

Economic Impact of Western Michigan University Homer Stryker M.D. School of Medicine



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March 5, 2021

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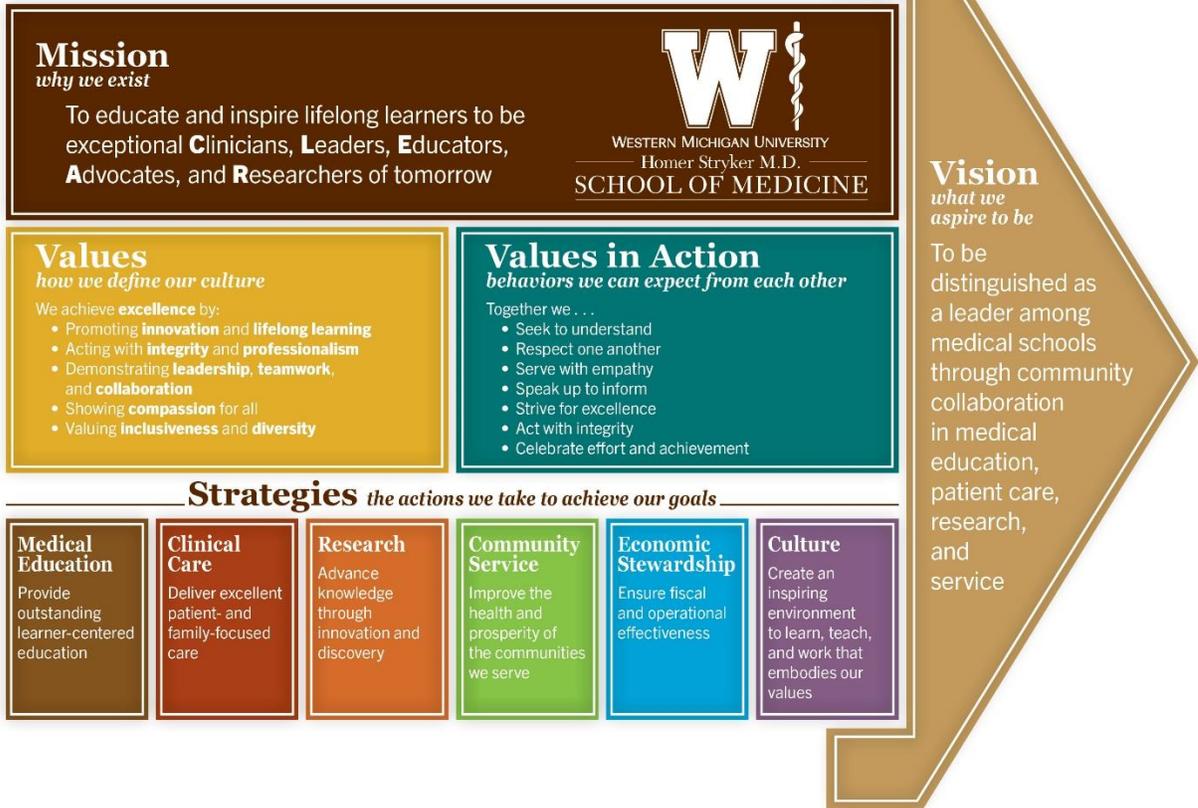
Executive Summary

In 2020, Upjohn's Regional and Economic Planning Services Team was engaged to assist Western Michigan University Homer Stryker M.D. School of Medicine (WMed) in its efforts to provide a set of estimates of the economic impact of the institution on the region. For the purposes of this research, the study region was identified by combining Kalamazoo and Calhoun counties into a single set of estimates. The choice of study region was based on the physical locations of the medical school and where services are provided.

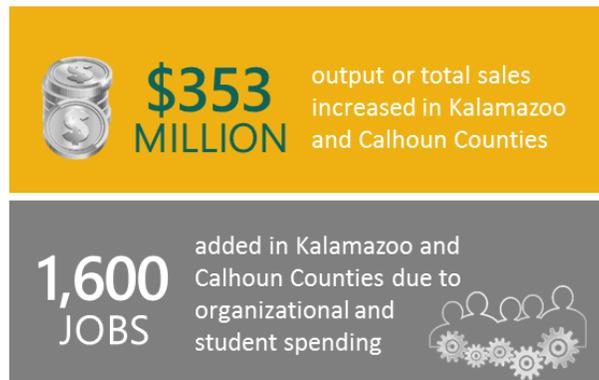
WMed is a collaboration of Western Michigan University and Kalamazoo's two teaching hospital systems, Ascension Borgess and Bronson Healthcare. The medical school is a private 501(c)(3) nonprofit corporation supported by private gifts, clinical revenues, research activities, tuition, and endowment income. WMed is fully accredited by the Liaison Committee on Medical Education and the Higher Learning Commission. The inaugural medical student class graduated in 2018 after completing an innovative, patient-centered four-year curriculum that prepares them to be exceptional clinicians, leaders, educators, advocates, and researchers of tomorrow. WMed also offers three Master of Science degrees programs in Biomedical Sciences, Clinical Informatics, and Medical Engineering. There are more than 200 residents and fellows in 10 residencies and five fellowships accredited by the Accreditation Council for Graduate Medical Education. WMed has Joint Accreditation for interprofessional continuing education, which incorporates accreditation by the Accreditation Council for Continuing Medical Education. WMed Health is the clinical practice of the medical school with more than 300 providers offering comprehensive primary care and specialty services. Housed in several locations throughout Kalamazoo and Portage, WMed Health is accredited by The Joint Commission with certification as a Primary Care Medical Home. The 350,000 square foot educational building on the W.E. Upjohn M.D. Campus located in downtown Kalamazoo underwent a more than \$78 million renovation and expansion including two laboratory research floors, forensic pathology lab, and a state-of-the-art Simulation Center that is accredited by the Society for Simulation in Healthcare. The Innovation Center on the Parkview Campus is a life science, technology, and engineering incubator serving the earliest startups to maturing companies with laboratory, office and conference space, access to core scientific equipment and expertise, and a wide range of support services.

The medical school's guiding principles include the mission, vision, values, values in action, and six strategies. While the six strategies – medical education, clinical care, research, community service, economic stewardship, and culture – individually affect the ability of WMed to impact the local economy, it was decided to look at the impact of the school as a unified entity that embodied the six strategies rather than looking at each one separately and attempting to estimate the impacts of each strategy.

Our Guiding Principles



The combined economic impact from both organizational spending and student spending added an estimated 1,600 total jobs to the study region in 2020. Those jobs provided more than an additional \$115 million in personal income to the two-county region. Additionally, output, or sales in the region, increased by slightly more than \$353 million.



Estimating the impacts of WMed is both interesting and challenging for several reasons. First, WMed is not a typical university, so modeling the medical school as such was not possible. WMed, while affiliated with Western Michigan University, does not have the functions and activities of a typical university, such as undergraduates, on-campus housing and meal services, athletics, and other student-centered activities. However, like most institutions of higher education, it does have both teaching and research at its core. Second, while part of the mission in training future doctors is in delivering healthcare services to the community, WMed is not a hospital in the traditional sense. In addition, the medical school had 337 students during the study period. While the medical school attracts visitors primarily as researchers and for education, the small number of students and lack of campus attractions, such as sports, makes the traditional campus “visitor” unlikely to be drawn to the campus and the community. Finally, by providing graduate-level training to students and without on-campus housing, all students live in market-rate housing within the community and access goods and services within the marketplace.

All these conditions make it essential to treat WMed as a unique set of assets, including revenues, expenditures, and students, rather than modeling its activities as a typical higher education institution or as a typical hospital.



How Economic Impacts Are Estimated

The first and largest set of impacts came from the unified operations of the medical school, including employee costs. WMed leadership was instrumental in providing data to Upjohn as well as helping the research team understand detailed revenues and expenses. Using data from WMed on both revenues and expenditures, a set of estimates was created for the operational aspects of the school. The underlying premise of an economic impact study is that the institution is bringing new dollars into a region that create a “shock” to the study region, and thus create additional rounds of spending called multipliers. The importation of dollars into the region and the associated rounds of spending are the components that change the wealth curve of the study region. In creating estimates, it is important to note that economists look to the “substitution effect” as an influencer on which revenues can and cannot be used to allocate expenditures, which ultimately drive the Regional Economic Models, Inc (REMI model) and the associated estimates. The substitution effect prevents the use of local dollars in impact modeling when those dollars have alternative uses within the local economy.

For WMed, it was necessary to consider whether the substitution effect was a factor. Prior to accepting its first class in 2014, there was medical education being provided within the region. Both in the previous period and in the current study period, medical education was and is supported by the region’s two health systems: Ascension Borgess and Bronson Healthcare. In discussions with leadership at WMed, it was determined that without the medical school as a focal point for medical education and training, medical research, medical services, and obtaining scale in the number of students, most or all of the impacts would not likely occur. Unlike most other places with institutions of higher education, without WMed there likely wouldn’t be the level of faculty, researchers, and students currently in Kalamazoo.

The operations impacts were estimated by modeling the number of employees and expenditures by the medical school. The employees and associated compensation included in the model and the expenditures by the medical school are often referred as the “direct” effect. Using these data, REMI estimates the impacts to suppliers, commonly referred to as the “indirect” effects. The direct and indirect impacts to the economy create a demand for households in the form of workers and their consumption. This is commonly referred to as the induced effect. These three effects combine to create the impact estimates of the operations of the medical school.

A second set of economic impact estimates was also estimated but is based on student spending. As noted earlier, WMed does not offer student housing, so students must find market-rate housing and purchase all goods and services within the community. Data for the student expenditures were collected directly from students in collaboration with medical school leadership.

Estimating Economic Impacts

The following sections use data supplied by WMed to Upjohn on direct employment and expenditures, and in partnership with WMed, survey responses from students to estimate the impact of students living within the study region. Using these data within the REMI model creates estimates of the additional rounds of spending, or multipliers, that are due to the existence of the medical school within the study region.

Estimating Impacts from Operations

Estimating economic impacts due to the operations of WMed are based in two sets of metrics: staffing and the associated compensation, and the purchases by WMed that are identified as local. The first set of inputs used reported staffing patterns for the period July 2019 through June 2020, commonly referred to as fiscal year 2020 (FY2020).

Table 1: WMed Employees and Students

Faculty	144
Staff	517
Residents & Fellows	241
Total Employees	902
Total Students	337

Total employees, as shown in Table 1, included faculty, staff, residents, and fellows. Although not shown in the report, WMed leadership also provided the total compensation¹ for employees. While data are provided by funding sources, it was decided that impacts would be reported for the entire entity of WMed. For modeling purposes, and based on the sources of funding and support, employees were placed into two broad categories: non-researchers and researchers. Based on funding sources, employees were allocated to either Kalamazoo County or Calhoun County. As might be expected given the base of operations in the city of Kalamazoo, most of the employees were allocated to Kalamazoo County.

WMed leadership also provided Upjohn with detailed expenditure data by funding source. Through conversations with WMed leadership, individual line items within the reported budget data were identified as being spent locally or spent outside of the study region. Included in the local category were expenditures on goods and services such as repairs and maintenance, equipment rentals, and promotion and media. On nonlocal spending, some examples of categories not included in the local spending are employee training and development that occurred outside of the region, as well as faculty and staff recruiting. One usual and often large set of expenditures for most institutions of higher education are in the areas of housing and food services. However, as mentioned earlier in the report, WMed is

¹ Compensation includes salary/wages and benefits.

not a typical university because all students live in some form of market-rate housing within the community, and also obtain goods and services, including food, through individual market decisions.

Table 2 shows the breakdown of expenditures that are used as inputs into the REMI model. On a technical note, it is important to recognize that REMI is sensitive to compensation levels within a region for each of the activities conducted by WMed. It is interesting to note that in some cases, negative adjustments are made to the level of total compensation for the employees of WMed due to REMI having higher cost estimates than the averages from the WMed data. This is likely, at least in theory, due to the high value added contributed by residents relative to their compensation rather than more highly-compensated workers such as physicians or advanced practice providers normally filling such roles. The primary impact of such an adjustment to compensation is to reduce induced or household spending in the study region. Conversely, positive adjustments are made in compensation for researchers, as REMI underestimates the compensation in the region for that activity at WMed.

Table 2: Operations Inputs to REMI

Labor	\$76,293,688
Operations	\$16,816,070
Total Expenditures	\$93,109,758

Estimating Economic Impacts from Students

In most studies of institutions of higher education, a school has a residential component that is included in estimating the impacts of operations of the campus. As mentioned earlier, WMed does not have campus housing and food services, but rather students look within the market for housing, goods, and services. Working with WMed leadership, Upjohn was able to survey students about their annual expenditures. The survey was conducted in the fall of 2020. The estimates of student spending are presented in Table 3.

Students enrolled in the programs offered at WMed must live in the Kalamazoo and Battle Creek areas to participate in course work and clinical rotations. As a result, WMed brings a new population to the Kalamazoo and Battle Creek region. This new population is one that must spend money on housing, goods, and services; this spending is part of the inputs into estimating the economic impact of WMed.

To establish an estimate of student spending, Upjohn, in partnership with WMed, developed a survey to administer to WMed students. Survey questions focused on monthly and annual expenses like housing, food, transportation, health care, and other expenses. The results of the survey were used to create estimates of student spending for inclusion in the REMI model.

The target population for the survey was medical and graduate students enrolled at WMed in the fall of 2020. For the purposes of this survey, students were operationalized as any

individuals enrolled in the MD degree program or master's degree programs offered through WMed. According to enrollment data provided by WMed leadership, the total number of individuals in this population was 337 as of September 2020.

The enrollment information provided by WMed contained a complete list of individuals within the population. Due to the small size of the population, Upjohn did not choose to sample the population. Instead a survey was sent to all students enrolled at WMed.

A total of 337 surveys were administered using Survey Monkey on December 1, 2020. The survey closed on December 14, 2020. Email was selected as the best option for survey administration. To incentivize students to take the survey, a promise of sweet treats was made by WMed leadership if a 30% response rate was achieved.

Out of the 337 surveys administered, 105 students responded to the survey, yielding a response rate of about 31%. From those, there were 97 usable responses. In interpreting the results of this survey, the margin of error is $\pm 8.41\%$. Results above or below this margin of error are not considered to be statistically significant.

The data collected from the survey were used to create the estimates on student spending used in the REMI model. Average spending was calculated based on the responses to the survey and then used to estimate annualized expenses for the entire student population. The student survey asked them to provide their best estimates on their spending. Upjohn was not able to validate the accuracy of the outcomes given in the surveys because these estimates were self-reported, and we did not ask for secondary modes of validation. As a result, we present some caveats when interpreting the survey results.

Self-reporting errors may affect the estimate. This is because self-reporting requires processing to answer a question. This requires making a judgement about what the question means, recalling the estimate, judging the answer, and reporting it. This may lead to mis-estimation, especially among behaviors that are difficult to recall. To help correct for this in the survey, Upjohn provided examples of what the survey was trying to collect for all the major categories and attempted to provide timeframes for estimation that are reasonable to examine. For example, the survey asked about annual expenditures on clothing rather than monthly costs. However, without secondary verification, the information provided by the students remains unsubstantiated and serves as their "best guess."

Another issue that may arise in self-reported data is the potential underreporting of socially undesirable behaviors. One example that may apply is the amount spent on eating out versus the amount spent on groceries. Additionally, self-reported data can also be biased by overreporting socially desirable behaviors, such as spending on sports and exercise each month. To correct for this potential bias, the instructions for the survey specifically informed students what the answers to the survey would be used for and clarified that their answers would in no way impact their student financial aid. Additionally, it was made clear that the answers provided in the survey would be kept confidential and that individual-level information would not be provided to WMed.

Despite the inherent issues that arise with self-reported data, the estimates provided by the students surveyed by Upjohn still serve as the best information to input into the REMI model. First, there were no other data sets that contain comprehensive estimates of medical school student spending. Second, because of the population surveyed (busy students) the collection of data through more invasive instruments was determined to be impractical and likely to yield a response rate too low to create any estimates.

While some bias may be present in the responses provided by students, it is assumed that the answers provided by students were done so in good faith. Additionally, because this study used the responses in the aggregate, it is likely that some of the errors in student recall are balanced out in the overall responses. In other words, those that overestimated are cancelled out by those that underestimated. Overall, the responses obtained in the student survey are deemed to be the most reliable estimate of spending for WMed students available for input into the REMI model.

It is important to include a note of caution in using the reported data: These data were collected during the COVID-19 period. During this time, the distribution of spending among categories and where the spending occurs may be different in other more “normal” times. First, due to administrative and regulatory conditions some goods and services may not be available locally. Examples of this include indoor dining, recreation establishments like gyms, and entertainment venues like theaters and concerts. Also affected is the availability of products at local providers. Due to this issue, another potential distributional impact may be on where respondents obtain goods. Traditionally most retail purchasing has been local or in “bricks and mortar” stores. Increasingly, however, personal supply chains are being supplanted by online providers, including nontraditional vendors such as Amazon, but also through more traditional vendors, such as Macy’s, offering online services. The implication of these distributional issues is that in another time and without the impacts of COVID-19, the estimates of impacts from students may be different than those presented within the report.



Table 3: Summary of Student Expenditures

	Per Respondent	Estimated Annual Expenditures
Total Students		337
	Reported as:	
	Monthly Expenditures	Annualized Expenditures
Arts and Entertainment	\$23.14	\$93,571.28
Child Care	\$15.43	\$62,380.85
Dry Cleaning and Laundry	\$4.21	\$17,036.43
Eating or Drinking Establishments	\$97.34	\$393,644.68
Gas	\$78.68	\$318,167.65
Groceries	\$242.55	\$980,885.11
Hair, Nail, and Skin Care	\$10.60	\$42,849.19
Health Expenses	\$27.81	\$112,476.53
Health Insurance	\$30.25	\$122,342.11
Housing	\$750.43	\$3,034,720.85
Insurance	\$8.18	\$33,099.26
Internet	\$36.77	\$148,710.80
Monthly Vehicle Payment	\$59.50	\$240,618.00
Parking	\$21.72	\$87,838.06
Personal Care Items	\$28.94	\$117,017.87
Sports, Exercise, or Recreation	\$24.37	\$98,561.74
Telephone	\$27.46	\$111,064.08
Transportation	\$10.82	\$43,772.97
Utilities	\$65.96	\$266,737.24
Annualized total monthly expenditures		\$6,325,494.69
	Reported as:	
	Annual Expenditures	Annualized Expenditures
Air Travel or Other Nonvehicle Travel	\$432.42	\$145,724.73
Animal or Pet Care Services	\$182.86	\$61,622.86
Automobile Repair and Maintenance Services	\$266.54	\$89,823.46
Clothing	\$320.05	\$107,858.52
Electronics or Appliances	\$245.27	\$82,657.58
Furniture	\$159.78	\$53,845.93
Repair and Maintenance Services	\$36.15	\$12,183.85
School Supplies	\$459.94	\$155,001.28
Vehicle Insurance	\$729.12	\$245,712.65
Total annualized expenditures		\$954,430.85
Total annual expenditures		\$7,279,925.54



Estimating Economic Impacts: Findings

Total Impact Estimates

The first set of estimates of impacts include all available inputs from WMed activities on the study region. This region and associated reporting included the combination of Kalamazoo and Calhoun counties. As shown in Table 4, operations and student spending increase employment in the two-county region by an estimated 1,600 jobs. While an estimated 88 are in the public sector, including state and local government, safety services, and education,² most jobs are in the private sector. Within the private sector, employment is estimated to grow by 1,512 jobs in the study region due to WMed. Gross domestic product (or value added)³ increases by almost \$223 million. Output, or total sales, in the study region increases by \$353 million. Finally, personal income in the study region increases by slightly more than \$115 million.

Table 4: Economic Impacts from All Inputs*

Total Employment	1,600
Private Employment	1,512
Gross Domestic Product	\$221,943,400
Output	\$353,008,200
Personal Income	\$115,120,700

*Due to rounding issues, totals may not equal the sum of impacts from detailed categories.

There are a few notes on these estimates. First, these are annual estimates, and within some confidence interval (holding things constant such as enrollment, staffing, organizational, and student spending), similar results could be expected in future years. Second, and as mentioned earlier, part of the “holding constant” of these estimates is that these estimates combine data for a full academic year with expenditure patterns of students based on a COVID-19 environment. It is unknown how or if the administrative conditions and changes in personal preferences due to COVID-19 may affect the student survey results and, consequently, the estimates of impacts. Finally, the REMI model utilized in the study was developed based on traditional spending and consumption patterns. The implication of this is that it was built to estimate economic impacts based on traditional conditions and economic patterns. It is unknown how or if the conditions due to the response⁴ to the COVID-19 situation will change future employment, spending, or consumption patterns.

² Education in this instance is public education in K-12 and public higher education such as Western Michigan University.

³ See a more detailed definition of impact concepts in the Terms Used in This Study section.

⁴ By institutions, state and local governments, the private sector, and individuals.

Impact Estimates from Operations

The operations of WMed provides the largest share of the estimates of economic impacts, as shown in Table 5. Estimates of economic impacts are based on direct employment (see Table 1) and WMed spending allocated to the region (see Table 2). In REMI there is an opportunity to not include suppliers as part of the estimates.⁵ Due to the detailed expenditure data provided by WMed leadership, detailed sales were used in place of letting the model estimate purchases from suppliers. Having access to better data allows the estimates to be more accurate.

Total employment, but for the medical school, increased by 1,530 in the Kalamazoo-Calhoun region. Of the total employment, 1,444 jobs (or just under 95%) were in the private sector. Gross domestic product increased by over \$215 million, output increased by over \$343 million, and personal income increased by almost \$113 million.

Table 5: Economic Impacts from Operations

Total Employment	1,530
Private Nonfarm Employment	1,444
Gross Domestic Product	\$215,043,300
Output	\$343,159,900
Personal Income	\$112,850,400

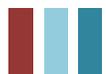
Impact Estimates from Students

While the smaller of the two contributors of economic impact to the study region, the spending by students creates jobs in the region. As shown in Table 6, estimates of impacts on employment are estimated at 71 total jobs, with 68 estimated to be in the private sector. Gross domestic product increased to an estimated value of \$6.8 million, with output or sales increasing to just under \$10 million, and estimates of personal income increasing to just under \$2.3 million.

⁵ In REMI this is done by using “nullifying intermediate inputs.” There was concern that employment at WMed did not easily fit into a REMI 70-sector model. By using actual spending data provided by WMed and using “Detailed Industry Sales,” the spend on suppliers (indirect) better reflected actual versus model spending for the estimates.

Table 6: Economic Impacts from Student Spending

Total Employment	71
Private Nonfarm Employment	68
Gross Domestic Product	\$6,886,500
Output	\$9,831,100
Personal Income	\$2,270,600

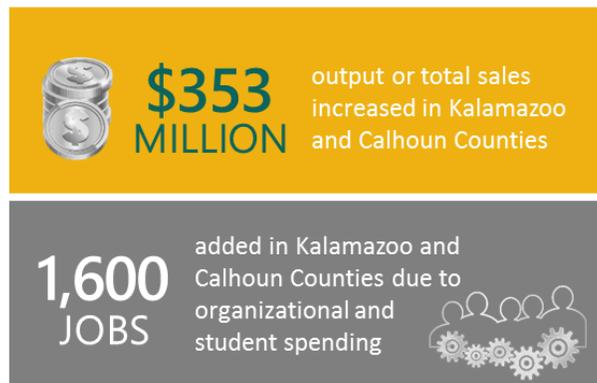


Summary

The Regional Team at the W.E. Upjohn Institute for Employment Research was engaged by WMed to estimate the economic impacts of the medical school on its primary service delivery area – the combination of Kalamazoo and Calhoun counties in the state of Michigan. This was a nontraditional study of a graduate institution, as the functions of the medical school include teaching, research, and medical practice. Given the mix of these functions, the Team worked closely with WMed leadership to understand activities, revenues, expenditures, and the role of students combined to impact the economy of the study region.

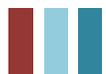
The Team used a model custom designed for the study region, which was supplied by Regional Economic Models, Inc (REMI) to create the estimates. The annualized estimates are based on data supplied by WMed and data collected from students through a survey in partnership with the medical school. The data supplied directly by the medical school included information on employees and their compensation and detailed local expenditures, and an understanding of the amount of spending by categories of consumption by the current students at WMed.

The combined economic impact from both organizational spending and student spending added an estimated 1,600 total jobs to the study region in 2020. Those jobs provided more than an additional \$115 million in personal income to the two-county region. Additionally, output, or sales in the region, increased by slightly more than \$353 million.



A few caveats are necessary in reviewing these numbers. First, these are the estimates for one year and, holding all things constant, are likely to be repeated in future years. Second, there should be caution in holding the assumptions of spending and consumption constant; 2020 was an unusual year. Given the COVID-19 pandemic, consumption patterns, both directly and through supply chains, may be evolving. As examples, regulatory and administrative decisions have affected the availability of eating and drinking places, entertainment and recreation, and retail establishments. This latter aspect has been affected not only by disruptions to local supply chains and product availability, but there has also been a shift in the retail sector because of increased online shopping and delivery services due to “stay at home” orders coupled with health concerns about public places.

While the potential change in behavior patterns by faculty, residents, staff, and students may affect the magnitude of the local economic impact, the spending by WMed (including employees) and its students will continue to have an important impact on the study area of Kalamazoo and Calhoun counties.



Terms Used in this Study

Jobs Created or Retained

The estimated number of jobs created or retained by project activities are simply “jobs” as counted by the U.S. Bureau of Economic Analysis (BEA) and can be either full- or part-time positions. They are likely distributed across multiple industries. In any given industry, a “job” may represent a summation of positions across several industries in which each industry has less than one complete position. For example, the impact study may report one “job,” but the spending patterns in the study may generate positions in three industries. However, each industry may require only one-third of a person. In this case, the three industries that employ one-third of a person each to meet demand would sum to one “job” in the REMI model.

Employment is composed of three elements:

- Direct – The employment created by actual investment, growth, or change
- Indirect – The employment created by the need of the new firm to purchase goods and services, essentially the local supply chain
- Induced – The household that supplies goods and services to the workers in the prior two elements. Examples include education, dry cleaners, accountants, gas stations, lawyers, and grocers.

Gross Domestic Product/Value added

Gross domestic product (GDP) is an economic measure of the value of goods and services produced within the United States. It is the broadest measure of economic activity within a region or country. It consists of compensation of employees; taxes on production and imports, less subsidies; and gross operating surplus. It does not include intermediate inputs; it is a measure of the value contributed by labor and capital to production.

Personal Income

Income is the goods and services produced by citizens and residents in the study region (i.e., gross national product) minus the consumption of fixed capital (i.e., depreciation).

Output/Sales

Gross output includes both GDP and expenditures on intermediate inputs. In that way, it is considered double counting, but it is an essential statistical tool to understand the interrelationships between industries. Gross output is principally a measure of an industry’s sales or receipts.

About the Upjohn Institute

The W.E. Upjohn Unemployment Trustee Corporation was incorporated on October 24, 1932, as a Michigan 501(c)(3) nonprofit corporation, and is doing business as the W.E. Upjohn Institute for Employment Research. The W.E. Upjohn Institute for Employment Research has been conducting economic research and consultation for 75 years, since its founding in 1945.

The Upjohn Institute is governed by a Board of Trustees, which employs a President who is responsible for the overall operation of the Institute. The President of the Upjohn Institute is Dr. Michael Horrigan.

The Upjohn Institute currently employs 104 individuals. Upjohn's research and consultation program is conducted by a resident staff of professional social scientists, 12 of whom are Ph.D.-level economists (senior staff). Senior staff is supported by a staff of research analysts and additional support staff. Upjohn also administers the federal and state employment programs for its four-county area through the local Workforce Investment Board. Upjohn also publishes books on economic development, workforce development, and other employment-related topics.

The Ph.D.-level economists have more than 175 years of collective experience, conducting research on a broad variety of economic and employment topics. Their experience includes, but is not limited to, employment program evaluation, labor market dynamics, labor-management relations, employment and training programs, economic and workforce development, income replacement policy, worker adjustment, the role of education in labor markets, employment and compensation, disability, international comparison of labor adjustment policies, site selection experience, and state, regional, and local economic analysis.

The Upjohn Institute also has a Regional Economic and Planning Services team of specialists who provide economic insights and analysis regionally and statewide in Michigan, in other individual states, and nationally. The team has experience in:

- Economic impact analysis
- Fiscal/cost-benefit impact analysis
- Labor market analysis
- Facilitating and conducting effective one-on-one interviews, focus groups, workshops, and charrette sessions in a diverse array of environments
- Economic and workforce development and education strategies
- GIS mapping abilities
- Rural and urban land use and economic development planning services
- Regional data analysis

For questions or information about this report, contact Jim Robey, Director of Regional and Economic Planning Services, 269-365-0450, or jrobey@upjohn.org.