



# Contents

## **Special Issue: Fostering Diversity and Inclusion in Agribusiness and Agricultural Economics Classrooms and Departments - Part 2**

(Special Guest Editors: Mariah Ehmke and Kenrett Jefferson-Moore)

<i>Feature Article: Perspectives on Diversity, Equity, and Inclusion in the Agricultural and Applied Economics Profession</i> <i>Donald Hirasuna, Dawn Thilmany, Andrew Muhammad, Deacue Fields, and Spiro Stefanou</i>	1
<i>AgEcon Search: Bringing the World to the Classroom</i> <i>Linda Eells, Shannon Ferrell, and Julia Kelly</i>	13
<b>Feature Article</b>	
<i>How to Thrive in Agricultural Economics PhD Programs: SAEA Emerging Scholar Award Winners' Experience and Advice</i> <i>Ruiqing Miao, Jerrod Penn, and Loka L. Ashwood</i>	25
<b>Teaching and Educational Methods</b>	
<i>Principles of Economics, the Survivor Edition</i> <i>Alina F. Klein and Rudolf F. Klein</i>	44
<b>Case Studies</b>	
<i>Market Power in the U.S. Dairy Industry</i> <i>Yuliya V. Bolotova</i>	62

# Applied Economics Teaching Resources

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**Feature Article**

# Perspectives on Diversity, Equity, and Inclusion in the Agricultural and Applied Economics Profession

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JEL Codes: A10, A11, A12, A13, A2, A20, A23, J7, M5, O10, Q00, Q10, R00

Keywords: Agricultural and Applied Economics, diversity, equity, inclusion

## Abstract

In this paper, we present perspectives on diversity, equity, and inclusion (DEI) from leaders in the Agricultural and Applied Economics profession. The leaders address how to enhance DEI by identifying goals, barriers, and strategies. DEI programs are already underway, and with the changing student demographics to an increasing proportion of minority students, leaders in Agricultural and Applied Economics departments and employing organizations may want to further position themselves to continue to have an impact. Moreover, creating a successful DEI environment for students may also require improvements in the hiring and retention of diverse talent in academic departments and government institutions. Professional associations like the Agricultural and Applied Economics Association (AAEA) may assist in helping students transition from their academic programs to successful careers, particularly if in collaboration with hiring institutions.

## 1 Introduction

Academic departments, professional societies, and governmental institutions recently recommitted efforts to ensure and enhance diversity, equity, and inclusion (DEI). Yet<sup>1</sup> in 2020, the Agricultural and Applied Economics Association (AAEA) launched an effort to increase diversity within the profession. Among the efforts, the AAEA integrated goals and strategies into the Strategic Plan adopted in 2020, refined mentoring programs to be inclusive of a broad set of participants with varying career goals, addressed the climate and resources for diverse audiences at meetings, and continued a Diverse Voices webinar series to share the “pathways to our profession” among a varied set of AAEA members. As an effort to add to and promote these new initiatives, a panel session featuring varied leaders was convened at the 2021 AAEA annual meeting to discuss their visions for a DEI environment. After some time to consider what else can be said, we asked the leaders to elaborate upon their visions for a DEI framework.

The purpose this paper is to report our findings from the follow-up contributions from the leaders participating at the 2021 AAEA panel session. In this article, we examine the information presented at the 2021 AAEA meeting and the follow-up contributions for themes and important findings. As a result, we find that six themes emerge from this paper. First, our leaders often made statements in the 2021 panel that were consistent with the current DEI literature. Second, changes in the demographic characteristics of the student body are coming, which means that Colleges of Agriculture, departments,

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<sup>1</sup> Agriculture has a rich and important history in the United States, shaping economic interests, policies, and even political affiliations (Hardin 1950). However, this history also includes slave labor, sharecropping, tenant farming, and discriminatory policies and practices affecting how some groups view agricultural and related majors to this day (Mann 1989; Warlow, Graham, and Scott 1995). Given this history, it could be argued that the culture of American agriculture has been disproportionately shaped by a select majority, with limited understanding of how policies, programs, and attitudes have affected underrepresented groups.

and employers have choices on how best to position themselves for success in the future. Third, efforts that encourage an emphasis toward DEI in the classroom and workplace are already underway. Fourth, economic principles can provide a useful perspective on the assumptions to a DEI framework. Fifth, leaders are an important ingredient to a successful DEI effort. Sixth, a successful effort may require more than creating a DEI environment for graduate students, it may require DEI environments in at least hiring academic departments and government research institutions.

Contextual information for this paper was gathered from two sources. At the 2021 AAEA panel session, the leader-participants were asked to discuss their vision for a DEI framework. At the session, we asked the panel members to elaborate on DEI goals, barriers, and strategies. We selected the panel members who represented important positions of influence, including university leadership, leadership within the profession (i.e., AAEA leadership), and leadership from a major employer of graduates from Agricultural and Applied Economics departments. Their comments provided perspectives from their institutions, and within the broader field of Agricultural and Applied Economics. To enhance their contributions from the panel session, we briefly compare our leaders' statements with the current DEI literature. This is relevant in that a considerable body of literature now exists in other fields, and it is useful to know whether the leaders had the knowledge capital of the literature from other fields to help guide their institutions.<sup>2</sup> Moreover, our leaders' statements are the application to the principles laid out from the DEI literature. We add the literature to help make clear some of the originating principles that are often written about in business and the social sciences. Second, we later asked the panelists to provide further thoughts after having given their presentation and taking more time to reflect on what they would like to contribute. Three out of four of the panelists were able to contribute further thoughts and are included as co-authors to this paper. They are Deacue Fields, Dean of the Dale Bumpers College of Agricultural, Food and Life Sciences, University of Arkansas; Dawn Thilmany, 2021 then President of the AAEA; and Spiro Stefanou, Administrator of the Economic Research Service (ERS), U.S. Department of Agriculture. Titus Awokuse shared his perspectives at the 2021 panel session from his leadership experiences as the Chair of the Department of Food and Agricultural Resource Economics at Michigan State University. Awokuse currently serves as the Associate Dean for Research and Strategic Partnerships for International Studies Program at Michigan State University.<sup>3</sup>

As noted, this paper discusses more than DEI in the classroom. Although education is critical in accomplishing a DEI environment, efforts necessarily include more than classrooms and universities alone. Success in achieving more diverse student bodies in universities means that future employers will encounter a more diverse pool of job seekers. If students' future incomes and employment is important to universities, then universities will have at least an interest in whether employers' HR offices and professional associations adopt DEI efforts that will help ensure the success of newly hired students.

The paper proceeds as follows. First, we briefly compare the current literature with statements by the leaders speaking at the 2021 AAEA panel session on DEI. Afterward, we follow up with more detailed perspectives from leaders within a university, the AAEA and a prominent employer, the Economic Research Service (ERS) of the United States Department of Agriculture. Although this article is different from the traditional papers in this journal, most of which have been dedicated to classroom, teaching, or Extension resources, we do contribute to a major aim of this journal, which is to provide

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<sup>2</sup> For some, this may be less surprising. After all, most persons receive training about DEI principles, but it is uncertain how effective these training are in using the principles. Also, it is uncertain how leaders in Agricultural and Applied Economics are following up with actions consistent with their training, or the literature.

<sup>3</sup> Donald Hirasuna and Andrew Muhammad contributed to this paper by conducting a literature review, identifying the themes and key findings, and writing the narrative. The other authors contributed and helped verify the follow-up statements in this paper and vetted the themes and key findings. The perspectives provided by leaders do not necessarily reflect the position of each of their institutions nor represents the collective perspectives of all leaders within Agricultural and Applied Economics, but rather their personal views and examples from their own experiences.

commentary that enhances our understanding of important societal issues, including inequality and discrimination.

## 2 Literature and the 2021 AAEA Panel Session on DEI

To help clarify what we mean by DEI, we first set the context with some definitions. Next, we compare scholarly writings with statements made by our panel members.<sup>4</sup> Perhaps somewhat ironically, the literature presented below is largely from other fields than Agricultural and Applied Economics, where research has become ubiquitous with many articles published on the topic.<sup>5</sup>

Establishing definitions will help focus the discussion. To some, the definitions may serve as an introduction. To others, the definitions help clarify what we consider within a DEI framework. Together, the definitions to DEI signal to economists that some economic assumptions are being scrutinized and potentially modified. Among the assumptions that are implicitly, or explicitly, questioned in a DEI effort is that demographic categories of persons are completely homogenous, that co-workers cannot wield power in a way that prevent choices that rationally achieve organizational objectives, that social externalities, such as bullying of minorities, crime in high-poverty neighborhoods, or even microaggressions would not eventually affect a person's willingness to participate in work groups, that management knows with certainty the potential benefits of all choices, including a choice to further emphasize a DEI framework, or even that management can omnisciently foresee the strategies that best achieve their objectives.

Below are the definitions.

*Diversity* refers to the varied personal experiences, values, and viewpoints that emanate from differences. It includes differences in national origin, language, race, color, disability, ethnicity, age, religion, sexual orientation, gender identity, socioeconomic status, veteran status, and family structures (University of California, Berkeley 2015). In addition, diversity could also include nonobservable characteristics like culture. These differences can result in varied perspectives on issues and diverse approaches to problem solving and practices (Roberson 2006).

*Equity* is the guarantee of fair treatment regarding access to resources and opportunities. As part of that guarantee, equity includes identifying and eliminating systemic and structural barriers that prevent participation, particularly for marginalized groups. Structural barriers include discrimination, implicit bias, and segregation (University of California, Berkeley 2015). More informative descriptions of discrimination finds that its expressions can span two dimensions. Discrimination can be overt, or subtle such as favoritism, or microaggressions.<sup>6</sup> Also, discrimination can be intentional, or it can be subconscious, such as favoritism of groups similar to ourselves (Roos and Gatta 2009).

*Inclusion* is a set of behaviors that encourages individuals to feel valued for their unique qualities and experiences. Multiculturalism, lack of cultural bias, resolution of intergroup conflicts, and freedom

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<sup>4</sup> To help ensure an exhaustive search and to help avoid a biased representation of the literature, we searched for DEI articles related to universities and employers. We searched EconLit, EBSCO, and Google Scholar for articles with keywords like diversity, equity, inclusion, goals, strategies, and barriers. To limit the number of articles, we searched for publications between the years 2015 through 2021. To further focus our search, we added keywords such as economics, university, and employer. Next, we searched several university and department websites for statements on DEI. We included land-grant universities in different regions of the country and several universities with highly ranked economics departments. Furthermore, we searched federal government department websites for DEI statements. Finally, we selected several articles that we had heard of before starting our search, such as the report from the American Council on Education. After identifying each article, we searched the bibliography for more citations. Our search found more than 50 relevant articles. From these articles, we pasted statements relevant to goals, barriers, strategies, and outcomes into a spreadsheet. Our literature review finally selected articles that we determined were representative of the recent literature on DEI.

<sup>5</sup> Garg and Sangwan (2020) cite that 13,896 publications on DEI appeared in the Social Sciences Citation Index from 1970 to 2009.

<sup>6</sup> Ioannides (2010) notes that whites in jury settings are developing more subtle interpretations to base their logical interpretations of guilt.

from harassment are characteristics of an inclusive organization (Roberson 2006). Inclusion includes two elements, a sense of belonging, which is the degree to which individuals feel a part of critical organizational processes such as access to information and resources, involvement in work groups, and ability to influence organization-wide decisions. The second is uniqueness, where individuals are valued for their contributions and encouraged to speak their opinions. Research suggests that diversity in and of itself may not necessarily result in positive benefits without inclusivity. Consequently, inclusion has emerged as a related and important concept.

The leaders-panelists from the 2021 session recognized the importance of DEI within their organizations. Thilmany noted that when she first began at Colorado State University, she was the only woman faculty. She subsequently made it a conscious effort to increase the number of qualified female graduate students and faculty. Broader definitions of equity and inclusion beyond gender was also recognized by the panelists. Thilmany noted that everyone has a responsibility to disallow discrimination. Stefanou noted that some may exercise their power and monopolize resources at the exclusion of others. Fields noted that when he was department chair, students would only communicate within their own racial groups. Awokuse emphasized that in the presence of less inclusive environments, one needs to build a community of trust and compassion, where others are treated with respect.<sup>7</sup>

Broadly speaking, today's paradigm has evolved over the last 70 years from the time when Title VII of the Civil Rights Act of 1964, affirmative action, and equal employment legislation were passed. In years past, the literature focused on barriers to diversity, such as discrimination, bias, and tokenism. The literature now includes empirical research on the benefits of diverse work and academic environments and the empirical conditions necessary for employers to reap the associated benefits like innovative perspectives, creative solutions, and enhanced problem-solving within the organization. The literature suggests that organizations are more likely to reap these benefits by inviting all characteristics, talents, and voices from different perspectives.<sup>8</sup> Under such conditions, persons may perceive themselves as being a welcome member of the group and are more likely to contribute their ideas toward creative solutions (Pless and Maak 2004).

Awokuse noted in the 2021 panel session that when graduate students and faculty feel that they have been treated equitably and fairly, they are more likely to stay in that department. Also, persons who are treated more equitably may become more productive and enhance the reputation of the department. That enhanced reputation in turn can benefit departments when they recruit the best graduate students and faculty.

Diversity can enhance education for all students by providing different perspectives in the classroom. Consequently, diversity can raise the level of critical thinking as students hear a variety of perspectives and unconsidered ideas. Discussions in the classroom that include unconsidered ideas might further provide the teachers with new ideas for research (UCLA Diversity and Faculty Development Program).

In the 2021 session, Thilmany noted that implementing a DEI framework may sometimes result in research and valued scholarship that may not have otherwise arisen, such as work on food insecurity. Stefanou also noted that the guiding principles for managers of research in Agricultural and Applied Economics is whether the research is relevant and is timely. A working group at the University of

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<sup>7</sup> Currently, little is known about the level of diversity in Agricultural and Applied Economics. However, some information is available for economics in general. Disproportionately, fewer women and minorities earn doctorates in economics. Also, Lundberg and Stearns (2019) examined 43 colleges and universities, finding that the percentage of full professors that were women equaled 13 percent, 23 percent for associate professors, and 24 percent for assistant professors. For minority economists, of 1,150 students graduating with a PhD in 2017, 682 were not permanent residents of the United States. Among the remaining 468 U.S. citizens and permanent residents, 13 percent were Asian, 3 percent were African Americans, and 4 percent were Hispanic (Wessel, Sheiner, and Ng 2019).

<sup>8</sup> Even though DEI has progressed, more can still be accomplished. For example, Gould et al. (2020) suggest that DEI efforts for the disabled tend to be seen as acts of charity, instead of looking upon the disabled as assets to their organization.

Pennsylvania notes that minority and female researchers may pursue research that is different from traditional work.<sup>9</sup> The challenge posed in the literature and recognized by Thilmany and Stefanou is that we as a profession must consciously avoid automatically discrediting frontier topics and approaches to our research work because of perceptions that it is not rigorous, not published in prestigious journals, or not the same as research traditionally done within the field (Zambrana et al. 2018).

Leadership plays an important role in the transformation to a DEI framework. Leaders communicate a vision of a DEI environment, identify DEI issues, set expectations for an inclusive environment, provide guidance, and help connect resources to diverse staff. The best leaders in the right conditions can weave together the fragmented visions for a DEI framework across different groups of minorities and all other stakeholders.<sup>10</sup> The ideal leader can identify the different factions, incorporate the complex visions of many, and develop relationships with persons at all levels of the organization to develop a mutually shared vision (American Council on Education 2020). That vision is more than abstract and includes practical tasks, such as hiring and retention, mentoring, and making decisions about tenure.

Our panelists provided many statements that demonstrated fulfillment of this role within Agricultural and Applied Economics. It should be emphasized that these are examples of what works and that leaders are only one ingredient to creating a DEI environment. Leaders on their own may not accomplish a department's goals. Constructing a DEI environment involves many complex factions and conditions, which may make it difficult for some leaders to gain significant headway early on, especially without cooperation from others. Even though the panelists leaders provided many examples of leadership in the 2021 session, we only provide two examples because of space limitations.

First, Fields set expectations and spoke the message as an Associate Dean. He communicated a vision of a DEI environment and demonstrated his commitment to inclusiveness by leading by example. Fields notes that a DEI environment represents changes from many parties throughout the university. Corroborating the literature, Fields noted that we have to weave together the different factions within the organization. Clarifying that message, Fields noted that even though Associate Deans often work indirectly on such issues with and through chairs and professors, Associate Deans too, should communicate a sense of inclusion to everyone, including students. Fields noticed that some minorities do not feel like the department wants them. When Fields talked to minority graduate students, Fields observed that they did not feel like they were the type of student the department was looking for. As Associate Dean, Fields communicated in a way that made them realize that he wanted them in the college. Fields further noted that because of color, persons will have different experience and will have different perceptions from their experiences. Moreover, Fields claimed that because of unique experiences, one would be surprised how many students felt they were invisible.

Second, as chair of an academic department, Awokuse emphasized the importance of creating a working environment where each member of the unit has a feeling of community and a sense of belonging. He suggested that an academic department should not just be a place where you work, but it should also be a place where everyone in the community is treated fairly, accorded respect, and allowed to have a voice in providing inputs in decisions that affect the group. To build community, Awokuse created settings that would foster casual and deeper relationships. Space via affinity groups were created and supported for students, faculty, and staff in the department. That way if one member of the

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<sup>9</sup> Zambrana et al. 2018.

<sup>10</sup> For purposes of this paper, we refer to minorities as groups of persons who would add to diversity. As noted above, this includes persons with different national origin, language, race, color, disability, ethnicity, age, religion, sexual orientation, gender identity, socioeconomic status, veteran status, and family structures. It can include a single one of the statuses listed above, or it can include multiple statuses. A broad interpretation suggests that minorities include not only underrepresented groups, but also groups who are in the majority, but may be treated inequitably, or in a noninclusive fashion. As an example, see Hirasuna and Allen (2012) on how groups with multiple statuses can disproportionately experience worse outcomes in the home mortgage market.

group had concerns, it could be shared in a safe space and a representative of the group, instead of the individual, could share the concern to a larger group or decision makers in positions of authority. This approach acknowledges and accounts for the uneven hierarchy and power dynamics that often exist in many departments and organization that might unintentionally hinder and constrain a thriving DEI environment. The absence of a safe and inclusive space for sharing inputs and engaging in the diverse areas of participation and leadership in a community often result in the marginalization of people of color, women, and other underrepresented population. Awokuse noted that a careful and intentional development of community norms and empowering activities in a department can help reduce or eliminate toxic and unwelcoming environments.

### **3 Follow-Up Statements by Panelists From the 2021 Session**

We summarize the follow-up statements by the panelist-leaders from the 2021 panel in this section. The supplemental statements are what the panelists further had to say after two years of consideration. The leaders-panelists tell us further about their vision for a DEI environment including important issues and examples of DEI resources.

#### **3.1 University Perspective on DEI in Agricultural and Applied Economics**

Fields provided three example issues that deans within colleges of agriculture and similar leaders face when developing a DEI vision. These include developing and monitoring progress toward diversity among faculty, developing strategies that connect minorities with resources, and helping diversify the pipeline of graduate students. Part of Field's role was to develop a democratically shared vision of how to address each of these issues.

A key challenge for colleges of agriculture and universities is to develop strategies that can help diversify the faculty and graduate students within academic departments. Fields commented that every department faces distinct challenges in identifying strategies. For some departments, successful strategies may involve identifying and removing barriers to DEI. For example, faculty mentoring programs can be an effective strategy, particularly if mentors understand cultural and ethnic influences (Zambrana et al. 2018). These can complement current strategies, such as ensuring transparency in promotion, tenure, and incorporating DEI efforts in annual performance reviews.

Fields pointed us to another key issue, diversifying the pipeline of students within colleges of agriculture and Agricultural and Applied Economics departments. Land-grant colleges and universities may be lagging when it comes to attracting "nontraditional students" and embracing the next generation based on changing demographics in the United States. Consistent with national trends, universities are becoming more diverse, with Hispanic and Asian students representing the biggest gains. In 1996, for instance, students of color made up less than 30 percent of the undergraduate student population. This increased to over 45 percent by 2016 (Comevo 2020). With this growth, Fields and other leaders must consider the unique challenges and barriers for current and future students. They must identify strategies for higher education institutions to keep pace with the changing needs of this growing majority, whose challenges are often overlooked. Fields noted that one of the biggest ways that the higher education system fails these students is by not identifying their unique needs, which can inform the necessary interventions to keep students on course to completing their degree.

Looking ahead, Fields suggested that an important determinant in the success of Agricultural and Applied Economics graduate programs is how they adapt to an increasingly diversified graduate student body. Important determinants for departments will be the level of comprehensiveness, cost-efficiency, flexibility, and relevance. Broadening the pipeline arguably poses a special challenge. Certain groups

may have limited exposure to agriculture and related fields, which can affect their decision to select an agricultural major (Wildman and Torres 2001).<sup>11</sup>

Fields suggested that as we think about DEI and recruiting students, it is important that we do the following: acknowledge the potential benefits from inclusivity, safe spaces, and minimal stress environments; understand current views about employment and job opportunities; emphasize people, culture, and international affairs; focus on technology; stress the need to strengthen networks; and promote leadership and entrepreneurship. Academic departments should also consider the following when communicating to perspective students and demonstrating the value of their degree programs: expanding online education, increasing recruitment to parts of the country where populations are growing, and increasing outreach to first-generation and underrepresented students (Comevo 2020). Fields concluded that if academic departments can embrace these and other changes to a DEI environment, the future is bright for the Agricultural and Applied Economics profession.

### 3.2 DEI and AAEA

The AAEA is especially well-suited to connect members with DEI resources. Former AAEA president, Thilmany presented a DEI vision from the AAEA's perspective. Initiatives range from collecting more detail data on membership demographics, supporting mentoring initiatives, and funding and supporting DEI surveys. The AAEA is relevant to DEI efforts in that the AAEA can not only help graduate students from diverse backgrounds achieve success, but it can assist its members as they move into professional careers.

Thilmany noted that the 2019 climate survey by the American Economic Association (AEA) is particularly informative. AEA reported a high incidence of what they termed "costly avoidance" activities among their members, such as avoiding certain research areas, not participating in conferences, not asking questions or engaging individuals and groups with ideas or viewpoints, or even leaving a job. Overall, average reported avoidances were higher among female and underrepresented minorities (Bayer et al. 2019).

As one timely response, the AAEA established a Professional Code of Conduct to transparently frame standards for conduct at our professional activities. Although such aims to improve the professional environment is needed, Hilsenroth et al. (2022) noted that such policies are insufficient to fully ensure more diverse, equitable, and inclusive professional spaces. They argue that collective and layered approaches from AAEA are needed to help shift norms.

Thilmany recognized that the AAEA launched a new strategic plan in 2018, but the COVID-19 pandemic and recent tensions elevated the need to address DEI and justice in the society. Consequently, the AAEA revisited the plan in 2020, with a focus on prioritizing DEI and social justice issues. A major focus area for the AAEA's 2020 strategic vision was establishing and fostering a culture of engagement and inclusion. In this regard, AAEA committed to supporting a diversity of perspectives by enhancing feedback and interaction opportunities for all at the annual meeting; encouraging programming by sections, which tend to allow for more comfortable group dynamics, similar to what Fields mentioned with respect to meetings he hosts with diverse students; forming sections to fully reflect the diversity of member interests; supporting diversity in thought through alternative meeting formats and venues, such as symposia, workshops, and sponsored events; developing inclusiveness by encouraging all members to participate in AAEA committees and sections; and striving for equality of opportunity by actively promoting fairness in access, treatment, and opportunity.<sup>12</sup> But what does this mean in practice? As an example, Hilsenroth et al. (2022) highlighted a recent effort spearheaded by the Committee on

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<sup>11</sup> As one reviewer noted, that although traditional row-crop and animal agriculture is important and the biggest focus in agricultural-based economics, increased diversity might foster more research within urban agriculture, food access, food security, and food distribution.

<sup>12</sup> For more about the role of sections in the AAEA conference, see Wilson 2022.

Women in Agricultural Economics (CWAE) to secure on-site childcare and childcare support at the annual meeting for greater inclusivity for faculty with young children, particularly women, on whom childcare responsibilities typically fall disproportionately. Additionally, Thilmany noted that in 2021, members of AAEA leadership participated with industry partners in Together We Grow (<https://twg.csusystem.edu/>) as part of a transformational leadership cohort receiving professional development training focused on providing leadership on DEI issues within ag organizations (ProInspire 2018).

Recognizing the long-term commitment that is needed to ensure greater inclusiveness and a diversity of voices, Thilmany noted that the AAEA prioritized investing in long-term leaders, including mentoring and training programs. In fact, the AAEA strategic plan elevated mentoring, noting that its members can be significantly strengthened professionally through mutual mentoring relationships. The AAEA also recognized that there is a wide range of professional training opportunities, formal and informal, that members can receive, including trainings and workshops for graduate students and early-to-mid-career professionals. Even with these efforts, new models are needed to increase the pipeline of African Americans, women, and other underrepresented groups into the profession.

Too often, social change efforts do not engage the right mix of people. When leaders bring data-driven solutions to underserved, limited resource or low-income communities, those communities not only should be at the table, but they should also be engaged and developed for leadership positions (Thilmany 2020). To this end, Thilmany stated that it has been heartening and hopeful that diverse leaders are stepping forward to frame, lead, and guide AAEA's efforts. Commitments to better track our members across several characteristics are underway and will inform how DEI are playing out in the association.

### 3.3 Perspectives from a Government Research Agency

In this section, the current administrator of the ERS, Stefanou, described the agency development and implementation of their DEI vision. Stefanou provided more information on the goals, barriers, conditions, and strategies that characterize the DEI efforts. What becomes clear is that the USDA and universities have a mutually dependent relationship that can work together to increase diversity in employment and in research topics considered. ERS looks to universities to provide well-prepared students skilled in the tools used by economists. Successful university departments and graduate programs supply future employees with diverse backgrounds and research interests.

ERS has been and continues to be the largest organization offering employment opportunities for individuals with post-graduate training in the Agricultural and Applied Economics profession. Stefanou noted that with about 75 percent of our staff holding advanced degrees, ERS has a keen interest in the breadth, depth, and relevance of graduate training. A challenge for ERS is recruiting diverse students graduating with advanced degrees who are eligible for federal service.

Like many employers, a core need for ERS is hiring staff who are well-versed in the tools, concepts, and models of applied economic analysis. The ERS places a premium on hiring staff who can be relied on to get the job done well and on time, are interested in contributing to our agency in a meaningful way that adds value to our activities, can see how their projects and activities fit into the larger picture, and bring a high level of integrity to how they conduct their work and engage with their colleagues. Beyond the skills and attitudes that contribute to an organization, Stefanou suggested that the ERS is in the business of thinking: "We engage in analysis, problem-solving, and making meaning of trends that can advance the well-being of American households, farmers, and rural America."

ERS seeks to contribute by engaging in capacity-building programs to advance efforts to build a DEI workforce. By building a pipeline of opportunities earlier in the education process and extending it through graduate studies, ERS will contribute to building a more diverse workforce for the agency, as well as a diverse group of agricultural economists, in general.

Stefanou noted that ERS has a long history of supporting undergraduate students studying agribusiness and agricultural economics through the USDA-wide 1890s program. This program provides tuition, books, and summer internship training for the selected students from 1890s institutions. The agency also has a program supporting the Farm Foundation Agricultural Scholars Program, which hosts up to 15 graduate students each year who engage in a series of programming supports with ERS to build networks, learn about USDA programs, receive mentoring from ERS economists, and complete a research project. Starting in 2022, ERS expanded this program to include graduate students from 1890 colleges and universities. Efforts are underway to collaborate with minority-serving institutions and others to explore additional research collaboration opportunities for students and faculty to support and expand ERS's reach to students of color, females, and persons with disabilities.

Stefanou noted that DEI does not only include the well-deserved workforce initiatives. Another dimension is the consideration to advance DEI in the science and research taken up by Agricultural and Applied Economists within ERS and elsewhere. Stefanou suggested that how we choose to engage in our science in the context of DEI bears closer scrutiny. The type of DEI-aware science we observe varies. Our profession addresses food security, food access, and broader poverty impacts on the well-being of socially disadvantaged stakeholders. As a profession, the portfolio of research could be more expansive in addressing the prospects to improve the well-being of socially disadvantaged stakeholders in terms of income and productivity growth, access to agricultural innovations, access to capital and markets, impacts of climate change, and the broader suite of research on agriculture, food, the environment, and rural America.

The opportunity set of DEI-aware research questions to stimulate graduate research is largely predetermined by the scope of research activities among faculty. Enterprising graduate students can take a different direction, but it can be a challenging path toward degree completion. How do we ensure the graduate research training reflects the well-being of our diverse stakeholders, particularly socially disadvantaged farmers, ranchers, and members of the public? Identifying the asset needs is a key step in terms of data, modeling frameworks, and expertise.

## 4 Conclusion

Institutions of higher education and associated organizations, are recognizing the benefits and are adopting strategies for increasing diversity, promoting equity, and enhancing inclusion. Indeed, DEI objectives have become a central concern at universities, where universities have created administrative infrastructures to address issues of representation, impartiality and fairness, and inclusivity. Although efforts are underway, significant challenges lie ahead as the agricultural economics profession seeks more diverse representation. There is a clear need for land-grant universities and Agricultural and Applied Economics departments to improve upon current efforts to attract minority students. Academic departments have the responsibility of graduating professionals with the needed skills to advance the profession. As noted in this paper, expanding the breadth and depth of research areas, and increasing opportunities for students to study disparity issues in food, agriculture, natural resources, the environment, and rural communities could help in this regard. Finally, to help maintain diverse representation, employers will look to universities for skilled economists. Professional associations like the AAEA must continue efforts to support DEI-focused research and inclusive professional engagement.

One of the objectives of this paper was to encourage discussions by Agricultural and Applied Economists and their respective departments about enhancing their DEI framework. This paper informs the reader of how leaders can facilitate a DEI environment. Not only can leaders aid in a DEI environment within the classroom, but leaders can also help in diversifying the workforce of Agricultural and Applied Economists. As part of diversifying the classroom and the workforce, leaders may forge new areas of research and new methods of investigation.

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**Acknowledgments:** The authors are grateful to the Agricultural and Applied Economics Association for the panel session that inspired this paper. Titus Awokuse provided many helpful comments to the paper and in the panel session. We also acknowledge the helpful suggestions from anonymous reviewers and the guest editors of this special issue.

**Disclaimer:** The views expressed in this paper are the authors and do not necessarily reflect the official views of the Economic Research Service and U.S. Department of Agriculture, or the views and opinions of the Minnesota Department of Commerce.

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5(2) doi: 10.22004/ag.econ.333520

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## Teaching and Educational Methods

# AgEcon Search: Bringing the World to the Classroom

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JEL Codes: A2, A30, D63, Q00

Keywords: Bibliodiversity, equity, open access, open educational resources, publishing ecosystems, scholarly communication

### Abstract

AgEcon Search (AES), the digital library for agricultural and applied economics, promotes diversity and equity in scholarly communication by bringing socioeconomically and geographically diverse perspectives into classrooms around the world. Freely available materials in AES can be used in place of textbooks or expensive journals from commercial publishers that are inaccessible in many classrooms due to cost barriers. AES promotes diversity in scholarly communications (bibliodiversity) as demonstrated by content such as theses from Africa providing diverse geographic perspectives, and journal articles reflecting gender perspectives or discussing rural issues in lower-income countries. AES also promotes equity in publishing, hosting papers from 88 organizations and publishers (including 33 journals) in the Global South, elevating and disseminating their content via indexes like Google Scholar and RePEc. These publications expose research by authors who may find it difficult to publish in commercial journals, but whose ideas can enrich the experience for students by introducing perspectives from and about regions outside the Global North. AES content promotes diversity and equity by offering agricultural and applied economics instructors and students free, open access (OA) to over 170,000 current and historical working papers, conference papers, journal articles, theses, and government documents from 71 countries on six continents.

## 1 Introduction to AgEcon Search

AgEcon Search (AES) is a nonprofit, permanent digital archive of the scholarly works of agricultural and applied economics researchers worldwide, including topics such as agribusiness, food security and supply, energy and natural resource economics, environmental economics, policy issues, international trade, and economic development. It collects, indexes, and electronically distributes full-text research papers, making them freely accessible and easy to find in internet searches. AES promotes geographic and socioeconomic diversity in agricultural and applied economics classrooms around the world, particularly in the Global South, by providing free access to literature that is often missing from the research corpus available to these students. This is partly due to the dominance of authors and editors from the Global North in the commercial publishing ecosystem, and to paywalls and cost barriers restricting access to literature for both authors and researchers in many parts of the world.

Built in 1995 as a cooperative project of the University of Minnesota Department of Applied Economics and the University of Minnesota Libraries, AES has evolved into a global resource with guidance from an international advisory board and partners including: Agricultural and Applied Economics Association (AAEA), African Association of Agricultural Economists, Australasian Agricultural and Resource Economics Society, Giannini Foundation of Agricultural Economics, International Association of Agricultural Economists (IAAE), and USDA Economic Research Service.

AES coverage is deep and broad, with over 170,000 freely available working papers, conference papers, journal articles, theses, and government documents (Figure A1 in the Appendix) in 26 languages from 71 countries on six continents. Content includes current documents as well as historical ones, spanning a period from 1914 to the present day. Current working papers and conference papers are

added as they are produced, and ongoing backfile digitization projects add to the historical content. Documents are added by universities, government agencies, research institutes, nongovernmental organizations, and professional associations. For example, the Collaborative Master's Program in Agricultural and Applied Economics (African Economic Research Consortium, Kenya) collection includes a growing corpus of theses that garner thousands of downloads every month. Conference collections from 67 professional societies worldwide include historic conference collections from, for example, the Caribbean Agro-Economic Society and the Farm Foundation (USA). Professional societies that post their current conference papers in AES include country groups such as the German Association of Agricultural Economists (GEWISOLA) and those with a broader scope (e.g., the AAEA and the IAAE) and local/regional U.S. societies (WAEA–Western Agricultural Economics Association). Resources in the repository are, therefore, reflective not only of the global historical context of an issue, but also of the most current work being done and presented at conferences.

While “gray literature” is not always recognized as an important information resource, testimonials from distinguished researchers speak to the unique and important role AES has for their students:

*I introduce my graduate students to AgEcon Search and strongly recommend them to actively use this source to conduct their literature review. Because of the vast collection of the materials, AgEcon Search is highly valuable to agricultural economists and graduate students all over the world for their research work.* —Steven Devadoss, Emabeth Thompson Endowed Professor, Texas Tech University (personal communication, November 2018)

*Researchers, whether experienced or new graduate students, need to quickly find what research is already underway or has been completed in the topic area they are focused on. AgEcon Search is a key place to search if the topic is in agricultural, environmental or resource economics, or more broadly—applied economics.* —Ross Cullen, Emeritus Professor, Lincoln University, New Zealand (personal communication, November 2018)

The quality of this type of content is particularly important also because instructors seek to direct their students to authoritative resources. In AES, all content must be part of a series, conference, or journal produced by an academic department, society, or organization that has already applied some level of review before the papers are deposited. Working with these organizations ensures that some form of review or vetting of the content has been done, with AES managers thus able to spend their limited resources on other priorities. Significant infrastructure and staff time are not required to organize and manage peer review of individual papers, as is the case with subject repositories like arXiv (<https://arxiv.org/>).

AES hosts many publications that may already be hosted on contributing organizations' websites, partly because they often are not elevated in search engine results and do not get the exposure needed to disseminate their articles to the international community. Further, many of these websites are not permanent and prioritize “current” content, so the publications hosted there are at risk for loss if not placed in a fixed repository. Some websites are archived in the Internet Archive (<https://archive.org/>), but that content is not exposed to search engines like Google and is not easily found even when directly searching that website.

AES thus adds value by gathering all of these articles and papers, hosting them on a repository with permanent web addresses, and adding metadata to increase findability. Detailed metadata is applied to every paper in AES, and all content is automatically harvested by indexes such as Research Papers in Economics (RePEc) and AGRIS (FAO). RePEc, “an initiative that seeks to enhance the dissemination of research in Economics and related areas ... to make research more accessible both for the authors and the readers,” uses the metadata from over 2,200 sources (such as AES) to build the

index (<http://repec.org/>). Both AES and RePEc are highly ranked by Google and Google Scholar, ensuring maximal exposure of AES content in search engine results. Exposing and disseminating content that is often excluded by curated indexes such as Scopus and Web of Science (Martín-Martín et al. 2019) greatly elevates the international discoverability of this research and these authors.

## 2 Diversity and Equity

AES promotes diversity and equity in scholarly communication by bringing diverse perspectives from many countries, particularly the Global South, into agricultural and applied economics classrooms around the world. In addition to diverse regional perspectives, AES content includes different types of publications produced by a globally representative group of authors, editors, and publishers. Instructors can use freely available materials in AES in place of textbooks or expensive journals from commercial publishers that are inaccessible in many classrooms due to the high cost. As the COVID-19 pandemic greatly increased researchers' reliance on e-resources, it became more important than ever to identify for students online resources that are comprehensive, global in scope, authoritative, and freely accessible. Subject repositories in particular provide highly discoverable, focused content to students, which is especially valuable in a discipline like agricultural and applied economics where content scope and type vary considerably relative to other disciplines. Digital libraries like AES bring high quality, socioeconomically and geographically diverse content into classrooms, without paywall barriers or article download limits.

### 2.1 Content

In applied economics, most research appears for the first time as a conference or working paper that is sometimes then further developed—with significant revision and editing by colleagues—into a formal journal article. Thus, AES serves a discipline with a strong preprint culture, unlike many disciplines that rely heavily on formal published articles, and its development and popularity are due to the importance of this literature to peer researchers around the world. AES content takes the form of preprints broadly defined (<https://en.wikipedia.org/wiki/Preprint>) and includes preprint working and conference papers that may someday disappear behind a paywall if they are subsequently published in a commercial or prestigious journal. It also includes articles in small journals published by academic societies, universities, and research institutes based in the Global South (e.g., *Bangladesh Journal of Agricultural Economics*, *Nigerian Journal of Rural Sociology*).

Of the 365 communities contributing content to AES, 88 (24 percent) are organizations or publishers from Africa, Asia, and South America. International use data reflects high global reach as well, with 63 percent of the 7 million visitors in 2021 coming from those regions. AES provides access to research relevant to students and researchers worldwide and accepts papers in any language—an important yet often overlooked component of this diversity. Fully 10 percent of the papers in AES are published in one of 25 languages other than English. Curry and Lillis found that although 9,000 peer-reviewed scholarly journals are published in languages such as French, German, Spanish, and Chinese, for example, “most of these journals are excluded from prestigious journal indexes, thus perpetuating the ideology that English is the global academic lingua franca” (Curry and Lillis 2018). Thus, the AES contributing community is truly international, disseminating research that reflects the perspectives of researchers from a geographically and socioeconomically diverse community (Figure A2 in the Appendix).

Papers in AES supplement and complement research published in the more “mainstream” commercial literature that is not readily available in many parts of the world due to paywalls and cost barriers both for readers and authors. Therefore, the use of AES in the classroom can ameliorate a northern bias and lack of availability of diverse and/or locally relevant content for students in some regions. “As infrastructures that underlie scholarly communications are never neutral, we need to be cognizant about biases that may further entrench inequity in whose knowledge is privileged and whose

knowledge is made invisible by the current system” (Shearer et al. 2020). By providing open access (OA) papers at no cost to users or providers, AES benefits agricultural and applied economists around the world. These benefits likely have the greatest value to lower income researchers and students because AES provides access to quality research for those who cannot afford paid access.

## 2.2 Publishing Ecosystem

A significant related advantage of fully OA, non-profit venues like AES is in providing authors from the Global South an outlet for their research, thus increasing the amount of relevant material from those regions that is available to student researchers. The journal literature in particular primarily reflects work being done in and by the Global North. Articles produced in higher income regions of the world dominate the formal international research literature. “A global North-South research gap still exists, with most scientific contributions originating from the U.S., the UK, Canada, and Australia ... while the total contribution of the world’s citations from Africa, South America, and Oceania is lower than 5 percent” (Skopec et al. 2020). One possible reason for this is reviewer bias, with Murray et al. (2018) finding that “[w]omen and authors from nations outside of North America and Europe were underrepresented both as gatekeepers (editors and peer reviewers) and authors” with “higher rates of [article] acceptance in the case of gender and country homophily.” Another reason is the application of bibliometrics that automatically confer advantage to northern publishers. Confraria, Godinho, and Wang (2017) sought to “understand the determinants of citation impact in the Global South, despite the fact that we analyze this by adopting indicators that are normally used to assess science in the Global North” (i.e., using data from the Web of Science). “Evidence has shown that these databases [Web of Science and Scopus] have limited coverage in the areas of Social Sciences and Humanities, literature written in languages other than English, and scholarly documents other than journal articles” (Martín-Martín et al. 2019). The result of inequities throughout the publishing system is that regionally relevant topic coverage may be limited for authors (and students) in the Global South.

Fortunately, fully OA repositories provide infrastructure and promote bibliodiversity in scholarly communications (Shearer et al. 2020), somewhat alleviating this North/South divide. AES seeks to open a window and disseminate research from lower income countries by hosting their small journals (Kelly and Eells 2016) and preprints. A conscious initiative to recruit small journals from underrepresented regions has been highly successful, with 23 percent of the 141 journals in the AES community published by organizations in sub-Saharan Africa, India, South America, and South Asia. These journals provide a valid dissemination venue for valuable research that would otherwise be unavailable or relatively invisible to the global research community. Small journals like these have very limited resources and sometimes do not even have their own website. AES provides a permanent home, a platform for dissemination, and the provision of detailed metadata that elevates these articles in search engine results. These features further increase students’ exposure to greater socioeconomic and geographic diversity in subject matter than is readily found in the commercial journal literature.

## 2.3 Authors and APCs

As detailed in a discussion of OA in Latin America, “[p]ublishing is dominated by Northern publishers, which disadvantages Southern authors through platform capitalism and open access models requiring article processing charges to publish” (Berger 2021). While large commercial publishers that dominate the formal international research literature lock most of their articles behind paywalls, many publishers now offer an OA option that has resulted in the publication of an increasing number of OA articles (Björk and Korkeamäki 2020). Although these publishers have been moving into the OA realm, as for-profit entities they only offer that access upon payment of Article Processing Charges (APCs) that must be paid by authors. APCs “effectively [shift] journals from a pay-to-read to a pay-to-publish model, which poses serious problems for authors in less well-funded disciplines or countries,” which raises “serious concerns ... about the implications for scholars in the global south and researchers in the social sciences”

(Meagher 2021). This special issue of *Development and Change* (52.2) delves into the history, infrastructures, and politics of OA as they apply to development research, with articles in the issue providing in-depth analyses of OA publishing in general and its implications to Southern researchers across the disciplinary spectrum.

A recent field study by Stich et al. of authors' willingness to pay (WTP) for OA publishing indirectly highlights part of the problem. They studied "243 economists in Germany, Austria, and Switzerland regarding their valuations of open access publishing in the 'Top 5' economics journals" (Stich, Spann, and Schmidt 2022), with this choice of participants automatically conferring a northern bias to the analysis. A large recent analysis of 37,000 articles published by Elsevier more specifically supplied empirical evidence that, despite the increasing move toward providing an OA option for authors, the required APCs for choosing that option are prohibitive for authors in low- and middle-income countries (Smith et al. 2021). The team was also "surprised at how ineffective waivers seemed to be" (Kwon 2022), noting that even if the authors' country was eligible for an APC fee waiver program, they rarely took advantage of it. Therefore, even though many publishers now offer an OA option, the requisite APC makes this access a one-way street, a "one-way movement of information from the developed to the developing world" (Kelly and Eells 2015). Also, the focus on OA as an option that can only be funded by APCs is itself problematic in ignoring the broader context of publishing ecosystem inequities around the world. As noted by Okune, "unless studies and policies pertaining to scholarly communications broaden out beyond discussions of business models and content, and turn their gaze on the established publishing infrastructures themselves, it would appear that OA systems could very well re-entrench long-standing colonial power imbalances" (Okune et al. 2021).

The positive result of OA publishing initiatives by large publishers is that students in the Global South have access to a growing slice of the literature historically stored behind a paywall. However, this slice is still small relative to the corpus available to more affluent researchers, and the articles published are predominantly authored by researchers from higher income countries. Smith et al. (2021) demonstrated that even researchers from low- and middle-income countries publish primarily in subscription-based titles. Researchers unable to scale that paywall may thus not be able to access and benefit from research being done even in their own region, or in other areas of the world that are similar to theirs in terms of environment, political climate, or socioeconomic status. This dynamic perpetuates inequities in the geographic and economic scope of research available worldwide regardless of the value or potential impact of that research in improving practices or conditions in these areas.

## 2.4 OA Options and Barriers

Many instructors at large institutions take for granted the access they have to quality resources and are not aware that these are not free or readily available to students in resource-poor parts of the world. Some index database producers such as JSTOR (2022a; <https://www.jstor.org/>) and CABI (2021; <https://www.cabi.org/>) attempt to address these inequities by offering some amount of content at no charge, and reduced fee structures geared toward lower income countries. However, *full* access is still fee-based, and some content remains behind a high paywall. The JSTOR Access Initiative (2022b; <https://about.jstor.org/librarians/fees/jai/>) offers lower income countries unlimited access to "a collection of..." resources in the database, implying that students and researchers in these countries still do not have access to the entire corpus of JSTOR material. Also, this special access must be requested at the institutional level, which is a barrier for individual researchers at universities and institutions regardless of location. Other supposedly OA sites also impose financial barriers and/or content coverage restrictions for students. The Social Science Research Network (SSRN) for example appears to be free, but it is in fact a subscription fee-based service now owned by Elsevier, whereby individuals can upload their papers for free, but an individual or institutional paid subscription is required to access most of their journal article content. As the COVID-19 pandemic swept the world, students at large universities with deep pockets benefited when their libraries crafted special, exclusive (to each university)

agreements with publishers and repositories (e.g., JSTOR and HathiTrust/Google Books at [https://www.hathitrust.org/digital\\_library](https://www.hathitrust.org/digital_library)). These agreements were designed to open up access to resources that are normally restricted by institutional affiliations or by content-limiting subscription categories. However, these limited agreements did nothing to open up more content for students in middle- or lower-income countries.

A final barrier that AES attempts to bridge is for instructors in all regions of the world to more fully accept gray literature (as is much of the content found in AES) as an important and useful resource for their students.

*For my students, AgEcon Search was a critical resource for their work, research, and source material for term papers, as well as me. What I used to tell the students (graduate and undergrad) was, look to the [mainstream] journals to see what has been published and reviewed, but this literature is a record of “what has happened,” perhaps a year or two ago, given the time needed to publish. On the other hand, what you see with AgEcon Search is “what is happening now,” what issues are attracting research interest. But you need to be transparent in your writing to make it clear that you are using “gray literature.”* —John Henning, Professor (retired), McGill University, Canada (personal communication, November 2018)

Gray recognizes the value of various publication outputs and recommends “moving beyond the academic journal as the sole vehicle for scholarly publishing and developing processes to validate other genres of publications including reports by think tanks and organizations outside of the academy” (Okune et al. 2021). An early OA article suggested using content-management software to “facilitate not only open-access journals, but also working-paper series, conference organization[s], scholarly societies, and other forms of scholarly communication” (Conley and Wooders 2009). AES fully realizes that suggestion, and its use by instructors around the world can demonstrate the value of these other publications to their students.

### 3 Freely Available Tools in the Classroom

Over the last several years, the idea of using freely available materials in classes in place of textbooks has been growing in popularity (Lane 2008; Smith 2013). This not only saves students money but also allows instructors to customize their readings to their curriculum instead of simply finding a textbook that is a good but not a perfect fit. Many of these “open educational resources” or OER are electronic books that are produced purposely for classroom use, for example Michael Boland’s “Introduction to Cooperation and Mutualism,” which is available in both English and Spanish (Boland 2018).

AES managers first learned that instructors were using AES materials in place of textbooks in classrooms from agricultural economics professors in Africa, where the use of open resources has been encouraged for the past decade by groups such as OER Africa (<https://www.oerafrica.org/>) and Saide (<https://www.saide.org.za/>; Cox, Masuku, and Willmers 2020). Since that time, AES managers have promoted AES use as part of course materials and have received positive feedback from instructors in both Europe and North America about the usefulness and timeliness of the papers as well as the ease of use. As demonstrated by visits from over 10,000 users every day (Figure A3 in the Appendix), AES resources are clearly popular and discoverable in all regions of the world.

Instructors may be concerned about the quality of materials that are freely available. In the case of textbooks, they can use resources such as the Open Textbook Library (<https://open.umn.edu/opentextbooks/subjects/economics>), which includes reviews by others who have already used the text in the classroom for many of the books that are listed. For those interested in using papers from AES for course readings, all materials are submitted under the auspices of a professional association, academic department, nonprofit, or government agency, so they have already undergone some level of peer review.

Since most research in agricultural and applied economics appears first as a working paper or conference paper, and AES includes over 200 working paper series as well as up-to-date conference papers from most of the large professional associations worldwide, it is an excellent source of readings on the latest research. It is also a rich source of historical resources with the full collections of AAEA and IAAE conference papers back to the 1920s, and 15 journals that include papers dating back 50 years or more.

In addition, AES is a useful resource for instructors assigning specific readings for the entire class or asking students to search the literature for research on a specific topic. For assigned readings, AES works well with course management software such as Blackboard, Canvas, or Moodle. Persistent links appear prominently in each record, and there is no need for authentication since the papers are all freely available. Instructors can also create a list of readings within AES for a class by using the “Personalize” menu on the main page. One or more groups may be set up, and students who register for an account in AES can be added to groups. “Baskets,” which include one or more papers from AES, can be created for individuals or groups, and both instructors and students may add comments to individual papers within a basket.

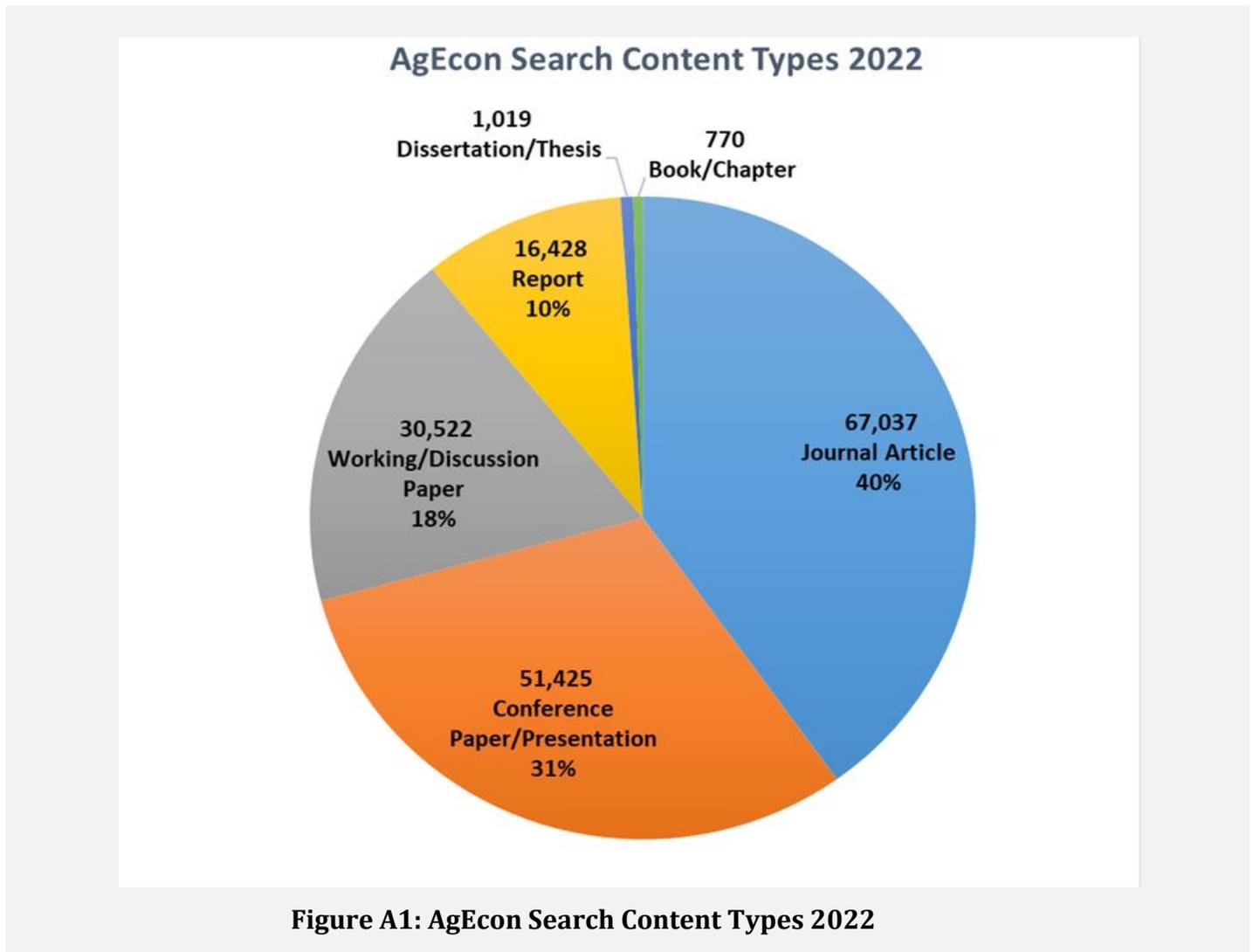
AES is an important resource for agriculture and applied economics students to include among the databases that they search for class assignments that involve literature reviews. Instructors can include a link to it on their course syllabi, and students will appreciate the fact that all papers are available in full text. Also, as a free-to-user database, it will be available to all students after they graduate, no matter where they are employed. Since it includes the conference papers from many professional associations as well as many working papers series, very current research is covered. Beyond the simple search box, there are many effective ways to narrow a search in AES. These include the “Advanced Search,” which can be accessed via a link under the simple search box. It offers the ability to more easily combine words or phrases using the Boolean operators, “and,” “or,” and “not,” and to search by exact phrases; designate specific search fields (e.g., author, title, abstract); and specify a range of dates. Search results may be narrowed by publication type, journal name, or volume or issue using the facets listed to the left of the results list. In addition, results may be sorted by relevance, author, title, or publication date using the “Options” menu, which also allows the user to narrow their search results to those in a particular collection such as the IAAE or the *Brazilian Journal of Rural Economy and Sociology* (*Revista de Economia e Sociologia Rural*). Simple and advanced searching is also available within each collection by navigating to that collection using the “Browse Collections” feature. Students working on an assignment may also find the “Alert” feature useful. This lets signed-in users save a search and receive weekly or daily emails listing new papers that match their search parameters. Thus, using AES in the classroom provides benefits to students both in terms of content scope, and in providing functionality that enables them to more effectively perform their literature reviews and online research.

## 4 Conclusion

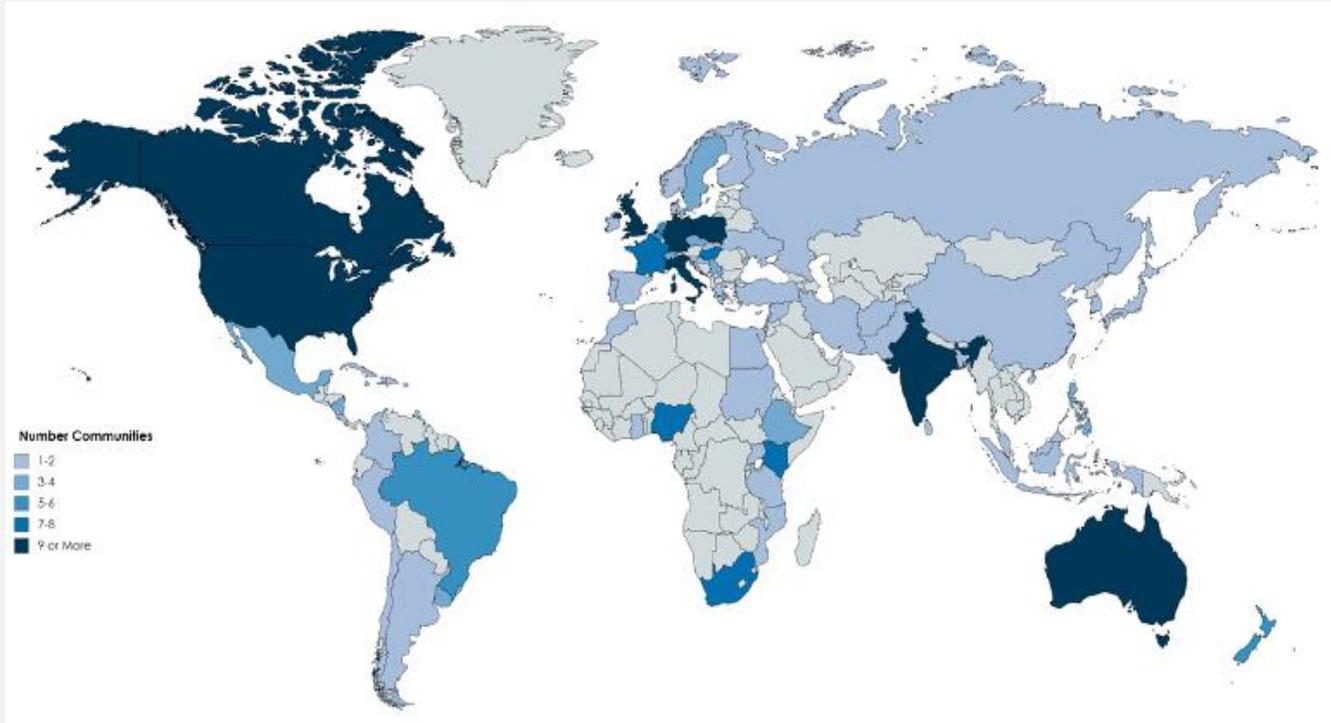
Digital libraries of OA material produced in (and reflecting perspectives from) *all* regions of the world are an essential component of the research literature. “Diversity” encompasses diversity of the regions that are the topic of the research, diversity in types of publications, and socioeconomic and demographic diversity of the authors, editors, and publishers of research. Fully OA repositories provide infrastructure and promote bibliodiversity in scholarly communications (Shearer et al. 2020), including contributions in any language. The mission of OA digital repositories like AES is to serve as a public good, providing benefits for all and high global value. Students are not limited to research from large publishers whose primary interest is in generating profits for shareholders, with authors and editors primarily based in the Global North. Instructors using AES resources in their classrooms expose their students to a corpus of quality research from and about all regions of the world, thus promoting global citizenship in students’ education.

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## Appendix

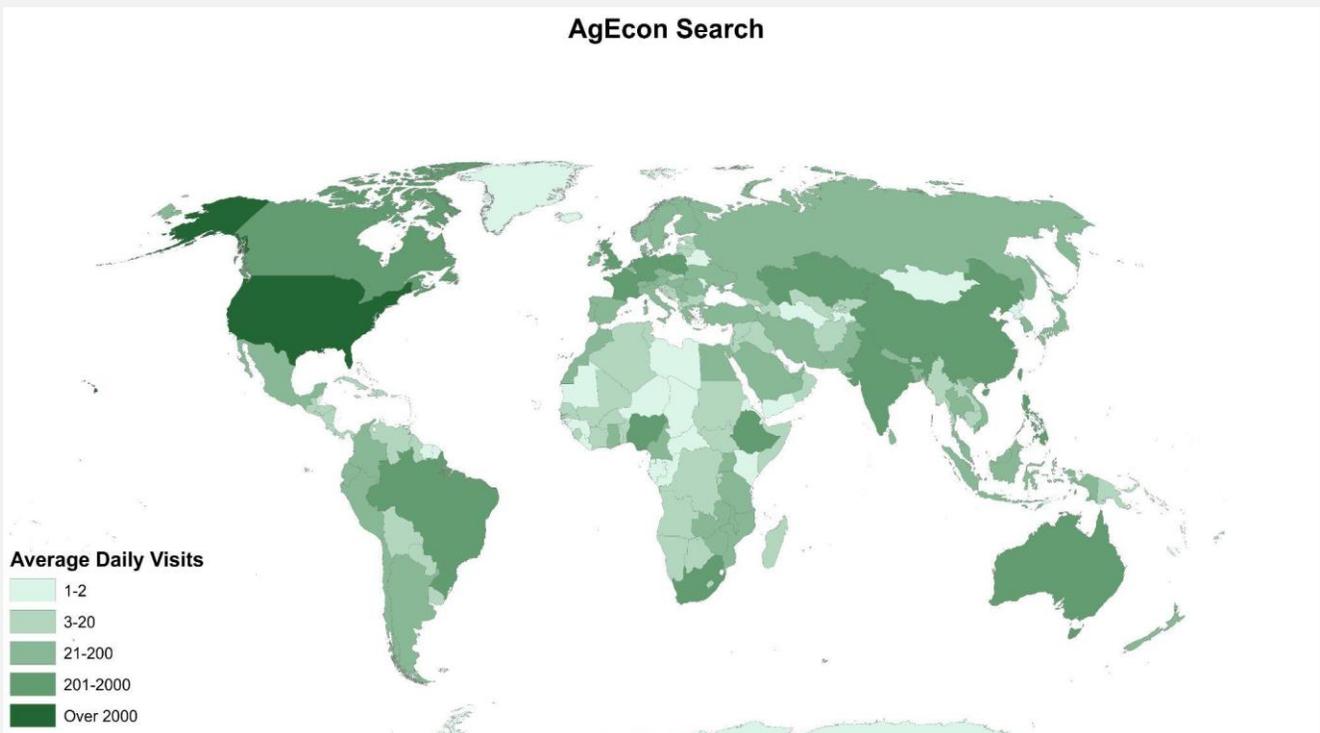


**Contributing Communities-Global Distribution**  
 >300 community members



**Figure A2: Contributing Communities–Global Distribution**

**AgEcon Search**



**Figure A3: AgEcon Search Daily Visits**

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5(2) doi: 10.22004/ag.econ.333521

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## Feature Article

# How to Thrive in Agricultural Economics PhD Programs: SAEA Emerging Scholar Award Winners' Experience and Advice

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JEL Codes: A11, A23

Keywords: agricultural economics, early career, emerging scholar, mentoring, PhD students, time management

## Abstract

Obtaining a PhD in agricultural economics can be stressful, and few studies offer holistic directions and advice to help students navigate PhD studies, particularly those seeking to transition into a research-intensive academic position. We surveyed and interviewed 21 agricultural economists who won the Emerging Scholar Award from the Southern Agricultural Economics Association between 2014 and 2021. We analyze their experiences to provide PhD students in agricultural economics with insights and tips for a career in academia. This article identifies patterns among these award winners' approaches to coursework, assistantships, working with mentors, teaching, research, technical writing, conferences, networking and job search, time management and work-life balance, and the transition to new positions. Drawing from our participants, the study also points out a few aspects where graduate programs can improve to enhance students' professional growth. Even though our target audience is current and prospective PhD students, we believe that this article is useful for postdoctoral researchers who are interested in faculty positions, junior faculty members who seek a smoother transition, and senior faculty members who are advising PhD students.

## 1 Introduction

The field of agricultural economics in the United States granted 1,235 doctoral degrees from 2010 to 2020 (National Center for Science and Engineering Statistics [NCSES] 2021, Table 13), with about 500 PhD students enrolled per year.<sup>1</sup> Between 2015 and 2020, the median years to completion since starting the doctoral program was about 5 years (NCSES 2021, Table 31). The PhD experience often includes stress, anxiety, and frustration, particularly among senior PhD students who face dissertation and job market pressures (Goodboy, Martin, and Johnson 2015; Woolston 2019; Bolotnyy, Basilico, and Barreira, 2022). However, few existing studies offer holistic directions and advice to students attempting to navigate this sometimes-tortuous professional growth period and the later transition to full-time academic positions. This article aims to fill this gap.

Several guides attempt to help PhD students in general economics. For instance, Eble's (2018) guidebook provides an overview of PhD programs in economics and education. McCloskey (2019) provides writing advice, and Thomson (2001) offers guidance on writing, presenting, and refereeing manuscripts. Cawley (2018) includes detailed guidance and advice regarding the job market for fresh PhDs, and Bolotnyy, Basilico, and Barreira (2022) provide recommendations to improve mental health. Weisbach (2021) provides early-career economists with a comprehensive guide of research, publishing, and career development. To date, few such specific guidance exists for agricultural economics. While overlaps exist between PhD studies in general economics and agricultural economics, important

<sup>1</sup> If we include PhD students in programs that grant degrees in applied economics, such as University of Minnesota and Auburn University, this number is even larger.

distinctions between the two exist (Perry 1998). Of the few publications that address PhD studies in agricultural economics, they mainly focus on mentorship style (Perry 1996), student productivity and mentorship (Hilmer and Hilmer 2007), students' departmental preferences (Mark, Lusk, and Daniel 2004), and skill sets and training prior to entering the PhD (Penn and Sandberg 2017). One exception is Bellemare (2022), who offers detailed advice on the many practical tools essential for applied and agricultural economists, including writing, presenting, publishing, obtaining funding, doing service, and advising. These studies are helpful to understand specific elements of PhD programs or junior faculty positions in applied and agricultural economics, but they often offer relatively little comprehensive guidance to help PhD students in agricultural economics better navigate graduate study and later transition to full-time positions.

To offer holistic directions and advice to students attempting to navigate through their PhD studies in agricultural economics, we interviewed 21 agricultural economists who won the Emerging Scholar Award of the Southern Agricultural Economics Association (SAEA) from 2014 to 2021. According to SAEA (2021a), the Emerging Scholar Awards "are designed to highlight the work of high-performing early-career professionals in our profession." Krishna Paudel, former SAEA President, described the selection of awardees as:

*"SAEA selects emerging scholars based on excellence in their field. For a teaching/research faculty, it looks at primarily journal articles and where those are published. For an extension faculty, it looks at the effectiveness of extension programs as well as their scholarly activities. SAEA does not have a ranking of journals that it uses to decide, but the SAEA executive board makes the final decision based on intense discussion after the initial ranking made by directors to finalize the list. Generally speaking, the final awardees are based on the consensus of the executive board members [of SAEA]."*<sup>2</sup>

Since the inauguration of the Emerging Scholar Award in 2014, SAEA has selected 24 awardees, as of 2021 (SAEA 2021b), 21 of whom participated in the study.<sup>3</sup> We employed surveys and semi-structured interviews to better understand each participant's experience as a PhD student and as a junior faculty member. We interviewed them to garner their insights about how current and future agricultural economics PhD students can thrive during their PhD study and as a junior faculty member. This article summarizes patterns among these award winners. It provides more relevant and specific advice to current and future agricultural economics PhD students aiming at academic careers than provided by existing studies tailored to economics PhDs generally or only a specific aspect of PhD study in agricultural economics.

Although the specific PhD experience and advice differ across the 21 participants, we still find several prominent themes. Specifically, the majority utilized their coursework strategically to generate conference presentations and publications. The average number of peer-reviewed publications of the participants at matriculation is 2.29, and the median is 2. About one third did not have peer-reviewed publications by graduation. Most paired with or switched to their eventual PhD advisors based on overlapping interests. All the participants found that mentorship was critical for their early success in research and writing, as found by Hilmer and Hilmer (2007). Moreover, we find that our participants improved their technical writing with help from their advisors or other faculty members. The participants all agreed that teaching experience as an independent instructor was critical for job search success. They stressed time management, advising that one should balance teaching effort and research

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<sup>2</sup> Personal e-mail communication.

<sup>3</sup> In line with our Institutional Review Board (IRB) protocol, we do not share our participants' names, degree-granting institutions, and current affiliations. Institutional Review Boards are administrative bodies, in this case within Auburn University, that protects the rights and welfare of human research subjects recruited to participate in research activities.

progress as PhD students. Most scholars mentioned that they were protective of their research (or study) time, striving for uninterrupted and focused research (or study) time. We found that four participants managed their PhD study as a nine-to-five job and were still successful. In terms of handling pressures during their PhD study, participants relied on physical exercise and friendships, and drew on support from fellow students. Participants shared that they were least prepared as junior faculty members to advise students, write grants, and meet service demands.

The contributions of this study are twofold. First, to the best of our knowledge, this is the first study that documents various aspects of agricultural economists' PhD study experience in the United States over the first two decades of the 21st century, including their transition from a PhD student to a new faculty member. The participants' experience and advice summarized in this article can aid current and future PhD students in agricultural economics. Second, the present study combines survey and semi-structured interviews that provide descriptive statistics and textual, more dialogical evidence (to be discussed in the next section), offering richer insight than previous studies (e.g., Penn and Sandberg 2017).

## 2 Methodology

Each participant agreed to meet via videoconference for approximately one hour. They began by taking a short survey, followed by a semi-structured interview.

### 2.1 Survey

The survey was designed to be completed in about five minutes via Qualtrics. Beyond basic information such as current appointment and the number of students they advised, it asked questions about their coursework, mentoring, research, writing, teaching, job search, time management, and stress management. This design allowed participants to reflect and formulate thoughts on various aspects of their PhD programs before beginning the semi-structured interview. For consistency, each interview began with the questionnaire.

The survey began with queries on how respondents were matched with their PhD advisor and the nature of the relationship with their advisor. Then, respondents were asked about the importance of and means to improve nontechnical skills such as time management and writing, opportunities and experience as a teaching assistant or instructor, the relevance of certain skills for obtaining a permanent position, and finally about their work-life balance. In total, the questionnaire consisted of eight multiple-choice questions, five sets of Likert scale questions, and two open-ended questions. The survey questions are listed in Item A of the online Supplementary Information (SI).

### 2.2 Semi-Structured Interviews

Semi-structured interviews, also sometimes referred to as co-constructed interviews, provide a crucial means for the interviewee, not just the interviewer, to direct what is important about the topic at hand (Orne and Bell 2015). Surveys or questionnaires often are praised for their ability to control for bias, where the subjectivity of the interviewer is assumed to be removed. However, surveys and questionnaires too are designed by people, and sometimes those doing the designing can ask less relevant or important questions. Interviews allow for rapport between interviewer and interviewee, lessening the sometimes-problematic power dynamic between researcher and subject (Deutscher, Pestello, and Pestello 1992).

Notably, positionality matters in interviews. For example, a more senior academic asking a junior person questions about their aspirations and strategies may result in different responses than two junior people discussing these issues together. Likewise, other sociodemographic differences between and among respondents as well as interviewers, like gender, sexuality, race, and class, can shape how they respond. The two economist co-authors conducted the majority of interviews. This positionality

comes with notable strengths: they both are insiders, agricultural economics professors, and former winners of the Emerging Scholar Award. Yet some respondents, knowing they are speaking to colleagues, may limit the candor of their responses in interviews and surveys, knowing that their colleagues will be studying their responses. This study received IRB approval at Auburn University (Protocol #20-256 EX 2007), and all participants were sent copies of an information letter. In line with the protocol, respondents' information is anonymous. Since this is a small group of participants who are known in their discipline, we remove key identifying details in an effort to protect their identities.

Awardees were generally pleased and grateful for the opportunity to reflect on their experiences. Because of the interviewers' insider status, we did not ask explicitly about mental health crises, discrimination, and other explicitly sensitive topics, unless raised by the interviewees themselves. The interview includes five sections of questions related to coursework, assistantship, mentorship, research, teaching, network, job search, time management, and work-life balance. The complete set of questions appear in Item B of the online SI.

### 2.3 Data Collection and Analysis

The survey and interview questions were vetted at a focus group held during the 2020 SAEA annual meeting in Louisville, Kentucky. The focus group featured nine participants (three postdoctoral researchers and six PhD candidates) from seven different universities (Auburn, Georgia, Kansas State, Kentucky, Louisiana State, Texas A&M, and Virginia Tech). Overall, this focus group viewed the survey and interview questions as appropriate. They were eager to learn advice from emerging scholars. Additionally, during spring 2020, the survey and semi-structured interview questions were piloted with two tenure-track junior faculty members at Auburn University and Louisiana State University to estimate the time required and to obtain feedback on the relevance of questions. It also enabled refinement of the script of the semi-structured interview. The 21 actual surveys and interviews occurred from September to December of 2020. An interview, including survey completion, typically took 60–70 minutes, excluding pre- and post-small talk. Each interview was recorded and transcribed, resulting in a total of about 200,000 words. Table 1 presents some summary characteristics of the participants.

**Table 1. Summary Characteristics of Participants (Number of Observations: 21).**

Characteristic	Mean	Std.	Min.	Max.
Gender (0: male; 1: female)	0.19	0.40	0	1
Country of origin (0: USA; 1: international)	0.24	0.44	0	1
Current affiliation (0: non-R1 institutions; 1: R1 institutions)	0.90	0.30	0	1
Current position assignment (0: research/teaching; 1: extension)	0.33	0.48	0	1
Number of peer-reviewed publications by graduation year	2.29	2.12	0	7
Number of <i>AJAE</i> articles by graduation year <sup>a</sup>	0.05	0.22	0	1
Number of years between PhD degree and master's degree	4.25	2.02	1	9
Number of years between PhD degree and bachelor's degree	7.15	2.48	5	14

<sup>a</sup> *AJAE* stands for *American Journal of Agricultural Economics*, the leading journal in the field of agricultural economics.

Before discussing the results, one caveat needs to be acknowledged. We identified our survey population as award winners, and we surveyed most of the population up to 2021 (87.5 percent response rate). Our study thus approaches those who received the award as offering particular insights to the PhD experience and later job placement. We do not have comparative data from those who did not

receive the award. Because the participants are not representative of all faculty in the profession and because we do not have a control group in the analysis, we do not intend to interpret the results as causal relationships.

### 3 Results

We present major themes that arose out of the survey and semi-structured interviews in chronological order typical of PhD programs in agricultural economics, starting with coursework and ending with transitioning into the role of a junior faculty member. The survey results are summarized in Table 2.

#### 3.1 Coursework: Intentional Balance with Support from Your Cohort

Regarding coursework, especially during the first two years of the PhD program, a few keywords such as “cohort,” “balance,” and “intentional” emerged from the interviews with our participants. About a quarter explicitly mentioned that they benefited significantly from interaction with fellow students in the same cohort to get through the coursework, particularly the first-year sequence of microeconomic theory, macroeconomics, and econometrics. One participant pointed out that while working with fellow students on the coursework is crucial, some degree of independence is important. Otherwise, dependency on your cohort, which can take root, may pose a barrier to independence of thought and scholarly innovation. This underscores the importance of balance between working independently and working collaboratively.<sup>4</sup>

Participants often mentioned “balance” in terms of coursework in the first two years and about their thoughts on taking additional courses in later years of PhD study. A few participants were conscious of the need to balance time spent on coursework versus research. They viewed some mandatory courses as less helpful to their future research, so they only spent enough time to pass those courses in order to save time for research. Except for a couple of individuals, all participants took additional courses beyond the minimum requirement mainly due to research needs or recommendations from advisors or other faculty members. Participants argued that additional courses provided the advantage of having well-rounded economic knowledge and of related tools. The disadvantage, however, is that one may become less focused in a specific area with less time devoted to research overall. Keeping this trade-off in mind, our participants’ advice was threefold: (a) take an additional course only when one requires specific tools needed for research or the material is difficult to learn independently; (b) for additional courses, rather than regular attendance, audit the sessions that are most relevant; and (c) identify what readily achievable graduate-level minors exist once one has decided to take additional courses.

Nearly half of our participants reflected on their intentional selection of PhD coursework, especially for field courses, in two aspects. First, they thought about the courses’ usefulness in their research. They acknowledged that having some research experience before starting their PhD study really helped them better understand, put into perspective, and apply the coursework content. Second, they developed their coursework papers into conference presentations and peer-reviewed publications. Most of the participants who mentioned that they utilized coursework intentionally had multiple peer-reviewed journal articles by their graduation, which helped differentiate them on the job market.

#### 3.2 Mentorship: Help Your Advisor Advise You

Mentorship is perhaps the most critical component for PhD study in agricultural economics because, unlike undergraduate education, PhD study involves much more interaction between mentors and graduate students (Perry 1996). Studies have shown that the quality of mentorship directly affects

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<sup>4</sup> Note that other participants did not comment on the disadvantages of working collaboratively on coursework during the interview, and therefore, we do not have information in this regard.

students' early career research output (Long and McGinnis 1985; Hilmer and Hilmer 2007; Breuninger, Pferdmenges, and Pull 2012). Because a productive mentoring relationship requires engagement from both the advisor and student, our survey and interviews included questions related to matching and working with their PhD advisors.

**Table 2: Survey Results for Characteristics of Participants During Their PhD Programs (Percent). (Number of Observations: 21)**

	<b>Percent</b>
<b>Advisor match based on:<sup>1</sup></b>	
Overlapping interests	86
Funding and familiarity	20
Assigned	0
<b>Switched PhD advisors during PhD study:</b>	14
<b>Highest level of teaching experience:</b>	
None	0
Guest Lecture	10
Grader	14
Lab TA or instructor of record for 1 credit	19
Full course instructor of record	57
<b>Resources used to improve teaching:<sup>a</sup></b>	
University-level resources	43
Preparing Future Faculty program	5
Other faculty members	81
Fellow graduate students	62
<b>Resources used to improve writing:<sup>1</sup></b>	
University-level resources	33
Other faculty members	76
Fellow graduate students	52
<b>Family traits in the majority of the PhD program:</b>	
Single	19
Married/partner, without kids	48
Married/partner, with kids	24
Parents live nearby	0
Other	5
<b>How much do you prioritize work-life balance?</b>	
Not at all	0
A little	5
Moderate	38
A lot	14
Very Much	43
<b>Compared to being a junior faculty, how stressful would you consider the last 2 years of your PhD program?</b>	
more stressful	9.5
Equally stressful	38.1
Less stressful	38.1
Much less stressful	14.3

<sup>a</sup> For these questions, participants can choose multiple answers, so total percentage points exceed 100.

### 3.2.1 Matching with PhD Advisors

Our survey shows that about 86 percent of the respondents paired with their advisors based on overlapping research interest. Secondary and tertiary reasons are funding and familiarity, with 5 and 4 respondents selecting these two reasons, respectively.<sup>5</sup> Three out of the 21 participants switched their advisors for a better match over the course of their PhD program.

During the interviews, we asked how our participants were paired with their PhD advisors. Most of our participants (13 out of 21, about 62 percent) identified their PhD advisors before they joined a PhD program. Among these 13 participants, six were connected to their PhD advisors by their earlier advisors in their undergraduate or master's programs, and two were connected to their future PhD advisors at a conference or seminar. The remaining eight participants sought out their PhD advisors after they started their PhD study, with four participants doing so based on faculty members' research interests. Respondents mentioned that seminars where faculty members introduced their own research interests helped students identify PhD advisors. The remaining four participants among the eight worked with their PhD advisors due to funding availability and common research interests. Some of these eight participants found it difficult to identify an advisor. For instance, one participant stated that, "no one told me how to find an advisor."

We compared the group of participants who had identified their PhD advisors before joining their PhD programs versus those who did not. We examined the difference in (a) the number of peer-reviewed publications based on a number of metrics using the PhD completion year; (b) the number of years between a PhD and a master's degree; and (c) the number of years between a PhD and bachelor's degree. We found that the average number of publications by the graduation year of the former group and the latter group is 2.9 and 1.3, respectively, with  $p$ -value of the  $t$ -test on equality of means at 0.08. This result indicates that upon graduation, PhD students who determine their PhD advisor before they start the program tend to publish twice as much as those who do not identify their advisor before their program begins. Note that the participants' PhD programs had similar structures. They are all at land-grant universities, and all require qualifying exams within the first two or three semesters of PhD study. It is feasible that proactive students who seek out advisors before they begin their studies have a chance to become involved in publishable research earlier, with more publications upon graduation. However, we do not find statistical difference in the number of years of PhD study between the two groups.

### 3.2.2 Working with PhD Advisors

All participants believed that mentorship had a tremendous effect on their early career success. Their PhD advisors mentored them on various aspects of research, such as refining research ideas, positioning their research work in the literature, selecting appropriate methodologies, improving technical writing, and time management. Almost all participants stated that they received prompt and constructive feedback on their work from their PhD advisors. Some participants particularly mentioned that they benefited significantly from the mentorship role that kept them focused while working on their dissertations. Moreover, some participants found mentoring outside research beneficial, such as networking and learning how academia works.

Based on the degree of control that an advisor may impose on the student's research, Perry (1996) specified four types of mentoring approaches: command-and-control, heavy direction, light direction, and sink-or-swim. The first approach involves the most control from PhD advisors and the last involves the least. Based on their description of the role of mentorship in their PhD study, we believe that none of our participants had a command-and-control or sink-or-swim mentorship. They all worked closely with their PhD advisors but had various levels of freedom to work on their dissertations. For some of our participants, who largely developed their own research ideas for their dissertation, the role

<sup>5</sup> Note that multiple reasons can be selected for this question about matching with advisors.

of mentorship lied in high-level or big-picture type of guidance. In such cases, PhD advisors helped the participants see a bigger picture of the research, drive the research to the most exciting directions, and identify the key contributions of the work to the literature.

When asked about what they did well as they worked with their advisors, our participants reflected on the following aspects. First, many of our participants believed that they helped leading the research process by being self-starting and self-motivated. They enjoyed freedom to develop their own research or choose specific techniques from various options for a given research project, with guidance and help from their PhD advisors. One of our participants described their research during the PhD study as “guided independent research.” Second, most of our participants recalled that they had frequent communications and meetings with their advisors during their PhD program, where the PhD students received prompt and constructive feedback from their advisors. Together with the self-starting and self-motivating characteristics of the students, these frequent communications and meetings resulted in high research productivity, demonstrated by peer-reviewed publications. Many of our participants explicitly mentioned that their personalities meshed well with their advisors’ and enjoyed mentorships that were also friendships. A few of our participants mentioned they engaged in some leisure activities with their PhD advisors such as hiking, camping, or card games. Through these activities, they learned things outside of research, such as networking and how academia works.

Several key points emerged from the interviews when our participants were asked about advice that they would provide to current or future PhD students about working with their advisors more efficiently. First, two participants suggested that before finding their PhD advisors, students should “search their soul” to identify their true research interests and evaluate their weaknesses and strengths. Students are then positioned to reach out to potential faculty members who fit their research interests and who are likely able to help them overcome their weaknesses for possible mentor-mentee matches. For instance, one of our participants realized that they needed more one-on-one time and more hands-on guidance on research and writing; therefore, they intentionally asked to work more with an advisor who could provide this type of mentorship. One of our participants suggested that, while working on a chapter of a dissertation, one should often set aside some time to think about high-level questions that are related to the research, such as “what is the most interesting and exciting point of this research?” and “how to better motivate this chapter?” One can also discuss these types of questions with their PhD advisors.

Second, several participants believed that communication is key to improving working relationships between students and advisors. Advice includes the quantity and quality of communications between students and advisors. In terms of quantity, or frequency, a few participants suggested weekly meetings, individually or as a group. Other participants mentioned that they benefited significantly from their advisors’ open-door policy under which they can meet their advisors whenever they see a need. Students should not be afraid to show their advisors their work, even when unfinished. In terms of communication quality or efficiency, two aspects stood out: activities associated with mentor-mentee meetings and documentation. One participant outlined how students could have more efficient meetings with their advisors:

*“... show up prepared to every meeting, know exactly what you want to get out of that meeting. ... I went in, I took notes, but then I digested the notes [after the meeting] in my office to know exactly what came out of that meeting, what were the next steps. ... After every meeting, set a couple of minutes aside to figure out what are the next steps that you are going to do.”*

Two participants mentioned that documentation in writing was critical during their PhD study. Careful, clear, and well-organized documentation of computer code and modeling is critical for quality control, transparency, and replicability. It is beneficial not only to other researchers but also to the students themselves because a project may take one year or longer to complete, and the students may work on it intermittently due to other obligations. Careful documentation helps students to recollect critical information about the project when it eventually resumes. Documentation can also be useful for organizing research ideas, recording data processing steps, and summarizing mentor-mentee meetings. A useful exercise after each meeting with advisors is digesting the content and planning for the next steps. Then, the student can write a summary about the meeting content, plan for the next steps, and then share these plans with all attendees. Documentation is also an excellent exercise for writing, a topic we discuss below.

Third, a consensus among our participants is that within a mentoring relationship, the students should take the initiative and lead the intellectual exploration. To find an advisor, students should not wait until advisors reach out to them. Instead, students should reflect on their research interests and reach out to advisors. Once matched with an advisor, the student should take initiative to “help your advisor advise you,” to “drive the intellectual process,” and to “work with your advisors but on yourself,” as two participants described. In practice, this means that the students should prepare themselves for every meeting with their advisors; send the materials to be discussed at least one day or even a week before the meeting; and summarize, reflect, and make plans after each meeting. When facing a hurdle during research, which is common during PhD studies, the students should not solely rely on their advisors to overcome the issue. One of our participants recollected his or her experience working with their advisor,

*“I did not just run down to my advisor’s office immediately when I got a problem. I typically went down there the next day and said something like, ‘This is the problem. I tried A, B, C, D, and E and I still can’t figure it out. ... I need some input [from you].’”*

Another participant commented,

*“I think you have to work independently, and then when you believe you’ve reached a certain threshold or level, then you get it evaluated and you get feedback.”*

However, to ensure progress with research, the student should not dwell on a research hurdle by themselves for too long (e.g., over a week) before they seek help from advisors. This makes for a delicate balance between when to work on the problem alone and when to seek help from advisors, which is to be managed by the collaborative effort of the student and their advisor.

Some other suggestions shared by our participants about working with advisors focused on mentor-mentee interactions within the mentoring relationship. First, they suggested that students should have open minds about feedback and criticism about research work without taking it personally. However, the students should also believe in themselves, be their own advocates, and “fight for what you really believe,” as one participant stated. Second, some of our participants suggested that knowing advisors informally was as important as knowing them formally. Students can learn something outside research in such relationships, but that is still critical for their career development, such as time management, networking, or even as general as how academia works.

Even though our participants had a high level of satisfaction regarding their mentoring experience, there were things that they wish they could have done better. These included asking more big-picture questions, taking on one or two more projects, aligning dissertation chapters better with advisors’ expertise, or even pushing the advisor harder for feedback.

### 3.3 Ways to Approach Research: Where to Start Is Different among Students and Faculty Members

We also asked about how our respondents as PhD students first and faculty members later explore a research idea and develop it into a project and perhaps a published paper. The answers show clear differences, in terms of exploring and developing a research idea into projects and publications, between PhD students and faculty members, as well as between faculty members with and without extension assignment. The majority of our participants worked as a research assistant during their PhD study. Therefore, they had a blueprint ready for at least part of their dissertation, and their tasks were mainly to ensure project deliverables by working with their advisors. For projects initiated by themselves during their PhD study, quite a few participants mentioned that they obtained the research ideas from reading literature, performing “small twists” on existing literature to get ideas for new papers. They then refined these ideas through interactions with their advisors and eventually carried through these research ideas and developed them into publications by working with their advisors. They also suggested that identifying ideas only from literature typically lead to marginal contributions and were not hypothesis-driven. As faculty, ideas were often obtained from the real world by reading newspapers or magazines or from conversations with colleagues or stakeholders. One of our participants elaborated how they explored research ideas and developed them into projects:

*“... in general, when I come up with a research idea that I think is intriguing, I write down some notes about it in a document. I have a document with all my research ideas. And I try to, at some point, maybe not right when I write it down, I will do a literature review and see whether this question has been answered before. If I start to think that this is a topic that’s really worth pursuing, then I’ll think about the data, and think about any sort of limitations, and I will write down a one-page abstract on what’s the research question, what’s the methodological approach, and what data I’m going to be using, and then I will ask myself if this paper is likely to be published in AJAE, or do I have a good feeling that it would be a good candidate for publication in AJAE. And if it really seems like it’s a feasible project in terms of the data and the empirical strategy, and topically it’s interesting enough that I feel like it has a legitimate shot at AJAE, then I’m gonna mentally move it to the papers that I would really like to pursue. When I have a little bit of time available for working on the project, and then I’ll start it. But I’m telling you this is my perspective now six years after graduating and I think that with a job market paper and with a dissertation, it should be a similar process. I don’t feel like I went through the exact same process back then, that [PhD study period] was more of like a conversation with my advisors about feasibility and working with him [on] the big grants that we have. But I think that the process should be very similar in terms of thinking about the research question, and then thinking about the feasibility doing research and judging the quality.”*

Regarding how to generate research ideas, our participants with extension assignments mentioned that it positioned them well in “taking on the ground problems and scaling them up” (a quote from one of our participants) to research questions that may have broader relevance to agriculture. In this case, the participant drew research ideas from issues faced by producers. Some of our participants who had no extension appointment mentioned that they obtain research ideas by working closely with extension colleagues. Most of our participants who had no extension appointment stated that they obtained research ideas from reading broadly, including newspapers, magazines, research articles, and from attending seminars, workshops, conferences, and from conversations with colleagues or stakeholders.<sup>6</sup>

<sup>6</sup>Varian (1997) and Weisbach (2021) provide detailed discussions on how to generate research ideas or select research topics in economics.

When asked about what the most difficult part of research is, our participants provided a range of answers, indicating that the most challenging aspects of PhD programs vary widely. Five of our 21 participants mentioned that identifying a novel, interesting, and feasible research idea or abandoning a bad research idea was the hardest part in research. Another three participants shared that finding the appropriate methods for the analysis was the most difficult for them. Three participants identified writing is the most difficult part of the research process. Interestingly, two of our participants mentioned that every part of the research process was difficult. Two participants mentioned that data availability is the hardest part, whereas another two participants believed that knowing the time and place to stop doing the analysis was the most difficult. Other difficult aspects that our respondents referenced include (without a particular order): finding sufficient time to work on research as an assistant professor, making decisions on numerous small choices during research, obtaining funds, uncertainty of keeping changing models and analyses, being organized and compartmentalizing a research project into manageable tasks, and finally, going through the entire referee process and publishing the paper.

These varied understandings of difficulties in the research process can be interpreted in two ways. First, from a PhD student's perspective, they should not be discouraged or frustrated when research difficulties arise. This is because, as we listed above, every researcher experiences some challenges. Second, from an advisor's perspective, one should be aware that different students may have different aspects of the research process where they require more guidance and help.

### 3.4 Re-do PhD: Perfect PhD Experience Is Rare

For the question "what would you do differently if you had to re-do your PhD," we received a variety of answers. Three of our participants mentioned that they would like to strengthen their quantitative skills by taking more econometrics courses. Two stressed that they would like to identify what their true interests were and to think twice when participating in projects that might not align well with their true interests. Another six participants centered their answers on quality and quantity of publications, referencing that ideally, they would have preferred to have a few high-quality publications. For instance, three of the six participants answered that they would make sure to have papers under review, to publish more papers, or to participate in more projects. Another three answered that they would write papers aimed at a larger audience or higher quality and would not focus too much on publication quantity.

Other participants reflected on how they would have changed their PhD study, although there is not a clear pattern on how they would have done so. For instance, one participant wished they would have been more thorough in the literature review in order to avoid a major research setback. Two participants wished they could read and research more broadly, whereas another two participants wished they had been more focused on fewer projects and were not spread too thin. Finally, one participant would like more formal training on writing research papers.

These experiences suggest a balancing act between quality and quantity, as well as breadth and depth of research. Fortunately, two participants mentioned that they do not know or would not change anything because they were very satisfied with their PhD experience. One stated,

*"I literally wouldn't change anything. I mean I had what I could define like the ideal trajectory for a PhD student [...] being able to build on a program of research, all in the same vein, being able to build in terms of rigor. Each paper was a little more rigorous, and each paper went to a higher quality journal. [...] To me, that's the ideal trajectory."*

### 3.5 Writing: Keep Writing and Rewriting

Eighteen out of twenty-one participants spoke how difficult writing has been for them. One of the participants believed that writing is perhaps the most undervalued tool in the PhD program because it is not typically taught in agricultural economics PhD programs. In the words of one participant, “bad writing will tank a brilliant paper.” Almost all the participants mentioned that their advisors helped the most to improve their writing by providing detailed comments and editing of their manuscripts. Other helpful resources for writing mentioned by our participants include help from other faculty members in the program (used by 76 percent of participants), fellow PhD students (used by 52 percent of participants), and writing workshops on campus (used by 33 percent of participants). English courses on technical writing or grammar, professional copy editors, relatives, writing club with fellow students, or even online writing tools also were of service.<sup>7</sup>

Among the many pieces of writing advice that our participants shared, in the words of one participant, “keep writing and rewriting” appears to be the most common suggestion. They believed that writing is a skill set that improves over time with regular practice, reflection, and help from many sources mentioned in the above paragraph. “Rewriting is as important as writing,” one of our participants remarked. We agree with the participant that the first draft of the paper needs not be perfect, and it will improve as it is rewritten, while receiving comments and suggestions from advisors, fellow students, seminar participants, or referees. Our participants suggested that when receiving feedback on writing, that like research content, students should not take criticism personally. Some participants suggested that a PhD student should write at least one paragraph every day. Additionally, students can utilize other more mundane and everyday settings to hone their writing skills, such as emails, meeting notes, and conference abstracts. One participant also shared an interesting writing strategy: “Formulate a cohesive argument in favor of something that you disagree with.” This exercise helps one to practice how to organize one’s thoughts, how to be persuasive, and how to be as clear as possible, as well as how to get across the main points of an argument. Another piece of advice included learning from reading. Reading can include classical writing examples in the field and can sometimes include poorly written working papers.<sup>8</sup> The latter can be as helpful as the former in terms of improving one’s writing, as they illustrate examples or cases that a student may want to avoid when they write their own papers. A few books on writing that were recommended by some of our participants include: Strunk and White (1999), Thomson (2001), Zinsser (2006), and McCloskey (2019). Moreover, Weisbach (2021) and Bellemare (2022) provide detailed guidance on writing papers in economics.

The introduction is arguably the most important part of a paper because it motivates the whole study and documents the main story in a paper. Two of our participants shared helpful thoughts on improving writing of introductions. One participant found that it is helpful to start with a very structured outline, which would assist students in organizing the flow of thoughts in the introduction. The participant commented, “It [introduction] should not be a matter of jumping around. Anyone should be able to get through this with relative ease and say I understand why we’re transitioning from paragraph to paragraph, [and] I see the core message from each paragraph.” The participant also mentioned that knowing the relevant literature helps in writing an introduction. The other participant provided an interesting metaphor that drew analogy between a research project and slaying a dragon, and offered one way to organize an introduction. They commented,

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<sup>7</sup> One participant mentioned that he or she used Hemingwayapp.com. The authors of this article declare that they have no relevant or material financial interests that relate to Hemingwayapp.com.

<sup>8</sup> The classical writing examples mentioned by some of our participants are: Cheung (1973), Weitzman (1998), Joshua Angrist’s works on causal inference, and some works by Richard Hornbeck.

*“... when you think about the introduction, think about it like there’s this dragon that has to be slayed. And so, what you want to do is to talk about this dragon and why it’s so terrible and why it’s so bad. And then you want to talk about how other people have tried to slay this dragon [but failed, or nobody has not noticed this bad dragon]. And then, you want to talk about why you can slay the dragon and why you’ve got the sword, the magic sword, that’s going to kill this dragon. I thought that illustrated to me what an introduction is supposed to be.”*

### **3.6 Teaching as a PhD Student: No More, No Less**

We find that most of our participants had worked as both teaching assistants (TAs) and research assistants (RAs) and believed that both were helpful experiences. Moreover, most of the participants mentioned that they were assigned to a role of TA or RA, and they did not have much freedom to choose one of the assistantship forms.

While the level of teaching experience gained as a PhD student ranged widely, all of the participants reported having at least some teaching experience (Table 2). During interviews, nearly all participants agreed that obtaining teaching experience, especially the experience of teaching independently during PhD study is important for one’s career development, even though their eventual positions might not involve teaching. This was because, in addition to gaining teaching experience that would strengthen one’s curriculum vitae, one could also improve their communication and learning skills through teaching. However, teaching independently can be time-consuming for PhD students. Therefore, there are tradeoffs between gaining teaching experience and devoting more time to research or other activities. The consensus among the participants is that teaching one course for one semester would be sufficient for PhD students who are interested in research-oriented positions. Note that about 90 percent of the participants in this study are employed at universities classified as “R1: Doctoral Universities—Very high research activity” in the Carnegie Classification of Institutions of Higher Education. Because we tailored our survey population to award winners, nearly all at R-1 institutions, our results are less applicable for teaching intensive or nonacademic positions. For students who are interested in positions at non-R1 higher educational institutions, additional teaching likely has more weight.

In terms of improving teaching skills as a PhD student, the majority of our participants (81 percent) relied on faculty members who had similar teaching experience. This included observing the teaching of these faculty members, obtaining teaching materials and tips from them, as well as having them observe and comment on the participants’ teaching. About 62 percent of our participants obtained help in teaching from fellow students. Less than half of our participants (43 percent) utilized formal university-level resources such as teaching workshops to improve their teaching skills. Only one of our participants utilized the Preparing Future Faculty (PFF) program to improve their teaching skills.<sup>9</sup> Another participant mentioned a two-credit hour teaching seminar on the scholarship of teaching that they found extremely helpful. Our findings in this regard indicate that PhD students mainly rely on informal channels (e.g., faculty members and fellow students) to enhance their teaching and that they believed that these informal channels are more effective than formal ones.

On the timing of teaching during the PhD study, most participants gained teaching experience as an independent instructor in the later years of their programs. This timing matches when students are more likely to have additional flexibility in their schedules. However, one participant suggested early teaching experience in PhD programs saves time for research and the job search in later years.

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<sup>9</sup> More details of the PFF program appear on its official website: <https://preparing-faculty.org/>.

### 3.7 Conferences, Networking, and Job Search: Present You and Your Research to the World

All our participants placed value on attending conferences as graduate students. They suggested attending as many sessions as possible at conferences as well as social events such as reunions and happy hours because they are great networking opportunities. When asked what the worst way would be to spend time at conferences, a consensus among our participants is spending too much time preparing one's own presentations at the cost of attending conference sessions. Our participants mentioned that for PhD students, attending sessions at conferences is a great way to learn about the current state of research, to generate research ideas, and learn how others explore research ideas and communicate them with an audience.

Our participants also emphasized the value of networking at conferences. A few of them mentioned that they benefited from their advisors introducing them to people during social events such as reunions or receptions. Some of our participants found that small conferences could be as beneficial as large conferences because students may receive extra attention. One participant mentioned that in order to encourage their students to meet other researchers across the profession, their students "are not allowed to hang out with people from the same school" at conferences. Another participant suggested adding one or two days before or after the conferences to explore the area where the conferences are held, and making sure one is fully engaged with the conference activities.

With respect to preparing for the job market, almost all of our participants believe that attending conferences and networking (with help from their advisors) are beneficial for job market candidates. Graduate students who plan to be on the job market in one or two years can also benefit from attending events (e.g., informal roundtable interviews) hosted by the Employment Center at the Agricultural and Applied Economics Association (AAEA). Regional associations also have similar opportunities to benefit from. However, our participants also emphasized that preparation for the job market starts on day one of PhD programs, and publications and job market papers are critical factors for job search success. Ideally, one would have several publications and a strong job market paper when they start the job search. When one is on the job market, interviewees suggested that the job candidate should be able to demonstrate expertise in their area, but without being defensive. Interviewees suggested that the candidate show a balanced research portfolio. As put by one participant, "Don't be a one-trick pony." Our participants encouraged PhD students to practice their job talks as much as possible. Moreover, because grants are increasingly important, gaining some grant application experience during PhD studies can be of service, although it is less important than some other factors (to be discussed below).

The survey allowed comparisons of the importance of various factors to job search success, with results shown in Table 3. These factors are ranked as follows: interview preparation, number of publications, and advisor's guidance are among the three most important elements, followed by networking, reputation of the department, and teaching experience. Consistent with the synthesis of the interviews, grant writing and a strong GPA score are the least important in terms of job search success.

Note that our interviews were conducted between September and December of 2020, when the job market was under severe constraints born by the COVID-19 pandemic. Based on Job Openings for Economists (JOE) listings, there were 1,074 openings listed from August 1, 2020 to January 31, 2021, 26 percent fewer openings than those listed over the same period one year before (1,455). We asked our participants for their advice on how to cope with the significant negative job market shock caused by the COVID-19 pandemic. Their advice centered on the following perspectives. First, a student could work with their advisor to stay in the PhD program for an additional year to strengthen their publication record or consider postdoctoral positions.

**Table 3: Importance of Following Elements to Obtain a Permanent Position in Academia. (Number of Observations: 21)**

Element	Mean (Std. Dev.)
Interview preparation	4.57 (0.68)
Peer-reviewed publications	4.48 (0.81)
Advisor's guidance	4.19 (0.75)
Professional meetings/networking	3.86 (0.65)
Department's rank/reputation	3.71 (0.72)
Teaching experience	3.14 (1.28)
Participate/exposure to grant writing	2.90 (0.77)
Have a near-perfect GPA	2.19 (0.93)

*Note:* Questions were Likert Scale with a 1 indicating "Not at all important" to a 5 indicating "Extremely important." No statistical difference detected for the three highest categories based on the Wilcoxon matched-pairs signed-rank test. Due to the small sample size ( $n = 21$ ), the results reported in Table 3 should be interpreted with caution. An anonymous reviewer mentioned that, based on their opinion and experience, letter of recommendation and department's rank/reputation are critical for job market success, because large amount of noise exists in the job market for junior economists, and these two elements offer clearer signals to potential employers.

They emphasized continuing to work on projects that one is passionate about and enjoys doing, so that the student can be better prepared when the job market rebounds.<sup>10</sup> Second, participants encouraged students to be flexible and keep an open mind, as there are many paths to accomplish what one wants to do. Third, during the pandemic when social distance was the "new normal" and in-person interaction opportunities had been significantly reduced, one could seek new ways to network, such as building a personal website or engaging on social media.

### 3.8 Time Management and Work-Life Balance: The Two Come Hand-in-Hand

Our participants were intentional of their time management. This in part stems from family structure. The majority of our sample balanced family with work: nearly half had a spouse, and a quarter had a spouse and children during their studies. Only a fifth of our participants were single for the major duration of their PhD studies (Table 2). At least at some stage of their PhD study, four of our participants managed their PhD study as a 9am-to-5pm job and were still successful. We find that the advice we received is highly consistent across all our participants, involving planning, organizing, and controlling, some of the basic functions of management.<sup>11</sup> In terms of planning, one participant shared that they followed "SMART" goals: goals that are Specific, Measurable, Achievable, Realistic, and Timely. Another participant suggested that one should avoid the planning fallacy where planning underestimates the time needed to complete a task. For organizing, our participants emphasized that one should protect their most productive time for research and writing, and use their less productive time for less important things (e.g., emails). For controlling, since research and writing need long periods of concentration, our participants suggested that one should minimize interruptions and distractions, such as closing email windows and turning off cell phones.<sup>12</sup> A common piece of advice regarding time management was: "when you go to work, you work." Staying in the office for a long time does not

<sup>10</sup> Fortunately, over August 1, 2021 to January 31, 2022, the job openings listed on JOE was 1,454, only one opening less than that over August 1, 2019 to January 31, 2020.

<sup>11</sup> Robbins and Coulter (2021) provide detailed discussion about four basic functions of management: Planning, organizing, leading, and controlling in their popular textbook, *Management* (15th edition).

<sup>12</sup> For more discussion about improving efficiency at work, we refer readers to Covey (1989) and Newport (2016).

necessarily imply high productivity due to distractions and diminishing returns of additional hours. Finally, one should carefully plan their activities and stick with their plans, with frequent reflection on whether the time is well-spent and evidence of reasonable progress is being made.

Regarding work-life balance, our survey results show that 95 percent of the participants prioritize it, and 57 percent of them prioritize it “a lot” or “very much.” Our participants believe that time management and work-life balance go hand-in-hand. That is, on the one hand, to achieve work-life balance, one must manage time very well; and on the other hand, work-life balance will help reduce stress from PhD study and improve work efficiency. Pertaining to work-life balance and stress management during PhD study, two elements emerged from the responses of our participants: physical exercise and social connections. The advice suggested that one should make sure to carve out time regularly for physical exercise that they enjoy because research work is “a marathon, not a sprint.” It would be even better, as one participant suggested, if one could combine physical exercise together with social connections, such as playing basketball or tennis together with friends. One participant shared,

*“... it’s amazing how better life is when you have somebody that you are complaining about the same thing. ... and having a good cohort will save you a lot of those stressors.”*

One participant also mentioned that PhD students should be mindful of their stress level, and not to hesitate to seek professional help from university health services if feeling that the stress is unmanageable.

### **3.9 Biggest Surprise as a Junior Faculty Member: Grant Writing, Student Advising, and Multitasking in an Unstructured Working Environment**

About half of our participants considered their junior faculty life more stressful than their last two years of their PhD study. Grant writing, graduate student advising, multitasking, and unstructured working environment are the major surprises for our participants when they just transitioned from their PhD or postdoctoral study to new positions (mainly faculty positions). First, only a couple of our participants had grant-writing experience before they started their faculty positions. On the other hand, obtaining extramural grants is becoming increasingly important for faculty members in agricultural economics. Therefore, most of our participants felt unprepared for and stressed by this task at the early stage of their junior faculty position. They wished that they could have accumulated some grant-writing experience during their PhD study. Some of our participants mentioned that working as a co-project investigator (Co-PI) with experienced colleagues on some grant applications is a good way to start. Attending grant-writing workshops is helpful as well.

Second, it is unsurprising that some of our participants viewed graduate student advising as one of their “biggest surprises,” because none of the participants had such experience before they started their faculty positions. One could advise students by reflecting on their own PhD study experience. However, every student is different and what worked for the (new) advisor may not work for the students. One of our participants suggested that, just like accumulating grant-writing experience for a junior faculty member, one could co-advise a student with a more experienced colleague to gain experience. Moreover, we hope that this article’s “Mentorship” section may help new advisors.<sup>13</sup>

Third, when compared with a PhD student whose key task is a dissertation, a faculty member may constantly find him or herself in a place where, in the words of one respondent, “so many things from all directions need your attention.” In addition to research, a faculty member has responsibilities for teaching, advising, outreach or extension, grant writing, and service. This is perhaps why some of our participants noted that the sharp increase in the number of responsibilities and time demands was the biggest surprise to them. As a result, time management becomes even more critical for a faculty member than for a PhD student.

<sup>13</sup> Both Weisbach (2021) and Bellemare (2022) include a chapter on advising in their books.

Fourth, a few of our participants mentioned that the biggest surprise to them as a junior faculty member was their unstructured working environment that came with substantial freedom and independence. For instance, one participant mentioned that in the first few months of their junior faculty career, perhaps nobody in the department noticed that they were there. Indeed, together with the extensive responsibilities discussed above, a faculty position also involves a considerable level of freedom and independence, but also can create isolation that a newly minted PhD might find difficult to handle. Faculty can do more to welcome new colleagues into their departments and help them feel less isolated. Likewise, new faculty members can use this time to work on dissertation chapters and get them published, as well as to meet with new colleagues, as suggested by our participants.

## 4 Conclusions

We distilled the experiences shared by 21 SAEA Emerging Scholar Awardees, aiming to provide current and prospective PhD students in agricultural economics with insights and tips for a fruitful early career. Beyond helping PhD students, we believe that this article benefits postdoctoral researchers aiming at faculty positions, junior faculty members who seek a smooth transition, and senior faculty members who are advising PhD students. These insights and tips, especially working with mentors, time management, and working through a research project, can help PhD students in other disciplines or those looking for nonacademic career routes.

As a summary, the experiences of our participants indicate the following. First, one should be intentional and utilize PhD coursework in terms of publications and presentations. Second, when working with their advisors, students should take the initiative to lead the intellectual process and maintain efficient communication with advisors. Third, writing can be difficult for many PhD students, and improving writing takes time and may require help from various sources. A major way to improve writing is to keep on writing and get feedback from advisors, fellow students, or other sources. Fourth, teaching experience is important for the job search, but one has to balance the time devoted to teaching and research. Fifth, time management is key to productivity; one should identify a time management strategy that fits them. Sixth, encouraging work-life balance such as physical exercise and socializing helps manage stress during PhD studies. Finally, the biggest surprises during the transition into faculty positions included grant writing, student advising, multitasking, and an unstructured working environment.

The PhD study experience shared by our participants indicates that graduate programs can improve some aspects to enhance students' professional growth. First, since writing is a hurdle for many PhD students, departments or programs may consider integrating writing into formal training of PhD programs, such as including it in research method courses or a second-year paper. Second, departments can facilitate the match between advisors and students by conducting workshops where both faculty members and students present their research work and interests. Third, exposing advanced PhD students to grant writing and graduate student advising will be helpful for their professional growth.

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**Acknowledgments:** We thank Mohit Anand, Luoye Chen, Lawson Connor, Prasenjit Ghosh, Zhongyuan Liu, Fahd Majeed, Krishna Paudel, Wendiam Sawadgo, Ling Yao, Chengzheng Yu, participants in the focus group conducted at the 2020 SAEA annual meeting, and seminar participants at the 2021 AAEA annual meeting for useful comments. We thank Nabin Bhandari, Brian Cornish, and Erin Matherne for their excellent research assistance. The authors declare that they have no conflicts of interests that relate to the research described in the paper. This research was partially supported by the Alabama Agricultural Experiment Station and the Hatch program of the National Institute of Food and Agriculture, the U.S. Department of Agriculture (Hatch project number: ALA011-1-17002).

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## Teaching and Educational Methods

# Principles of Economics, the *Survivor* Edition

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JEL Codes: A22, B21, B22, D10, E00, F10, P00

Keywords: Alternative teaching styles, economics education, principles of economics, Survivor

### Abstract

This paper builds on an ever-growing literature relating economics to movies, books, and TV shows. *Survivor* is a highly acclaimed reality TV show with 42 aired seasons (so far). We use *Survivor* as a tool that helps with identifying and understanding economic principles and for an application of these principles. This show bridges the generational gap between students and teachers, as its premise, rules, and objectives are either common knowledge or easily accessible to anyone. We present scenes from the show, vocabulary, in-depth discussions, lesson plans, and sample questions that instructors can use in the classroom. This *Survivor* edition offers a fun twist to the classic exposition of principles of economics, hoping to make students more passionate about our field.

## 1 Introduction

In the past 70 years, instructors have been using an increasingly standardized way of teaching introduction to economics courses. Mankiw (2021) notes that the textbooks for these courses have become less mathematical, with a simpler style of writing, and more digital content. We argue that instructors should continue to find opportunities for change and improvement. As Knoedler and Underwood (2003) notice, we have been experiencing a decline in the number of economics majors, as well as overall enrollments in economics in recent decades. Therefore, new ways of teaching newer generations of students could be beneficial (Becker 2000; Becker and Watts 1996, 2001, 2008; Cotti and Johnson 2012). Nevertheless, Watts and Schaur (2011) show that “chalk-and-talk” continues to be the predominant way of teaching, mainly due to the large cost-to-benefit ratios when using alternative teaching styles (Goffe and Kauper 2014). Thankfully, more and more studies present less traditional methods of teaching economics with small cost-to-benefit ratios. For instance, Cotti and Johnson (2012) talk about using historical novels, Miller and Watts (2011) find economic concepts in Dr. Seuss books, Karlan (2017) discusses three economic models using the reality TV show *Survivor*, while Geerling et al. (2018) relate economics to *The Big Bang Theory*. Instructors can also access a plethora of websites that include clips from popular shows and movies, and a description of pedagogical techniques for classroom usage (see, for instance, Ghent, Grant, and Lesica 2011 on *Seinfeld*; Wooten, Staub, and Reilly 2020 on *Modern Family*; Rousu, Smith, and Hackenberry 2022 on *Star Wars*; Wooten and Lynch 2022 on *Superstore*).

In this paper, we introduce some of the most important principles of economics (discussed in section 2), and connect them to the TV show *Survivor*. Section 3 explains how the show works. This description of the show should not take more than five minutes of class time. We present applications of some principles of economics in *Survivor* in section 4. We include lesson plans that add a small component of active (and entertaining) learning in the classroom. Each lesson contains a short YouTube video (less than five minutes long) with a brief summary, or a news article. Our pedagogical design minimizes the cost-to-benefit ratio of adding alternative teaching methods, and it is not aimed to replace standard teaching styles. Our lesson plans can be followed by all instructors and students, regardless of their familiarity with the show. The last section concludes this article.

## 2 The Principles of Economics

Economics textbooks can present the most important principles in an abstract and complex manner, which can create a cognitive overload for students. However, these principles remain vital as they can help in breaking down the most complicated economic problems taught later in the semester into more basic elements. The principles summarized in Table 1 appear in numerous textbooks (both Keynesian and classical).

**Table 1. Overview of Principles and Lessons Examined**

Principle of Economics	Vocabulary	Learning Objectives (LOs)	Videos Length by Lesson	CEE Voluntary National Standards in Economics
Due to scarcity, people face tradeoffs.	Scarcity, tradeoffs.	<i>LO 1:</i> Students will define scarcity. <i>LO 2:</i> Students will recognize that everybody faces tradeoffs due to scarcity.	Lesson 1: 19 m (optional), 1 m, 20 s, 1 m. Lesson 2: 30 s, 25 s.	Scarcity
An opportunity cost represents what one gives up to obtain something else.	Tradeoffs, opportunity costs.	<i>LO 1:</i> Students will define opportunity costs. <i>LO 2:</i> Students will recognize opportunity costs. <i>LO 3:</i> Students will compute opportunity costs.	Lesson 3: 1 m 15 s. Lesson 4: 2 m 9 s.	Opportunity cost
People are rational.	Rationality, economic analysis at the margin, marginal costs, marginal benefits.	<i>LO 1:</i> Students will observe that everybody is rational. <i>LO 2:</i> Students will recognize that people make decisions at the margin. <i>LO 3:</i> Students will analyze economic decisions by comparing marginal costs with marginal benefits.	Lesson 5: 20 m (optional).	Decision-making
Incentives matter.	Incentives, positive incentives (rewards), negative incentives (punishments).	<i>LO 1:</i> Students will correctly identify monetary and nonmonetary incentives. <i>LO 2:</i> Students will recognize that people are motivated by incentives.	Lessons 6 and 7: no video.	Incentives
Trade can make everyone better off.	Trade, benefits vs. costs.	<i>LO 1:</i> Students will identify the costs and benefits of trading. <i>LO 2:</i> Students will observe that trade can be beneficial for all parties involved. <i>LO 3:</i> Students will analyze absolute and comparative advantage.	Lesson 8: 4 m. Lesson 9: 2 m 30 s. Lesson 10: 1 m. Lesson 11: no video.	Trade Benefits of trade and comparative advantage
Producing more goods and services increases a nation’s standard of living.	Standard of living, production of goods and services, productivity, factors of production.	<i>LO 1:</i> Students will identify that the differences in the standard of living between countries are due to different productivities, which leads to different abilities to produce goods and services.	Lesson 12: 21 m (optional), 2 m, 30 s.	Economic growth, productivity, productive resources

### 3 The TV Show *Survivor*

The first season of this very popular TV show aired in 2000 and was shot in Malaysia. The last aired season was season 42 and was shot in Fiji (like all seasons since season 33). Between 16 and 20 players are organized into two to four “tribes,” and marooned on a remote isolated location (we will hereafter call it a “deserted island”), where they must build a new society. In most seasons, players do not know each other previously to coming on the show, though there were a few seasons that brought either returning players, or players with pre-existing relationships. The players need to work with each other to survive on the deserted island, with practically no food, water, or shelter. Instructors can show this quick 1-minute [video](#) in class, describing a simplified version of the show.

During the first part of the show, the tribes compete against each other for “reward” and/or “immunity.” These competitions, called “challenges,” can be physical (involving swimming, running, obstacle courses, etc.), intellectual (for instance, a large variety of puzzles), or a combination of the two. The loser tribe(s) in an immunity challenge go to “tribal council” and anonymously vote one member of their tribe out of the competition.

About halfway through the game, when only about 10 to 12 players are left, there is a merge of these remaining players into one single tribe. From this point on, the players compete individually for immunity. Hence, immunity challenges become individual, and the winner of a particular immunity challenge cannot be voted out at the next tribal council. Most players voted out after the merge become members of a “jury.” When two or three contestants are left (depending on the season), the jury gets to vote the player who managed to “Outwit, Outplay, Outlast” everybody else. This player receives the title of “Sole *Survivor*” and a prize of \$1,000,000.

Due to the “appeal of uncertainty” (Haralovich and Trosset 2004), in time, producers added many twists and turns in the game (such as, but not limited to, hidden immunity idols, tribal switches, multiple eliminations, special powers, etc.).

The first seasons attracted huge ratings (the 1st season’s finale attracted over 50 million viewers). The show decreased in popularity since then (with only about 5 million viewers watching the finale of season 42), but it still has a loyal fan base and receives award nominations.<sup>1</sup> We know that most students do not watch the show. However, we argue that its longevity and online accessibility increase the pedagogical benefit of its use, when compared with other classic models presented in economics textbooks.

Moreover, as Salibian (2012) notes, viewers appreciate its “realism.” The isolated setting, the way the contestants must interact with one another and with their new habitat, and the democratic manner of voting each other out make *Survivor* a great example of a newly formed society (albeit, artificially). This newly created microcosm is “primal, fundamental and unpredictable” (Salibian 2012).

Though this show offers a variety of examples that could be used in a Game Theory course—see, for instance (Karlan 2017) or the 21 Flags challenge on Professor Wooten’s (2014) webpage—this paper proposes illustrations of some of the most important principles of economics taught in introductory classes. By incorporating short clips while using traditional “chalk-and-talk” teaching style, we offer opportunities for increased engagement in the classroom. We recommend that instructors use the examples provided below with high school and college aged students only. Even though *Survivor* is rated TV-PG, many viewers consider that the conversations around camp about sex and alcohol may not be appropriate for elementary school students. Consequently, an elementary school teacher who would like to use these examples should check with their school administration beforehand.

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<sup>1</sup> Instructors and students who want to know more about the show can visit *Survivor*’s main Wikipedia page: [https://en.wikipedia.org/wiki/Survivor\\_\(American\\_TV\\_series\)](https://en.wikipedia.org/wiki/Survivor_(American_TV_series)). Each season has its own Wikipedia page with a detailed description of each episode. CBS also provides details about the show: <https://www.cbs.com/shows/survivor/>.

## 4 The Principles of Economics Explained—*Survivor* Style

This section provides all necessary tools (including lesson plans and links to videos) that instructors can use to explain the principles of economics in *Survivor* style.

### 4.1 Due to Scarcity, People Face Tradeoffs

#### Vocabulary

- Scarcity
- Tradeoffs

#### Learning Objectives

LO 1: Students will define scarcity.

LO 2: Students will recognize that everybody faces tradeoffs due to scarcity.

#### Introduction

Instructors can analyze this principle by looking at the very first season *Survivor: Borneo*. This season has 16 players, organized into two tribes: Pagong and Tagi. After six players are voted off the island, the two tribes merge, and the individual gameplay starts. After each immunity challenge, the winner receives immunity. The tribe (including the winner) votes somebody else out who, subsequently, becomes a member of the jury. When only two players are left, the power shifts to the jury. During one last tribal council, the jury votes who should earn the \$1,000,000 prize and the title of “Sole Survivor.” As this is the first season, there are no twists in the game.

#### Lesson 1: Leisure vs. Work

##### 1a. Instruction

Instructors can ask students to watch the first episode of *Survivor: Borneo* before class, though it is not mandatory. Alternatively, the students can watch this [video](#) (19-minute recap of the season) before class. During class time, the instructor can start the lesson by showing the students the first minute or so of this [video](#). The difference between the two tribes becomes obvious very quickly.

During the creation of these new societies, the tribes need to spend their time wisely between work (building a shelter, gathering food, cooking, boiling their water, etc.) and leisurely activities. Tagi chooses to spend more time working around camp. They have a good shelter and Richard Hatch (the winner of the season) catches fish instead of playing around (the instructor can show a few seconds from the [video](#) in which Richard catches his first fish). Meanwhile, Pagong chooses to focus on leisure. For instance, one day, the entire tribe enjoys a newly discovered mud bath (the first minute of this [clip](#) shows this event). They also spend time flirting with each other, playing games, and fooling around.

##### 1b. Guided Questions

Due to scarce resources (i.e., time), students should recognize the tradeoff between leisure and work in *Survivor*. The instructor can ask them if they face any tradeoffs in their daily lives, including in terms of work and leisure, or study and social life.

## Lesson 2: Voting People Out

### 2a. Instruction

Before the merge, the tribes compete against one another. At the first tribal council, after Tagi loses the immunity challenge, the players face a tradeoff between voting a stronger, but more rough-around-the-edges tribemate (Rudy) and a weaker, but more pleasant member (Sonja). Sonja leaves the competition because most contestants value strength above entertainment. The summary of this vote can be watched [here](#) (the instructor can show up to minute 1:31). As a side note, Rudy reaches the final three and becomes one of the most loved players in *Survivor* history.

Meanwhile, on the other tribe, B.B. is working very hard to build a shelter, while almost everybody else is trying to preserve his or her strength. The Pagong players are looking at tradeoffs from a different perspective: conserving their energy for the challenges versus working for the improvement of their camp. Besides B.B., everybody else believes the former is more important, so B.B. becomes the first person voted off the Pagong tribe. The instructor can show this tradeoff [here](#) (up to minute 3:18).

### 2b. Guided Questions

The students can be asked what they would do if they were in the Tagi tribe. They can vote for Sonja or for Rudy, recognizing the tradeoff for the tribe. The results of the vote can be discussed briefly, as well as the reasons for the vote.

### Assessment

The following questions can be asked at the end of one or both lessons:

1. People face tradeoffs because:
  - a. Resources are limited.
  - b. To get something, you need to give up something else.
  - c. Due to scarcity, people must make choices.
  - d. All of the above**
  
2. Students face a tradeoff between playing or socializing, and studying because:
  - a. Time is limited.**
  - b. Studying is better, so students should only focus on study.
  - c. Socializing is better, so students should only focus on socializing.
  - d. Income is limited.

## **4.2 An Opportunity Cost Represents What One Gives Up to Obtain Something Else**

### Vocabulary

- Tradeoffs
- Opportunity cost

### Learning Objectives

*LO 1:* Students will define opportunity costs.

*LO 2:* Students will recognize opportunity costs.

*LO 3:* Students will compute opportunity costs.

## Introduction

Winning *Survivor* comes with a \$1,000,000 prize. So let us focus on some decisions with an opportunity cost of \$1,000,000.

In 15 out of the 42 seasons broadcasted so far, there are two finalists who battle for the \$1,000,000 prize: the first 12 seasons, as well as *Survivor: Micronesia*, *Survivor: Tocantins*, and *Survivor: Cagayan—Brawn vs. Brains vs. Beauty*. For each of these seasons, when there are three players left in the game, there is a final challenge. The winner secures his or her spot in the final and gets to choose who the second finalist is. In other words, the opportunity cost of choosing the “wrong” opponent is \$1,000,000.

## Lesson 3

### 3a. Instruction

The instructor can show the students the [video](#) (up to minute 38:22) explaining the decision Colby needs to take after winning the final immunity challenge. The scene is from *Survivor: The Australian Outback*, the second season of *Survivor*. Colby must choose between Tina (a lovely mother of two, who masterminded many of the decisions to vote people off without “ruffling any feathers”) and Keith (perceived as arrogant and with poor social skills by other tribe members). Colby finds himself in a situation to choose between philanthropy and strategy.

### 3b. Guided Questions

The instructor can ask the students to vote: Tina or Keith (another tradeoff like the ones presented in section 4.1).

Then, students can find the opportunity cost of their decision. For the students who choose Keith (i.e., strategic), the opportunity cost of their decision is their morals. For the students who choose Tina (i.e., nice), the opportunity cost is \$1,000,000. Students should notice that opportunity costs are not necessarily expressed in money and that they are not limited to monetary and financial costs.

## Lesson 4

### 4a. Instruction

They say that people learn from history. In the end, Colby’s decision in season 2 had a very high opportunity cost. Fast forward to season 28, *Survivor: Cagayan—Brawn vs. Brains vs. Beauty*, and Woo faces a similar decision. Woo needs to choose between Tony and Kass. Tony is a strategic mastermind, a player always on the “right side” of the votes, and always aware of everything around camp. Kass has defected from a coalition and has a blunter personality. The instructor can show a [video](#) from the last tribal council, in which one of the jury members explains how much such a decision costs, while Woo explains why he made it. Karlan (2017) analyzes Woo’s decision in detail and argues that concepts like honor and pride should be included in the utility function, alongside the more traditional consumption of goods and services.

Just like Colby, Woo, a Tae Kwon Do teacher, decides to be loyal to his beliefs and picks Tony (his ally) to go with him.<sup>2</sup> This decision costs him \$1,000,000. However, as he states in later interviews, he values the Tae Kwon Do tenets more than the money. Subsequently, instructors can also use this lesson for the next principle, in which we discuss how people make rational decisions by comparing marginal costs and marginal benefits.

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<sup>2</sup> The philosophical side of Tae Kwon Do instructs its students to follow five tenets: courtesy, integrity, perseverance, self-control, and indomitable spirit.

#### 4b. Guided Questions

The instructor can lead the same discussion as in lesson 3. Furthermore, one can incorporate in the classroom only one of the two lessons provided for this principle.

#### Assessment

The following questions can be asked at the end of one or both lessons:

1. What is the opportunity cost of coming to class today?
  - a. \$1,000,000.
  - b. Sleep, socializing, work, or play.**
  - c. The cost of a 3-credit hours course.
  - d. Zero.
2. People face an opportunity cost when making a decision because:
  1. There are always tradeoffs in life.
  2. Nothing is free.
  3. We always give up something to obtain something else.
  - 4. All of the above.**

### 4.3 People Are Rational

#### Vocabulary

- Rationality
- Economic analysis at the margin
- Marginal costs and marginal benefits

#### Learning Objectives

*LO 1:* Students will observe that everybody is rational.

*LO 2:* Students will recognize that people make decisions at the margin.

*LO 3:* Students will analyze economic decisions by comparing marginal costs with marginal benefits.

#### Introduction

*Survivor* players give interviews before, during (a.k.a. “confessionals”), and after the show. Many contestants declare that their strategy changes all the time (i.e., they think at the margin). They do come into the game with a set strategy, but as Chris, winner of the ninth season *Survivor: Vanuatu*, says in a confessional:

*“In this game, your strategy changes just immediately [...].”*

Sarah, winner of the 34th season *Survivor: Game Changers* has a similar declaration:

*“If you come into this game with a preset plan, you’re doomed.”*

One frequently used pedagogical example of making decisions at the margin is: do you choose to study 24/7 for an exam, or study for 1 more hour, another hour, etc.? Students can understand that we make decisions at the margin, but might have difficulties in accepting that all people are rational. They look at somebody’s “dumb” decision as an “irrational decision.” Therefore, we analyze Erik’s game play as one of the final five contestants of the 16th season *Survivor: Micronesia—Fans vs. Favorites*, considered the dumbest move in *Survivor* history on numerous fan websites.

## Lesson 5

### 5a. Instruction

If the instructor is so inclined, he/she can ask the students to watch episodes 9–12 from *Survivor: Micronesia—Fans vs. Favorites* before class. Another option is for the instructor to summarize these episodes. Six women and four men make it to the merge. After Eliza is voted out, the five remaining women form the Black Widow Brigade, an alliance designed to eliminate the men one by one. In episode 12, Erik is the only male remaining, and he wins immunity. Alexis is voted out, and the final five contestants of the season are revealed: Parvati, Amanda, Cirie, Natalie, and Erik.

The students can watch this [video](#), explaining Erik's move in detail. As the video is almost 20 minutes long, the students should watch it before the lecture and analyze it in class. Alternatively, we provide a summary of the video below.

In the video, Erik once again wins the immunity challenge. However, this time, the women have a plan. After Natalie overhears Erik talking to Cirie about going to the final three without her, she goes to Erik and tries to convince him that, as it stands, he switched his loyalties too often. Therefore, if he wants to redeem himself in front of the jury, he should give her his immunity necklace at the tribal council. This way, he will prove that he is trustworthy. She also convinces him that Amanda will be the next one out. At the tribal, he stupidly gives up his immunity, and the Black Widow Brigade eliminates him. It is very difficult to understand his decision, a decision that, very possibly, cost him \$1,000,000. So why did he do it? Let us analyze if his decision is rational.

### 5b. Guided Questions

The instructor can ask students what makes a decision rational. He/she can guide the students to understand that a rational decision means making the best decision based on marginal costs and marginal benefits, given the available opportunities and information.

Then, the students can determine Erik's marginal costs and marginal benefits. The marginal cost of giving his necklace to Natalie is the possibility of being eliminated. The marginal benefits are redeeming himself, not losing all the jury votes (in case he makes it to the final) and getting the women's approval. In a confessional early in the season, he admits that he finds many of the female players attractive, which might get him in trouble. As it turns out, he was right. Natalie persuades him that taking a big risk will help his game and that all women will vote for Amanda anyway (at the previous tribal council, Amanda had received the majority of the votes, but had saved herself with a hidden immunity idol).

Therefore, Erik analyzes the marginal benefits of his move (jury votes, Natalie liking him, eliminating Amanda) and the marginal costs (getting voted out). With the available information, he perceives his marginal costs as lower than the marginal benefits, so he makes the move. His decision is rational from this point of view, even if, in retrospect, it is dumb. He later tells EW, confirming our point:

*“The crazy thing too, which I realized over the years, is that I don't regret the moment.”<sup>3</sup>*

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<sup>3</sup> Karlan (2017) gives another example of making a rational decision at the margin by discussing how Woo maximized his utility when taking Tony to the final two with him (even though he lost the \$1,000,000 prize as a result) in *Survivor: Cagayan—Brawn vs. Brains vs. Beauty*.

### Assessment

The following question can be asked at the end of the lesson:

1. Is a drug addict who commits a crime to buy their drugs rational?
  - a. No, because doing drugs is dumb.
  - b. **Yes, because their marginal benefits outweigh their marginal costs.**
  - c. Only if it is legal to buy drugs in that state.
  - d. I don't know.

## 4.4 Incentives Matter

### Vocabulary

- Incentives
- Positive incentives (rewards)
- Negative incentives (punishments)

### Learning Objectives

*LO 1:* Students will correctly identify monetary and nonmonetary incentives.

*LO 2:* Students will recognize that people are motivated by incentives.

### Introduction

The game of *Survivor* gives money and other rewards to the contestants, as well as punishments discussed below in lessons 6 and 7, respectively.

## Lesson 6

### 6a. Instruction

In terms of positive incentives, the producers of the show offer contestants a monetary reward for playing the game. The instructor can hand out this [article](#) to the students.

Students already know that the “Sole Survivor” receives a \$1,000,000 prize.<sup>4</sup> In addition, each participant in the series finale (the “Reunion” episode) receives \$10,000, but the exact compensation for everybody else is unknown. Some report that the first person voted off makes \$3,500 and that, the more they stay on the island, the more money they make, with an even bigger reward for jury members. The second and third place make between \$80,000 and \$100,000; *ABC News* (2006) reports, for instance, \$100,000 for the second place, \$85,000 for third, and \$70,000 for fourth during the first season. One *Survivor* player, Corrine Kaplan from *Survivor: Gabon* declared that she won \$45,000 for her seventh place (and “jury duty”; Chichizola 2020). Additionally, players gain notoriety and, if fans and/or producers of other shows like them, they can make additional income in show business, media, books, ads, “Playboy” gigs, and so on. For instance, “Boston Rob” Mariano, a construction worker before *Survivor*, now owns his own production company, later played in *The Amazing Race*, as well as in his own reality show, *Rob and Amber Get Married* (featuring his wife, whom he met on his second season of *Survivor*). Furthermore, one does not have to become the “Sole Survivor” to become a public figure. Elisabeth Hasselbeck, who placed fourth in the second season, *Survivor: The Australian Outback*, appeared as a co-host on the ABC daytime talk show *The View* from 2003 until 2013.

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<sup>4</sup> The only exception is the 40th season of *Survivor: Winners at War*, where the ultimate prize was \$2,000,000.

### 6b. Guided Questions

The producers are trying to offer incentives so that players play as hard as they can in difficult conditions (with no or limited food and water, no shelter, away from family and friends) for as long as they can. Would these positive incentives be enough for the students? The instructor can lead a guided discussion to assess how much would the students be willing to endure to have a chance at winning \$1,000,000.

## Lesson 7

### 7a. Instruction

In terms of negative incentives, the producers reserve their right to forfeit the \$10,000 offered for the season finale participation if any part of the contract is broken. This makes players aware that, for instance, they are not allowed to drop any spoilers. Richard Hatch, the winner of the first season of the show, offers another example of a negative incentive. He failed to declare his *Survivor* winnings with the IRS. Consequently, he was charged and found guilty of tax evasion in January 2006, and served a 51-month prison sentence.

### 7b. Guided Questions

The laws (paying taxes, wearing your seat belt, not drinking alcohol before 21, etc.) are usually enforced with negative incentives. Instructors can ask students if they follow these rules and what the consequences of breaking the law are. Students will notice that the government is very aware of this economic principle.

### Assessment

The following questions can be asked at the end of the lessons:

1. Parenting books state that parents should use positive incentives to encourage good behavior in their children. That means that:
  - a. **Good behavior should be rewarded.**
  - b. Bad behavior should be punished.
  - c. People should not have children because we already have an overcrowding problem.
  - d. Children should be allowed to do whatever they want.
  
2. Most laws are enforced through:
  - a. Positive incentives.
  - b. **Negative incentives.**
  - c. Externalities.
  - d. Prices.

## 4.5 Trade Can Make Everyone Better Off

### Vocabulary

- Trade
- Benefits vs. costs
- Absolute and comparative advantage

### Learning Objectives

LO 1: Students will identify the costs and benefits of trading.

LO 2: Students will observe that trade can be beneficial for all parties involved.

LO 3: Students will analyze absolute and comparative advantage.

### Introduction

Considering that the marooned 16 to 20 players need to organize themselves into a society, they must learn how to interact with one another, including through trade.<sup>5</sup> We provide examples of trades in lessons 8 and 9 below. For instance, in lesson 9, we describe one situation in which one hungry contestant offers another contestant \$40 just to lick her chocolate-covered fingers. Contestants also interact with the producers through confessionals and with Jeff Probst during the challenges, tribal councils, and auctions (and sometimes with other occasions as well).

## Lesson 8

### 8a. Instruction

In the 25th season, *Survivor: Philippines*, the reward challenge in episode 6 ends with a trade. The instructor can show this 4-minute [clip](#) in class.

Three people from each of the two tribes, Tandang and Kalabaw, must push a giant wood ball across a mud field to their goal. The field is slightly similar to a soccer field, and the challenge starts with the ball in the middle and the three members of each tribe at opposite ends of the field, near a goal post. While the members of one team try to push the ball in order to score, the members of the other tribe do everything they can to stop them from scoring. The first tribe to score three goals wins the challenge. The winner tribe receives sandwiches, soup, potato chips, and brownies. The two tribes fight for over an hour with no scored goals. Neither tribe has any more energy to push the ball to the goal. They are all exhausted from the lack of food, as well as the high physical demands of the challenge. At this standstill, Jonathan from Kalabaw proposes a trade. Kalabaw wins the reward (sandwiches, soup, potato chips, and brownies) and gives Tandang all their remaining rice (from camp) in exchange. After some discussion, each of the two tribes vote, and they decide to barter. In this case, barter was the only possible form of trade due to the lack of an actual monetary economy. However, this situation displays the limitations of barter, such as the need of a double coincidence of wants and the indivisibility of certain goods (i.e., the reward provided by the producers).

### 8b. Guided Questions

Students can be divided into two “tribes”: Tandang and Kalabaw. Each tribe should answer the following questions:

- What do we gain from this trade?
- What do we lose from this trade?

For Kalabaw, the reward would bring them the much-needed fuel right now. Furthermore, they are expecting a new merge soon (which comes with a “new” endowment of rice). Jonathan also convinces his tribe that he can catch fish. The members of Tandang would also benefit as it means more rice for them.

The instructor should guide students to compare costs and benefits for the two tribes. The costs of not trading would have been spending all their energy in pushing the ball for even longer. The

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<sup>5</sup> One additional angle (not discussed here) is the usage of trust as a currency in this game (a very scarce currency, with significant value).

benefits for both tribes were conserving their strength and receiving food. One can argue that no better outcome could have come from this situation for any of the two tribes.<sup>6</sup>

## **Lesson 9**

### **9a. Instruction**

An interesting (and funny) example of trade comes from the same Erik, from the 16th season, *Survivor: Micronesia—Fans vs. Favorites*, the very nice, but easily fooled young man, whose “dumb,” but rational decision we discuss in section 4.3 (lesson 5).

The show creators introduced *Survivor* auctions in the second season *Survivor: The Australian Outback*. Due to inefficient market outcomes (not discussed here), the producers have not brought back the auctions since the 28th season, *Survivor: Cagayan—Brawn vs. Brains vs. Beauty*. Most auctions appear after the merge (with one unsuccessful exception in the fifth season *Survivor: Thailand*). Each player is given a set amount of money (\$500), and they go to “Trader Jeff’s” to bid for various items ranging from goods (hamburgers, fries, chocolate, etc.) and services (letter from home, a bath, etc.) to (in later seasons) advantages in the game. On an unrelated note, these auctions also give us great examples of how relative scarcity can drive the price of a good up. For instance, the very first item sold at the *Survivor: The Australian Outback* auction was four Doritos chips and a bowl of salsa, and its price was a whopping \$60, while the second item was a chocolate bar and a bowl of peanut butter sold for \$260. In the 17th season, *Survivor: Gabon*, a complete meal of hamburger and fries cost \$400. How would our students feel about paying \$400 for a Big Mac Combo Meal?

The instructor can show this [video](#) in class (either the entire video, or only from minute 1:13 to minute 3:40). In the video, at the auction in *Survivor: Micronesia—Fans vs. Favorites*, Natalie buys a chocolate cake, but she has only 60 seconds to eat it, and she must share it with three other players. As expected, she chooses her Black Widow alliance. After the minute is up, Erik offers \$40 to Cirie to lick the chocolate cake off her fingers, and she accepts.

### **9b. Guided Questions**

Based on the clip, students can be asked:

- If they were Erik, would they take the trade? What are the costs, and what are the benefits of this trade for Erik?
- If they were Cirie, would they take the trade? What are the costs, and what are the benefits of this trade for Cirie?
- Who gains and who loses from this trade?

## **Lesson 10**

### **10a. Instruction**

Season 8, *Survivor: All-Stars* brought back 18 returning competitors from the previous seasons. Most importantly, it delivered the most beloved *Survivor* alliance of all times, an alliance that evolved into romance, then marriage: “Boston Rob” Mariano and Amber Brkich. This alliance, based on teamwork and complete trust between partners, ends up in the final two, where Amber wins \$1,000,000.

Boston Rob is better at strategy and can be more intimidating, so he has absolute advantage in convincing people to vote his way by being a bully. Meanwhile, Amber is a better social player and is perceived as a sweet person by the other tribe members. While playing more under the radar, she has an absolute advantage in persuading people by charming them. Forming an alliance based on

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<sup>6</sup> In retrospect, neither party was happy after the trade. Jonathan turns out to be a lousy fisherman, while Tandang resented losing a challenge. This situation can lead to a more detailed discussion about losers in trade.

specialization in their respective absolute advantages allows Boston Rob and Amber to play a better game together than if they played an individual game (i.e., being self-sufficient). The beginning of their alliance can be seen in this [video](#) (only the first minute suffices). Though many fans believe Boston Rob should have won the season, there is little doubt that the two would not have ended up in the final two had they not collaborated with one another.

### 10b. Guided Questions

Students can be guided to understand the absolute advantage principle in their own household:

- If most chores are done by their parents, who is better at doing dishes? At mowing the grass? And so on.
- For their own chores, same questions can be applied.
- Students who have roommates (or live with a significant other) can add to the discussion.

## Lesson 11

### 11a. Instruction

Comparative advantage is determined based on the lowest opportunity cost. We can analyze the Boston Rob–Amber alliance from this point of view.

As mentioned in lesson 10, Boston Rob has higher returns with his bullying, while Amber produces more by being charming. Now let us analyze the opportunity costs for the two players using each of the two strategies. For Boston Rob, being pleasant would involve much more effort than being intimidating, due to his personality. Therefore, for him, the opportunity cost of being nice is higher than the opportunity cost of being a bully. Therefore, he has a comparative advantage in being a bully. For Amber, the opposite is true. Therefore, she has a comparative advantage in being charming. They each specialize in the skill that entails the lowest opportunity cost, trade information and strategy with one another and “Outwit, Outplay, Outlast” the competition.

### 11b. Guided Questions

Students can be guided to understand who has comparative advantage in what in their own household:

- If most chores are done by their parents, who does the dishes? Why? What is the opportunity cost for this person if he/she chooses to do something else (like mowing the grass)?
- If many chores are done by themselves and their siblings, same questions can be applied.
- Students who have roommates (or live with a significant other) can discuss the same things.

### Assessment

The following question can be asked at the end of the lesson:

1. People trade with one another because:
  - a. It is better not to trade because one party always loses.
  - b. It is better not to trade because one party always gains more than the other party.
  - c. Trade can provide benefits for everybody involved.**
  - d. None of the above.
2. Absolute advantage means:
  - a. One party is better at something.**
  - b. One party is worse at something.
  - c. One party is more efficient at something.
  - d. One party is less efficient at something.

3. Comparative advantage means:
  - a. One party is better at something.
  - b. One party is worse at something.
  - c. **One party is more efficient at something.**
  - d. One party is less efficient at something.

## 4.6 Producing More Goods and Services Increases a Nation's Standard of Living

### Vocabulary

- Standard of living
- Production of goods and services
- Productivity
- Factors of production

### Learning Objectives

*LO 1:* Students will identify that the differences in the standard of living between countries are due to different productivities, which leads to different abilities to produce goods and services.

### Introduction

For this principle, we choose to focus on one of the (if not the) worst tribes in *Survivor* history: the Ulong tribe in the 10th season, *Survivor: Palau*. Ulong starts with nine players: all young, athletic, and strong. From the outside, they appear to be the stronger tribe. During this season, the contestants start with no initial endowment of food or water, hence relying only on what nature provides, and what they can gain in the reward challenges (assuming that they win these reward challenges).

## Lesson 12

### 12a. Instruction

Students can be encouraged to watch this [video](#) covering the entire history of Ulong before class. Alternatively, they can watch [this short clip](#) in class (ending at minute 4:06).

Ulong starts by losing the first immunity and reward challenge and, with that, not only one person from the labor force (as somebody must be voted out), but also fire supplies, which make getting drinking water and cooking impossible. (After all, as Jeff Probst says at every tribal council: “Fire in this game represents life.”) They do win the next reward challenge on day 4, earning them fire, fishing gear, and water. However, the drama continues as they lose all subsequent immunity challenges and only win three reward challenges (with only that first one being of any value). Ulong’s inability to increase their standard of living is due to multiple factors.

The first problem is their disorganized way of leading camp life. Besides one player, Bobby Jon, castaways are not inclined to do anything around camp. Most of them sunbathe or flirt with each other (essentially taking themselves “out of the labor force”). Secondly, they run the challenges the same way they manage their camp life. At one tribal council, Jeff Probst points out how two players underperformed during the challenge by wasting time with fixing their clothes instead of doing the challenge (this challenge can be watched [here](#)—ends at minute 16:19). Thirdly, losing challenges reduces their already small “labor force,” as they need to vote somebody out approximately once every three days. One of their physically strongest members also suffers an unfortunate accident by stepping on a stray coconut, which renders him “out of the labor force.”

### 12b. Guided Questions

Students can be guided to understand that a nation's standard of living is based on its ability to produce goods and services. The higher the productivity, the better off a nation is. A nation can increase their productivity by increasing and/or improving their factors of production: labor, capital, and land. In *Survivor*, the land is a given.<sup>7</sup> The castaways in the Ulong tribe have a continuously decreasing labor force (on day 22, Ulong has one member left, Stephenie, who is "absorbed" by the other tribe). Their lacking work ethic also decreases their potential productivity. In terms of capital, they do not win many reward challenges (in one challenge, for instance, the other tribe wins a whole shelter built by professional construction workers) and fail to use their fishing gear efficiently. Without any intervention from the outside world (i.e., the producers of the show) and without any properly enforced institutions (i.e., a governance system to impose rules on how things should be done around camp and in challenges<sup>8</sup>), the cycle of "poverty" continues unhinged, and the tribe eventually implodes.

### Assessment

The following questions can be asked at the end of the lesson:

1. The factors of production:
  - a. Labor.
  - b. Capital.
  - c. Land.
  - d. All of the above.**
  
2. To produce more, a nation can increase its productivity through:
  - a. More/better quality labor.
  - b. More/better quality capital.
  - c. More/better quality land.
  - d. All of the above.**

## 5 Conclusions

Allgood, Walstad, and Siegfried (2015) note that teaching principles of economics courses is the most important instructional contribution that economics professors have in educating today's students. These courses represent a major recruiting tool for majors (Jones et al. 2009 report that 52 percent of majors selected economics because they did well in these early courses), and they offer a good foundation for other majors (such as business, political science, etc.). Instructors interested in keeping their students more actively engaged might choose to add alternative methods of teaching.

We offer such an addition to the principles of economics textbooks. We include vocabulary that any student in economics should know. We also provide details on how to use scenes from *Survivor* to teach various principles of economics, as well as in-depth discussions and lesson plans on how to use these scenes in or outside the classroom.

Even though our goal is to present principles taught in introductory economics classes, instructors in other economic fields can investigate a variety of topics in the same context. For instance, Karlan (2017) applies *Survivor* to game theory. Furthermore, in some seasons, during reward challenges, tribes can win chickens, or must choose between fishing gear and comfort items. These instances can be discussed in the context of agricultural economics. The examples can continue with many other

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<sup>7</sup> This can provide an opportunity to discuss that economic models oftentimes make assumptions to simplify a very complex world. In many such models, land is considered an exogenous factor.

<sup>8</sup> One of the tribe members, James, calls their system a "democracy," though it resembles an anarchy more.

economics areas such the impact of informal institutions on economic development, or the role of asymmetric information in decision-making.

People might perceive *Survivor* as merely a TV show, but economists can see it as a simplified version of the world, a Robinson Crusoe economy with more individuals, hence more opportunities for interaction, trade, decision-making, and so on. Clips from the show are widely available on the internet, so instructors can easily use the lessons provided in this paper. Alternatively, they can analyze thoroughly only one season throughout the semester. The economic topics provided in the show are abundant and can keep the students engaged in both smaller and larger classrooms setups, while maximizing information retention.

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5(2) doi: 10.22004/ag.econ.333523

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**Case Study****Market Power in the U.S. Dairy Industry**Yuliya V. Bolotova<sup>a</sup><sup>a</sup>*Iowa State University*

JEL Codes: L1, L2, L4, Q13

Keywords: Antitrust, Capper-Volstead Act, dairy cooperatives, seller market power, supply management, Sherman Act

**Abstract**

The motivations for this case study are developments in the U.S. dairy industry involving implementation of a herd retirement (HR) program by the National Milk Producers Federation (NMPF) and the Cooperatives Working Together (CWT) in the period from 2003 to 2010. This program was part of a broader private supply management initiative, which aimed to balance milk supply and milk demand and to stabilize and strengthen milk prices received by dairy farmers. The HR program, which intended to decrease milk supply, raised legal issues leading to antitrust lawsuits filed by buyers of manufactured dairy products against dairy cooperatives. These buyers argued that the HR program was a form of illegal conspiracy aiming to increase prices for raw milk and manufactured dairy products. The lawsuits resulted in large settlements. This case study introduces economic, business, and legal issues related to implementation of the HR program. The case study presents a theoretical framework that may explain market and price effects of the HR program using the perspectives of dairy farmers and buyers of raw milk and manufactured dairy products. In addition, the case study presents a basic market and price analysis based on publicly available data reported by the U.S. Department of Agriculture. The case study is suitable for a variety of undergraduate and graduate courses taught in agricultural economics and agribusiness programs, as well as extension and outreach audiences. A teaching note includes teaching guidance, as well as answers to discussion and multiple-choice questions.

**1 Introduction**

The motivations for this case study are developments in the U.S. dairy industry involving implementation of a herd retirement (HR) program by the National Milk Producers Federation (NMPF) and the Cooperatives Working Together (CWT) in the period from 2003 to 2010. This program was part of a broader private supply management initiative (CWT program), which aimed to balance milk supply and milk demand and to stabilize and strengthen milk prices received by dairy farmers. The CWT program, in addition to the HR program, included an export assistance program (2003–present). The HR program was used to control milk supply by removing from production the entire milking herds of selected dairy farmers. The export assistance program has been used to help dairy farmers expand foreign markets for manufactured dairy products by allocating subsidies to participating dairy cooperatives on export of selected products (cheese, butter, etc.).

In 2011, buyers of fluid milk and other fresh milk products<sup>1</sup> at the retail level (indirect purchasers) and in 2015 buyers of raw milk, cheese, and butter at the wholesale level, who purchased these products directly from dairy cooperatives (direct purchasers), filed class action antitrust lawsuits against NMPF, CWT, and a group of dairy cooperatives: Agri-Mark, Inc., Dairy Farmers of America, Inc., Dairy Lea Cooperative Inc., and Land O'Lakes, Inc. In their complaints filed in the court, these buyers alleged that by implementing the HR program the cooperatives engaged in an unlawful conspiracy to

<sup>1</sup> Fluid milk products include “beverage” milk (whole milk, reduced fat milk, one percent milk, etc.). Other fresh milk products include cottage cheese, cream cheese, cream, half-and-half, sour cream, and yogurt.

limit the production of raw milk to achieve short-run and long-run increases in the wholesale prices of raw milk, cheese, and butter and in the retail prices of fluid milk and other fresh milk products.<sup>2</sup>

The buyers argued that the HR program was not within the scope of Capper-Volstead Act (1922) immunity and consequently violated Section 1 of the Sherman Act (1890) and the state antitrust laws.<sup>3</sup> The cooperatives settled the lawsuit with indirect buyers in 2016 for \$52 million (Hagens Berman 2018; Fresh Milk Products Antitrust Litigation 2022). The cooperatives settled the lawsuit with direct buyers of cheese and butter in 2019 for \$220 million (Fu 2019; Butter and Cheese Class Action 2022). In their settlement agreements, the cooperatives did not admit to any wrongdoing.

This case study introduces economic, business, and legal issues related to implementation of the HR program. The case study presents a theoretical framework that may explain market and price effects of the HR program (conduct and performance of the dairy industry) using the perspectives of dairy farmers and buyers of raw milk and manufactured dairy products. In addition, the case study presents a basic market and price analysis based on publicly available data reported by the U.S. Department of Agriculture.

The case study is suitable for a variety of undergraduate and graduate courses taught in agricultural economics and agribusiness programs, including agricultural marketing, agricultural markets and prices, and applied industrial organization. Table 1 summarizes student learning objectives.

**Table 1. Student Learning Objectives.**

<b>Student Learning Objective (SLO)</b>	
SLO #1	Students should be able to discuss the U.S. dairy industry’s institutional environment at the end of the last century that might have led to an idea of a private supply management program (HR program).
SLO #2	Students should be able to explain the objectives and implementation procedure of the HR program, as well as the role of dairy cooperatives in implementing this program.
SLO #3	Using a graphical analysis, students should be able to explain two variations of the theoretical framework that may explain market and price effects of the HR program using the perspective of dairy farmers and the perspective of buyers of raw milk and manufactured dairy products.
SLO #4	Students should be able to conduct a basic market and price analysis, as well as a dairy farm profitability analysis using the U.S. Department of Agriculture data for the period of the HR program and the periods before and after the program to evaluate possible effects of this program.
SLO #5	Students should be able to discuss the role of the Capper-Volstead Act, as a limited antitrust immunity to the Sherman Act, in regulating collective agricultural marketing activities of dairy farmers in the analyzed situation.

<sup>2</sup> Figure A1.1 presented in Appendix 1 depicts the dairy product supply chain.

<sup>3</sup> The Clayton Act (1914), a Federal law, allows direct purchasers of cartelized products to recover treble damages for violations of the Sherman Act. Indirect purchasers of cartelized products are allowed to recover damages under the state antitrust statutes in the states where these statutes exist (Hovenkamp 2005). The state antitrust statutes exist in approximately half of the states. The state “antitrust statutes” may include antitrust laws, restraint of trade laws, and consumer protection laws.

## 2 The U.S. Dairy Industry Institutional Environment and Economic Forces Leading to a Private Supply Management Initiative

The competitiveness of the U.S. dairy industry depends on the economically viable domestic production and profitability of individual dairy farmers. During the last two decades of the last century, the institutional environment of the U.S. dairy industry changed, which affected milk prices received by dairy farmers and dairy farm profitability. Changes in the institutional environment affected strategic decisions of the dairy industry, in particular programs implemented by dairy cooperatives. Dairy cooperatives representing individual dairy farmers have historically been involved in milk marketing and dairy product manufacturing in the United States (Ling 2011, 2012, 2014).

During the last century, there was a significant degree of Federal government intervention in dairy industry pricing and marketing, mostly in terms of price supports and associated government purchases of manufactured dairy products (Manchester and Blayney 1997, 2001; Shields 2010). The milk price support provided a price floor on the level of milk prices received by dairy farmers, which guaranteed a satisfactory milk price level and milk price stability, which consequently ensured a viable profitability level for dairy farmers. Dairy product prices in international markets were below the U.S. dairy product prices, which limited export opportunities for the U.S. dairy industry during that period.

In the 1980s, the Federal government intervention in the dairy industry pricing began to decrease (Manchester and Blayney 1997, 2001; Brown et al. 2010). In particular, the level of dairy (milk) price support declined. Milk oversupply problem became obvious, when the government purchases of manufactured dairy products were substantially decreased as a result of a decline in the dairy (milk) price support level. At the same time, milk productivity per cow continued increasing due to the improvements in animal genetics and production management practices.

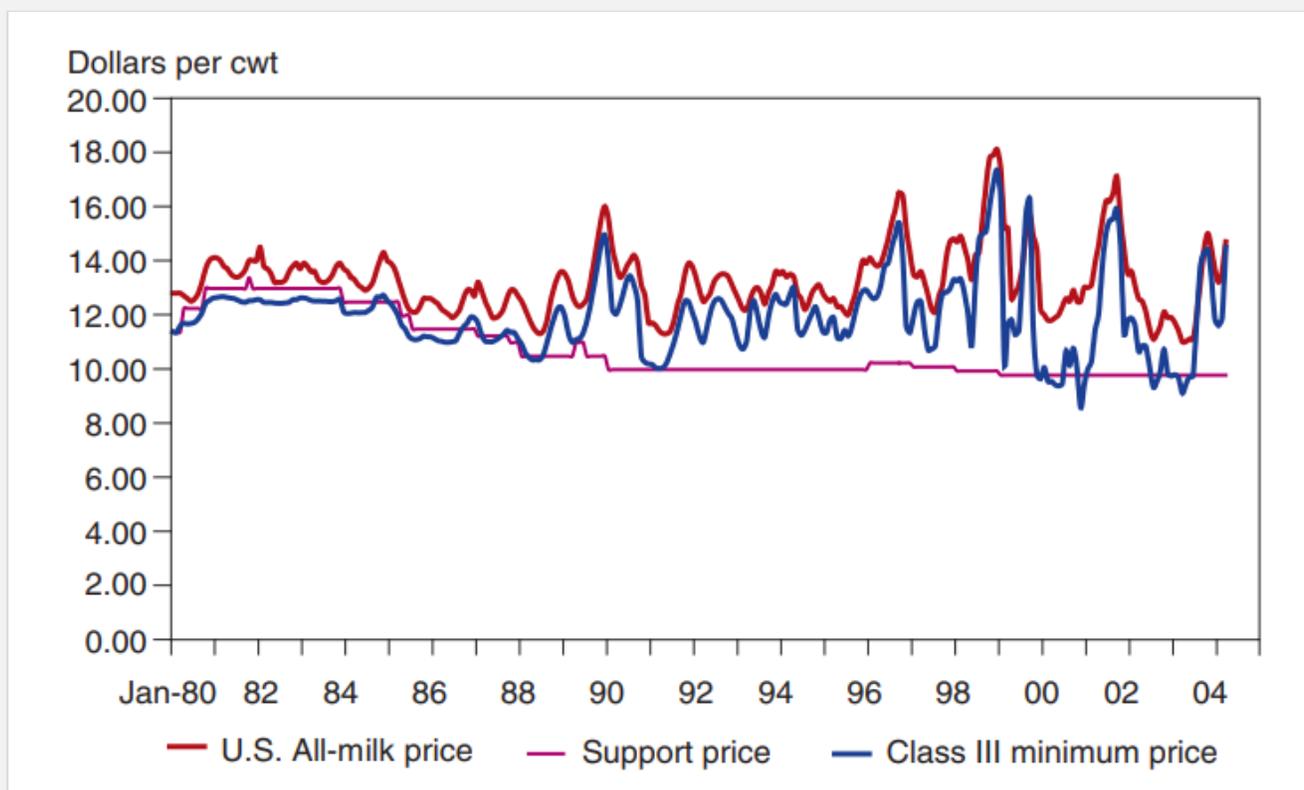
In the 1980s, two Federal government-sponsored voluntary supply management programs were implemented in the U.S. dairy industry. The overall objective of these programs was to strengthen and stabilize farm-level milk prices by controlling milk supply (Gale 1990; Dixon, Susanto, and Berry 1991; Brown et al. 2010). The Milk Diversion Program was implemented in 1984, and the Dairy Termination Program (herd buyout) was implemented in 1986 and 1987. The U.S. Congress authorized these programs, and they were funded partially through the dairy producer assessments and partially through the government funds. Under the Milk Diversion Program, dairy farmers who committed to decrease their milk quantity marketed by 5 to 30 percent were paid \$10 per hundredweight (cwt)<sup>4</sup> of milk on the reduced milk quantity. Under the Dairy Termination Program, the U.S. Department of Agriculture accepted bids from dairy farmers who committed to slaughter or export all female dairy cattle and not to re-enter the dairy industry for at least 5 years. After the implementation of both programs, the milk supply continued to increase.

Increased globalization and reduced trade barriers in the early 1990s created export opportunities for the U.S. dairy cooperatives (Liebrand and Spatz 1993; Seipel and Heffernan 1997; Kennedy 2006). As a result of the international trade liberalization (WTO/GATT Uruguay Round) affecting many agricultural markets, the U.S. dairy product prices came closer to international prices for these products, which created incentives for the U.S. dairy industry to explore export opportunities. At the same time, the U.S. dairy industry began being affected by price fluctuations taking place in international dairy markets.

This complex interaction of economic and policy forces affected the level and volatility of milk prices received by dairy farmers. The milk price volatility began to increase when milk prices started rising above the milk price support level beginning in the 1990s (Figure 1). Coupled with the increasing level and volatility of prices for agricultural inputs used in milk production (in particular, feed and energy), the increasing milk price volatility adversely affected the profitability of many dairy farmers.

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<sup>4</sup> "Cwt" is one hundredweight (100 pounds).



**Figure 1. U.S. All-Milk, Class III Milk, and Support Prices, 1980–2004**

*Source:* This figure is from U.S. Department of Agriculture, Economic Research Service (2004).

The problem that the U.S. dairy industry was faced with at the beginning of this century was to determine the strategies that would help effectively balance milk supply and demand, to achieve a satisfactory level of milk prices and milk price stability. In 2003, the NMPF and CWT developed and began implementing a private supply management program.

### 3 CWT and HR Program

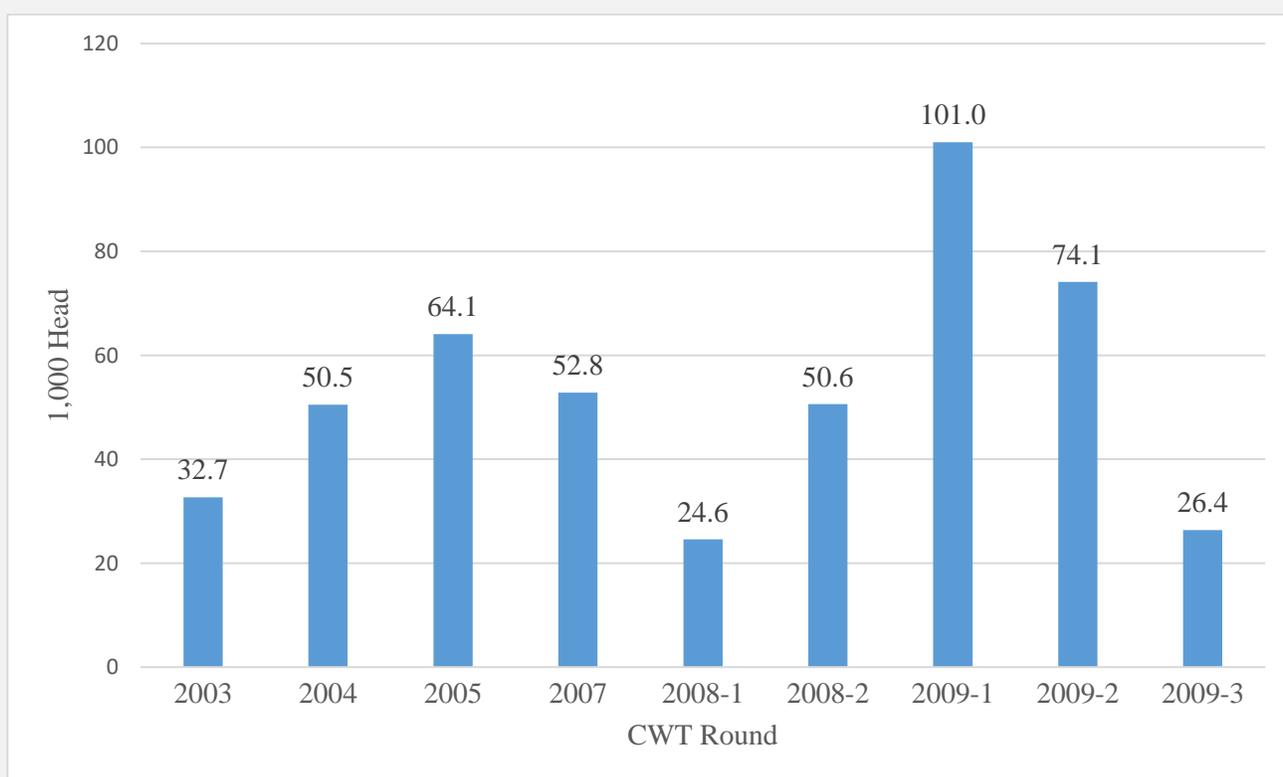
CWT is a voluntary, marketing-focused program that is managed by the NMPF, a trade association of dairy cooperatives (Brown et al. 2010; CWT 2022). The CWT program is funded by assessments paid by participating dairy cooperatives and individual dairy farmers. The CWT program operates in accordance with the Capper-Volstead Act. There has not been any government participation or assistance involved in this program.

The CWT supply management program, originally developed in 2003, included the HR program (2003–2010) and an export assistance program (2003–present; Siebert and Lyford 2009; Brown et al. 2010). The participation of dairy farmers is on a voluntary basis. Dairy farmers participating in the CWT program have marketed on average 67 to 74 percent of the national milk supply (Brown et al. 2010). The CWT program has been funded by assessments of participating dairy farmers. The assessment introduced in July 2003 was \$0.05 per cwt of milk produced. The assessment was increased to \$0.10 per cwt of milk produced in July 2006. Approximately 90 percent of all funds were allocated to the HR program.

The objective of the HR program was to control milk supply by removing from production the entire milking herds of selected dairy farmers.<sup>5</sup> The HR program was implemented in the period from 2003 to 2010. During this period, CWT held ten HR rounds. To decide on whether to conduct an HR round, CWT used guidelines, which included an analysis of economic indicators such as all-milk price, milk production costs, milk-feed price ratio, and milk cow inventories. During each HR round, participating dairy farmers had to submit their bids on how much money they were willing to accept to slaughter their entire milking herds. The dairy farmers, which bids were accepted by CWT, had to slaughter their milking herds within 15 days after the audit process of their production was completed.

The audit focused on comparing the current year’s milk production to the previous year’s milk production to verify that there were no significant changes in the milk production attributed to the herd retiring. After the audit was completed, cows were CWT tagged, and the dairy farmers were responsible for sending these cows to slaughter within 15 days. Once the tags were returned to CWT, the dairy farmers received their checks. Originally, dairy farmers who retired their milking herds were not prohibited from re-entering dairy farming. The requirement of not to re-enter dairy farming within 12 months to receive a full payment was introduced in 2009 (Brown et al. 2010). In particular, the dairy farmers received 90 percent of their bids when they were accepted. The dairy farmers received the remaining 10 percent of their bids and interest after 12 months, when it was verified that these farmers and their dairy operations stayed out of milk production.

Figure 2 summarizes data on the HR levels during the first nine rounds (2003–2009; Brown et al.



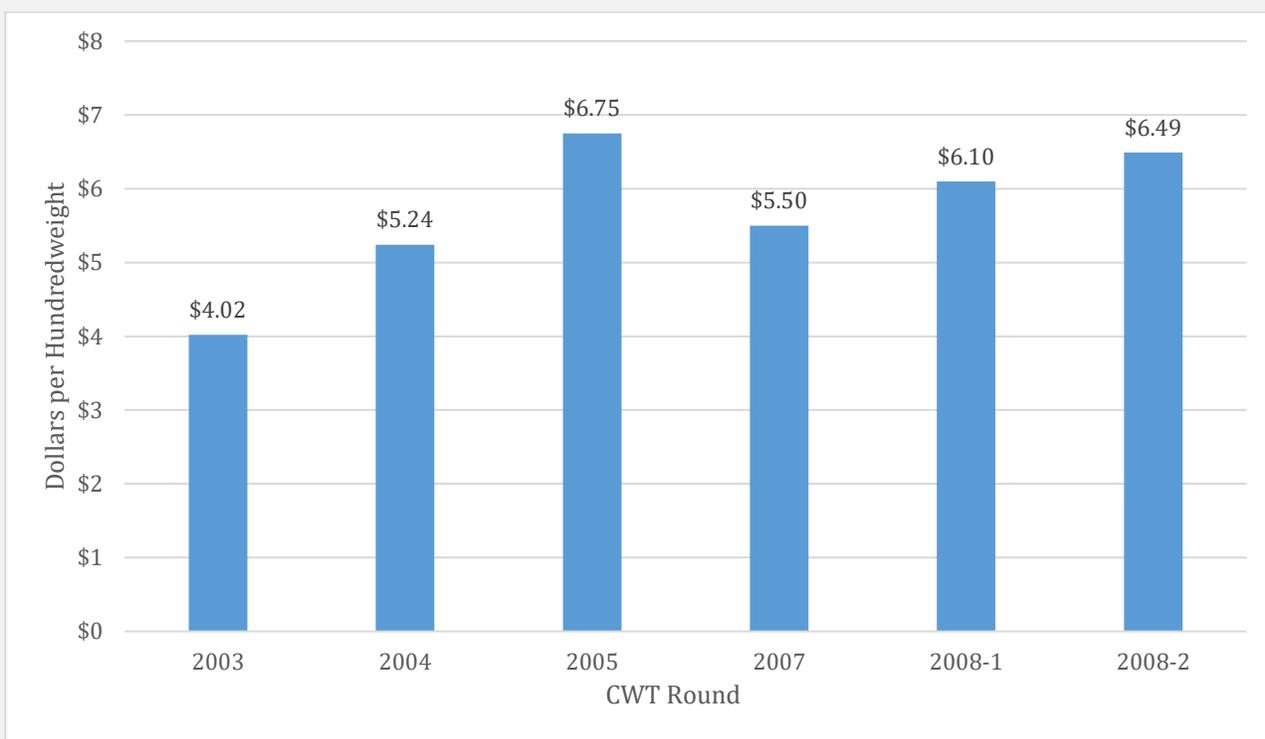
**Figure 2. CWT HR Levels**

Source: The data depicted in this figure are from Brown et al. (2010).

<sup>5</sup> A detailed discussion of the HR program is presented in the complaints filed by the buyers of raw milk and manufactured dairy products at the wholesale level: Edwards et al. v. National Milk Producers Federation et al. (2014) and by the buyers of fluid milk and fresh milk products at the retail level: First Impressions Salon, Inc., et al. v. National Milk Producers Federation, et al. (2015). The CWT program is also discussed in Siebert and Lyford (2009), Brown et al. (2010), and newsletters available on the webpage of the CWT (2022).

2010). One HR round was conducted in 2003, 2004, 2005, and 2007. Two HR rounds were conducted in 2008. Three HR rounds were conducted in 2009. The number of cows retired in each round ranged from 24,600 heads in the first round in 2008 to 101,000 heads in the first round in 2009. The smallest number of cows were retired in 2003 (32,700 heads during one round). The largest number of cows were retired in 2009 (201,500 heads during three rounds).

As a result of the nine rounds depicted in Figure 2, approximately 476,800 cows were removed from milk production. The combined effect of these HR rounds on the U.S. all-milk price in 2009 was over \$1.50 per cwt of milk (Brown et al. 2010). Figure 3 summarizes the bids that selected dairy farmers accepted to retire their milking herds during the first six rounds of the HR program (2003–2008; Brown et al. 2010). The average bid per round ranged from \$4.02 per cwt of milk in 2003 to \$6.75 per cwt of milk in 2005.



**Figure 3. CWT HR Average Bids**

Source: The data depicted in this figure are from Brown et al. (2010).

According to the complaint filed by the buyers of cheese and butter in the court,<sup>6</sup> as a result of ten HR rounds (2003–2010), 2,802 dairy farms retired their milking herds, 506,921 cows were removed from production, and milk supply was reduced by 9.672 billion pounds of milk. In addition, the effect of the HR program on the U.S. all-milk price was \$0.05 per cwt in 2003, \$0.16 per cwt in 2004, \$0.44 per cwt in 2005, \$0.55 per cwt in 2006, \$0.62 per cwt in 2007, and \$0.57 per cwt in 2008.

Since 2011, the entire focus of the CWT program has shifted to export assistance. The objective of the export assistance program is to help dairy farmers expand foreign markets for manufactured dairy products by allocating subsidies to participating dairy cooperatives on export of selected products. In the period from 2003 to 2009, butter and cheese were the products subject to CWT export assistance. Beginning in 2010, the product list was expanded to include whole milk powder.

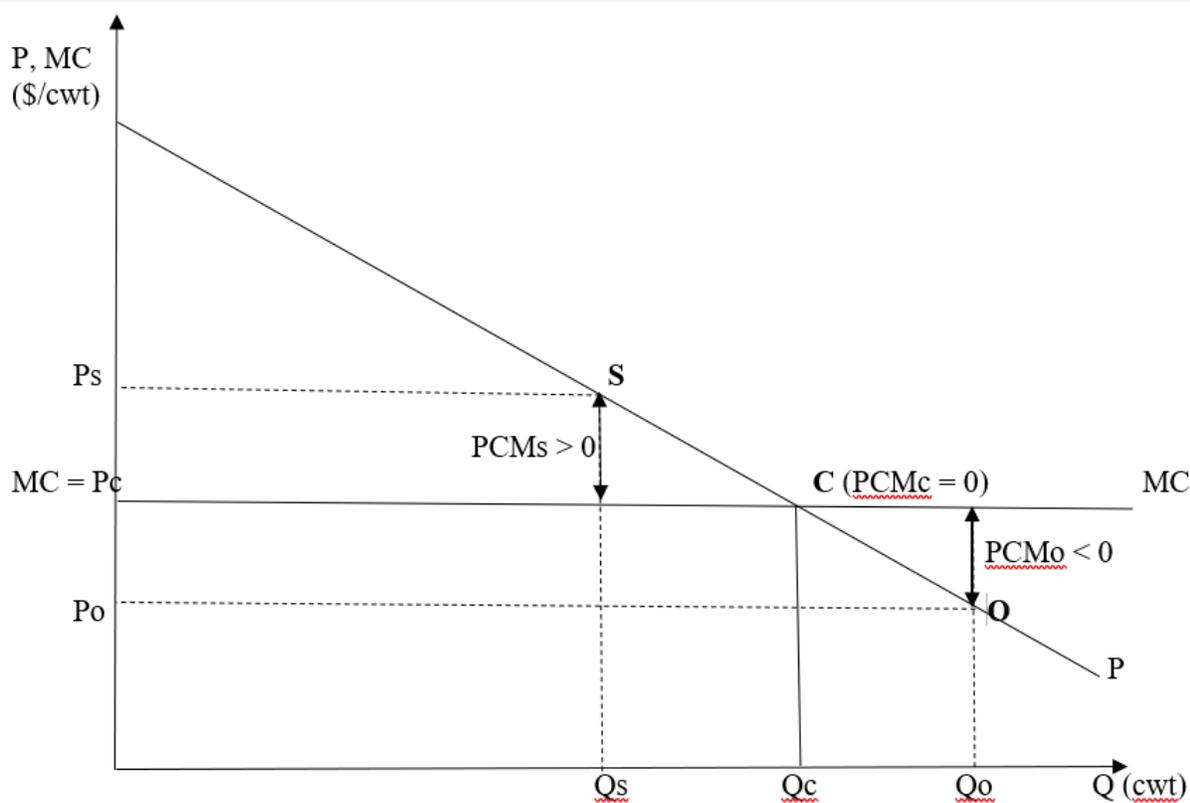
<sup>6</sup> First Impressions Salon, Inc., et al. v. National Milk Producers Federation, et al. (2015).

## 4 Market and Price Effects of the HR Program: Theoretical Framework

This section presents two variations of the same theoretical framework that may explain conduct and performance of the dairy industry (market and price effects of the HR program) using the perspective of dairy farmers and the perspective of buyers of raw milk and manufactured dairy products.

### 4.1 Perspective of Dairy Farmers

Figure 4 depicts a wholesale demand curve for raw farm milk (labeled as “P”) and a constant marginal cost curve (labeled as “MC”). The wholesale demand curve is a graphical representation of a price-dependent (inverse) demand function for raw farm milk, and the MC curve is a graphical representation of a constant MC function. In addition, this figure depicts three market scenarios differing due to total milk quantity produced by all dairy farmers each year (Q), milk price received by dairy farmers (P), and industry profit measured using a Price-Cost Margin (PCM). These are a milk oversupply scenario ( $Q_o$  and  $P_o$ ), a perfectly competitive industry scenario ( $Q_c$  and  $P_c$ ), and a small degree of seller market power scenario ( $Q_s$  and  $P_s$ )<sup>7</sup>. The MC of producing milk is the same in the three scenarios. Table 2 compares milk price-quantity combinations and profit for these scenarios.<sup>8</sup> These three scenarios can be thought of as three different years.



**Figure 4. Alternative Market Scenarios for the U.S. Dairy Industry**

*Note:* Point O at  $Q_o$  and  $P_o$  is a milk oversupply scenario. Point C at  $Q_c$  and  $P_c$  is a perfectly competitive industry scenario. Point S at  $Q_s$  and  $P_s$  is a small degree of seller market power scenario.

<sup>7</sup> This theoretical framework, as applied to all agricultural industries, is discussed in greater detail in Bolotova (2019).

<sup>8</sup> Marginal cost of producing milk is assumed to be the same in the three scenarios to isolate the effect of seller market power of the dairy industry due to a reduction in milk quantity, for example, due to the HR program. Theoretically, higher milk prices may be due to the seller market power and also due to higher milk production costs.

**Table 2. Alternative Market Scenarios for the U.S. Dairy Industry.**

Scenario	Price and quantity depicted in Figure 4 <sup>a</sup>	Comparison of scenarios' prices and quantities	Profit
Perfect competition	Scenario C: Q <sub>c</sub> and P <sub>c</sub>	P <sub>c</sub> = MC	PCM <sub>c</sub> = P <sub>c</sub> – MC = 0 Zero profit for the industry and firms.
Milk oversupply	Scenario O: Q <sub>o</sub> and P <sub>o</sub>	Q <sub>o</sub> > Q <sub>c</sub> P <sub>o</sub> < MC	PCM <sub>o</sub> = P <sub>o</sub> – MC < 0 PCM <sub>o</sub> < PCM <sub>c</sub> Loss for the industry and firms.
A small degree of seller market power	Scenario S: Q <sub>s</sub> and P <sub>s</sub>	Q <sub>s</sub> < Q <sub>c</sub> P <sub>s</sub> > MC	PCM <sub>s</sub> = P <sub>s</sub> – MC > 0 PCM <sub>s</sub> > PCM <sub>c</sub> Profit for the industry and firms.

<sup>a</sup> Q (cwt), P (\$ per cwt), MC (\$ per cwt), and PCM (\$ per cwt) are quantity, price, marginal cost, and price-cost margin, respectively. Subscripts “c,” “o,” and “s,” denote a perfectly competitive industry scenario, a milk oversupply scenario, and a small degree of seller market power scenario.

In a perfectly competitive industry scenario, the dairy industry (all dairy farmers in the country) produces milk quantity (Q<sub>c</sub>) at which milk price received by dairy farmers (P<sub>c</sub>) is equal to the MC of producing milk, and profit is equal to zero (PCM<sub>c</sub> = 0).<sup>9</sup> In the milk oversupply scenario, dairy farmers produce milk quantity (Q<sub>o</sub>), which is larger than milk quantity in a perfectly competitive industry scenario (Q<sub>c</sub>), as a result milk price (P<sub>o</sub>) is below MC, and the industry profit is negative (PCM<sub>o</sub> = P<sub>o</sub> – MC < 0); dairy farmers incur losses. In the scenario with a small degree of seller market power, dairy farmers produce milk quantity (Q<sub>s</sub>), which is smaller than milk quantity in a perfectly competitive industry scenario (Q<sub>c</sub>), as a result milk price (P<sub>s</sub>) is above MC, and the industry profit is positive (PCM<sub>s</sub> = P<sub>s</sub> – MC > 0).

According to this theoretical framework, a decrease in the total milk quantity produced increases milk price and industry profit. This theoretical framework illustrates the rationale for implementing the HR program and its market and price effects. In the period prior to the HR program (the pre-HR period), the dairy industry experienced a milk oversupply (overproduction). The expected effect of the HR program is for the total milk quantity produced to decrease due to a decrease in the milk cow inventory, which consequently would increase milk prices received by dairy farmers, decrease loss, and possibly allow to make profit. By implementing the HR program, the dairy industry exercises seller market power: a decrease in total milk quantity causes milk price and industry profit to increase.<sup>10</sup>

Theoretically, due to the HR program, the dairy industry may move from a milk oversupply scenario to a perfectly competitive industry scenario, and possibly to a small degree of seller market power scenario. However, depending on the actual reduction in milk quantity in the HR program period (HR period), the dairy industry may remain in the milk oversupply scenario where milk price, although

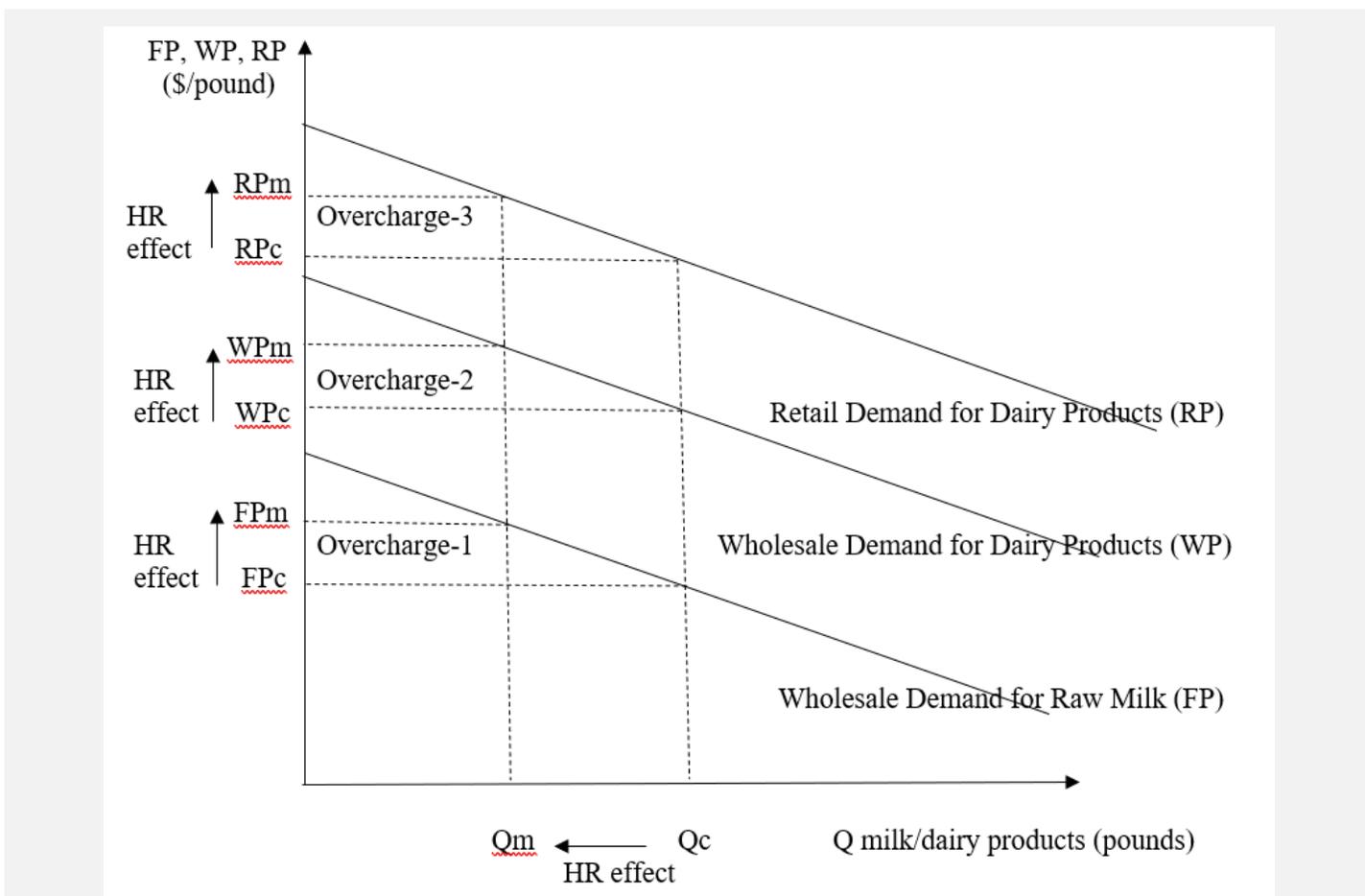
<sup>9</sup> In this case study, “profit” refers to economic profit, which is different from accounting profit. Accounting profit is equal to revenue minus costs associated with generating that revenue. Economic profit is equal to revenue minus costs associated with generating that revenue and minus opportunity cost. Opportunity cost is the forgone benefit of using capital in an alternative business venue. A simple example is earning interest on the money deposited in a savings account in a bank.

<sup>10</sup> A classic definition of seller market power is the industry’s ability to increase output price above MC to earn a positive profit, as compared to a perfectly competitive industry. Lerner Index of market power is a classic measure of seller market power:  $L = [(P - MC) / P] * 100\%$  (Carlton and Perloff 2005; Besanko et al. 2006). The output quantity is typically decreased to achieve the output price increase. Seller market power of dairy cooperatives due to the HR program, as compared to seller market power of classic cartels organized in oligopolistic industries, is discussed in greater detail in Bolotova (2016).

higher than the one in the pre-HR period, is still below MC, and the industry incurs loss, although smaller than the one in the pre-HR period.

### 4.2 Perspective of Buyers of Raw Milk and Manufactured Dairy Products

Figure 5 depicts a wholesale demand curve for raw farm milk (this is the same demand curve labeled as “P” in Figure 4), a wholesale demand curve for manufactured dairy products (fluid milk, cheese, butter, etc.), and a retail demand curve for manufactured dairy products.<sup>11</sup> These demand curves are graphical representations of price-dependent (inverse) demand functions. Figure 5 also depicts price-quantity combinations for raw milk and manufactured dairy products for two market scenarios: a competitive industry scenario representing the industry situation prior to the HR program ( $Q_c$ ,  $F_{Pc}$ ,  $W_{Pc}$ , and  $R_{Pc}$ ), and a scenario where the dairy industry exercises seller market power by implementing the HR program ( $Q_m$ ,  $F_{Pm}$ ,  $W_{Pm}$ , and  $R_{Pm}$ ). Raw milk is the main input used to produce manufactured dairy products.<sup>12</sup> This is the reason the same  $Q$  is used to define raw milk quantity and quantities of manufactured dairy products in Figure 5. Note that the perspective of buyers of raw milk and manufactured dairy products does not take into consideration milk production costs and profitability of dairy farmers.



**Figure 5. Seller Market Power in the U.S. Dairy Product Supply Chain: The Effects of the HR Program on Quantities and Prices**

<sup>11</sup> Figure A1.2 presented in Appendix 1 depicts a simplified version of the dairy product supply chain directly matching Figure 5.

<sup>12</sup> For example, in manufacturing fluid (beverage) milk products, one unit (gallon) of raw milk is required to produce one unit (gallon) of fluid milk. In cheese manufacturing, ten units (pounds) of raw milk are typically required to produce one unit (pound) of cheese.

A decrease in milk cow inventory due to the HR program causes the raw milk quantity and consequently the quantity of manufactured dairy products at the wholesale and retail levels to decrease from  $Q_c$  to  $Q_m$ . As a result, raw milk price received by dairy farmers (this is the price paid by manufacturers of dairy products) increases from  $F_{Pc}$  to  $F_{Pm}$ , and the wholesale price of manufactured dairy products charged by manufacturers of these products (this is the price paid by food retailers) increases from  $W_{Pc}$  to  $W_{Pm}$ . The retail price of manufactured dairy products charged by food retailers (this is the price paid by final consumers) increases from  $R_{Pc}$  to  $R_{Pm}$ . In the market power scenario, buyers of raw milk and manufactured dairy products pay higher prices and are overcharged.

The overcharge (in \$ per unit) is the output price increase due to the output quantity decrease due to the HR program in this case study. The overcharge attributed to direct buyers of raw milk (manufacturers of dairy products), who purchased raw milk directly from dairy farmers, is  $F_{Pm} - F_{Pc}$  in \$ per pound of raw milk, and the total \$ overcharge is  $(F_{Pm} - F_{Pc}) * Q_m$ , which is the “Overcharge-1” rectangle in Figure 5. The overcharge attributed to direct buyers of manufactured dairy products (food retailers and food services), who purchased these products directly from dairy cooperatives, is  $W_{Pm} - W_{Pc}$  in \$ per pound of these products, and the total \$ overcharge is  $(W_{Pm} - W_{Pc}) * Q_m$ , which is the “Overcharge-2” rectangle in Figure 5. The overcharge attributed to final consumers (indirect buyers), who purchased manufactured dairy products at the retail level is  $R_{Pm} - R_{Pc}$  in \$ per pound, and the total \$ overcharge is  $(R_{Pm} - R_{Pc}) * Q_m$ , which is the “Overcharge-3” rectangle in Figure 5. The total overcharge is the basis for damages that direct buyers of raw milk and manufactured dairy products (cheese and butter) at the wholesale level and indirect buyers of fluid milk and other fresh milk products at the retail level aimed to recover during the antitrust litigations.<sup>13</sup>

## 5 Empirical Market and Price Analysis in the U.S. Dairy Industry

This section presents a basic market and price analysis in the U.S. dairy industry, as well as an analysis of the U.S. dairy farm profitability during the period of the HR program (HR period) and the periods before and after this program (the pre-HR period and the post-HR period, respectively). The purpose of this analysis is to evaluate possible effects of the HR program.

The market and price behavior in the HR period (2003–2010) reflects current effects of the HR program and to a smaller extent current effects of the export assistance program. Most of the funds were allocated to the HR program in this period. The market and price behavior in the post-HR period (2011–2014) reflects delayed effects of the HR program and current effects of the export assistance program. The HR program effects were likely to disappear during three to five years after each round (Brown et al. 2010).<sup>14</sup>

The yearly data on milk cow inventory, milk production per cow, total milk quantity produced (total milk production), and milk prices received by dairy farmers are collected from the U.S. Department of Agriculture, National Agricultural Statistics Service (2022). Total milk production is determined by milk cow inventory and milk production per cow. The yearly value of production, total operating costs, and total production costs are collected from the U.S. Department of Agriculture, Economic Research Service (2022)<sup>15</sup> to analyze dairy farm profitability. The monthly wholesale prices of cheddar cheese and butter are collected from the U.S. Department of Agriculture, Agricultural Marketing

<sup>13</sup> As a result of the antitrust litigation involving direct buyers, only direct buyers of cheese and butter were awarded damages (direct buyers of raw milk originally included as one of the plaintiffs were not awarded any damages). Buyers who purchased fluid milk and other fresh milk products at the retail level recovered damages in the states where antitrust laws allowing to recover these damages existed.

<sup>14</sup> The post-HR period in this case study includes four years after the last HR round conducted in 2010.

<sup>15</sup> Milk prices that dairy farmers receive in the United States are determined within the system of Federal and State Milk Marketing Orders. Milk prices are calculated on a monthly basis using a series of price formulas, which include wholesale prices of manufactured dairy products (cheddar cheese, butter, nonfat dry milk, and dry whey). Appendix 2 provides a brief description of the Federal Milk Marketing Orders pricing system.

Service (2022). The monthly retail prices of fluid whole milk are collected from the U.S. Bureau of Labor Statistics (2022a). The averages and coefficients of variation<sup>16</sup> are calculated for the analyzed economic variables for the three periods of interest. The changes in averages and coefficients of variation among the three periods are also calculated.<sup>17</sup>

## 5.1 Dairy Farm Level of the Dairy Product Supply Chain

### 5.1.1 Milk Cow Inventory, Production, and Prices

Table 3 presents yearly averages and coefficients of variation (CV) for milk cow inventory, milk production per cow, total milk production, and milk prices for the three analyzed periods, as well as changes in the averages and CVs among the three periods.<sup>18</sup> Figure 6 depicts the U.S. yearly milk production and prices for the three analyzed periods.

In the pre-HR period, the yearly average milk cow inventory is 9.25 million cows, the yearly average milk production per cow is 17,453 pounds, the yearly average total milk production is 161 billion pounds, and the yearly average milk price received by dairy farmers is \$13.79 per cwt.<sup>19</sup>

**Table 3. U.S. Dairy Industry: The Yearly Average Milk Cow Inventory, Production, and Price Prior, During, and After the HR Program, 1995–2014.**

Period	Milk cow inventory	Milk production		Milk price
	Number of cows	Pounds per cow	Billion pounds	\$ per cwt
Average (coefficient of variation)				
Pre-HR period (1995–2002)	9,250,838 (0.02)	17,453 (0.05)	161.0 (0.04)	13.79 (0.09)
HR period (2003–2010)	9,132,175 (0.01)	19,934 (0.04)	182.2 (0.05)	15.47 (0.16)
Percentage change in HR period, relative to pre- HR period	___ (___)	___ (___)	___ (___)	___ (___)
Post-HR period (2011–2014)	9,204,975 (0.004)	21,783 (0.02)	201.0 (0.02)	20.75 (0.11)
Percentage change in post-HR period, relative to HR period	___ (___)	___ (___)	___ (___)	___ (___)

Source: U.S. Department of Agriculture, National Agricultural Statistics Service (2022). Descriptive statistics are calculated by the author.

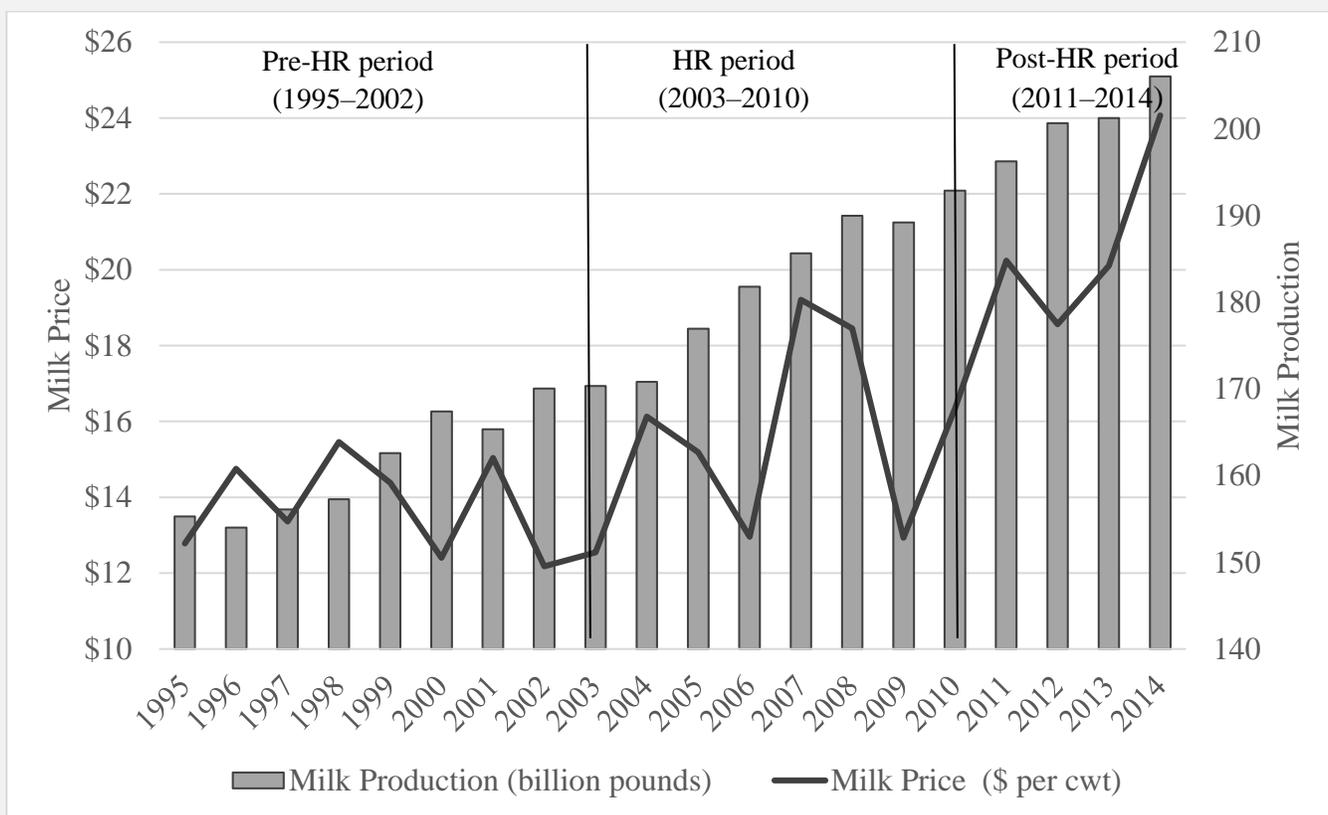
Note: Students should calculate percentage changes in the analyzed economic variables among the three periods and record their answers in cells with missing answers in this table and in the text of the case study (Question 6.1).

<sup>16</sup> Coefficient of variation is chosen to measure the volatility of the analyzed variables in this case study. Although other measures of volatility are available, for example, standard deviation and variance, an advantage of the coefficient of variation is that it measures the standard deviation relative to the mean of the analyzed variable. The coefficient of variation can also be expressed in a percentage form.

<sup>17</sup> The teaching note includes an Excel file with all data and calculations.

<sup>18</sup> Students should calculate percentage changes in the analyzed economic variables among the analyzed periods, record them in Table 3 and in the text of the case study (Question 6.1).

<sup>19</sup> A descriptive statistical analysis of milk prices and prices of manufactured dairy products (cheese, butter, and fluid milk) presented in the case study uses nominal prices. Appendix 3 explains the rationale for using nominal prices and presents a similar descriptive statistical analysis of real prices for the analyzed products.



**Figure 6. U.S. Yearly Milk Production and Prices Before, During, and After the HR Program, 2000-2014**

Source: U.S. Department of Agriculture, National Agricultural Statistics Service (2022).

Note: Pre-HR period, HR period, and post-HR period are the pre-HR program, HR program, and post-HR program periods, respectively.

In the HR period, as compared with the pre-HR period,<sup>20</sup> the yearly average milk cow inventory decreases to 9.13 million cows (or by \_\_\_ percent), and the yearly average milk production per cow increases to 19,934 pounds (or by \_\_\_ percent). As a result, the yearly average total milk production increases to 182.2 billion pounds (or by \_\_\_ percent). The yearly average milk price increases to \$15.47 per cwt (or by \_\_\_ percent). The volatility of milk cow inventory and milk production per cow decreases, and the volatility of total milk production and milk price increases in the HR period, as compared with the pre-HR period.

In the post-HR period, as compared with the HR period, the yearly average milk cow inventory increases to 9.2 million cows (or by \_\_\_ percent), and the yearly average milk production per cow increases to 21,783 pounds (or by \_\_\_ percent). As a result, the yearly average total milk production increases to 201 billion pounds (or by \_\_\_ percent). The yearly average milk price increases to \$20.75 per cwt (or by \_\_\_ percent). The volatility of all analyzed economic variables decreases in the post-HR period, as compared with the HR period.

The following changes in the analyzed economic variables might reflect the current and delayed effects of the HR program. First, the yearly average milk cow inventory and the volatility of milk cow inventory decreased in the HR and post-HR periods, as compared with the pre-HR period. Second, the volatility of total milk production (“supply volatility”) decreased in the post-HR period, as compared

<sup>20</sup> The pre-HR period is 1995-2002 in the analysis conducted in this section. The length of the pre-HR period (eight years) is equal to the length of the HR period (2003-2010).

with the pre-HR and HR periods. Third, the yearly average milk price received by dairy farmers increased in the HR and post-HR periods, as compared with the pre-HR period.

Despite a decrease in the yearly average milk cow inventory in the HR and post-HR periods, as compared with the pre-HR period, the yearly average total milk quantity produced increased over time, because the yearly average milk production per cow increased. In addition, given the fact that dairy farmers who did not participate in the HR program marketed about 30 percent of the national milk supply, some of these dairy farmers might have expanded their milking herds, thus contributing to the increases in total milk production in the analyzed periods. The latter likely decreased the effectiveness of the HR program. In summary, the HR program decreased the size of milk cow inventory and might have decreased the growth rate in the total milk production, which might have contributed to the observed increases in milk prices received by dairy farmers.

### 5.1.2 Dairy Farm Profitability

Table 4 presents yearly averages and CVs for Total Value of Production (TVP),<sup>21</sup> Total Operating Costs (TOC), Total Costs (TC), profit based on TOC, and profit based on TC for the three analyzed periods, as well as changes in the averages and CVs among the three periods.<sup>22</sup> Figure 7 depicts two dairy farm profitability measures for the three analyzed periods. Negative profitability measures indicate losses.

**Table 4. U.S. Dairy Industry: The Yearly Average Total Value of Production, Production Costs, and Profit Prior, During, and After the HR Program, 2000–2014.**

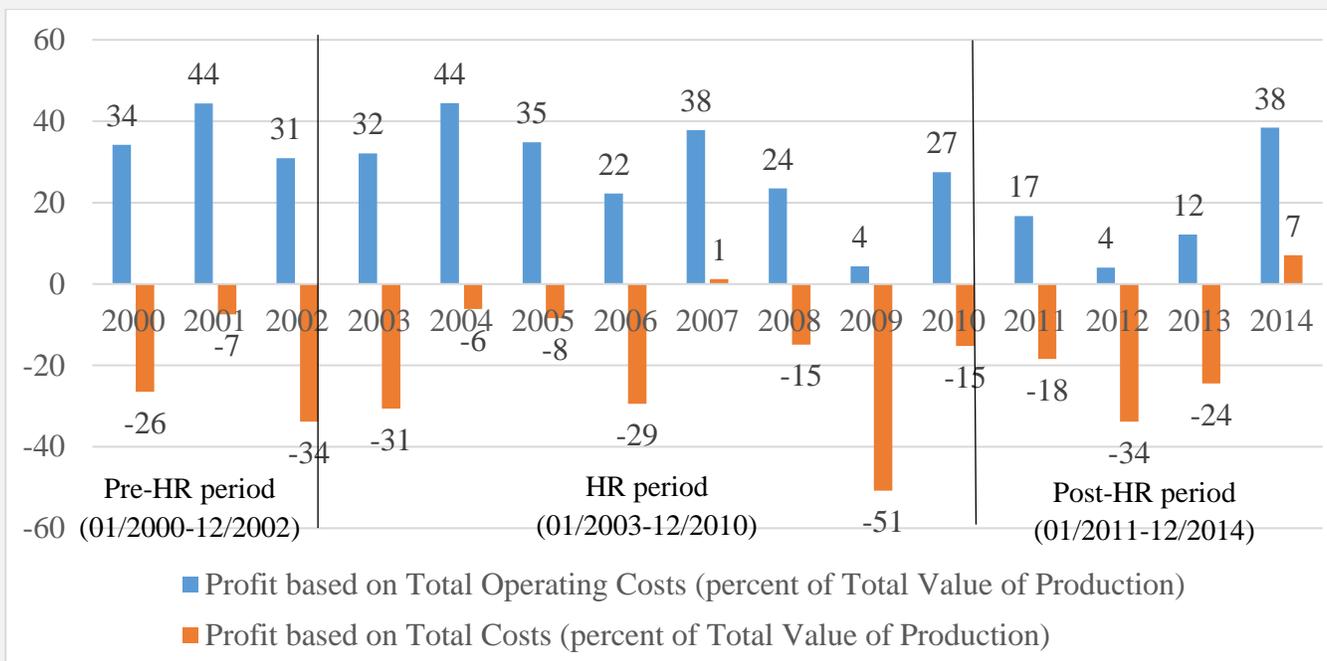
Period	Total value of production (TVP)	Total operating costs (TOC)	Total costs (TC)	Profit based on TOC [TVP-TOC]	Profit based on TC [TVP-TC]
	\$ per cwt	\$ per cwt	\$ per cwt	\$ per cwt	\$ per cwt
Average (coefficient of variation)					
Pre-HR period (2000–2002)	15.19 (0.12)	9.57 (0.02)	18.46 (0.02)	5.62 (0.31)	-3.27 (-0.55)
HR period (2003–2010)	17.51 (0.15)	12.42 (0.17)	20.57 (0.09)	5.09 (0.49)	-3.07 (-0.79)
Percentage change in HR period, relative to pre-HR period	— (—)	— (—)	— (—)	— (—)	— (—)
Post-HR period (2011–2014)	23.09 (0.11)	18.71 (0.09)	26.78 (0.06)	4.38 (0.94)	-3.70 (-1.07)
Percentage change in post-HR period, relative to HR period	— (—)	— (—)	— (—)	— (—)	— (—)

*Source:* U.S. Department of Agriculture, Economic Research Service (2022). The profit measures and descriptive statistics are calculated by the author.

*Note:* Students should calculate percentage changes in the analyzed economic variables among the three periods and record their answers in cells with missing answers in this table and in the text of the case study (Question 6.2).

<sup>21</sup> The TVP (\$ per cwt of milk) is the sum of value of milk sold (\$ per cwt of milk), value of dairy cattle sold (\$ per cwt of milk), and other income (\$ per cwt of milk; U.S. Department of Agriculture, Economic Research Service 2022). The value of milk (\$ per cwt) can be thought of as the milk price received by dairy farmers in this case study. The share of value of milk in the TVP is typically more than 90 percent.

<sup>22</sup> Students should calculate percentage changes in the analyzed economic variables among the analyzed periods and record them in Table 4 and in the text of case study (Question 6.2).



**Figure 7. U.S. Dairy Industry Yearly Profit Before, During, and After the HR Program, 2000–2014**

Source: U.S. Department of Agriculture, Economic Research Service (2022). The profit measures are calculated by the author. Note: Pre-HR period, HR period, and post-HR period are the pre-HR program, HR program, and post-HR program periods, respectively.

In the pre-HR period,<sup>23</sup> the yearly average TVP is \$15.19 per cwt of milk, the yearly average TOC are \$9.57 per cwt of milk, and the yearly average TC are \$18.46 per cwt of milk. In the same period, the yearly average profit based on TOC is \$5.62 per cwt of milk, and the yearly average profit based on TC, which is a loss, is -\$3.27 per cwt of milk.

In the HR period, as compared with the pre-HR period, the yearly average TVP increases to \$17.51 per cwt (or by \_\_\_ percent), the yearly average TOC increase to \$12.42 per cwt (or by \_\_\_ percent), and the yearly average TC increase to \$20.57 per cwt (or by \_\_\_ percent). The yearly average profit based on TOC decreases to \$5.09 per cwt (or by \_\_\_ percent), and the yearly average profit based on TC, which is a loss, decreases to -\$3.07 per cwt (or by \_\_\_ percent). The volatility of all analyzed variables increases in the HR period, as compared with the pre-HR period.

In the post-HR period, as compared with the HR period, the yearly average TVP increases to \$23.09 per cwt (or by \_\_\_ percent), the yearly average TOC increase to \$18.71 per cwt (or by \_\_\_ percent), and the yearly average TC increase to \$26.78 per cwt (or by \_\_\_ percent). The yearly average profit based on TOC decreases to \$4.38 per cwt (or by \_\_\_ percent), and the yearly average profit based on TC, which is a loss, increases to -\$3.70 per cwt (or by \_\_\_ percent). The volatility of TVP, TOC, and TC decreases, and the volatility of both profit measures increases in the post-HR period, as compared with the HR period.

The following changes in the analyzed economic variables might reflect some of the current effects of the HR program in the HR period, as compared with the pre-HR period. While the yearly average TVP increases by 15.3 percent in the HR period, the yearly average TC increase only by 11.4 percent. The observed increase in the TVP is mostly due to the increase in the TC. The remaining 3.9

<sup>23</sup> The pre-HR period is 2000–2002 in the analysis presented in this section. While historical costs and returns for milk are available (U.S. Department of Agriculture, Economic Research Service 2022), the reporting procedure somewhat changed in 2000. This impacted the pre-HR period length used in this section, as compared to the one used in the previous section.

percentage-point increase in the TVP is due to other factors, but the milk production costs. One of these factors may be seller market power of the dairy industry due to the effective implementation of the HR program. While the yearly average profit based on TOC decreases by 9.4 percent in the HR period, as compared with the pre-HR period, the yearly average profit based on TC, which is a loss, decreases by 6.4 percent. This is because the yearly average TOC increased faster than the yearly average TC in the HR period. Consequently, the yearly average loss in the HR period (-\$3.07 per cwt) is smaller than the one in the pre-HR period (-\$3.27 per cwt), or by 6.4 percent.

The following changes in the analyzed economic variables might reflect some of the delayed effects of the HR program in the post-HR period, as compared with the HR period. While the yearly average TVP increases by 31.9 percent in the post-HR period, the yearly average TC increase by 30.2 percent. The observed increase in the TVP practically reflects the increase in the TC. The remaining 1.7 percentage-point increase in the TVP is due to other factors, but the milk production costs. One of these factors may be seller market power of the dairy industry due to the delayed effects of the HR program and current effects of the export assistance program. The yearly average profit based on TOC decreases by 13.9 percent in the post-HR period, as compared with the HR period, and the yearly average profit based on TC, which is a loss, increases by 20.6 percent. The yearly average loss in the post-HR period (-\$3.70 per cwt) is higher than the one in the HR period (-\$3.07 per cwt), or by 20.6 percent.

In summary, the HR program might have been effective in helping the dairy industry to pass on milk cost increases on the buyers of raw milk and manufactured dairy products in the form of higher prices. Theoretically, to pass a cost increase on to the buyers, the industry has to decrease output quantity produced to increase output prices. If the dairy industry had not implemented the HR program to decrease total milk quantity produced, milk prices received by dairy farmers might have been lower, and the dairy industry and dairy farmers might have incurred greater financial losses.

## 5.2 Wholesale Level of the Dairy Product Supply Chain

Table 5 presents monthly averages and CVs for wholesale prices of cheddar cheese and butter for the three analyzed periods, as well as changes in the averages and CVs among the three periods.<sup>24</sup> The analyzed wholesale prices of cheddar cheese and butter correspond to the first handler-level of the cheese and butter supply chains. These are the prices charged by manufacturers of these products (dairy cooperatives and proprietary firms).<sup>25</sup> Figure 8 depicts wholesale prices of cheddar cheese and butter for the three analyzed periods.

In the pre-HR period,<sup>26</sup> the monthly average wholesale prices of cheddar cheese and butter are \$1.23 per pound and \$1.26 per pound, respectively. In the HR period, as compared with the pre-HR period, the monthly average wholesale prices of cheddar cheese and butter increase to \$1.54 per pound and \$1.45 per pound, respectively (or by \_\_\_ percent and \_\_\_ percent, respectively). The volatility of the wholesale cheddar cheese price increases and the volatility of the wholesale butter price decreases in the HR period, as compared with the pre-HR period.

In the post-HR period, as compared with the HR period, the monthly average wholesale prices of cheddar cheese and butter increase to \$1.86 per pound and \$1.81 per pound, respectively (or by \_\_\_ percent and \_\_\_ percent, respectively). The volatility of these prices decreases in the post-HR period, as compared with the HR period.

<sup>24</sup> Students should calculate percentage changes in the analyzed economic variables among the analyzed periods and record them in Table 5 and in the text of the case study (Question 6.3).

<sup>25</sup> These wholesale prices are survey-based prices that are collected by the U.S. Department of Agriculture and are used in milk price formulas to calculate Class milk prices within the system of Federal Milk Marketing Orders (Appendix2).

<sup>26</sup> The pre-HR period is January 2000–June 2003 in the analysis presented in this section. The wholesale prices of cheddar cheese and butter used in the analysis are reported beginning in January 2000 (U.S. Department of Agriculture, Agricultural Marketing Service 2022). This impacted the pre-HR period length used in this section, as compared to the one used in Section 5.1.1.

**Table 5. U.S. Dairy Industry: The Monthly Average Wholesale Prices of Cheddar Cheese and Butter and Retail Prices of Fluid Whole Milk Prior, During, and After the HR Program, 2000–2014.**

Period	Wholesale cheese price	Wholesale butter price	Retail fluid whole milk price
	\$ per pound		\$ per gallon
	Average (coefficient of variation)		
Pre-HR period (01/2000–06/2003)	1.23 (0.14)	1.26 (0.25)	2.79 (0.03)
HR period (07/2003–12/2010)	1.54 (0.17)	1.45 (0.19)	3.27 (0.10)
Percentage change in HR period relative to pre-HR period	___ (___)	___ (___)	___ (___)
Post-HR period (01/2011–12/2014)	1.86 (0.13)	1.81 (0.18)	3.55 (0.03)
Percentage change in post-HR period relative to HR period	___ (___)	___ (___)	___ (___)

Source: U.S. Department of Agriculture, Agricultural Marketing Service (2022) and U.S. Bureau of Labor Statistics (2022a). Descriptive statistics are calculated by the author.

Note: Students should calculate percentage changes in the analyzed economic variables among the three periods and record their answers in cells with missing answers in this table and in the text of the case study (Questions 6.3 and 6.4).

Higher wholesale prices of cheddar cheese and butter in the HR and post-HR periods, relative to the pre-HR period, might reflect current and delayed effects of the HR program. A decrease in raw milk supply due to the HR program would lead to higher raw milk prices that cheese and butter manufacturers have to pay for raw milk. Higher raw milk prices would increase the costs of cheese and butter manufacturing and consequently wholesale prices of these products.

At the same time, other factors might have contributed to higher wholesale prices of cheese and butter in the HR and post-HR periods, for example possibly increasing prices of other inputs used in cheese and butter manufacturing (labor, energy, packaging, equipment, etc.), output pricing strategies and seller market power of cheese and butter manufacturers,<sup>27</sup> and the CWT export assistance program directly affecting the quantities of cheese and butter available for the domestic market and consequently wholesale price of these products.

### 5.3 Retail Level of the Dairy Product Supply Chain

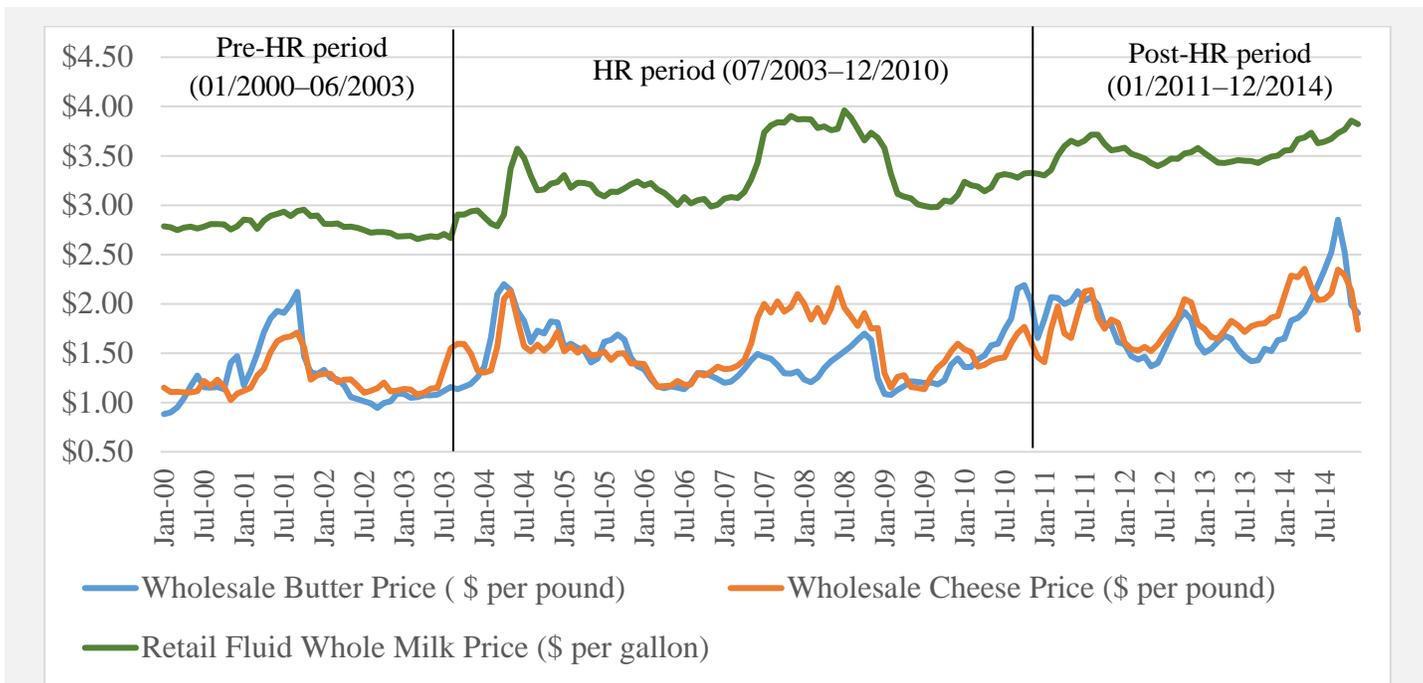
Table 5 presents monthly averages and CVs for the retail fluid whole milk price (U.S. city average) for the three analyzed periods, as well as changes in the averages and CVs among the three periods.<sup>28</sup> Figure 8 depicts retail fluid whole milk prices for the three analyzed periods.

In the pre-HR period,<sup>29</sup> the monthly average retail price of fluid whole milk is \$2.79 per gallon. In the HR period, as compared with the pre-HR period, this price increases to \$3.27 per gallon (or by \_\_\_ percent), and the volatility of this price increases as well. In the post-HR period, as compared with the

<sup>27</sup> There is empirical evidence suggesting that wholesale cheese pricing by cheese manufacturers (dairy cooperatives and proprietary firms) is consistent with oligopoly and monopoly pricing (Bolotova and Novakovic 2015; Bolotova 2020).

<sup>28</sup> Students should calculate percentage changes in the analyzed economic variable among the analyzed periods, record them in Table 5 and in the text of the case study (Question 6.4).

<sup>29</sup> The pre-HR period is January 2000–June 2003 in the analysis presented in this section. The pre-HR period has the same length as the one used to analyze wholesale prices of cheddar cheese and butter.



**Figure 8. U.S. Monthly Wholesale Prices of Cheddar Cheese and Butter and Retail Fluid Whole Milk Prices Before, During, and After the HR Program, 2000–2014**

Source: U.S. Department of Agriculture, Agricultural Marketing Service (2022) and U.S. Bureau of Labor Statistics (2022a). Note: Pre-HR period, HR period, and post-HR period are the pre-HR program, HR program, and post-HR program periods, respectively.

HR period, the monthly average retail price of fluid whole milk increases to \$3.55 per gallon (or by \_\_\_ percent), and the volatility of this price decreases.

Higher retail fluid whole milk prices in the HR and post-HR periods, relative to the pre-HR period, might reflect current and delayed effects of the HR program. A decrease in raw milk supply due to the HR program would lead to higher raw milk prices that fluid milk processors have to pay to dairy farmers for raw milk used in fluid milk manufacturing. Consequently, fluid milk processors would increase fluid milk prices when they sell fluid milk to food retailers, and food retailers would increase fluid milk prices at the retail level when they sell fluid milk to final consumers.

At the same time, other factors might have contributed to higher retail prices of fluid whole milk in the HR and post-HR period, for example possibly increasing prices of other inputs used in fluid milk manufacturing and food retailing (labor, energy, packaging, equipment, etc.), as well as output pricing strategies and seller market power of fluid milk manufacturers and food retailers.<sup>30</sup>

## 6 Legal Issues: HR Program and Antitrust

Dairy cooperatives presumed that their HR program was within the scope of the Capper-Volstead Act immunity. Section 1 of the Capper-Volstead Act provides a limited antitrust immunity to the Sherman Act

<sup>30</sup> By the beginning of the 2000s, the U.S. fluid milk industry was a highly concentrated industry. In 1999, the average market share of the four largest fluid milk processors reported for 14 U.S. markets was 75.6 percent (U.S. General Accounting Office 2001). In 2003, the average market share of the four largest food retailers reported for 15 U.S. markets was 73.9 percent (U.S. Government Accountability Office 2004). These market shares are the four-firm concentration ratios (CR4). The industries with CR4 exceeding 75 percent are likely to facilitate anticompetitive conduct of firms with market power (Hovenkamp 2005). In other words, firms operating in highly concentrated industries are likely to exercise market power. There is empirical evidence suggesting that retail fluid milk pricing by fluid milk retailers is consistent with oligopoly and monopoly pricing (Carman and Sexton 2005; Bolotova and Novakovic 2012; Bolotova 2022).

(1890) for collective agricultural marketing activities of individual agricultural producers implemented through their organizations.<sup>31</sup> Section 1 of the Sherman Act makes illegal agreements among competitors (firms producing and selling the same or similar products) that aim to affect product quantities, prices, or both in interstate commerce.<sup>32</sup> These agreements are often referred to as cartels, price-fixing cartels (or price-fixing conspiracies), and/or output allocation agreements.

Agricultural producers are competitors, and collective agricultural marketing activities (programs) that affect agricultural product prices, quantities, or both are agreements among competitors. For example, the CWT HR program may be interpreted as an agreement among competitors (dairy farmers participating in the CWT program) aiming to decrease output (raw milk) quantity produced with the purpose of increasing and stabilizing output (raw milk) prices received. In the absence of the Capper-Volstead Act, collective agricultural marketing activities would have violated Section 1 of the Sherman Act.

Section 1 of the Capper-Volstead Act declares:

***“Persons engaged in the production of agricultural products as farmers, planters, ranchmen, dairymen, nut or fruit growers may act together in associations, corporate or otherwise, with or without capital stock, in collectively processing, preparing for market, handling, and marketing in interstate and foreign commerce, such products of persons so engaged. Such associations may have marketing agencies in common; and such associations and their members may make the necessary contracts and agreements to effect such purposes: Provided, however, That such associations are operated for the mutual benefit of the members thereof...”***

In 2011, buyers of fluid milk and other fresh milk products at the retail level (indirect buyers) and in 2015 buyers of raw milk, cheese, and butter at the wholesale level, who purchased these products directly from dairy cooperatives (direct buyers), filed class action antitrust lawsuits against the NMPF, CWT, and a group of dairy cooperatives. These buyers alleged that the CWT HR program was not within the scope of the Capper-Volstead Act immunity and that it violated Section 1 of the Sherman Act. The buyers argued that the HR program was *not* a form of collective agricultural “marketing” mentioned in Section 1 of the Capper-Volstead Act.

Buyers of cheese and butter, who purchased these products directly from dairy cooperatives (defendants), sued under the Clayton Act (1914; a Federal law), allowing them to recover treble damages and reasonable legal expenses for violations of the Sherman Act. The total overcharge is the basis for damages (Rectangle labeled as “Overcharge-2” in Figure 5). The total monetary damages are three times the total overcharge. The dairy cooperatives settled the lawsuit with direct buyers of cheese and butter in 2019 for \$220 million (Fu 2019; Butter and Cheese Class Action 2022).

Buyers of fluid milk and other fresh milk products at the retail level, who purchased these products indirectly from dairy cooperatives (defendants), sued under the state antitrust statutes (antitrust laws, consumer protection laws, or restraint of trade laws). Approximately half of the states have these antitrust statutes (Hovenkamp 2005). The total overcharge is the basis for damages (Rectangle labeled as “Overcharge-3” in Figure 5). The size of damages that indirect buyers can recover depends on a particular state and may range from one to three times the total overcharge. The cooperatives settled the lawsuit with indirect buyers in 2016 for \$52 million (Hagens Berman 2018; Fresh Milk Products Antitrust Litigation 2022).

The organizations of agricultural producers in the potato, egg, and mushroom industries in the United States also implemented agricultural supply management programs affecting the quantities of agricultural products produced and faced similar antitrust lawsuits (Bolotova 2014; Peck 2015).

<sup>31</sup> These organizations should be formed according to the standard established in the Capper-Volstead Act.

<sup>32</sup> Section 1 of the Sherman Act refers to these agreements as contracts, combinations, or conspiracies in restraint of trade.

Apparently, there was a very limited case law interpreting the legal status of agricultural supply management programs in light of Section 1 of the Capper-Volstead Act.

Recent legal decisions and discussions establish that the types of agricultural supply management programs—whether they are implemented at the pre-agricultural production stage, agricultural production stage, or post-agricultural production stage—affect their legal status in light of the Capper-Volstead Act (Frackman and O'Rourke 2011; Hibner 2011; Bolotova 2015; Peck 2015). It is crucial whether collective agricultural marketing activities (programs) in question can be interpreted as “marketing” under Section 1 of the Capper-Volstead Act.

Collective agricultural supply management activities implemented at the post-agricultural production stage are more likely to be interpreted as “marketing” and, therefore, are likely to be within the scope of Capper-Volstead Act immunity. Collective agricultural supply management activities implemented at the pre-agricultural production and agricultural production stages are not likely to be interpreted as “marketing” and therefore are outside the scope of Capper-Volstead Act immunity. The HR program is an example. The courts interpret the legal status of collective agricultural marketing activities on a case-by-case basis.

## 7 Discussion and Analytical Questions

You are a regulator today and are being petitioned to revisit the topic of dairy farmers violating antitrust laws between 2003 and 2010. Using graphical techniques and price analysis explain whether dairy farmers violated antitrust laws when they enacted the HR program. Formulate your reasoning by answering a set of questions included in this section.

The teaching note provides additional guidance for responding to selected questions and suggested answers to all questions. In addition, the teaching note includes multiple-choice questions, which can be used as in-class assignments, quizzes, and exam questions.

1. Discuss the U.S. dairy industry’s institutional environment at the end of the last century, which may have led to the idea of a private supply management program (the HR program).
2. Discuss the objectives and implementation procedure of the HR program. Discuss the role of dairy cooperatives in implementing this program.
3. Using a graphical analysis, explain two variations of the theoretical framework that may explain market and price effects of the HR program using the perspective of dairy farmers and the perspective of buyers of raw milk and manufactured dairy products.

3.1. Using the perspective of dairy farmers, explain a theoretical framework that incorporates seller market power of dairy farmers and describes milk price-quantity relationships and dairy industry profitability for the three alternative market scenarios: milk oversupply, perfectly competitive industry, and a small degree of seller market power. Show on a graph relevant curves and three milk price-quantity combinations corresponding to these scenarios. Explain changes in milk quantity, price, and industry profit as the dairy industry moves from the milk oversupply scenario to a perfectly competitive industry scenario and to a scenario where the dairy industry has a small degree of seller market power.

3.2. Using the perspective of buyers of raw milk and manufactured dairy products (fluid milk, cheese, butter, etc.), explain a theoretical framework that incorporates seller market power of dairy farmers (dairy cooperatives) and describes price-quantity relationships at different stages of the dairy product supply chain in two scenarios: without the HR program and with the HR program.

Show on a graph relevant curves and price-quantity combinations corresponding to the two scenarios. Explain changes in quantities of milk and manufactured dairy products and these products' prices as the dairy industry moves from the scenario without the HR program to the scenario with the HR program.

4. Perform an analytical analysis of the milk price-quantity relationships and dairy industry profitability for the three market scenarios mentioned in Question 3.1. To complete this analysis, use the following assumptions. The inverse (price-dependent) demand function for raw farm milk is  $P = 27 - 8Q$  ( $P$  is in \$ per cwt, and  $Q$  is in billion cwt), and the MC of producing milk is \$14.00 per cwt. MC is the same in these three scenarios.<sup>33</sup> Assume that the U.S. dairy industry (all dairy farmers taken together) produces the following total milk quantity under the three alternative market scenarios: 1.40 billion cwt, 1.625 billion cwt, and 1.80 billion cwt.

4.1. Using the milk inverse demand function ("price equation"), MC of producing milk ("cost"), and milk quantities, calculate the following economic measures to complete a profitability analysis of the dairy industry. For each market scenario, calculate milk price in \$ per cwt, total costs in \$, total revenue in \$, total profit in \$, and price-cost margin (profit) measured in \$ per cwt and as a percentage of the milk price (Lerner Index of market power). Classify each scenario as milk oversupply, perfect competition, or small degree of seller market power.

4.2. Discuss the results of your analysis. First, draw a figure similar to Figure 4 of the case study to show the three analyzed market scenarios: show relevant curves, price-quantity combinations, and price-cost margins. Second, explain the pattern of milk price-quantity relationship and industry profitability in each scenario. In which scenario(s) are dairy farmers better off? In which scenario(s) are dairy farmers worse off? In which scenario(s) are buyers of raw farm milk better off? In which scenario(s) are buyers of raw farm milk worse off? Explain your reasoning.

5. Familiarize yourself with the U.S. Department of Agriculture and U.S. Bureau of Labor Statistics databases used to collect economic variables for the analysis presented in this case study. Use the U.S. Department of Agriculture, National Agricultural Statistics Service Quick Stats database to download economic variables reported in Table 3: milk cow inventory, milk production per cow, total milk quantity produced, and milk price for the period of 1995–2014.
6. Perform a basic market and price analysis, as well as a dairy farm profitability analysis in the U.S. dairy industry.

6.1. Evaluate changes in yearly milk cow inventory, milk production per cow, total milk production, and milk price and their volatility in this case study's three periods of interest: prior, during, and after the HR program (1995–2014). Use data reported in Table 3 to complete this analysis.

6.1.1. Calculate percentage changes in yearly averages and coefficients of variation among the analyzed periods for all economic variables reported in Table 3.

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<sup>33</sup> The milk inverse demand function was estimated using yearly milk production and price data for the period of 1995–2002 reported by the U.S. Department of Agriculture, National Agricultural Statistics Service (2022). The MC assumption was developed using milk production costs reported in "Commodity costs and returns" database for milk for the same period (U.S. Department of Agriculture, Economic Research Service 2022).

6.1.2. Describe the results of your analysis. Explain which patterns of changes in the analyzed economic variables are consistent with effective implementation of the HR program.

6.2. Conduct the profitability analysis of dairy farming. Evaluate changes in yearly Value of Production, Total Operating Costs, Total Costs, and profit and their volatility in this case study's three periods of interest: prior, during, and after the HR program (2000–2014). Use data reported in Table 4 to complete this analysis.

6.2.1. Calculate percentage changes in yearly averages and coefficients of variation among the analyzed periods for all economic variables reported in Table 4.

6.2.2. Describe the results of your analysis. Explain which patterns of changes in the analyzed economic variables are consistent with effective implementation of the HR program.

6.3. Evaluate changes in monthly wholesale prices of cheddar cheese and butter and in their volatility in the three periods of interest: prior, during, and after the HR program (2000–2014). Use data reported in Table 5 to complete this analysis.

6.3.1. Calculate percentage changes in monthly averages and coefficients of variation among the analyzed periods for the wholesale prices of cheese and butter presented in Table 5.

6.3.2. Explain which patterns of changes in the analyzed prices are consistent with effective implementation of the HR program.

6.4. Evaluate changes in the monthly retail price of fluid whole milk and in its volatility in the three periods of interest: prior, during, and after the HR program (2000–2014). Use data reported in Table 5 to complete this analysis.

6.4.1. Calculate percentage changes in monthly averages and coefficients of variation among the analyzed periods for the retail fluid whole milk price presented in Table 5.

6.4.2. Explain which patterns of changes in the analyzed retail fluid whole milk price are consistent with effective implementation of the HR program.

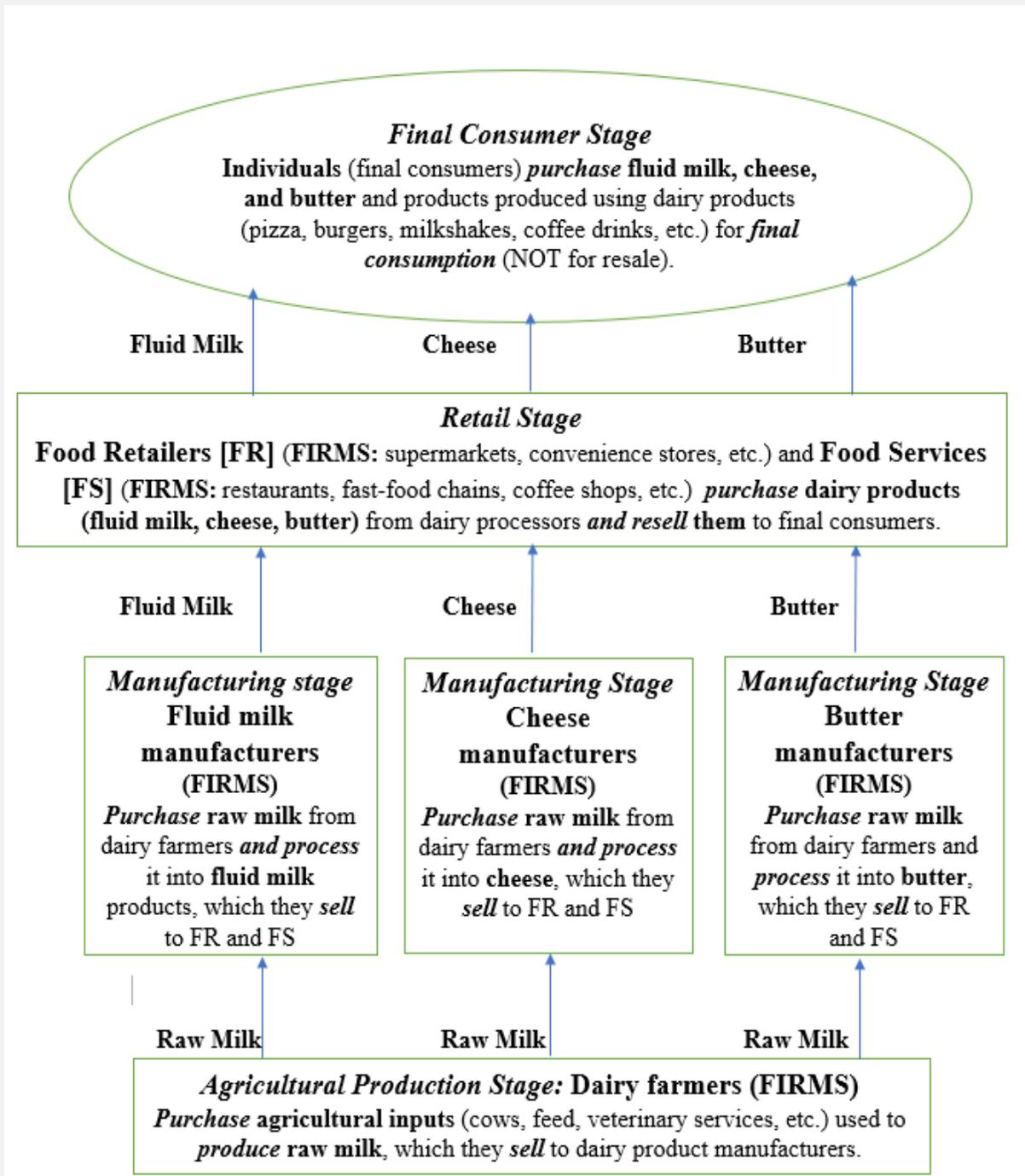
7. Explain why buyers of raw milk and manufactured dairy products (cheese, butter, fluid milk, and other fresh milk products) at the wholesale and retail levels of the dairy product supply chain filed antitrust lawsuits against a group of dairy cooperatives involved in implementation of the HR program. Explain the outcomes of the two antitrust litigations mentioned in the case study. Discuss the role of the Capper-Volstead Act and the Sherman Act in regulating collective agricultural marketing activities of dairy cooperatives in the industry setting discussed in this case study.

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#### **Acknowledgments**

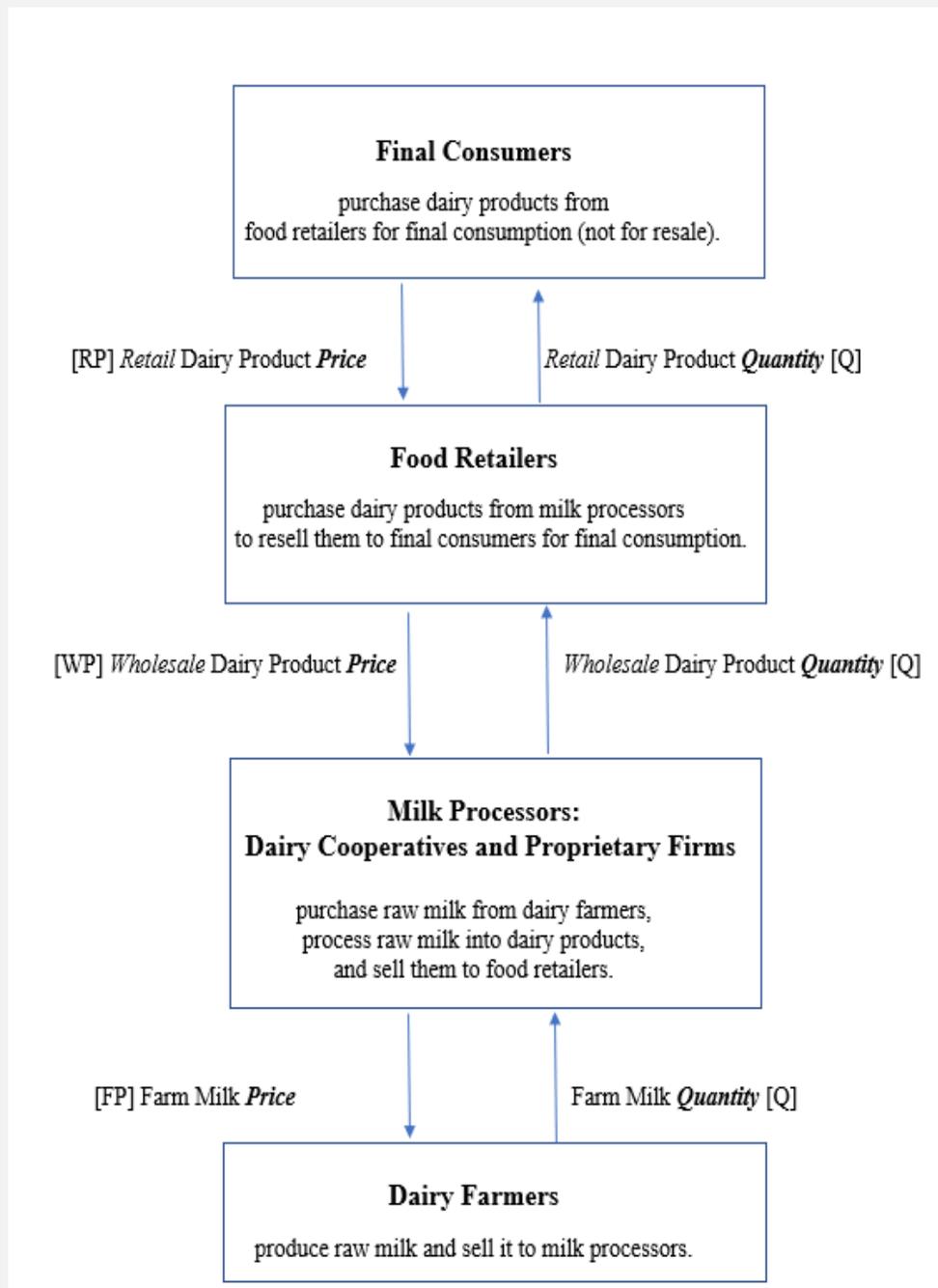
The author acknowledges constructive comments provided by the AETR Editor, Jason Bergtold, and anonymous reviewers.

## Appendix 1



**Figure A1.1. Dairy Product Supply Chain**

*Note:* Dairy product manufacturers include dairy cooperatives and proprietary firms.



**Figure A1.2. Dairy Product Supply Chain Structure (corresponds to Figure 5)**

*Note:* As milk processors, dairy cooperatives do not purchase milk from dairy farmers. Dairy cooperatives process raw milk into manufactured dairy products (fluid milk, cheese, butter, etc.) and market them on behalf of dairy farmers. Dairy cooperatives also negotiate raw milk prices with milk processors on behalf of dairy farmers, when dairy farmers sell raw milk directly to milk processors.

## Appendix 2

### Milk Pricing System within the Federal Milk Marketing Orders

The system of Federal Milk Marketing Orders (FMMOs) regulates marketing and pricing of Grade A milk at the farm-first handler level in the United States. FMMOs are geographically defined areas based on the demand for fluid milk products.<sup>34</sup> Currently there are 11 FMMOs, which regulate the marketing of approximately 75 percent of total milk production. The objectives of FMMOs are to create orderly marketing conditions for fluid milk products and to ensure sufficient supplies of quality milk at reasonable prices for final consumers as well as to improve terms of trade and the bargaining process between milk producers and milk processors and to increase returns to dairy farmers. FMMOs are authorized in the Agricultural Marketing Agreement Act (1937). Practically all milk produced in the United States is Grade A milk.

The two main features of FMMOs are classified pricing and pooling of milk. Grade A milk produced by dairy farmers is divided into four Classes, depending on the end use of milk (i.e., the type of processed products). Class I milk is used to manufacture fluid (beverage) milk products (whole milk, reduced-fat milk, skim milk, and so on). Class II milk is used to manufacture soft dairy products (yogurt, sour cream, cottage cheese, ice cream, and so on). Class III milk is used to manufacture hard dairy products (cheese and cream cheese). Class IV milk is used to manufacture butter and milk products in dry and evaporated forms.

FMMOs are used to determine minimum prices that regulated milk handlers (processors) have to pay for Grade A milk. Class I milk has the highest price. Dairy farmers do not receive Class milk prices directly; instead, these prices and the rates of milk utilization in each class determine uniform prices (blend prices) for each FMMO. The uniform price is the minimum milk price that dairy farmers within the same Order receive. Dairy cooperatives are allowed to negotiate premiums (over-order premiums), which are added to the FMMOs' minimum prices. Over-order premiums are paid based on milk quality, volume, and milk assembling services provided by dairy cooperatives. Class milk prices and uniform prices are calculated and announced on a monthly basis.

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<sup>34</sup> A comprehensive discussion of Federal Milk Marketing Orders is presented in U.S. Congressional Research Service (2017) and U.S. Department of Agriculture, Agricultural Marketing Service (2019).

## Appendix 3

### U.S. Dairy Industry: Nominal and Real Price Analysis

Nominal prices for raw milk and manufactured dairy products (cheddar cheese, butter, and fluid whole milk) are used in the empirical analysis presented in the case study for the following reasons.

(1). Figures 4 and 5 demonstrate changes in output quantity and output price due to the exercise of seller market power of dairy cooperatives. To understand the effect of a reduction in the output quantity on the output price—the output price increase or the overcharge—the output price has to be assumed to be an actual market price (nominal price). If a real price (the price adjusted for inflation) is used, theoretically there may be a price decrease or no price increase depending on the adjustments made to the price series. Figures 4 and 5 explain the industry's conduct and performance in the short-run period. For the empirical analysis to be consistent with these figures, nominal wholesale and retail prices are used.

(2). When dairy cooperatives, as producers of manufactured dairy products (cheese, butter, fluid milk, etc.), make decisions on output quantities to produce, they consider actual market prices for their outputs that they currently observe, not output prices adjusted for inflation. Similarly, dairy farmers, as agricultural producers, make their production decisions by taking into consideration current market prices (Kohls and Uhl 2002; Bolotova 2019).

(3). The empirical analysis presented in this case study is a very simplified version of the analysis that would be used in antitrust proceedings to calculate damages: the overcharge rectangles in Figure 5. When the overcharge in \$ per unit of output (the output price increase due to illegal collusion) is calculated, actual firm-specific transaction prices are used. These prices are not adjusted for inflation because this adjustment may distort the size of damages and may lead to lower damages or no damages.

(4). Some of the U.S. Department of Agriculture, Economic Research Service reports, which compare yearly production and price data for agricultural commodities over several years, use actual market prices (Dohlman and Livezey 2005; Dohlman, Foreman, and Da Pra 2009).

Table A3.1 presents descriptive statistics for nominal and real wholesale prices of raw farm milk like the ones reported in Table 3. To adjust the nominal raw milk price for inflation, the Producer Price Index (PPI) reported by the U.S. Bureau of Labor Statistics (2022b) for raw milk is used. The monthly average real milk price decreases from \$13.57 per cwt in the pre-HR period to \$13.42 per cwt in the HR period (or by 1.1 percent). This price increases to \$13.43 per cwt in the post-HR period (or by 0.1 percent).

Table A3.2 presents descriptive statistics for nominal and real wholesale prices of cheddar cheese like the ones reported in Table 5. To adjust the nominal wholesale cheddar cheese price for inflation, the PPI reported by U.S. Bureau of Labor Statistics (2022c) for cheese manufacturing is used. The monthly average real cheddar cheese price increases from \$1.00 per pound in the pre-HR period to \$1.02 per pound in the HR period (or by 1.5 percent). This price decreases to \$0.97 per pound in the post-HR period (or by 4.8 percent).

**Table A3.1. U.S. Yearly Nominal and Real Milk Prices Received by Dairy Farmers, 1995–2014.**

Period	Nominal milk price	PPI for raw farm milk	Real milk price, PPI adjusted
	\$ per cwt	1982 = 100	\$ per cwt
Average (coefficient of variation)			
Pre-HR period (1995–2002)	13.79 (0.09)	101.60 (0.09)	13.57 (0.01)
HR period (2003–2010)	15.47 (0.16)	115.30 (0.16)	13.42 (0.00)
Percentage change in HR period relative to pre-HR period	12.2 (78.4)	13.5 (83.1)	-1.1 (-70.5)
Post-HR period (2011–2014)	20.75 (0.11)	154.45 (0.11)	13.43 (0.00)
Percentage change in post-HR period relative to HR period	34.1 (-31.4)	34.0 (-31.5)	0.1 (-58.0)

Source: For nominal prices was U.S. Department of Agriculture, National Agricultural Statistics Service (2022).

Note: “PPI for raw farm milk” is Producer Price Index commodity data for farm products (raw milk), series ID WPU016 (U.S. Bureau of Labor Statistics 2022b).

Real price = (Nominal price / PPI) \* 100.

**Table A3.2. U.S. Monthly Nominal and Real Wholesale Cheddar Cheese Prices, 2000–2014.**

Period	Nominal wholesale cheese price	PPI for cheese	Real wholesale cheese price, PPI adjusted
	\$ per pound	1981/06 = 100	\$ per pound
Average (coefficient of variation)			
Pre-HR period (01/2000–06/2003)	1.23 (0.14)	122.49 (0.05)	1.00 (0.09)
HR period (07/2003–12/2010)	1.54 (0.17)	151.31 (0.11)	1.02 (0.09)
Percentage change in HR period, relative to pre-HR period	25.5 (20.3)	23.5 (106.4)	1.5 (5.6)
Post-HR period (01/2011–12/2014)	1.86 (0.13)	192.48 (0.09)	0.97 (0.06)
Percentage change in post-HR period, relative to HR period	20.8 (-26.3)	27.2 (-20.3)	-4.8 (-34.6)

Source: For nominal prices was U.S. Department of Agriculture, Agricultural Marketing Service (2022).

“PPI for cheese” is Producer Price Index (industry data) for the cheese manufacturing, series ID PCU311513311513 (U.S. Bureau of Labor Statistics 2022c).

Real price = (Nominal price / PPI) \* 100.

Table A3.3 presents descriptive statistics for nominal and real wholesale prices of butter like the ones reported in Table 5. To adjust the nominal wholesale butter price for inflation, the Producer Price Index (PPI) reported by U.S. Bureau of Labor Statistics (2022d) for creamy butter manufacturing is used. The monthly average real butter price increases from \$1.33 per pound in the pre-HR period to \$1.35 per pound in the HR period (or by 1.4 percent). This price further increases to \$1.38 per pound in the post-HR period (or by 2.7 percent).

**Table A3.3. U.S. Monthly Nominal and Real Wholesale Butter Prices, 2000–2014**

Period	Nominal wholesale butter price	PPI for butter	Real wholesale butter price, PPI adjusted
	\$ per pound	1984/06 = 100	\$ per pound
Average (coefficient of variation)			
Pre-HR period (01/2000–06/2003)	1.26 (0.25)	94.49 (0.23)	1.33 (0.03)
HR period (07/2003–12/2010)	1.45 (0.19)	107.29 (0.17)	1.35 (0.03)
Percentage change in HR period, relative to pre-HR period	15.2 (-23.8)	13.5 (-27.7)	1.4 (-11.2)
Post-HR period (01/2011–12/2014)	1.81 (0.18)	130.64 (0.18)	1.38 (0.02)
Percentage change in post-HR period, relative to HR period	24.8 (-5.3)	21.8 (4.9)	2.7 (-29.5)

Source: For nominal prices was U.S. Department of Agriculture, Agricultural Marketing Service (2022).

Note: “PPI for butter” is Producer Price Index (industry data) for the creamy butter manufacturing, series ID PCU3115123115120 (U.S. Bureau of Labor Statistics 2022d).

Real price = (Nominal price / PPI) \* 100.

Table A3.4 presents descriptive statistics for nominal and real retail prices of fluid whole milk like the ones reported in Table 5. To adjust the nominal retail fluid whole milk price for inflation, the Consumer Price Index (CPI) reported by U.S. Bureau of Labor Statistics (2022e) for fresh whole milk (U.S. city average) is used. The monthly average real fluid whole milk price decreases from \$1.73 per gallon in the pre-HR period to \$1.71 per gallon in the HR period (or by 1.0 percent). This price further decreases to \$1.65 per gallon in the post-HR period (or by 3.8 percent). The teaching note Excel file includes data and calculations, which results presented in Tables A3.1–A3.4.

**Table A3.4. U.S. Monthly Nominal and Real Retail Fluid Whole Milk Prices, 2000–2014.**

Period	Nominal retail fluid whole milk price	CPI for fluid whole milk	Real retail fluid whole milk price, CPI adjusted
	\$ per gallon	1982 - 1984 = 100	\$ per gallon
<b>Average (coefficient of variation)</b>			
Pre-HR period (01/2000–06/2003)	2.79 (0.03)	161.20 (0.03)	1.73 (0.02)
HR period (07/2003–12/2010)	3.27 (0.10)	190.67 (0.09)	1.71 (0.02)
<i>Percentage change in HR period, relative to pre-HR period</i>	17.2 (242.8)	18.3 (225.9)	-1.0 (-17.3)
Post-HR period (01/2011–12/2014)	3.55 (0.03)	215.80 (0.04)	1.65 (0.02)
<i>Percentage change in post-HR period, relative to HR period</i>	8.8 (-64.0)	13.2 (-53.9)	-3.8 (47.1)

Source: For nominal prices was U.S. Bureau of Labor Statistics (2022a).

Note: “CPI for fluid whole milk” is Consumer Price Index for fresh whole milk, U.S. city average, series ID: CUUR0000SS09011 (U.S. Bureau of Labor Statistics 2022e).

Real price = (Nominal price / CPI) \* 100.

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5(2) doi: 10.22004/ag.econ.333524

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