reflect the precise activity of DSU.

We used five categories of spending to calculate DSU's total economic impact:

1. Compensation – wages, salaries, and benefits paid to employees of the University and associated programs.
2. Operations – non-compensation and non-capital spending.

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3. Capital – investment on construction, machinery, and equipment.
4. Student expenses – on and off-campus.
5. Visitors – expenses off-campus related to the visit.

### 1. Compensation.

Through the direct employment of faculty, administrative, and operations staff DSU affects the economy of the State of Delaware directly. During 2016, the University had 269 full-time and an annual average of 130 part-time members of the teaching corps distributed among the Dover, Wilmington and Georgetown campuses with the core of the faculty at the main campus. The impact of that employment is twofold: consumption and investment effected at the place of residence plus expenses incurred at the place of work or nearby.

Also, DSU's have 750 employees among Professionals, Classified, Administrative, and hourly, part-timers, and other categories. It also counts with 858 students hired as Researchers, T.A., etc. The table below shows the main distribution of expenses into Wages, Salaries, and Benefits

**Table 1 - Wages and Salaries, Benefits, and Number of Employees by Classification - 2016**

Classification	Wages and Salaries	Benefits	Total Inc. Benefits	Number of Employees
Faculty	\$19,440,470	\$8,768,877	\$28,209,347	265
Classified	\$6,136,754	\$3,587,859	\$9,724,612	237
Professional	\$18,207,259	\$8,658,994	\$26,866,253	399
Administrative	\$4,988,474	\$1,851,229	\$6,839,703	35
Hourly/PT/ADJ *	\$1,937,578	\$287,822	\$2,225,400	209
Students	\$3,069,380	\$46,765	\$3,116,144	858
<b>TOTAL</b>	<b>\$53,779,915</b>	<b>\$23,201,546</b>	<b>\$76,981,461</b>	<b>2003</b>

\* Part-time faculty included here

As can be seen in Table 1 above, DSU paid a total of \$77 million in wages and salaries, including benefits to 2003 employees (including students.) The total paid to Faculty reflects only

payment to full-time, which reduces the total amount about \$10 million as part-time faculty forms part of the Hourly/PT/ADJ category.

DSU employees use their University-originated income into purchases of goods and services. To allocate this amount among different industries, we use national data based on the purchasing patterns calculated by the Bureau of Economic Analysis (BEA) as Personal Consumption Expenditures.

### **2. Operations - Non-Compensation and Non-Capital Spending**

The assessment of Operational Spending involves the evaluation of all payments to contractors, vendors, professional organizations, travel companies, etc., plus the recognition of expenses incurred by members of the University through the usage of credit cards. All expenses have been classified, according to the object of the disbursement, into sub-classes of the NAICS and a posteriori into the 68 aggregated industries that are part of the REMI PI+ model.

Total expenses (except Compensations) during 2016 amounted to \$83 million. Out of that total, 66% corresponded to transaction done with vendors and other providers within the State of Delaware and the remaining 34% with vendors and providers in the rest of the country and international vendors. Transactions in two industries: Retail and Wholesale Trade and Construction ( a component of Capital Investment) represent almost 30% of DSU's annual expenses.

### **3. Capital – Investment on Construction, Machinery, and Equipment**

The main component of Capital Investment that can be individualized is Construction. The total spending in Construction during 2016 was **\$12.4 million**. That total includes improvements, repairs, and fitting of building across campus as well as replacement of big-ticket

price equipment like HVAC central units. Investment in Machinery and Equipment does require individualization as REMI PI+ consolidates those amounts in Retail and Wholesale trade

#### **4. Student Expenses – On- and Off-Campus**

Many students spend their money on-campus and off-campus. For instance, those living on-campus pay Room and Board to DSU. Consequently, that amount is omitted from the EIA to avoid double accounting. We also eliminate expenses in Books and Educational Material as we assume students purchase those at the DSU's Bookstore. Students living off-campus paid some Rent, but we except those living with family. However, all student expenditures off-DSU's campus, including expenditures for restaurants, retail goods, entertainment, and housing, need to be added.

We rely on the latest and widely used allocation by students estimated by O'Donnell and Associates. We estimate that those students living on-campus spend \$21,636 per year outside campus, those living off-campus \$31,320, and commuters \$11,722. Of course, in our calculations, those numbers are corrected according to State of residence and months of the year living in Delaware before entering as inputs to the REMI model. For instance, an out-of-state student living on-campus would spend \$16,227 while living off-campus the correct amount would be \$26,100. Also, in-State students living with their family, as they do not pay Room and Board, required further adjustments. Expenses of Tuitions and Fees and Books and Supplies are eliminated for all students as they pay Tuitions to DSU, and most likely buy Books from DSU's bookstore, which will represent double accounting. Table 2 summarizes how DSU's students allocate their expenses.

**Table 2 – Distribution of Students Annual Expenses according to Living Arrangements - 2016**

	%	On-Campus	Off-Campus	Commuters
Room and Board	26%		X	
Other Expenses	8%	X	X	X
Transportation	3%		X	X
Discretionary	40%	X	X	X
Tuition and Fees	19%			
Books & Supplies	4%			
<b>Total</b>	<b>100%</b>			
<b>Total Expenses</b>		<b>\$ 21,636</b>	<b>\$ 31,320</b>	<b>\$ 11,722</b>

Source: O'Donnell & Associates

## 5 . Visitors

DSU attracts expenditures to the zone, largely from out of the State<sup>1</sup>. We are estimating the number of visitors into these categories:

1. Admissions, including prospective students and accompanying individuals. The total number of applicants in 2016 was 8,529. According to reports from the University of Delaware<sup>2</sup>, and the University of Ohio<sup>3</sup> among others, each prospective student visits schools along with an average of 1.9 companions. The number of applicants can be lower than the actual number of prospective students visiting DSU as not all visitors apply. Our estimate for this category is of 17,505, which is a very conservative number.
2. Athletic events. In this category, we include public attending to the events, visiting teams, coaches, etc. Precise numbers are very difficult to gather as no record is available for the total number of visitors to athletic events. However, based on the number of local games played by DSU Athletic teams we estimate at 10,300 the total annual number of visitors to athletic events.

<sup>1</sup> Not all visitors' expenditures are from out of State as some are from within the State. However, an estimate of spending from within the State is included as we assume that the visitors exists because of DSU is there.

<sup>2</sup> Latham and Lewis (2010)

<sup>3</sup> OHIO UNIVERSITY ECONOMIC IMPACT ASSESSMENT / WWW.OHIO.EDU/IMPACT

3. Conferences, Symposia, Seminars, and Alumni events. Our conservative estimate for this category is of 13,700 participants in the year.
4. Visitors to Colleges and Departments not only at Dover but also Wilmington and Georgetown campuses gives an estimate of 5,600 in 2016.
5. We estimate the number of visitors to events organized by Associated Enterprises like farms, K-12 and K-6, etc. as 4,500 during the year.

The total number of visitors can be surely higher than 51,600, but as we said above, we prefer to err on the low side. For all these visitors we are considering only three kinds of expenses: Accommodations, Food off-campus, and Gasoline. We do not include spending in Retail as there are high probabilities that that spending may be at DSU's stores, which would imply a double accounting. We estimate each visitor spent an average of \$250 per visit.

## RESULTS OF DSU ECONOMIC IMPACT ANALYSIS

In this section, we model the direct impact of DSU into the economy of the State of Delaware and the effects and ramifications into other sectors of the economy, which constitutes the secondary impact. Although the analysis accounts for DSU economic activity during 2016, the base year for the simulation, additional iterations were necessary to appraise the total economic impact. REMI PI+, as a dynamic economic impact system, does not exhaust all possibilities of markets equilibria in just a single iteration. On average, it required three additional rounds of simulation to achieve equilibria in all markets. Consequently, the result we present in this section is an excellent appraisal of the total Economic Impact of DSU.

In spite of the main objective of the authorities of DSU to focus the analysis on the whole State of Delaware as opposed to each Delaware County, we have modified REMI to operate on the State as a single unit. Nevertheless, as DSU spent in the three Counties, there were economic interactions among all them.

We should note that a large portion of DSU spending goes out of the State. Out of the \$83 million spent with vendors, 35% went out of State with 27% to the rest of the country and other parts of the world. At the same time, as we allocated Wages and Salaries paid to DSU' personnel according to the place of residence, an important part of the economic impact of purchases done with those compensations had limited impact within the State. For instance, out of the \$77 million paid by DSU in Wages, Salaries, and Benefits, 14% were allocated out of the State. The core of the spending power of that amount does not have feedback into the State of Delaware.

To give an idea of part of the economic impact located outside of the State, we have included an aggregation: Surrounding States. In that geographic definition, we combined all

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Counties from the States of Pennsylvania, New Jersey, and Maryland-Virginia, which share boundaries with Delaware.

The following table summarizes the main macroeconomic variables resulting from the DSU Economic Impact Analysis.

**Table 3 – Summary of DSU Economic Impact Analysis - 2016**

<b>Category</b>	<b>Units</b>	<b>Delaware</b>	<b>Surrounding</b>
Total Employment	Jobs	2,783	869
Private Non-Farm Employment	Jobs	2,625	820
Population	Number of Persons	1,992	868
Labor Force	Number of Persons	1,514	682
Gross Domestic Product	Millions of (2009) Dollars *	143	66
Output	Millions of (2009) Dollars *	235	107
Personal Income	Millions of Current Dollars	180	91
Disposable Personal Income	Millions of Current Dollars	155	77
Real Disposable Personal Income	Millions of (2009) Dollars *	127	59

\* Dollars valued at prices of 2009

As can be seen in Table 3, the expenses by DSU, students, employees, and visitors created 2,783 jobs in the economy of Delaware and 869 in the surrounding area. Importantly, 2,625 of those jobs are Non-Farm and Non-Government jobs. Just private sector jobs. The population is also higher by 1,992 persons as higher demand for labor increases the participation rate of the labor force. At the same time, REMI estimates that some portion of out-of-state students remains in the State after graduation.

The Gross Domestic Product of the State, the value of all goods and services produced during the year (net of intermediate inputs – difference between Output and GDP,) increased by \$143 million of Dollars at prices of 2009, which represents close to 0.26% of the total GDP for the State. Personal Income expanded by \$180 million and Disposable Personal income (Personal Income net of taxes) by \$155 million. (The difference between Personal and Disposable income

gives an approximation to taxes paid to State, Local, and Federal Governments by workers and retirees.)

**Table 4 – Employment Created In The Top 10 Industries - 2016**

<b>Category</b>	<b>Units</b>	<b>Delaware</b>	<b>Surrounding</b>
Educational services; private	Jobs	1035	134
Construction	Jobs	402	153
Retail Trade	Jobs	394	95
Accommodation and Food Services	Jobs	214	66
Health Care and Social Assistance	Jobs	107	78
Transportation and Warehousing	Jobs	98	21
Arts, Entertainment, and Recreation	Jobs	98	15
Other Services, except Public Administration	Jobs	70	50
Professional, Scientific, and Technical Services	Jobs	56	46
Administrative and Waste Management Services	Jobs	53	46

Table 4 disaggregates the total change in employment among the 10 top industries. Unsurprising, Educational Services is the top beneficiary of DSU economic activity. Employment in construction increased by 402 jobs on the back of construction activity at DSU (close to \$23 million spent during 2016) and the multiplier effect of the other industries. Employment in Restaurants, Bars, and Hotels is largely a beneficiary of the spending by students and visitors.

**Table 5 – Changes in Employment by Occupation - 2016**

<b>Category</b>	<b>Units</b>	<b>Delaware</b>	<b>Surrounding</b>
Sales and related, office and administrative support occupations	Jobs	659	216
Education, training, and library occupations	Jobs	579	88
Construction and extraction occupations	Jobs	270	102
Management, business, and financial occupations	Jobs	261	86
Food preparation and serving related occupations	Jobs	206	63
Building and grounds cleaning, personal care, and service occupations	Jobs	156	70
Transportation and material moving occupations	Jobs	149	46
Healthcare occupations	Jobs	100	50
Installation, maintenance, and repair occupations	Jobs	98	40
Arts, design, entertainment, sports, and media occupations	Jobs	90	15

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Among occupations created by the activity of DSU, students, employees, and visitors, Sales and related are at the top with 659 jobs. In the second term are occupations in the Education area, which includes not only teaching but also support and related activities. In general, all top 10 occupations are closely related to the activity of the Delaware State University on the State of Delaware.

Table 6 shows how much compensation and earnings have increased as a result of DSU activity in the state.

**Table 6 – Changes in Compensation and Earnings - 2016**

<b>Category</b>	<b>Units</b>	<b>Delaware</b>	<b>Surrounding</b>
Wages and Salaries	Millions of Dollars	157	48
Compensation	Millions of Dollars	203	59
Earnings by Place of Work	Millions of Dollars	214	70
Average Annual Wage Rate	Dollars	60	1
Average Annual Compensation Rate	Dollars	89	2
Average Annual Earnings Rate	Dollars	74	2

Wages and salaries increased by \$157 million and compensation by \$203 million during 2016. Earnings by place of work reached \$214 million. This figure includes not only total compensation but also the estimate of compensation earned by out-of-state residents.

## 2018 ECONOMIC IMPACT SIMULATION

DSU completed most of the major construction projects before 2016. CREOSA and OSCAR, the two newest research facilities required only minor investments to be completely operational. Consequently, investment in construction and equipment decreased vis-à-vis previous years. However, DSU has big plans for 2018-2019. According to DSU authorities, work for the construction of a new dormitory facility will begin in 2018 and should be completed in 2019. The new 20,000-square-foot residence hall will allow DSU to increase the number of students living on campus by 600. At the same time, the new residence hall will replace two old and high-maintenance buildings: Tubman and Laws halls.

The new building, a five-story dormitory, will be built under the system of public-private partnership. In other words, a private developer will build the facility with a long-term lease on the land. DSU will assume full ownership of the building after the expiration of the lease. The developer must assume the responsibility for construction and operational costs during the term of the lease.

DSU authorities estimate the cost of the new facility in \$60 million. The amount of the investment largely exceeds DSU's spending on investment and equipment during 2016, a year without major projects. Consequently, we consider that a simulation of the expected economic impact of DSU in 2018 is beneficial as this allow the measurement of the impact of DSU activity in a year with major investments, as opposed to 2016.

For the simulation, we allocate \$25 million in construction investment in 2018, out of the estimated \$60 million for the whole project and maintain the \$83 million in normal operational expenses as in 2016. Similarly, all other items, for instance, visitors and students spending remain the same as in the 2016 impact analysis.

The following tables summarize the results of the simulation:

**Table 7 – Summary of DSU Economic Impact Simulation - 2018**

<b>Category</b>	<b>Units</b>	<b>Delaware</b>	<b>Surrounding</b>
Total Employment	Jobs	3,161	1,024
Private Non-Farm Employment	Jobs	2,873	936
Population	Number of Persons	6,027	2,127
Labor Force	Number of Persons	3,632	1,374
Gross Domestic Product	Millions of (2009) Dollars	175	81
Personal Income	Millions of Current Dollars	287	130
Disposable Personal Income	Millions of Current Dollars	254	112
Real Disposable Personal Income	Millions of (2009) Dollars	194	72

The table above shows how strong would be the impact of DSU’s new construction project on the economy of the State of Delaware if carried on as announced. Total employment created and supported by the additional investment would reach 3,161 jobs and 2,873 private non-farm positions. In other words, 378 jobs across all sectors and industries and 248 jobs on the private non-farm (and non-government) would be added to the economy during 2018 compared to 2016.

The State Real Gross Domestic Product, the value of all goods and services produced during the year, would expand by \$175 million, measured with 2009 prices, which represents an increase of \$32 million vs. 2016.

Disposable Personal Income, Personal Income less estimated taxes, with \$32 million increase is another area where the DSU’s additional spending will have an important impact.

Table 8 below shows the number of jobs that will be created within the State of Delaware and the Surrounding area during 2018 and their distribution among the top 10 industries.

**Table 8 – Employment Created In The Top 10 Industries – 2018 Simulation**

<b>Category</b>	<b>Units</b>	<b>Delaware</b>	<b>Surrounding</b>
Educational services; private	Jobs	1036	134
Construction	Jobs	619	204
Retail Trade	Jobs	435	117
Accommodation and Food Services	Jobs	226	81
Health Care and Social Assistance	Jobs	124	93
Transportation and Warehousing	Jobs	100	20
Arts, Entertainment, and Recreation	Jobs	90	14
Professional, Scientific, and Technical Services	Jobs	86	59
Other Services, except Public Administration	Jobs	68	51
Administrative and Waste Management Services	Jobs	56	51

As we maintained the same amount of operating expenses in 2018 than in 2016, it is not surprising that the number of jobs within Educational Services remains unchanged. The main change is in Construction, where the number of jobs increased to 619, additional jobs are due to the investment in the new residence hall building. Despite not making the investment spending by itself, DSU is the reason why the construction will take place, and the simulation model accounts for that.

In addition to Construction, Retail Trade, and Accommodation and Food Services will post a higher number of jobs. Retail will increase by 41 jobs while Food Services by 12. It is clear that as employment in construction increases, associated industries and services will also increase.

Other than those industries directly connected to satisfy the needs of the new employees, those related to the Construction industry, like Transportation and Warehousing, Professional, Scientific, and Technical Services, and Administrative and Waste Management Services show some increase in employment but far from the increment of those directly involved in the trade.

**Table 9 – Changes in Compensation and Earnings – 2018 Simulation**

<b>Category</b>	<b>Units</b>	<b>Delaware</b>	<b>Surrounding</b>
Wages and Salaries	Millions of Dollars	207	56
Compensation	Millions of Dollars	265	70
Earnings by Place of Work	Millions of Dollars	275	81
Average Annual Wage Rate	Dollars	113	4
Average Annual Compensation Rate	Dollars	162	5
Average Annual Earnings Rate	Dollars	125	4

Regarding Wages and Salaries and Compensation in general, the increment in 2018 compared to 2016 is important. Wages and Salaries will be \$207 million in 2018, \$50 million more than in 2016. Compensation, which includes benefits associated with Wages and Salaries will increase by \$62 million to \$265 million.

Earnings by Place of Work will increase by \$61 million to \$275 million in 2018. Comparing that amount to the \$265 million in Compensation illustrates the fact that the large construction project will require additional labor from the surrounding area as the Labor Force in Delaware may not be enough. In other words, about \$10 million in Compensation will go to out-of-state residents.

As we indicated before, for the 2018 simulation, we have allocated less than half the amount estimated as a necessary investment for the new residence hall. During 2019, the level of investment will be higher hence the overall impact on the economy.

Additionally, we kept the regular or no construction spending at the same level in 2018 than in 2016, which is a very conservative assumption. Despite low Consumer Inflation readings, the costs of operating a University run higher than Inflation, which should increase DSU operative expenses in 2018 vs. 2016.

## **CONCLUSION**

The purpose of this report was to estimate the Economic Impact of the Delaware State University on the economy of the State of Delaware. DSU effects positively on the economy of the State in many ways. First and foremost, for building human capital through the education of the students, for being an employer of the faculty and other personnel, for being a center of generation of scientific, social, and community activities, etc.

Because the Model used for this EIA, the REMI PI+ model, is a dynamic system, the overall impact evolves rather than being a static concept.

The increase in Employment, Personal Income, Value of Product, and the rest of the macroeconomic variables listed give a clear magnitude of the importance of DSU for the State.

The original intention of this research project was to evaluate the Economic Impact of DSU in a single year. However, as DSU has embarked on a major construction expansion project, we have added a simulation of what will be the Economic Impact of DSU once the construction kicks off in 2018.

The report demonstrates that DSU is a source of large and meaningful benefits for the State of Delaware and even part of the surrounding States not only in term of the human capital created but also on the positive economic impact exercised over the population of the State.

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