Chapter 10
Current and Emerging Research on Economics of Higher Education

Abstract In this concluding chapter, we briefly revisit each of the topical areas in the economics of higher education that we have covered in Chaps. 3, 4, 5, 6, 7, 8, and 9 of this book. Our purpose here is not to summarize the content of those chapters. Instead, for each broad topical area or chapter, we introduce and examine a subtopic that has been the focus of more *recent* and *current* economic research in each subject. Current research is the best indicator of future research. Therefore, by considering representative examples of recent research on a subtopic related to each chapter of the book, we hope to illustrate future directions toward which economic research has recently been, or is now, moving in each of the broad areas.

Each chapter of this book applies economic concepts, theories and models to the study of higher education. The first chapter provides an overview of economic reasoning. It introduces the economic concepts and methods that underlie how economists think and how they do their work. In particular, the chapter examines those economic concepts, models and methods that are most essential to an understanding of the economic models of optimal decision making. Economists use models of optimal decision making to study and analyze the behavior of individuals and institutions in pursuit of their goals and objectives subject to multiple constraints in the context of higher education.

In this concluding chapter, we briefly revisit each of the topical areas in the economics of higher education that we have covered in Chaps. 3, 4, 5, 6, 7, 8, and 9 of this book. Our purpose here is not to summarize the content of those chapters. Instead, for each broad topical area or chapter, we introduce and examine a subtopic that has been the focus of more *recent* and *current* economic research in each subject. Current research is the best indicator of future research. Therefore, by considering representative examples of recent research on a subtopic related to each chapter of the book, we hope to illustrate future directions toward which economic research has recently been, or is now, moving in each of the broad areas.

The topics that we have covered in Chaps. 2, 3, 4, 5, 6, 7, 8, and 9 of this book were arranged into two distinct groups. Chapters 2, 3, 4, 5, and 6 applied economics to analyze how and why students and society participate in higher education. In brief, students and society participate in higher education because investment in higher education—i.e., investment in human capital—yields a profitable return, which reflects the relative private benefits and private costs of attending college in general

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or choosing to attend a specific college, which in turn, motivates students to participate as part of the demand for enrollment in higher education. Finally, these students' investments in higher education may also generate public benefits (positive externalities) that accrue to others and motivate society to seek the provision of a greater amount of investment in higher education than students would choose based on their private benefits alone. So, in combination, this group of chapters (Chaps. 2, 3, 4, 5, and 6) particularly focused on the "demand" side of the higher education marketplace.

On the other hand, Chaps. 7, 8, and 9 applied economics to analyze the supply side of higher education markets. We drew on concepts and models from the microeconomic theory of the firm to study how institutions behave or operate in the marketplace. In Chap. 7, we used revenue theory to analyze institutional behaviors related to the question "where does the money come from" that enables colleges and universities to effectively operate. And we focused on cost theory to analyze institutional behaviors related to the question "where does the money go" when colleges and universities allocate their budgets in ways that pay their bills and cover the costs of providing educational services.

In Chap. 8 we used economic concepts and models to analyze those institutional behaviors that relate to markets, competition, and production. We relied on microeconomic theories of market structures to analyze how colleges and universities compete with each other for students and for non-tuition resources, such as subsidies, including private donations or government appropriations. We then applied microeconomic concepts to analyze how colleges and universities engage in both price and non-price competition. Finally, we used the production function to model how institutions process inputs into valued educational outputs for student consumers, and extended the model to analyze the potential impact of online and distance education on students and institutions in the marketplace.

In Chap. 9, we took the concepts, theories and models of labor economics to study the wages and employment of faculty in the academic labor market. Both labor supply and labor demand models offer a good deal of explanatory power about a wide range of characteristics and outcomes of faculty labor markets. We used the economic models of demand and supply in faculty labor markets to examine how individual, institutional, disciplinary, environmental and other factors explain variations in salaries and employment across individual faculty members. These markets are the source of faculty, an essential resource in institutional provision of the educational products that student consumers demand. So, in combination, this group of chapters (Chaps. 7, 8, and 9) particularly focused on the "supply" side of the higher education marketplace.

Research on Investment in Human Capital and College Choice

Economists view going to college as an investment in human capital. These investments result in both benefits and costs to students and to society. Human capital theory serves as an economic model of optimal decision making in which

students compare the expected benefits and costs of a possible investment in higher education. The framework of human capital theory enables economists to better explain and predict the process and outcome of students in pursuit of an optimal investment decision in higher education. As explained in some detail in Chap. 2, the topical terrain of research in the economics of higher education first expanded into those areas of interest that were the most clearly grounded in, and connected to, human capital theory.

Today, economic researchers continue to rely heavily on human capital theory to explain the postsecondary decisions of students. In their book *The Race between Education and Technology*, economists Goldin and Katz (2008) refer to the twentieth century as the "human capital century". To explain this appellation, they assert, and empirically demonstrate, that America's investment in education—at high school, college and post-baccalaureate levels—played a very prominent role in the remarkable growth of the economy and in America's international leadership in the educational attainment of its citizenry and workforce in the twentieth century. They make further use of the construct of human capital to explain how the human capital century was really "a tale in two parts" (p. 42).

From 1900 to the 1970s, America's record of investment in human capital through education established the nation as the world's leader in educational attainment in terms of the numbers of students going to college and earning degrees at various levels. However, after unparalleled advancement in educational attainment in the first three-quarters of the twentieth century, during the final quarter, rates of educational attainment in the US began to level off and even declined for some subgroups, and showed no growth, or slow growth, at best. During this period, rates of educational attainment at both high school and college levels plateaued. Beginning in the 1970s, and aided in part by a sustained period of slower growth in the numbers of college graduates, rates of return to human capital investments in college degrees increased substantially and reached historically-high levels on into the twenty-first century (Goldin & Katz, 2008). During this period, rates of college participation or enrollment have, and continue to, respond favorably to the rising rates of return to investment in college.

The study of college choice behavior—i.e., examining how various factors affect students' decisions about whether or not to attend college, which college to attend, and whether or not to persist at that college—continues as a vibrant focus of current research. One development in recent college-choice research that is attracting a growing number of researchers is captured in the concept of *undermatching*. Undermatching is said to occur when low-income, but high-achieving, students do not apply to a more selective college or university for which they are academically qualified and are likely to be admitted, and in which they would have similar academic qualifications as their peers (Bowen, Chingos, & McPherson, 2009). Because these selective colleges and universities often have substantial resources per student, high persistence and graduation rates, very favorable college outcomes, and often provide lower net prices than less selective institutions because of the more substantial financial resources they have to devote to institutional grants, there is concern that students who undermatch are missing out on potential benefits which may also spill over to society.

Two broad patterns of application behavior have been observed in recent economic research in this area. Hoxby and Avery (2013) observed that the actions of high-achieving students varies substantially according to whether or not the student is from a low- or high-income background. In particular, the behavior of low-income, high-achieving students is typically quite different from that of their equally high-achieving but high-income counterparts. High-income high-achieving students tend to follow the standard high school counselor's advice and apply to some colleges that would be likely matches for their academic qualifications, some schools whose average student test scores might be a bit beyond their own academic credentials (overmatches), and some safety schools where students average test scores are a bit below their own scores (undermatches). When high-achieving low-income students make college-choice decisions that are similar to their high-income counterparts, Hoxby and Avery refer to their behavior as "achievement-typical." However, when high-achieving low-income students only apply to colleges where average test scores are less than their own academic credentials, their behavior is called "income-typical" because they act in ways that are consistent with their income level and not their academic achievement.

Recent research indicates that undermatching is a pervasive occurrence. In addition, the most consistent results indicate that the likelihood of student undermatching behavior increases significantly for lower-income students, first-generation students and rural students (i.e., such students are more isolated and dispersed).[1] One particularly noteworthy effort of economists' recent work has been the administration of an intervention—on a national scale—that targeted high-achieving low-income students (Hoxby & Turner, 2013). The "ECO-Intervention" included such elements as providing students in the treatment group with carefully-crafted information on the application process, information about the actual net prices of colleges, and a no-paperwork-needed waiver of application fees. The successful effects of the intervention are impressive: the college-going behaviors of high-achieving low-income students in the treatment group changed. The intervention resulted in less undermatching behavior due to students submitting more applications overall, more applications and admissions to more selective colleges and universities, greater use of application fee waivers, as well as actual enrollment in more selective institutions. These advances are quite promising and economic research in the area of college choice continues to expand and deepen. What is not clear, however, is why some low-income, high-ability students do not apply to more selective institutions, and whether changing their behavior is truly in the best interest of the student. As noted in Chap. 3, students are thought to base their college decisions on expected utility, which encompasses a range of financial and consumptive benefits and their own unique preferences. It is possible that many students who exhibit "undermatching" behavior are actually making rational decisions in their selection of institutions that are consistent with their preferences by choosing to apply to colleges where they feel that they will be happiest and most successful.

[1] For example, see Belasco and Trivette (2015), Bowen et al. (2009), Hoxby and Avery (2013), Roderick, Nagaoka, Coca, and Moeller (2009, April), and Smith, Pender, and Howell (2013).

Research on Rates of Return to Higher Education

During the late 1950s and early 1960s, when economists successfully established human capital theory as the foundational theory for the field of economics of education, they were also developing methodologies for the estimation of rates of return to investments in higher education. Since that time, economists have continued to be very interested in estimating rates of return to education, as evidenced by the vast literature that has been created via economists' increasingly sophisticated methodological efforts to validly estimate these returns.[2] In their thorough analysis of the role of investment in education in the growth of the American economy through the twentieth century and into the early twenty-first century, Goldin and Katz (2008) estimated that by 2005, the rate of return to 1 year of college ranged from 13 to 14 %. As the authors indicate, these estimates are historically high, and therefore, have been and continue to be attractive to students making college-going decisions. A more recent review of research on returns to education reports that returns in the United States range from about 6 to 14 %—a range that is inclusive of Goldin and Katz's estimates of 13–14 %—depending on variations in use of samples and methodologies (Gunderson & Oreopoulos, 2010). And as described in Chap. 4, Toutkoushian, Shafiq, and Trivette (2013) recently showed how to adjust aggregate-level estimates of the return to college for the risk of non-completion, and found that while the average returns for all college-goers were lower than in prior estimates for only college graduates, they were still substantial.

In recent years, many voices, from President Obama to policy analysts and scholars, have expressed a resurgence of interest in the potential benefits of providing free tuition at public 2-year colleges.[3] At the same time, scholars who recognize and emphasize the value of community college education have expressed concern that some economists and other social scientists have suggested that undermatched students should have attended a more selective college—i.e., a 4-year college—rather than a community college.[4] In order to more fully examine and estimate the labor market outcomes of community college education, economists have conducted a series of key studies related to the estimation of returns to sub-baccalaureate education—including credits and credentials.[5] One characteristic of a number of these recent studies is that the researchers are taking advantage of

[2] See Card (1999) for a comprehensive review of much of this literature, with a special focus on analysis of the variety of methodological approaches to the estimation of returns on investment in education.

[3] President Obama recently proposed a version of this plan. See the Mangan and Supiano (2015) article on "The Players Who Influenced Obama's Free-College Plan" on *Inside Higher Education*, January 11, 2015. This article provides some information about the proposal, along with the origins of the ideas in the plan.

[4] For example, see Belfield and Bailey's explanation of this concern (2011, p. 47).

[5] See, for example, Bahr (2014), Belfield and Bailey (2011), Cellini and Chaudhary (2014), Dadgar and Weiss (2012), Jepsen, Troske, and Coomes (2014), and Liu, Belfied, and Trimble (2014).

new large state-level datasets consisting of administrative data on students and institutions that have become available in several states including Kentucky, North Carolina, Texas, and Washington State.[6]

In general, findings from these latest studies of the labor market returns to credentials and credits from sub-baccalaureate education are consistent with those of earlier studies, as reviewed by Belfield and Bailey (2011). These studies typically assess labor market outcomes in terms of estimated earnings gains associated with completion of a credential (i.e., associate's degrees and certificates) or completion of credits at community colleges. Research has consistently shown that investments in associate's degrees yield significant and substantial earnings gains compared to high school graduates, averaging 13% for men and 22% for women, albeit returns vary substantially across different fields of study. Almost all studies have found that earnings gains are higher for women than men, regardless of the credential earned or the field of study. Students attending community colleges, without earning a credential, still experience average earnings gains of 9% and 10% for men and women, respectively. In general, earnings gains are greatest for associates degrees and certificates earned in quantitative and/or vocational-technical fields, such as health-related fields (especially nursing), accounting, engineering, computing, transportation, and protective services.

As noted above, the patterns of findings from these latest studies estimating earning gains from credentials and credits earned at community colleges are quite consistent with those of earlier studies. However, in many previous studies, more limited data required that researchers often estimate only returns to associate's degrees. One new and distinctive characteristic of the recent spate of new state-level studies is that the more detailed data available to these researchers has made it possible for them to obtain robust estimates of earnings gains for many community college certificate programs, in addition to the returns to associate's degrees like those produced in previous studies.[7] As a result, one consistent and noteworthy finding of these new studies is that the earnings gains from long-term certificate programs—like those for most associate's degrees—are also substantial and statistically significant. In general, the labor market returns to investment in community college certificate programs follow patterns similar to those seen in the returns from associate's degrees—e.g., earnings gains are consistently higher for women than men, and they are greatest for certificates earned in the types of quantitative and/or vocational-technical fields like those listed above. However, it is important for policy makers to focus on both the level and rate of return to these certificates, and take into account the risk of non-completion when measuring the return for all students who began such programs.

[6] For example, for a study using data on Kentucky see Jepsen et al. (2014), for North Carolina see Liu et al. (2014), for Texas see Andrews, Li, and Lovenheim (2012), and for Washington State see Dadgar and Weiss (2012).

[7] The new state-level datasets provide some additional benefits for researchers. For example, as Liu et al. (2014) explain, another "important distinction between these newer studies and earlier studies is that the newer studies make comparisons within the sample of postsecondary students and not between postsecondary students and high school graduates who never attended college" (p. 44).

Research on Demand and Supply for Higher Education

The early studies of the demand for higher education—i.e., enrollment demand—used national, state and institutional data on a variety of environmental and institutional variables in order to explain and predict enrollment demand, as well as to estimate the effects of environmental and institutional variables on that enrollment demand.[8] Economists have continued to study the effects of such factors on enrollment demand well into the twenty-first century. Recently, the "Great Recession" in the decade of the late 2000s and early 2010s created shocks to, or changes in, many factors that can affect enrollment demand at the institutional, state or national levels. The Great Recession was different in many ways from the more common cycles of contraction and expansion in the economy. As a result, economists have recently conducted a series of studies that test the various elements of the theories of demand (and supply), assess their explanatory power in application to enrollment demand, and estimate the effects of various factors on enrollment demand—and its determinants—during the Great Recession.[9]

In recessionary periods, economic theory predicts that higher unemployment rates result in reduced foregone earnings—a large component of the costs of college—which, in turn, leads to increases in demand for higher education. At the same time, potential college students have less taxable income and falling home values during a recession, both of which tend to reduce subsidies (i.e., state appropriations) to public institutions that typically respond by raising tuition to help generate revenue to offset declining state subsidies. In combination, the lower household incomes and the rising tuition lead to decreases in enrollment demand. The net effect on enrollment demand of these positive and negative forces depends on the relative magnitudes of the opposing effects. All of these factors are present, and ordinarily play themselves out, in any recessionary phase of a business cycle.

However, the Great Recession is distinguishable from ordinary recessions in a number of important ways (Long, 2015). First, both the costs of college and the debt levels of students were already at historically high levels prior to the onset of this recession. Second, loans to students played a far larger role than they had in any prior recession. Third, the Great Recession occurred just as institutions of higher education were about to experience the demographic shock of the largest graduating cohort of high school students. By itself, an increase in the number of high school graduates would tend to increase enrollment demand. Thus, the characteristics that distinguish the Great Recession from other prior recessions engender even more forces with opposing effects on enrollment demand.

[8] Most of these early studies of the demand for higher education (enrollment demand) occurred in the 1970s and 1980s. These studies were well reviewed in Becker (1990) and Paulsen (1990).

[9] Some examples of economists' research on the effects of the Great Recession on higher education enrollment include the following: Brown and Hoxby (2015), Long (2015), Barr and Turner (2013) and Barr and Turner (2015).

In Long's (2015) study of the effects of the Great Recession on college enrollment, she examines multiple characteristics of enrollment growth as well as the effects on factors that influence enrollment growth. For her analysis, she distinguished between states according to how severely they were affected by the recession. In particular, she identified states with the most substantial increases in unemployment and decreases in housing values as the most severely affected by the recession. Overall, college enrollment increased during the period; however, enrollment increased the most in states that were the most negatively affected by the recession. Separating the effects on full-time versus part-time enrollment revealed that while full-time enrollment levels were somewhat lower during the recession, part-time enrollment grew substantially across all states during the recession. While white student enrollment showed modest increases overall, white enrollment decreased somewhat in states most severely affected during the recession. On the other hand, minority student enrollment grew substantially in states that were impacted the most by the recession. Completion of certificates and degrees increased during this time, and less-than-1-year certificates grew the most. However, in states hit hardest by the recession, longer-term certificates, associate's and bachelor's degrees all increased. Both gross and net tuition went up over this period, increasing significantly faster in states most affected by the recession. While the percentage of students receiving Pell grants increased in states most severely affected, the average amount received decreased across all states during the recession.

A study by Barr and Turner (2013) complements the findings from Long's study in several ways. For example, the largest share of the increased enrollment during the Great Recession, or specifically between 2007 and 2010, occurred at community colleges (32 %). The next largest increase was at for-profit colleges (30 %), the third largest was at public 4-year colleges and universities (27.4 %) and finally, only about 10% of the increase in enrollment was at private non-profit institutions. During the Great Recession, the American Recovery and Reinvestment Act provided generous increases in funding for the Pell grant. The Pell grant is "countercyclical" in the sense that during a recession more students and families become eligible to receive a Pell grant. This effect was greater than usual during the Great Recession and Barr and Turner assert that this effect, and the generous increase in Pell grant funding, help explain the large increase in college enrollment among low-income students during the Great Recession. As state appropriations decreased during (and after) the recession, public institutions had to look to alternative revenue sources. One of these sources is out-of-state students. Therefore, it is noteworthy that enrollment of out-of-state students increased from 2007 to 2010 by 15 % at flagship public universities and 20 % at other public research universities.

Finally, in another study of the effects of the Great Recession on college enrollment, Barr and Turner (2015) examine the effects of the duration of unemployment insurance (UI) available for displaced workers on college enrollment. They find that each "additional 10 weeks of UI benefits increase enrollment likelihoods by around 1.8 percentage points, or by about 20 %" (p. 63). Not surprisingly, most of this growth occurs in two-year colleges.

As part of studying the many effects of the Great Recession, economists have been learning more about the various ways in which the worst recession since the 1930s has affected, and is affecting, colleges and universities and the overall higher education marketplace. We expect that both the severity and the complexity of conditions associated with the Great Recession will continue to motivate and direct economists in their areas of focus for research on the determinants of college enrollment demand.

Research on Positive Externalities and Government Intervention

American citizens long ago committed themselves to a belief that all of society—i.e., both students and the public—benefit from a high school education. This commitment can be assessed by noting that American citizens have been willing to sufficiently tax themselves so that every individual is guaranteed a public education from kindergarten through high school at no direct charge to the student. This commitment expresses a strong belief in substantial public benefits of an education through high school. Even at the postsecondary level, until recent years, citizens have been willing to sufficiently tax themselves so that a very large portion of the tuition that students would otherwise have to pay to attend public colleges and universities could likewise be covered by subsidies to public institutions.

Nevertheless, in recent decades, many contributors to public rhetoric have increasingly asserted that the benefits of investments in higher education are mostly private—i.e., they accrue primarily to the student who gets the education. During and since the Great Recession in the late 2000s, on average, states have reduced subsidies to their public institutions to the point that college students and their families are now responsible for paying the majority of the costs of attending an in-state public institution themselves. This is understandable, in part, because the private benefits (and costs) of college are much easier to identity and calculate, and they have been much more widely studied and publicized, than the public benefits of college investments. Nevertheless, the substantial and continuing decreases in states' relative investments in the higher education of their citizens have contributed, at least in part, to a new wave of interest among economists in examining the costs and benefits of higher education—with a special focus on, or at least greater attention to—the public or external benefits of higher education.[10]

In one of a series of related studies, Trostel (2010) focused on estimating the fiscal benefits of public investment in college education. This is quite a worthwhile

[10] For example, see Baum, Ma, and Payea (2013), Damon and Glewwe (2011), Institute for Higher Education Policy (2013), McMahon (2006, 2009, 2010), Paulsen and Fatima (2007) and Trostel (2010).

way to investigate the return to public investment in higher education, especially because from a fiscal perspective, one can more readily identify and quantify the public or external benefits and costs. The fiscal benefits of public investment in higher education can be broadly identified as the two sources of expansion of the government budget or public coffers that result from public investments in the college education of citizens. First, college graduates pay much more in taxes than high school graduates, and thereby, generate considerably more tax revenue available for government spending on public services. Second, government expenditures on various social programs, such as corrections or Medicaid, are much less for college graduates than for high school graduates. The contributions that college graduates make to the public coffers—in both increased tax revenues and reduced government expenditures—constitute unambiguous external benefits to investment in higher education.

Using data for the fiscal year 2005, Trostel was able to estimate the public fiscal cost of investment and compare that to estimates of the fiscal contributions to public coffers from college graduates. He separated the federal from the state and local fiscal benefits. This is an important step, because it clearly reveals the fact that most of the fiscal benefits that results from these public investments—as identified above—accrue to the federal government, while most of the fiscal cost of public investment in bachelor's degrees occurs at the state level. Therefore, the fiscal rate of return to federal investment in higher education is greater than that for states; however, the overall estimate of the average *fiscal rate of return* to public investment in higher education is 10 %.

Of special interest is Trostel's detailed effort to estimate the many sources of reductions in government expenditures on public services due to the increasing share of the populace with college degrees. These include decreased public expenditures on Medicare, Social Security, Medicaid, corrections, unemployment insurance, workmen's compensation, public healthcare, and other public assistance—such as food stamps, school lunches, housing subsidies, childcare assistance, energy assistance, and transportation assistance. The first two of these—Medicare and Social Security—are among the largest components and the complex effects of investment in additional college graduates on these two programs are noteworthy. On the one hand, because college graduates have longer average lifespans than high school graduates, they may collect benefits from both of these programs for more years (i.e., greater fiscal costs). However, college graduates also pay taxes at higher rates and for more years, have significantly less health problems, and they retire and begin collecting benefits from both these programs at more advanced ages (i.e., greater fiscal benefits). Ultimately, for each additional bachelor's degree, the present values of fiscal benefits exceed those of fiscal costs so that the result is a significant net saving for government. Only the *direct* fiscal effects of increased tax revenues and decreased expenditures on public services are considered. The *indirect* effects of higher education investment on economic growth, which in turn, affects tax revenues and government spending, are not considered in this analysis. This means that the reported rates of return in this study are likely to be underestimates of the true returns to such investments.

In a related study, Damon and Glewwe (2011), also using data for fiscal year 2005, conducted a study to estimate the private and public benefits due to the subsidies the state provides to Minnesota's public universities. In order to make some of their important estimates, the authors assumed that without the state subsidies, public institutions would have to raise their tuition to levels commensurate with those of Minnesota's private colleges in order to acquire sufficient revenue to replace that provided by the public subsidies. As a result, what they call non-marginal students would either pay the higher tuition and stay at Minnesota's public colleges or attend a private college—i.e., their educational levels would not change—while those they call marginal students require the subsidies to pursue their college degrees and in the face of higher tuition, their educational attainment levels would decrease. This potential loss of marginal students is an important mechanism for assessing the private and public benefits that would occur as a result of the public subsidies to public universities in Minnesota.

After estimating the real economic costs of the subsidies to public universities, Damon and Glewwe examined each component of the private and public benefits related to the public investment in subsidies. For example, they estimate that the subsidies will induce the marginal students to pursue their educational attainment plans to complete college degrees and earn higher wages (private benefits), while these additional college-educated individuals in the workforce will generate spillover or external benefits to the public through interaction with less-educated workers (public benefits). In addition, college graduates have lower unemployment rates than high school graduates (private benefits), are more civically engaged, and have lower government expenditures on crime and incarceration (public benefits). After all estimates are summed and compared, results indicate that the total value of the public plus private benefits of the public subsidies to public institutions exceed the economic cost of the subsidies by a substantial margin—whether using the "conservative" or "very conservative" assumptions about benefits. The challenge with this type of work, however, is how to isolate the benefits that are due to the causal impacts of higher education rather than the average characteristics of college students per se.

Research on Higher Education Revenues and Expenditures

Between 2007–2008 and 2013–2014, state funding for public colleges and universities, per full-time equivalent student, decreased by an average of 23 % across the United States. This is a relatively recent part of a long-term downward trend in state appropriations to higher education that began in the 1980s. During the 10-year period from 2001–2002 to 2010–2011 the percentage of institutional revenues from state funding decreased from 44 % to 27 % for public doctoral universities and 55 % to 35 % at public master's universities (College Board, 2014). Public institutions have understandably come to view cuts in state funding as the norm. Obviously, public universities—and all public institutions—have had to find ways to replace

these substantial losses in revenues. Public institutions have used a variety of ways to replace lost state funding with alternative revenue sources. Some examples include increases in published (sticker) prices and net prices, increases in private voluntary support, increases in tuition discounting, and increases in out-of-state enrollment (Brown & Hoxby, 2015; Cheslock & Gianneschi, 2008; College Board, 2014; Hillman, 2012; McKeown-Moak & Mullin, 2014; Zhang, 2007).

Many public universities—and public flagship universities in particular—have engaged in a strategic focus on the tuition-revenue-generating potential of out-of-state students; and this practice has been an important focus of recent economic research.[11] In their study of nonresident freshmen enrollment demand, Jaquette and Curs (2015) found that state appropriations are negatively and significantly related to nonresident enrollment, while controlling for a wide range of appropriate covariates. Moreover, they found that a one-percent decrease in state funding was associated with a .46% increase in nonresident enrollment at public research universities; and a .50 % increase in nonresident enrollment at research-extensive universities in particular. The authors assert that these findings indicate that reductions in state appropriations "compel" public universities—and especially public research universities—to increase their nonresident enrollment as an effective tuition-revenue-generating strategy.

The tuition-revenue-generating effectiveness of nonresident enrollment strategies is quite understandable, especially in light of recent estimates of the price-elasticity of nonresident enrollment. Zhang (2007) found that nonresident enrollment, across all public four-year institutions, was inversely related to nonresident tuition and inelastic; while at public research universities in particular, nonresident enrollment was not responsive to, and not significantly related to, changes in nonresident tuition. Similarly, Winters (2012) found that nonresident enrollment was not responsive to, and not significantly related to, changes in nonresident tuition at either flagship or non-flagship public universities. Moreover, Adkisson and Peach (2008) found that nonresident enrollment at public land grant universities was directly related to nonresident tuition and was elastic.[12]

[11] For example, see Adkisson and Peach (2008), Canche (2014), Jaquette and Curs (2015), Jaquette, Curs, and Posselt (in press), Leeds and DesJardins (2015), Winters (2012), and Zhang (2007).

[12] The finding of a positive relationship between nonresident tuition and nonresident enrollment (Adkisson & Peach, 2008) is counter-theoretical to price theory. Nevertheless, a number of plausible explanations of this result for nonresident enrollment demand have been proposed (e.g., see Zhang, 2007). One possible explanation is that some nonresident students may view price as an indicator or signal of quality and respond favorably to higher quality in their enrollment decision-making. Another plausible explanation is that nonresident students are more likely to enroll for reasons other than the published nonresident tuition level. In support of this, Leeds and DesJardins (2015) have found that nonresident students who have sufficiently high academic scores to qualify for the University of Iowa's National Scholars Awards (NSA)—for which only nonresident students are eligible—are significantly more likely to enroll than their peers who did not receive the NSA. Moreover, analysis of subgroup behavior showed that minorities were more responsive in their enrollment to NSA receipt than their white counterparts.

There are three possibilities to explain how institutions can use the nonresident student market to increase revenues. First, when nonresident enrollment is inversely related to nonresident tuition and is inelastic, then for a given percentage increase in nonresident tuition, nonresident enrollment decreases by a smaller percentage, resulting in an increase in tuition revenue from nonresident students. Second, when nonresident enrollment is not significantly related to nonresident tuition, then for a given percentage increase in nonresident tuition, nonresident enrollment would be unchanged, which also results in an increase in tuition revenue. Finally, when nonresident enrollment is directly related to nonresident tuition and elastic, then for a given percentage increase in nonresident tuition, nonresident enrollment increases by a larger percentage, resulting in an even more substantial increase in tuition revenue from nonresident students.[13]

Research on Higher Education Competition and Production

It is not just rates of enrollment, but also the transformation of enrollment rates into more productive rates of degree completion, that ultimately determines the supply of college-educated workers in the labor force (Turner, 2004). Finding ways to convert more enrollments into degrees is a very important part of the investment in higher education. Many economists and other policy researchers have often focused on explaining rates of enrollment—an important step in an investment in higher education. Unfortunately, until recently, economists had been paying far less attention to explaining rates of educational attainment (i.e., degree completion) and the process by which students and colleges, in varying policy contexts, transform college enrollment into college completion. The outcome of this process is college and university *production* of degrees.

Fortunately, in recent years, research in the economics of higher education has begun to pay a good deal more attention to the determinants of college completion, and therefore, a further expansion in America's investment in the human capital of its workforce and citizenry. One noteworthy example of this development can be seen in the book by Bowen et al. (2009), the primary focus of which is research on college completion, as reflected in book's title, *Crossing the Finish Line: Completing College at America's Public Universities*. A growing number of recent studies have continued and expanded this focus on college completion. There are at least two broad categories of possible determinants of college completion. One category includes demand-side factors, such as insufficient academic preparation or inadequate financial access for college completion. Another category includes

[13] There are, however, some unintended consequences of strategically pursuing greater tuition revenues via recruitment of nonresident enrollment. In particular, Jaquette et al. (in press) have found that when public research universities increase their proportion of nonresident enrollment, the growth in nonresident students is negatively related to the proportions of low-income and underrepresented minority student enrollment.

supply-side factors, such as resources per student available at institutions. Potential determinants of decreased educational attainment (college completion) also reflect the stratification of opportunities by SES and race/ethnicity on the demand side and the stratification of resources by institutional type on the supply side. These and other related factors are analyzed in this newly-focused, expanding literature.[14]

Even though rising labor market returns to college have yielded sustained growth in college enrollment in recent decades, rates of college completion have definitely not experienced commensurate growth; in fact, rates of educational attainment have plateaued. Using national datasets—NLS:72 for the high school class of 1972 and NELS:88 for the class of 1992—to examine college completion rates across different cohorts, a recent study by Bound, Lovenheim, and Turner (2010a, 2010b) yielded several interesting findings. For example, both lower levels of student academic preparation (e.g., lower math test scores) and reduced institutional resources per student (e.g., manifested in higher student-faculty ratios) have contributed to the reduced college completion rates. Increases in enrollment of students with lower levels of college academic preparation contributes to lower completion rates. Decreases in college completion rates are primarily concentrated in public colleges and universities outside the most selective public institutions. Increases in enrollment at these institutions, when unaccompanied by commensurate increases in public funding (i.e., subsidies), reduces the level of resources per student, which contributes to lower rates of college completion.[15] Reductions in college completion rates are greater among men than women.

Other economists have been concentrating on an institutional or state production function in which the inputs are transformed into the production of bachelor's (and other) degrees.[16] For example, categories of institutional expenditure—such as instruction, academic support, student services, research, etc.—represent the inputs (e.g., instructional expenditures = quantity of faculty x average compensation) in the production of degrees. In this context, Webber (2012) recently found that expenditures on student services have the most substantial effect on degree production for students with below-median ACT/SAT scores; while instructional expenditures have the greatest effect on degree production for students with above-median scores. In addition, instructional expenditures have a greater effect on students in STEM fields than those in non-STEM fields. Using a state-level perspective and state-level data, Titus (2009) found that state appropriations and state need-based aid for students are significantly and positively related to bachelor's degree production; while states' non-need-based aid to students have no

[14] For example, see Bound and Turner (2007), Bound, Lovenheim, and Turner (2010a, 2010b), Bowen et al. (2009), Goldin and Katz (2008), Titus (2009), Webber (2012), Webber and Ehrenberg (2010).

[15] In an earlier study, Bound and Turner (2007) refer to this phenomenon as the "cohort crowding" effect. They explain that "within public institutions, those that expand to meet population-related shifts in demand may face reductions in resources per student, further reducing attainment of enrolled students" (p. 896).

[16] See, for example, Titus (2009), Webber (2012) and Webber and Ehrenberg (2010).

significant effect on a state's degree production. This last finding of non-significance is important because about one-third of the states have implemented large merit-based aid programs in the past 20 years.

Research on Labor Issues for Faculty

Research on faculty issues in general has waned in the early part of the twenty-first century. This decline can be traced back to the decision by the Institute of Education Sciences (IES) to discontinue the National Study of Postsecondary Faculty (NSOPF). NSOPF was first administered in 1988, with additional surveys of new cross sections of faculty taking place in 1993, 1998, and 2004. These surveys provided economists and other researchers with a rich source of nationally-representative data on the personal and work characteristics of faculty, their activities and levels of satisfaction with their work, and their compensation. The many studies that were published using these data enabled researchers to make inferences to the national pool of faculty, and examine many different issues relating to labor economics as described in Chap. 9. However, IES has not administered NSOPF since the 2004 iteration, which has left a gap of more than a decade without new information on the labor market experiences of faculty. Academics who have continued to work on labor issues in higher education have had to do so using institutional-, system-, or state-level data on individual faculty when available, or rely on aggregate-level data on faculty from sources such as IPEDS and the AAUP. Accordingly, there is less research currently being conducted on faculty issues than has been true in the past.

Nonetheless, research is still taking place on labor market issues in higher education. An example of this work is a recent study by Rippner and Toutkoushian (2015), in which the authors examine the changes in the levels of pay for faculty who work at private versus public institutions. As documented by the AAUP, the average pay for faculty at private not-for-profit institutions is significantly higher than it is at public institutions. Table 9.4 in Chap. 9 showed that on average faculty are paid more in private institutions than they are in public institutions. The average pay gap for professors is particularly large at doctoral-granting institutions ($33,674), but still exceeds $10,000 even at less research-intensive colleges and universities.

Interestingly, faculty members in public institutions have not always been at a pay disadvantage relative to their peers at private institutions. In fact, the AAUP has shown that prior to the 1980s average faculty salaries were very similar across the two sectors.[17] In 1980–1981, for example, the average salaries for full professors at public institutions were 91 %, 99 %, and 103 % of the average salaries for full professors at private independent institutions in doctoral, master's, and bachelor's

[17] See Curtis and Thornton (2014) and Rippner and Toutkoushian (2015).

institutions respectively. By 2010–2011, however, these ratios had fallen to 75 %, 84 %, and 89 %, respectively. The declines in relative pay at public institutions appear to have been fairly consistent from 1980 through 2010.

Two important policy questions emerge from these observations. The first question is: what could have caused such a rapid decline in relative pay for faculty at public institutions? Labor economics would suggest that factors that have shifted the supply and/or demand curves in the two sectors could be partially to blame. For example, if the age distribution of faculty at private institutions has increased more than it has at public institutions, then some of the decline could be attributed to the fact that faculty in private institutions are now older, have more human capital, and thus merit higher salaries. Another possibility is that public institutions have directed more of their compensation to faculty in the form of medical and retirement benefits. Finally, the different levels of pay could simply reflect differences in the financial health of institutions. If private institutions have fared better than public institutions in raising revenues, then some of the financial gains may have been passed along to faculty.

Rippner and Toutkoushian explored the factors that influence relative pay for faculty in public and private institutions. In cross-sectional models, they found that the large pay disadvantage for faculty in public research institutions relative to private research institutions was largely explained by faculty, student, and institutional characteristics. However, the same factors had no effect on the relative public/private pay difference at master's institutions, and that faculty in public liberal arts (bachelor's) institutions earned more than their peers after controlling for these same factors. Therefore, the public/private pay gap is not uniform across the sectors and not fully explained by financial differences between institutions. Additionally, they looked at changes in average faculty pay between 2001 and 2011, and found that only a fraction of the higher rate of growth in faculty salaries at private institutions during this period could be explained by faculty, student, and institutional characteristics. The evidence clearly suggests that faculty jobs are becoming more lucrative in the private sector over time.

This leads to a second, and perhaps more important, policy question: what will this mean for the future of public higher education? If faculty pay continues to rise faster in the private sector than the public sector, then models of labor economics would suggest that private institutions will be able to hire and retain more higher-quality faculty than will public institutions. Such a trend could have profound effects on public higher education by possibly reducing the quality of teaching and research services. It could lead to a two-tiered system where some students would have to settle for a lower-quality education at public institutions. Likewise, the pay trend could lead to more research dollars flowing to private institutions, which means that fewer research activities would be carried out in the public sector.

Final, Final Thoughts

As evidenced by the studies discussed in this chapter, the economics of higher education is a growing and constantly-evolving area of study. Changes in what is studied and how it is done depend in part on data availability. The development of longitudinal and nationally-representative surveys of students has contributed significantly to our collective understanding of how students make choices about college and the costs and benefits of those choices. Likewise, national efforts to collect data from institutions through IPEDS has not only assisted researchers but also policy makers and practitioners who wish to study issues such as pricing, costs, and enrollments for specific purposes.

Research within the economics of higher education has also been enhanced by improvements in the collection of tools and analytical techniques that economists can bring to bear on important issues in higher education. Technological improvements in computers and computing software have made it possible for more researchers to apply very sophisticated statistical techniques to higher education data. Desktop computers today can estimate models in a fraction of the time that it would have previously taken for large mainframe computers to do the same task. And the software is increasingly user-friendly, opening the door to quantitative analysis in the field to a larger group of faculty, students, and policy analysts.

Similarly, economists have introduced a range of quantitative methods into the analysis of higher education issues, such as panel data techniques and quasi-experimental methods. These advances have gradually started to shift the type of work that is being done in the field of higher education. In particular, the increased use of quasi-experimental methods is particularly important given that many of the problems and issues that we face in higher education can be affected by the self-selection of decision makers. For example, choices about whether or not to go to college can be influenced by unobservable attributes of students (such as their motivation to succeed), and failure to try to take this into account may lead to incorrect conclusions and poor policy recommendations.

The formal study of the economics of higher education recently celebrated its 60th anniversary dating back to the pioneering work of economists including Gary Becker, W. Lee Hansen, Jacob Mincer, Theodore Schultz, and Burton Weisbrod that we have acknowledged earlier in this book. Other notable economists such as Sandy Baum, William Becker, Howard Bowen, David Breneman, Charles Clotfelter, Elchanan Cohn, Ronald Ehrenberg, Marianne Ferber, Stephen Hoenack, Larry Leslie, Lucie Lapovsky, Walter McMahon, Michael McPherson, Ronald Oaxaca, George Psacharopoulos, Michael Ransom, Morton Schapiro, John Siegfried, Paula Stephan, Joseph Stiglitz, Gordon Winston, and many others too numerous to list here, have built on this work and applied it to higher education in ways that perhaps could not have been envisioned 60 years ago when economists began to examine human capital formation and its connection to higher education.

We look for the study of the economics of higher education to grow in size and complexity in the future. Today, a new generation of economists including Thomas

Bailey, Debra Barbezat, Eric Bettinger, John Bound, Paul Brinkman, Celeste Carruthers, John Cheslock, Christopher Cornwell, Brad Curs, Susan Dynarski, Caroline Hoxby, Brian Jacob, Thomas Kane, Gregory Kienzl, Bridget Long, Brian McCall, Tatiana Melguizo, David Mustard, Leslie Stratton, Marvin Titus, Philip Trostel, Sarah Turner, John Winters, Liang Zhang, and many, many others are continuing to work on a wide range of higher education issues and introduce new (economics-oriented) approaches to research to the field of higher education. In addition, much of the work that falls under the heading of "economics of higher education" is being done by academics who were not formally trained as economists. Non-economists can often bring to the table a deeper understanding of the nuances of how higher education works, that can then be combined with the intellectual framework and techniques used by economists to study important issues. The ultimate success of this work depends in part on how well integrated economic reasoning becomes among academics in the larger field of higher education. We hope that our book is a step forward at bridging this gap and strengthening these connections.

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