PRACTICE

Experiential and Service Learning through Local Data Projects

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Abstract

An increased focus on high-impact pedagogical practices at a small, residential, higher education institution led to a grant-funded project to gather and analyze multi-dimensional data on 10,155 residential foreclosures in central Illinois from 2006 to 2013. Student researchers applied skills gained through academic coursework to investigate a real-world issue in the local community and communicated their findings to a variety of stakeholders, including local governments, nonprofit organizations, banks, and social agencies. The direct assessment of 85 capstone-level research projects reveals that those with a community service focus displayed a stronger mastery by students of particular expected proficiencies relative to research projects with a traditional scholarly focus.

Keywords: *community-based projects, data, economics, experiential learning, service learning*

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The undergraduate research projects described in this article exemplify three different types of collaboration: *between faculty and students* engaged in several modes of research; *across the disciplines of geography and economics*, incorporating the concepts of proximity and density into a statistical analysis of the socioeconomic determinants of residential foreclosures; and *between "Town and Gown,"* in which the tools of statistical analysis taught in the classroom are applied to a locally relevant issue and then proactively shared with diverse members of the community through various media, including print, radio, and presentations to those invested in economic development within the community.

Although the educational value of the type of high-impact pedagogy known as *experiential and service learning* is well documented, the literature on economic education is relatively scarce on sophisticated examples of this type of pedagogical strategy. The pioneering work of describing strategies for bringing service learning into the instructional toolkit of economists was done by McGoldrick (1998). The theoretical and practical underpinnings of this pedagogical strategy have been subsequently expanded upon by McGoldrick, Battle, and Gallagher (2000), McGoldrick and Ziegert (2002), and Ziegert and McGoldrick (2008). This body of work emphasizes the fact that "service learning suggests an active approach to learning" (McGoldrick 1998, 365) and that it connects student education with experiences that "cannot be simulated within the classroom" (McGoldrick et al. 2000, 45). Service learning in economics can be "situated anywhere along a continuum" of complexity, scale, and format (Ziegert and McGoldrick 2008, 45). For example, it can range from a "limited volunteer experience focused mainly on exposure" to a "more in-depth experience culminating in a research-focused project benefiting the organization as well as the student" (McGoldrick et al. 2000, 45). The research project developed took on the latter form.

Compared to many of the applications of service learning in economics documented in the work edited by McGoldrick and Ziegert (2002), this data-focused research project contributed skilled analytical services to the local community. Similarly to the applications described by Hoyt

(2002), Brooks and Schramm (2007), and Bednar and Simpson (2013), the experiential nature of the project provided a "venue for the full process of analysis from data collection through results presentation" (Ziegert and McGoldrick 2008, 47). In contrast to those applications, the projects described here were not always embedded in the curriculum in the form of credit-bearing courses. Nonetheless, they were able to sustain student engagement across several academic terms and effectively created the desirable "self-perpetuating" momentum advocated by McGoldrick and colleagues (2000).

Background and Overview

The project "Statistical Analysis of Socio-Economic Determinants of Residential Foreclosures in Central Illinois (2006–2013)" gathered multidimensional data on 10,155 residential foreclosures, mapped their locations, and overlapped them with US Census surveys. Besides identifying geographical clusters, the statistical analysis helped profile the socioeconomic composition of those households most affected by the housing market crash that sparked the "Great Recession" of 2007–2009. Findings from this study were posted on a website and shared through presentations to local government officials and representatives from nonprofit organizations to better target and provide services to their community members.

The project had several objectives. First, it aimed to develop opportunities for experiential student-faculty research collaboration, focused on large data collection and analysis efforts. Applying research skills acquired in a class setting to a community-focused project offered the opportunity to pursue a wide range of student learning outcomes highlighted in the economic education literature. For example, information literacy skills gained throughout students' general education and major coursework were key to understanding the topic in a broad context. In addition, a baseline proficiency with data was key to not only complete the analysis but also to communicate findings to community members and to academics. Regarding critical thinking, a project of this nature forced students to think in real time about fresh problems generated by community partners. A real and relevant question for study does increase student engagement and promotes buy-in. Regarding the deployment of high-order skills—quantitative reasoning, clear writing, and effective communication—the applied character of this project demanded that students put all these skills to use in a practical setting.

Second, the project placed the faculty/student research team in a new plane of engagement with the local community: it served the local community by providing valuable information not previously available. As a local city official stated during a meeting with the research team, "we simply didn't have the resources to collect and analyze this information." By the time the project was completed, direct relationships had been developed with organizations and agencies central to social and economic well-being in the community. This social capital build-up would carry the town-gown partnership forward in new directions. Seeing the institution as a trusted and reliable partner, local organizations and agencies will suggest new and varied opportunities for undergraduate research.

Design and Execution

This project was designed and completed over a course of three years (2012–2014) and was funded through three separate grants: one small ($1,000) internal seed grant and two medium-sized ($25,000 each) external grants. In addition to faculty stipends, the grants provided summer financial support for seven students and covered the hiring of an external consultant, the purchase of state-of-the-art instructional equipment, and professional travel expenses for all members of the research teams.

Undergraduate research in economics at the home institution has traditionally adopted a scholarly focus. This focus influenced its intended audience (i.e., fellow scholars), its message (e.g., international currency unions and migration topics), and its media (i.e., written communication through research papers suitable for peer review). A robust partnership with the library has included instructing students in information literacy, searching databases, accessing data sources, and using information ethically. The design of this particular project built on that foundation and offered an alternative to that instructional paradigm: the intended audience was practitioners, the topic was local, and the research output was a combination of written documents and oral presentations.

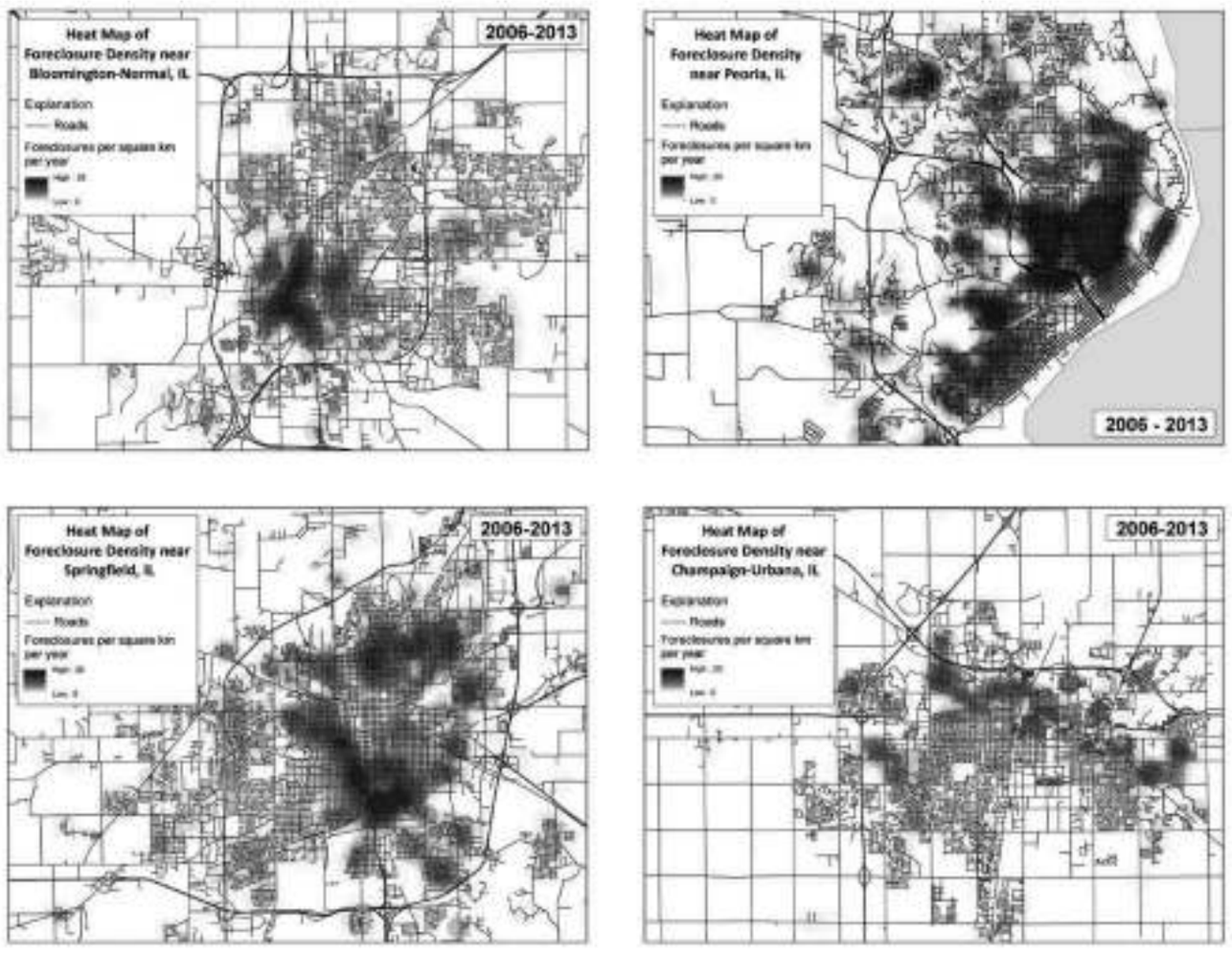
With the overarching goal of facilitating a high-impact experiential and service-learning opportunity, a faculty member in the economics department applied in May 2011 for a small internal grant provided by the institution's Action Research Center. During the subsequent 12 months, one faculty member and one student formed a research team tasked with harvesting and analyzing local foreclosure data. The first step was collecting 2,645 multidimensional data points from the online database of the local county Recorder's Office. Since the format of this database was unknown to the research team, the process presented a unique opportunity to develop new computer skills and foster technological adaptability. Once the data were collected, they were shared with local government agencies, which volunteered geographical information software (GIS) expertise to create basic maps of the recorded foreclosures. The statistical analysis involved the study of the time series properties of the data and their association with regional trends in financial and labor markets. As the project moved along, the research team fielded multiple information requests from print and radio media, delivering nine separate presentations

to local government, nonprofit, for-profit, and academic audiences. Finally, the student developed an independent fourth-year research project focused on the topic of local foreclosures, presented it at a regional scholarly conference, and received academic research honors for his work upon graduation.

To expand the project in scope and sophistication, the faculty member successfully applied for a PNC Bank Community Development grant in September 2012. This medium-sized external grant built on the work developed through the small internal grant. It funded summer stipends for three students, facilitated data collection and analysis in additional counties, paid for a smart board in the Economics Department, and allowed for the hiring of a GIS consultant. The specialized skills of that consultant were applied to creation of the heat maps of residential foreclosure densities presented in Figure 1. To explore the socioeconomic determinants of local foreclosures, the research team gathered an additional 3,552 multidimensional data points and overlaid them on a new database: the US Census American Community Survey. That way, linear regression analysis could be used to determine the relative influence of factors such as educational attainment, rates of unemployment, percentage of population living below the poverty line, and racial/ethnic composition of census blocks on the relative volume of foreclosures. As this work moved along, the team delivered presentations to local nonprofit organizations, including a consortium administering a multiyear housing-related grant from the State of Illinois Attorney General's Office. Finally, the three students presented their work at a regional scholarly conference, and one of them was awarded academic research honors upon graduation.

In October 2013, the geographical scope of the project was once again expanded through a second PNC Bank Community Development grant. This external grant, of the same size as the previous one, funded summer stipends for three students, facilitated data collection and analysis in

FIGURE 1. Heat Maps of Residential Foreclosure Densities in Central Illinois (2006–2013)



two new counties, and allowed for the rehiring of the GIS consultant. As in earlier stages of this project, working with new databases demanded high levels of technological adaptability from the research team. Depending on the source of the data, the research team worked with data presented in online, proprietary software, print, and machine-readable formats. Data gathering, reading, and cleaning work were always the first step, contributing to the development of new software skills among the students. Once the 3,958 multidimensional data points were mapped and analyzed, the team's findings were shared with local and regional audiences through media releases to print press and radio as well as oral presentations to local nonprofit organizations. These included the Community Preservation Clinic at the University of Illinois's College of Law, an organization dedicated to guaranteeing renters' rights during the foreclosure of a landlord's property.

Evolution

As external funding for the study of local housing was exhausted, new avenues opened for creating experiential and service-learning opportunities that were data intensive. The new teaching and learning opportunities, built on the foundation laid by the multiyear study of residential foreclosures, pushed subsequent faculty-student research teams in new directions, employing new analytical tools and diversifying engagement with local organizations.

After sharing the work on residential foreclosures with the local economic development council, the team next was asked to employ its expertise in quantitative analysis to estimate the economic impact of a potential new downtown hotel and conference center. To do so, a different tool was employed: the IMPLAN (Impact Analysis for Planning) software from MIG Inc. IMPLAN, a well-established program for economic modeling, can be used to estimate the impact of a variety of business activities through a series of regional economic multipliers. The team first used a borrowed copy of the software/hardware package and later one that had a dedicated license purchased with institutional funds to complete a series of economic impact studies on behalf of local nonprofit organizations. During the next several summers, the team was able to quantify the contribution to local employment, sales, and tax revenue of the human and social services provided by Habitat for Humanity and the United Way of McLean County (IL). Depending on the project, data were collected through either large-scale dedicated surveys or file/archival research of each particular organization. Summer stipends for students were provided through competitive, institution-wide research fellowships in which the students received $5,000, and the faculty mentor received $500.

This particular line of undergraduate research, employing data analysis in experiential and service-learning projects, has expanded in scope and increased in frequency. Research teams composed of a faculty member and one or several students have produced large-scale local economic impact studies for the arts (i.e., painting, sculpture, performance) and higher education. Simultaneously, individual students have seized the analytical tools used in these studies, including the Bureau of Economic Analysis Regional Input-Output Modeling System (RIMS II) tables, to estimate the economic impact associated with tourism flows to the county's history museum and patronage of the summer Shakespeare theater festival. These studies have been supported by local organizations through internships and student stipends. When completed by fourth-year students, as either part of their capstone experience or in pursuit of research honors, the work has received academic credit. A list of the 19 research projects based on local data and completed under faculty guidance by 21 undergraduate students is presented in Table 1.

The data-focused experiential and service-learning research projects listed in Table 1 vary in terms of analytical methods employed, degree of input from local partners/clients, amount of financial support received, breadth of distribution of their end product, and alignment with existing graduation requirements. The methods of analysis have included linear regression (both with and without a GIS component for data mapping), descriptive statistics, and the use of economic multipliers through either IMPLAN or RIMS II. In specific projects, local partners have been able to define both the nature and the scope of the project, although most frequently it was the faculty-student team or the individual student who chose the topic. Financial support for the research, either from internal or external grants, has been sporadic. Nonetheless, the end product of most research projects has been presented to interested parties, including local government agencies and nonprofits, and shared with the public through news releases and interviews. As for their alignment with existing credit-bearing coursework, all projects completed during a regular academic term have accrued academic credit for the participating student. In fact, the research projects that were completed as part of the credit-carrying capstone course Senior Project provide the material basis of the assessment effort.

Assessment

In 2012, the Economics Department at Illinois Wesleyan University articulated its student learning goals into a set of measurable proficiencies, designed a rubric for their evaluation, and began a five-year assessment cycle (see Illinois Wesleyan University n.d.a, n.d.b). In short, between 2012 and 2016, the department of six faculty members evaluated 85 student-authored research papers written in fulfillment of the graduation requirement embodied in the capstone course Senior Project. To assess student mastery of the "methodology," "communication," and "initiative and synthesis" proficiencies, the faculty employed a rubric that breaks down each learning goal into distinct areas. For

TABLE 1. Undergraduate Research Projects Based on Local Data (2011–2018)

Title	Local partner	Method of analysis	Sharing of end product	Support	Academic credit
Foreclosures in Bloomington–Normal	Town of Normal	Regression analysis; GIS	Presentations to local agencies; media	Internal grant	N.A.(Summer)
Foreclosures in Bloomington–Normal	N.A.	Regression analysis; GIS	Presentations to local agencies; media	N.A.	Research Honors
Foreclosures in McLean and Peoria Counties	N.A.	Regression analysis; GIS	Presentations to local agencies; media	External Grant	N.A. (Summer)
Local mortgage delinquency	N.A.	Regression analysis	N.A.	N.A.	Senior Project
Crime flows in Normal	N.A.	Regression analysis	Presentation to local agency; symposium	N.A.	Senior Project
Tax Increment Financing (TIF) districts in Bloomington–Normal	City of Bloomington	Descriptive statistics	Presentation to local agency	N.A.	Internship (Spring)
Foreclosures in Urbana and Sangamon Counties	N.A.	Regression analysis; GIS	Presentations to local agencies; media	External Grant	N.A. (Summer)
Benchmarking labor-force losses	N.A.	Multiplier analysis	Media	N.A.	Independent Study
The economic impact of cultural enterprises	Arts Council	Multiplier analysis	Presentations to local agencies; media	Internal Grant	N.A. (Summer)
The economic impact of Habitat for Humanity	Habitat for Humanity	Multiplier analysis	Presentation to local agency; media	Internal grant	N.A. (Summer)
The economic impact of heritage tourism	McLean Co. history museum	Multiplier analysis	Presentation to local agency; media	N.A.	Senior Project
The economic impact of the IL Shakespeare Festival	ILSF	Regression analysis	Presentation to local agency; media	N.A.	Senior Project
The economic impact of Habitat for Humanity	Habitat for Humanity	Multiplier analysis	N.A.	N.A.	Senior Project
The economic impact of United Way	United Way	Multiplier analysis	Presentation to local agency; media	Internal grant	N.A. (Consulting)
The economic impact of YWCA	YWCA	Multiplier analysis	Presentation to local agency; media	Internal grant	N.A. (Consulting)
The economic impact of higher education	N.A.	Multiplier analysis	Presentation to local agency; media	N.A.	N.A. (Summer)
The economic impact of the Bloomington Coliseum	N.A.	Multiplier analysis	N.A.	N.A.	Senior Project
The impact of the Constitution Trail on home prices	McLean Co. GIS	Multiplier analysis	N.A.	N.A.	Senior Project
The economic impact of cultural enterprises	N.A.	Multiplier analysis	N.A.	N.A.	Senior Project
The economic impact of college sports	N.A.	Multiplier analysis	N.A.	N.A.	Senior Project
Seasonality in local crime data	N.A.	Regression analysis	N.A.	N.A.	Senior Project

Note: N.A. = not applicable

example, proficiency in economic methodology includes separate proficiencies in reviewing literature, selecting and applying theoretical frameworks, as well as describing and working with data sets. The first column of Table 2 names all the rubric categories ascribed to each learning goal. Each category was evaluated in a discrete scale of mastery and assigned numerical scores: Weak (1–2), Capable (3–4), Strong (5–6), and Exceptional (7–8).

From the rich set of data produced in this assessment exercise, the Senior Project papers identified with a local, experiential, and service-learning experience were tagged

TABLE 2. Comparative Assessment of Scholarly and Service Fourth-Year Capstone Projects

Rubric Category	Service (N = 9)	Scholarly (N = 76)	Difference
Literature	4.49	4.61	-0.12
Theories	4.39	4.48	-0.09
Empirical	4.64	4.50	0.14
Visuals	5.01	4.87	0.14
Interpretation	4.46	4.51	-0.05
Organization	4.75	4.69	0.06
Writing Skills	5.05	5.08	-0.03
Question	5.22	4.88	0.34
Data	4.53	4.70	-0.17
Methods	4.72	4.66	0.06
Conclusions	4.41	4.20	0.21
Overall	4.66	4.59	0.07

as "Service." The more traditional student papers that ranged in topic area from international economics to industrial organization were tagged as "Scholarly." All student papers were able to be sorted into these two categories. Table 2 presents the average score by rubric category of all the "Service" papers ($N = 9$), all the "Scholarly" papers ($N = 76$), and the difference in average rubric category scores between "Service" and "Scholarly" papers. To test the impact on specific student proficiencies of undertaking "Service" research projects vis-à-vis "Scholarly" research projects, independent-sample equality of mean *t*-tests were conducted. In all cases, the tests were found to be statistically insignificant, with differences ranging from -0.17 to 0.34. The lack of statistical significance likely results from a small observation sample. Lacking demographic and academic information for the student researchers and having multiple sections of Senior Project taught each year, the researchers did not control for student or instructor characteristics. Also, as in every study of this nature that does not randomly assign students/participants to treatment and control groups, there is a possibility of self-selection bias. With those provisos, the findings are discussed below.

On the student learning goal related to "methodology," "Service" research projects were found to display a more proficient use of empirical methods and visuals (i.e. diagrams and data plots) than "Scholarly" research projects. The opposite is the case regarding a proficient command of the academic literature or the use of abstract theories. On the student learning goal related to "communication," almost no difference in organization or writing skills was documented across "Service" research projects and "Scholarly" research projects. It is on the student learning goals related to "initiative and synthesis" where more marked differences in assessed proficiencies are observable. Although "Scholarly" research projects display a more capable command of data than "Service" research projects, the latter exhibit a stronger understanding of the research question and include an effective testing strategy. Similarly, "Service" research projects display a higher student proficiency in presenting conclusions: drawing practical policy implications from the research exercise as well as describing possible extensions of this research work. Finally, and at a holistic level, the "Service" research projects are evaluated as marginally more competent than the "Scholarly" research projects.

Summary and Conclusions

The range of projects described in this article exemplify three different types of collaboration: *between faculty and students* engaged in several modes of research; *across the disciplines of geography and economics*, incorporating the concepts of proximity and density into a statistical analysis of the socioeconomic determinants of residential foreclosures; and *between "Town and Gown*," where the tools of statistical analysis taught in the classroom are applied to a locally relevant issue and then proactively shared with diverse members of the community through methods such as print, radio, and presentations to those invested in economic development within the community. Overall, the type of relationship created through projects made the university a provider of analytical services and the local community its recipient. Simultaneously, the faculty became a facilitator of research by leading students either in small groups or individually.

The key to sustaining data-focused undergraduate research with an experiential and service component has been to evolve its topics and tools. Simply put, it is not possible to sustain an open-ended intellectual engagement with any narrowly-defined local problem or issue. The limited scale of the problem will keep a constant flow of student, faculty, and institutional support from materializing. Expanding

the analytical toolkit allows faculty and students to engage different local agents and issues. In our case, the large dimensions of the foreclosure and census data set were suitable to regression analysis and the effort associated with its collection and formatting was a major element of the research enterprise. Later on, gathering information for estimating the economic impact of different activities or organizations proved to be an exercise in creativity and imagination rather than one based on computational power. In other words, adaptability to the specific conditions of each study, whether it required an online survey or researching the archives/files of an organization, became the key to each research project.

Articulating experiential and service-learning experiences through undergraduate research projects has allowed for projecting teaching and learning outside of the classroom. Students shared results with local government agencies, nonprofits, and academic audiences through a variety of presentations, thus acquiring a truly holistic view of the differing interests and perspectives held by different groups. In addition, the topics of undergraduate research underwent a radical evolution in their genesis: from faculty and students choosing a research topic to the local community partners identifying their needs. This switch, exciting as it was, also brought with it the need to synchronize as much as possible the academic calendar to the work timelines of individual organizations. Encouragingly, a comparative assessment of research projects embodying experiential and service learning suggests that projects of that nature are more effective at developing specific student competencies in the areas of "initiative and synthesis" than the traditional form of scholarly undergraduate research.

Ultimately, the further development of experiential and service-learning data-focused opportunities is a matter of academic affairs leadership: the completed projects and accrued experience have demonstrated that the intellectual potential and the personnel are in place at the institution. But a series of individual project successes do not make, in and of itself, an institutional course of action. Deliberate and robust connections between these out-of-class learning opportunities and curricular innovation efforts are needed to ensure their sustainability. That way, access to regular channels of faculty development and support can be tapped into and broader faculty participation secured.

References

Bednar, Steven, and Nicole B. Simpson. 2013. "Incorporating Community-Based Learning in a Course on the Economics of Poverty." Unpublished manuscript. https://www.aeaweb.org/conference/2014/retrieve.php?pdfid=214

Brooks, Nancy, and Richard Schramm. 2007. "Integrating Economics Research, Education, and Service." *Journal of Economic Education* 38(1): 36–43. doi: 10.3200/JECE.38.1.36-43

Hoyt, Gail M. 2002. "Regression Analysis for the Community: An Application of Service Learning in a Business and Economics Statistics Course." In *Putting the Invisible Hand to Work: Concepts and Models for Service Learning in Economics*, ed. Kim-Marie McGoldrick and Andrea Ziegert, 138–149. Ann Arbor: University of Michigan Press. doi: 10.3998/mpub.11291

Illinois Wesleyan University. n.d.a. Economics: Student Learning Goals. https://www.iwu.edu/economics/learning-goals.html

Illinois Wesleyan University. n.d.b. Institutional Research & Planning: Student Learning Assessment. https://www.iwu.edu/institutional-research/student-learning.html

McGoldrick, KimMarie. 1998. "Service-Learning in Economics: A Detailed Application." *Journal of Economic Education* 29: 365–376. doi: 10.1080/00220489809595929

McGoldrick, KimMarie, Ann Battle, and Suzanne Gallagher. 2000. "Service-Learning and the Economics Course: Theory and Practice." *American Economist* 44(1): 43–52. doi: 10.1177/056943450004400106

McGoldrick, KimMarie, and Andrea L. Ziegert (Eds.). 2002. *Putting the Invisible Hand to Work: Concepts and Models for Service Learning in Economics*. Ann Arbor: University of Michigan Press. doi: 10.3998/mpub.11291

Ziegert, Andrea L., and KimMarie McGoldrick. 2008. "When Service Is Good for Economics: Linking the Classroom and Community through Service-Learning." *International Review of Economics Education* 7(2): 39–56. doi: 10.1016/S1477-3880(15)30090-6

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