The Impact of Federal Research Grants

on the University of Wisconsin System and the State of Wisconsin

UNIVERSITY OF WISCONSIN WHITEWATER
Fiscal and Economic Research Center

Introduction

In response to the current state of the federally funded research within The University of Wisconsin (UW) System (and the possible impact of COVID-19 on the current and future research projects), the University of Wisconsin - Whitewater's Fiscal and Economic Research Center (FERC) reviewed the recent economic impacts of the federally funded grants on the State of Wisconsin's economy. This study focuses on the research conducted during the 2018-2019 fiscal year where financial contributions from the Federal Government were allocated to students and faculty members, fringe benefits, travel expenses, job training and development, etc. In addition, financial resources were also allocated to rental/lease expenses, maintenance, repairs, non-personal insurance fees, miscellaneous services, and supplies, etc. Over this period, the UW System received, approximately, $590 million in research funding from federal grants, while allocating the largest amount of money to the University of Wisconsin - Madison who received, approximately, 94% of total funds.

The UW System expands amongst 13 universities across 26 different campuses, each of which host students and faculty research programs that produce new advancements in research, science, and development while injecting millions of dollars into the economy.

Stories of Research Excellence – UW – Madison

Typical methods for gene-editing are complex and can lead to severe side effects. Researchers at the University of Wisconsin - Madison, with the support of the National Science Foundation, have made headways in developing an alternative that reduces the risk of the procedure. Researchers found that nano-capsules can be used to deliver the genome editors efficiently and safely. Dr. Shaoqin Gong, a Professor of Biomedical Engineering and investigator at the Wisconsin Institute for Discovery at the UW–Madison campus, along with several other distinguished professors from UW-Madison published a paper in Nature Nanotechnology, highlighting their findings. This research could lead to profound discoveries in developing treatments for diseases such as cancer, genetic diseases, and several viral infections.

Antibiotic drugs also play a significant role to combat illness and assisting livestock growth in agriculture. However, bacteria - malignant and benign – have become more resistant to antibiotics over time. Dr. Van Pijkeren and the members of his laboratory at UW–Madison are pursuing a new method to fight bacterial infections by taking probiotic bacterium and turning it into an "antimicrobial delivery system" that can kill specific pathogenic bacteria as it passes through the digestive system. Their work offers an alternative solution to combat antibiotic-resistance development and will positively impact the health and quality of cattle and meat production. In fact, Wisconsin is the second largest producer of dairy products in the country making this method important as it would ensure that the higher quality of meat production will bolster the impact of the dairy industry.

Emeritus Professor William Dove, in collaboration with other Wisconsin faculty members, are conducting federally funded research to advance the fight against colon cancer. They are seeking blood markers for a minimally invasive procedure that can reduce over-diagnosis as well as the incidence of low compliance rates in colon cancer screenings. To combat this paradox, scientists at UW–Madison have identified biomarkers associated with the pre-cancerous forms of colon cancer that are more likely to develop into the disease. Their findings are not meant to replace a colonoscopy, but it will lead to an alternative blood test for colon cancer which would provide another method to increase screening rates and reduce over-diagnosis.

Stories of Research Excellence – Examples from Other UW System Universities

UW – Platteville: One of the more pressing concerns regarding space travel is the possibility of contamination of microbes and similar lifeforms from other celestial bodies. At the University of Wisconsin – Platteville, Dr. Mark Levenstein is developing a method to remove and isolate microbes and/or DNA from surfaces. The method used to isolate such materials from surfaces would not only influence travel, but it will also, as Dr. Levenstein points out, revolutionize industrial food preparation and forensic technology. The isolation of microbes and DNA materials would help protect food from bacterial and viral infection which would lead to a decrease in food poisoning cases. In addition, forensics would gain a more reliable method in extracting evidence from crime scenes while protecting and preserving the evidence found. In fact, as it pertains to the current outbreak of COVID-19 and any future pandemics, Dr. Levenstein states that his team is currently working to implement this method for hard surfaces, which would directly influence the decontamination in health care facilities.

UW - River Falls: Dr. Jamie Schneider, a Professor of Chemistry and Biotechnology at UW – River Falls, spearheads a team consisting of faculty members from the US Naval Academy, Texas State University and UW – Milwaukee in charge of refining current practices in chemistry education. Dr. Schneider presents that general chemistry education usually takes place in large lectures, thus requiring instructors to implement multiple-choice exams providing limited feedback. The research team is currently looking for methods in which instructors could interpret this feedback to maximize the learning capabilities of students. Additionally, Dr. Schneider emphasizes that their work can be implemented for other STEM fields

such as physics, biology and more. Their work has the potential to increase the efficiency of STEM education; thus, creating inroads to an expansion of the work forces for STEM related industries.

UW – Superior: As the human population increases, inequities in access to water becomes a greater dilemma. People, commerce, and climate are all affected by such inequities. The Great Water Research Collaborative (GWRC) aims to address the quandary in a more practical fashion. GWRC is a project spearheaded by the UW-Superior Lake Superior Research Institute (LSRI). The project is a collaboration between the LRSI, the University of Minnesota-Duluth's Natural Resources Research Institute, and AMI Consulting Engineers. Between 2009 and 2020, the U.S. Department of Transportation and Maritime Administration has supplied over $13 million in funds to the organization which supports 15 academic staff members and over 20 students annually. GWRC provides services ranging from ship and harbor sampling to toxicity testing.

UW – Whitewater: In 2010 alone, over 3,350 people were killed and 54,300 were seriously injured unnecessarily because they failed to wear their seat belts, costing society $10.43 billion. The failure to properly use seatbelts cost society much more than monetary losses. Dr. Tracy Buchman presents, with the collaboration from the Department of Transportation and Bureau of Transportation Services, an observational study on Wisconsin seat belt usage. The results could help understand methods to which seat belts utilization can be maximized, which would lead to potential decreases in traffic accidents and related death tolls.

The Economic Impact of Federally Funded Research on the Wisconsin Economy

This analysis uses data from Quarterly Census of Employment and Wages, County Business Patterns, and Regional Economic Accounts to determine the economic impact of GE Appliances in Georgia. This model produces an economic multiplier and a quantitative measure of economic impact that recognizes that all levels of the economy are interconnected networks of interdependent activities. In other words, events and changes in one part of the economy influences the rest of the economy. This will typically result in a greater total impact than was caused by the original injection of activities into the economy

IMPLAN Analysis

For this study, the FERC utilized IMPLAN to give a quantitative assessment of the economic impacts of the Federal Funds for research for Wisconsin as a whole. IMPLAN is an input-output method of measuring the economic impact of grant making. IMPLAN estimates are grouped into three categories that affect the local economy. These categories are the:

- Direct effect – The direct effect refers to the production change associated with a change in demand for the good itself. In other words, the direct effect is the initial impact to the economy, which is exogenous to the model. This could be wages for faculty members and student salaries and/or traveling expenses incurred by the researchers when carrying out research tasks or attending conferences.
- Indirect effect – The indirect effect refers to the secondary impact caused by changing input needs of directly affected industries (e.g., additional input purchases to produce additional output). It concerns inter-industry transactions, as companies that received a grant create a demand for locally sourced materials that are needed to produce said companies' products or services. An example for this criterion would be the expenses that the traveling agencies incur when booking flights for conferences attended by the researchers.
- Induced effect – The induced effect is caused by the changes in the household spending due to the additional employment

generated by direct and indirect effects. The induced effect measures the effects of the changes in household income, as individuals working in the training facilities and the industry's suppliers spend money at places such as restaurants, grocery stores and shops.

Below is is the average annual economic impact based on 2018-2019 for the Federal Funds for research in the UW-System.

ANNUAL ECONOMIC IMPACT OF THE FEDERAL FUNDS PROVIDED TO THE UW-SYSTEM

	EMPLOYMENT	LABOR INCOME	TOTAL OUTPUT
Direct Effect	12,218	$419,257,284	$1,018,014,413
Indirect Effect	3,049	$152,522,333	$455,098,037
Induced Effect	3,564	$153,351,396	$484,026,171
Total Effect	**18,831**	**$725,131,013**	**$1,957,138,621**

Conclusion

The economic impact of the Federal Funds provided do generate a level of taxes. In other words, the Federal Government gets back a portion of the funds they allocated to the research projects of the universities of the UW-System. The Federal government receives approximately $156 million in taxes annually for the funds they inject. The State Government receives approximately $64 million in tax revenues. These taxes would not be generated in the state if not for the existence of the Federal research programs (this is an injection into the State's Tax Revenue). Hence the gains created by the knowledge and skills developed because of these programs eventually lead to a greater output and further tax revenues.

Consequently, this analysis determines that the Federal Grants are a component of Wisconsin's economy. These funds, essentially, create employment opportunities and income in a direct fashion throughout the state. As a result of the supply chains and multiple levels of spending, the impacts benefit multiple layers of our economy. And, given the presence of research on campuses throughout Wisconsin, the benefits are not limited to one region. But, given the web of supply and demand throughout the state, the indirect and induced impacts are felt in all corners of Wisconsin.

About the Fiscal and Economic Research Center

The University of Wisconsin-Whitewater Fiscal and Economic Research Center provides research services for area businesses, not-for-profits organizations and government entities, including:

- Economic analysis
- Land-use planning
- Geographic Information Systems (GIS) analysis
- Market research, marketing strategy and planning
- Statistical analysis
- Simulation analysis
- Ecological and biological analysis
- Government and public policy analysis
- Entrepreneurship

About the Authors

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For More Information: A full version of the Economic and Fiscal Impact of the Friends of the Chicago River Study, complete with methodology, documentation, footnotes and appendices, is available at www.uww.edu/ferc/completed.

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