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The Community College Role in Economic Development: A Conceptual Model

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Introduction

As policymakers discuss how to develop a skilled workforce, community colleges are frequently called upon both to become involved in these conversations and to become key actors in providing the education and training required to meet those development goals. Public investments in community college workforce programs have been substantial in recent decades, and over \$14 billion of that funding has come from the National Science Foundation’s Advanced Technological Education (ATE) program. In a 2019 report, the National Science Board recognized the critical contributions of the skilled technical workforce (STW) to technological innovation, recognizing community colleges as a “critical access point to the STW.” Other policymakers agree: the bipartisan CHIPS Act invests millions of dollars in community colleges to support their role in technician education via the ATE program (Miranda, 2022; Quilantan, 2023). The renewed public policy focus on technician education raises the question of how community colleges and their programs contribute to economic development efforts more broadly. Policymakers are interested in how contributions can be measured, sustained, and improved to benefit both firms and workers.

This paper is part of a series of publications stemming from an ATE-targeted research project that explores the role of community college technician education in economic development. Here, we present a broad survey of the literature on community colleges and economic development that will lay the foundation for the companion papers in this series, each of which will detail specific examples of community college technician education and economic development. After providing a brief overview of conceptions of economic development and a broad review of community colleges and economic development, we introduce a conceptual model aimed at increasing the understanding of the role of community colleges in economic development and to inform future research. In the ensuing discussion we outline the main components of community college education as it relates to economic development activities and outcomes.

Economic Development

This paper develops a concept that centers community colleges in the training of the STW and within the broader processes of economic development to ensure that recent investments in community colleges can be effectively evaluated. Economic development is inherently a complex phenomenon. By placing community colleges in this broader context, we complicate our models but improve our ability to effectively evaluate the evolving role of community colleges.

Economic development refers to all the activities that seek to promote economic activity in a region, state, or country (Galbraith, 1964; Malizia et al., 1999). This includes a range of activities that involve the use of human, financial, physical, and natural resources to create goods and services that lead to the accumulation of wealth and well-being (Malizia et al., 1999; Schumpeter & Backhaus, 2003). In recent decades, with the movement to the knowledge economy, developing a skilled workforce is increasingly recognized as an important part of economic development (Giloith, 2000; Raspe & Oort, 2006).

Economic development activity can occur on a variety of geographic levels including national, state, regional, or local. Community colleges fit most neatly into concepts of regional economic development because their services areas correspond to sub-state labor markets and political boundaries. The activities that comprise regional economic development include entrepreneurship training, recruiting firms to locate in a region, providing small business–development support, creating industrial clusters to promote industrial specialization, and developing a skilled workforce through education and training (Malizia et al., 1999; Bartik, 2009).

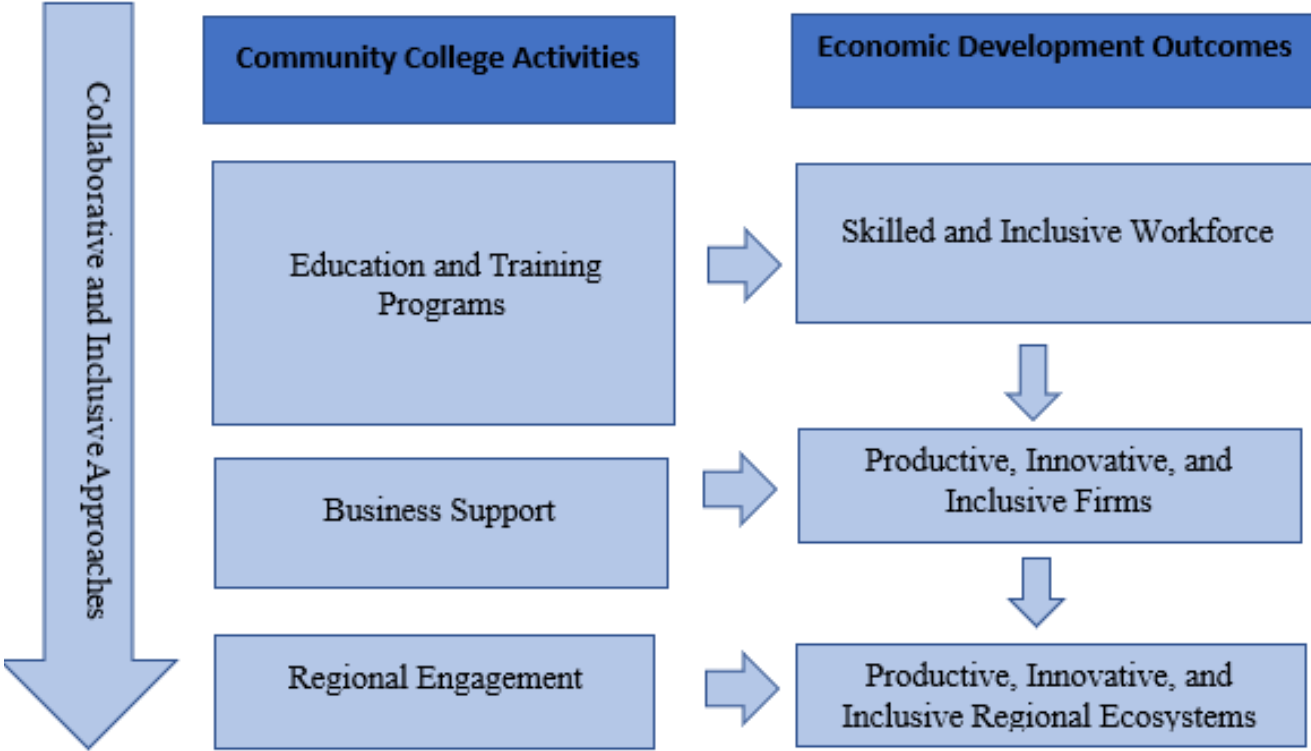
Limitations and advantages of a region include geographic characteristics such as proximity to water or the presence of natural resources that can shape the kinds of industries that develop, as well as cultural factors based in historical and social factors that shape the development of certain industries and attitudes within the workforce (Krugman, 1991; Saxenian, 1996; Ketels, 2007; Kline & Moretti, 2014; Porter, 1990, 1998). Political boundaries can define funding opportunities and leadership authority (Beer et al., 2019; Bartik, 2009). And new paradigms can shift attention. For example, inclusive economic development evaluates access to the benefits of economic growth and development for all actors/stakeholders (Malizia et al., 1999; Schumpeter & Backhaus, 2003). This view recognizes that aggregate growth in an area may mask stark structural inequalities and that public policies can be crafted to ensure that people living on low incomes, communities of color, and others marginalized from the economy also benefit from economic development efforts (Minzner, 2020; Giloith, 2000), including strategic efforts to address the needs of distressed areas where local residents need employment and career paths (Bartik, 2020).

Community Colleges and Economic Development

Traditional economic arguments for the benefits of education to economic development have relied on the measurement of years of education with the underlying assumption that an additional year of education has the same effect in any context. From this perspective, more education is better, and the type or level of education is less important. However, the empirical literature frequently finds that increases in human capital (generally measured by educational attainment) have a weak connection to observed economic growth (Bils and Klenow, 2000; Hanushek and Woessmann, 2012; Hanushek and Kimko, 2000; Jones, 2014; Lucas Jr., 2015; Baily et al., 2021). Yet, education may relate to economic development in more nuanced ways than the overall number of years of educational attainment might convey. One possibility is that the composition of education within the workforce—the mix of workers with different levels of education—makes a difference. In short, workers possessing different levels of skill and education are complementary to one another (Jones, 2014). An important implication is that we should care about intermediate levels of education in addition to four-year college attainment (see Hanushek and Woessmann, 2015). Further, the different types of education may have different impacts based on the regional economy, the characteristics of local institutions, and the economic environment (Petrakis and Stamatakis, 2002; Self and Grabowski, 2004; Breton, 2013; Kruss et al., 2015; Hendricks and Schoellman, 2018).

With this in mind, community college education may have a unique and important role in economic development. Based on our review of the literature, we offer a conceptual model, presented in Figure 1, that illuminates how community college activities relate to potential economic development outcomes. The conceptual model identifies components of community college education and illustrates how they may connect to various economic development outcomes. The three categories of economic development activities identified at community colleges provide an organizing structure for this examination and shape the categories in the conceptual model. These are: education and training to develop skills in individuals, business support to local employers by programs and colleges, and regional engagement by programs and colleges. These activities then lead to a set of potential economic development outcomes in terms of the workforce, firms, and the regional ecosystem. Each of these elements of the community college infrastructure may contribute to economic development by generating the following outcomes: a skilled and inclusive workforce in the region; more productive, innovative and inclusive firms in the region; and/or a more productive, innovative, and inclusive regional ecosystems overall.

Figure 1. Conceptual Model of Community Colleges and Economic Development



As “democracy’s college,” community colleges have long articulated a mission to broadly serve the community and to provide open access to education for those in the community who have been previously marginalized from education. With this goal in mind, community colleges are particularly well positioned to engage in inclusive economic development; they are designed to provide economic opportunity for marginalized community members. Given that community colleges serve as the primary institutions of higher learning for a wide range of students, including many from underserved populations—immigrants, minorities, first-generation college goers, and others—their potential role in inclusive economic development becomes even more important.

Community College Activities Related to Economic Development

The three areas of community college activity in our conceptual model are drawn from the prior literature on the economic development role of community colleges as it has been explored over the years (Katsinas, 1994; Grubb et. al, 1997; Dougherty & Bakia, 1999; Young, 1997; Jacobs, 2012; Harmon et. al, 2022; Schwartz & Lipson, 2023).¹ Across this literature, the most commonly mentioned activity is education and training, which involves the core function of community colleges in human capital development. The activity that is referenced most often after education and training focuses on community colleges working directly with employers in “business support,” and the third most-referenced activity is working with various institutions and local stakeholders in “regional engagement.” Table 1 summarizes how prior studies on community colleges and economic development address these three activities, providing an organizing structure for our study. We elaborate on these items in the following sections.

Table 1. Types of Economic Development Activities Engaged in by Community Colleges as Identified in Prior Research

Education and Training
Courses & programs aligned with local workforce needs
Customized training
Entrepreneurship training
Business Support
Customized training
Entrepreneurship training
Small-business incubation and assistance
Establishment of facilities for use by local companies
Technology transfer & applied research
Regional Engagement
Conducting economic scans
Participating in local economic planning/policymaking
Assisting in attracting employers to the region
Convening regional stakeholders

¹ Through searches of ERIC and Google Scholar using key words “community colleges” and “economic development” we identified a list of key articles in the past 4 decades that covered the broadest selection community colleges nationally and provide a general picture of the field.

Context influences how community colleges approach economic development. For example, many, but not all, operate on a regional level as their service areas have a regional focus for how they seek to meet community needs. In alignment with policy, states also initiate economic development efforts with their community colleges that can bring together a broader range of actors and activities (Cleary & Fitchner, 2005). For example, when Iowa sought to develop new industries aside from agriculture, the state saw a role for community colleges in providing funding mechanisms to be used for customized education and training (Friedel & Reed, 2019). Further, community colleges in rural areas have distinctive experiences (Harmon et al., 2022). Because they are spread out, they may serve a substantial population, yet they are likely to experience significant equity issues compared with their nonrural counterparts because of the lack of access to jobs in these regions. While rural areas have fewer job opportunities, however, they also tend to possess natural resources, as well as important infrastructure—both physical and communications-related—that can be valuable assets in attracting new businesses to their area.

Education and Training

The core mission of community colleges is to provide education and training; thus, their fundamental contribution to economic development is by providing individuals with skills that are sought after by employers. All prior conceptualizations of economic development build on this basic function of the community college—outlining how it supports economic development and considering particular ways it can achieve this goal such as provision of high-tech courses in line with local economic development efforts (Katsinas, 1994; Grubb et al., 1997; Dougherty & Bakia, 1999; Young, 1997; Jacobs, 2012; Harmon et al., 2022; Schwartz & Lipson, 2023). Community college programs include a vast array of fields and a range of credentials including credit-bearing programs offering associate degrees and certificates, transfer pathways to four-year degrees, noncredit programs offering certificates, or programs preparing students for industry certifications or licensure. They also offer apprenticeships and customized training programs developed for the needs of particular employers. With this wide range of offerings, community colleges seek to align their programming with industry needs and to provide students with support and career pathways leading to economic opportunity. Depending on the college, the credit and noncredit programs may work closely together or as separate entities of the college with variable levels of coordination to engage with economic development. Entrepreneurship training is another community college-based activity for individuals that can promote economic development by fostering the emergence of new businesses (Mullin & Winkel, 2019).

Business Support

Community colleges can engage in activities beyond education and training to directly support businesses. While working directly with businesses is not a core activity of community colleges, several scholars have noted this kind of engagement as an important way that the colleges contribute to economic development (Dougherty & Bakia, 1999; Jacobs, 2012; Katsinas & Lacey, 1989). These activities can include providing customized business training and small-business incubation and assistance, including working with small companies on specific issues around the application of research and technology or training; technology

transfer; and opening up college facilities for use by local companies (Dougherty & Bakia, 1999; Jacobs, 2012; Katsinas & Lacey, 1989). Customized training serves both the needs of individual students (as part of education and training) as well as employers (as part of business support).

Regional Engagement

Community colleges may engage with stakeholders at a regional level in ways that support the economy of the broader region. Regionally focused activities include conducting economic scans; economic planning; assistance in attracting employers to the region; and convening industry clusters and other stakeholders (Dougherty & Bakia, 1999; Jacobs, 2012; Katsinas & Lacey, 1989; Lipson, [First Init., year], in Schwartz & Lipson, 2023). Stakeholders may include the K–12 system and regional universities, industry associations, community-based organizations, public supports and benefits systems (childcare, family services, etc.), and local/ regional planning and policymaking bodies. By engaging with these various entities, community colleges can become organizers and convenors of multi-stakeholder regional workforce partnerships that support community and overall regional development (Grubb et al., 1997; Goldsmith & Coleman, 2022). Colleges can work with local and regional workforce boards around labor market information, local and regional policymaking, and planning. Some community colleges act in an entrepreneurial manner, whether through brokering community partnerships in a way that can foster and support the engagement needed to promote a more strategic approach to workforce development (Kisker, 2021) or through a variety of other approaches (Tello, 2019; Giovannini, 2019).

Community College Approaches to Economic Development Activities

Across these three areas of economic development activity, colleges have varying overarching approaches to their engagement with industry and the region that potentially shape how they advance economic development goals. Prior research has examined these activities through a variety of frameworks and perspectives, yet all point to efforts that are similarly engaged in ways that are oriented toward economic development. These activities have been examined in the literature on community colleges and labor market responsiveness (e.g., MacAllum et al., 2004; Adams et al., 2013); career pathways development (e.g., Blume et al., 2016; Spence, 2007; Cielinski, 2019); industry-recognized credentials (e.g., Daugherty & Anderson, 2021; Walsh et al., 2019); employer engagement approaches (e.g., Wilson, 2015; Yarnall et al., 2016); and community colleges as labor market intermediaries (e.g., Hoops & Wilson, 2010). How colleges engage with employers—whether to inform their education and training programs, to directly serve business needs, or engage more broadly with their region—can vary in a few key ways, including: (1) whether and to what extent the college takes a lead role in fostering collaboration in the region, (2) how the college balances the needs of stakeholders to promote an inclusive approach, and (3) how the college develops new opportunities in an entrepreneurial manner.

Collaborative

Many community colleges seek to develop their programs in alignment with industry by offering work-based learning arrangements for students and assessing local hiring trends to address immediate and emerging workforce needs, working with employers to ensure that instruction and curriculum development are up to date with technology and processes; (MacAllum et al., 2004; Cleary et al., 2017; Yarnall et al., 2015). How they approach industry alignment can vary on some key dimensions—including whether they align with a few employers or a broader set that represent the regional economy’s needs and the extent to which they align employer desires for specific skills with students’ interests in gaining wider skills that allow for educational and career advancement.

The importance of collaborations is seen in employer engagement approaches, which can be understood as a process with deepening levels of collaboration over time (Wilson, 2015). Levels of collaboration may start at a basic level, where collaborations are weak and employer partners provide informal feedback via employer advisory committees. They may then evolve to higher levels of business support, where engagement deepens when colleges work with employers to provide customized training to their workers; share or donate equipment and facilities; codevelop curricula and materials; or provide instructional support, equipment, and facilities. The higher levels align more fully with regional engagement, where colleges and employers engage in strong collaborations that are focused on the regional workforce in terms of building talent pipelines, creating career pathways for students, and actively convening workforce partnerships. Higher levels of collaboration focus on strategic engagement with economic development in ways that may be more likely to translate college activities, particularly those focused on education and training, more directly into positive economic development outcomes.

Inclusive

Another important factor in how community colleges approach economic development activities has to do with how they address the balance between community needs for economic opportunity and industry needs for workers regardless of job quality. Inclusive economic development focuses on regional industry engagement that ensures that members of populations historically marginalized from high-quality jobs are prepared for and successful in securing employment that benefits individuals, families, and communities. This approach is in contrast to one that focuses only on training individuals for jobs to meet the workforce needs of employers without regard for the quality of those jobs in terms of earnings, benefits, and safety. Striking a balance between the sometimes-competing needs of employers and workers in the community is part of promoting inclusive engagement in economic development for community colleges. Outreach to communities where populations have been traditionally marginalized from economic activity is another way to promote inclusive engagement. Greater levels of inclusive engagement, aligned with the community college mission of access, may lead to stronger overall economic development efforts and outcomes in the region.

Entrepreneurial

As community college missions adapt to changing community needs and shifting resources, some institutions are highlighted in the literature for their entrepreneurial efforts. As organizations, these colleges are trying new approaches and building new partnerships in efforts to create economic opportunity (Roueche & Jones, 2005; Kisker, 2021). With an entrepreneurial focus, community colleges can be “flexible and responsive” (Roueche & Jones, 2005). An entrepreneurial approach at a community college can lead to a variety of activities, including entrepreneurship training for individuals in the community as well as a broader way of engaging with the community to foster a more entrepreneurial approach to developing programs aligned with economic growth opportunities (Corbin & Thomas, 2019). Foundationally, this approach is what underpins the efforts highlighted in labor market-responsive colleges (Harmon & MacAllum, 2003) and of colleges highlighted as leaders in economic development.

Economic Development Outcomes from Community College Activities

Community college education is one of innumerable factors that may have an influence on economic development outcomes. Given the number of factors that may be operating, attempting to isolate the precise influence of education and training on economic development is an empirical challenge. To begin to disentangle this question, this framework seeks to outline the potential ways that community colleges contribute to economic development—and how these might be measured. This includes three interconnected sets of outcomes that flow off the components of community college education that are measured at different levels: the workforce, firms, and regional ecosystems. Education and training is intended to lead to a skilled and inclusive workforce. Along with the workforce, business support is intended to help promote productive, inclusive, and innovative firms. Along with the workforce and firms, regional engagement can help contribute to productive, inclusive, and innovative ecosystems as reflected in effective collaborations between entities.

Ultimately, a healthy regional ecosystem is one in which employers have designed production systems that utilize the capacities of highly trained workers and in which educational institutions and the labor market are engaged in activities that lead them to readily supply such workers. By measuring how close or far a given region is from such a healthy system, one can gauge the relative strength of the regional ecosystem within which local manufacturers operate. The health of that system will in turn greatly affect the productivity and innovation of these companies. This section describes in more detail these workforce, firm, and ecosystem outcomes and the various potential ways they each can be measured.

Skilled and Inclusive Workforce

The foundational outcome of community colleges is a skilled workforce. A skilled workforce shapes economic development outcomes through the distinctive ways it functions in the workplace—both through productivity and innovation. Productivity may increase with a more skilled workforce via greater efficiency in the workplace, as well as innovation gains. Innovation is defined as the development and application of ideas and technologies that improve the provision of services and goods in the economy, make their production more efficient, and contribute to growth and improvements in economic output through higher productivity (ECB, 2017). Several decades of innovation studies have shown that the broader technical workforce with middle-level skills can play an essential role in the innovation process (Barley & Orr, 1997). An inclusive workforce where everyone can participate successfully is a key outcome that can promote productivity and innovation. An analysis by Benner and Pastor (2015) shows that longer spells of economic growth are associated with characteristics of regions with greater social inclusion—and the proportion of the population with a sub-baccalaureate education is associated with this.

Productive, Inclusive, and Innovative Workplaces

Labor market outcomes are commonly measured in terms of employment and earnings outcomes among graduates of educational programs. A vast literature demonstrates that, on average, additional education leads to higher levels of employment and earnings (Becker, 1994; Belfield & Bailey, 2017; Kane & Rouse, 1993; Schultz, 1961). The underlying assumption in these analyses is that increased earnings in the labor market reflect higher levels of productivity among workers rewarded within firms (Galbraith, 1964; Schultz, 1961). Yet, to fully understand how community college education leads to greater productivity requires a deeper understanding of what occurs in the workplace—the actual practices that underlie the assumption that earnings reflect productivity. Some research within firms highlights the role of a trained workforce and its possible connection to higher workplace productivity and innovation (Appelbaum et al., 2000; Beaven et al., 2011; Dearden et al., 2006). Research on management practices offers some insights on the study of productivity through understanding the direct experience of people in the workplace (Ichniowski & Shaw, 2009).

It is of particular interest to document the ways that education is connected with workplace productivity, and how community college programs are aligned with industry needs (Cleary et al., 2017; Leigh & Gill, 2007). The degree of alignment between community college programs and employer needs can be an important factor in promoting productivity. Communication failures (between firms, educational institutions, government, and workers) and coordination issues (should colleges offer programs before jobs are available; should workers learn skills before the jobs are available; should employers create good jobs before the workforce supply is ready) are critical factors, as is the training's alignment with both present and future workforce needs (how well is the training aligned to actual jobs requirements; how can graduates hit the ground running).

To understand the relationship between the type of education and training that community colleges provide, on the one hand, and workplace productivity and innovation, on the other, requires understanding how employers hire and deploy workers. Too often, questions on this topic are boiled down to time-to-hire and number of vacancies. Although measuring these quantities is important, it is also important to understand the types of systems workers are entering. Across an industry, there exists substantial variation in occupational structure (Aguirregabiria & Alonso-Borrego, 2001). The number of workers employed and the role workers play can vary widely even in a single workplace. While some employers view certain roles as a dynamic requiring continuous training and access to a job ladder, others view jobs as more static, involving limited training and shorter job tenure. Employers also differ in their preferred mix of technology and labor, as well as in their expectations of how workers use technology (Leonardi, 2007). Some workers are empowered to make front-line production decisions and offer input into production innovations; others are not. Partnerships between employers and community colleges are a key factor in fostering the development of dynamic, high-quality production systems that boost productivity, spur innovation, and generate high-quality jobs.

Productive, Inclusive, and Innovative Regions

Region has emerged as an increasingly important consideration in the study of economic development in the United States. Regions can be important areas of focus for the development of innovative and competitive industries that build off an area's particular history and culture (Saxenian, 1996). Included in regional economic development ecosystems are specific arrangements and combinations of regional resources, institutional capacities, policies, and regulations—as well social and cultural relations—that support and enable development processes such as knowledge generation and diffusion. For example, the United States has a high degree of regional specialization in knowledge-based industries such as high-tech fields, intensifying the impact of innovation and entrepreneurship policies (Ketels, 2007; Kline & Moretti, 2014).

In general, regional outcomes are difficult to measure. Still, as with education, there is great interest in measures of productivity and growth. Typical economic development measures are crude and do not get at underlying mechanisms (Aghion et al., 2009). Some researchers have demonstrated the relationship between education and the overall productivity of a country in terms of gross domestic product (Cullison, 1993; Malecki, 1997), while others have documented how cognitive skills are associated with economic growth in developed and developing countries (Hanushek & Wößmann, 2007). Economic growth includes job creation as well as strategic shifts in the mix of sectors in the economy (Malecki, 1997). Skill levels, which can be measured at the regional level, form an indicator of economic competitiveness that can reveal changes in learning over time (Wolf-Powers & Andreason, 2013).

Measuring the contribution of various factors to generating growth remains a perennial challenge. For example, is the extent to which productivity in a given region grows or declines associated with strategic local decisions, or is it due to broader trends in industries, technology, consumer tastes, or global trade? Sorting this out becomes even more challenging when the focus is a single industry or occupation.

Concluding Thoughts

Community colleges and economic development have some consistent linkages that have been articulated in the literature. These include colleges' work providing education and training, providing business support, and conducting regional engagement. Emergent ways to understand community college linkages with economic development are also becoming evident. These include increased understanding of the approaches to industry engagement in community college workforce development activities. Community colleges may view their work in a larger regional context and partake in collaborations that provide this larger perspective and more intentionally seek to meet economic development goals. They may approach their activities with greater levels of collaboration—to take on a leadership role in their community with regard to economic development. Further, they may serve to promote inclusive economic development by engaging with populations who have been marginalized from or excluded from high-quality jobs and economic opportunities in their communities. While it is challenging to link those activities directly to their specific impacts in the economy, some possibilities for doing so have emerged. These include examining the skilled workforce in terms of qualified workers for jobs in the economy, and searching for both more productive and innovative firms and more productive, innovative, and inclusive economies measured through the ways in which they function. Efforts to understand these issues are the goal part of this ongoing research effort, which will provide more insight based on the activities of community colleges around the country and their technician education programs to help understand their role in economic development.

References

- Adams, J. L., Edmonson, S. L., & State, J. R. (2013). Community colleges and market responsiveness: A conceptual model and proposed analysis. *Community College Journal of Research and Practice*, 37(7), 528–540.
- Aghion, P., Boustan, L., Hoxby, C., & Vandebussche, J. (2009). The causal impact of education on economic growth: evidence from US. *Brookings papers on economic activity*, 1(1), 1–73.
- Aguirregabiria, V., & Alonso-Borrego, C. (2001). Occupational structure, technological innovation, and reorganization of production. *Labour Economics*, 8(1), 43–73.
- Appelbaum, E., Bailey, T., Berg, P., & Kalleberg, A. (2000). *Manufacturing advantage: Why high-performance work systems pay off*. ILR Press.
- Baily, M. N., Bosworth, B. P., & Kennedy, K. (2021). *The contribution of human capital to economic growth: A cross-country comparison of Germany, Japan, and the United States*. Brookings Institution.
- Barley, S. R., & Orr, J. E. (Eds.). (1997). *Between craft and science: Technical work in US settings*. Cornell University Press.
- Bartik, T. J. (2009). What works in state economic development? In S. Eddy & K. Bogenschneider (Eds.), *Growing the state economy: evidence-based policy options* (1st ed., pp. 15–29). University of Wisconsin.
- Bartik, T. J. (2020). *Bringing jobs to people: Improving local economic development policies* [Policy Paper No. 2020-023]. W. E. Upjohn Institute for Employment Research. <https://doi.org/10.17848/pol2020-023>.
- Beaven, R., May-Gillings, M., Wilson, R., Bosworth, D., Joshi, S., & Nitsch, S. (2011). *Measuring the economic impact of further education* [BIS Research Paper 38]. UK Department for Business Innovation and Skills.
- Becker, G. S. (1994). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). The University of Chicago Press.
- Beer, A., Ayres, S., Clower, T., Faller, F., Sancino, A., & Sotarauta, M. (2019). Place leadership and regional economic development: A framework for cross-regional analysis. *Regional Studies*, 53(2), 171–182.
- Belfield, C., & Bailey, T. (2017). *The labor market returns to sub-baccalaureate college: A review* [A CAPSEE Working Paper]. Center for Analysis of Postsecondary Education and Employment.
- Benner, C., & Pastor, M. (2015). Brother, can you spare some time? Sustaining prosperity and social inclusion in America's metropolitan regions. *Urban Studies*, 52(7), 1339–1356.
- Bils, M., & Klenow, P. J. (2000). Does schooling cause growth? *The American Economic Review*, 90(5), 1160–1183.

- Blume, G., Meza, E., Bragg, D., & Love, I. (2016). Estimating the impact of nation's largest single investment in community colleges: Lessons and limitations of a meta-analysis of TAACCCT evaluations. *New America*. <https://www.newamerica.org/education-policy/reports/estimating-impact-taacct/#authors>
- Breton, T. R. (2013). The role of education in economic growth: Theory, history and current returns. *Educational Research*, 55(2), 121–138. <https://doi.org/10.1080/00131881.2013.801241>
- Cielinski, A. (2019). *Career pathways in career and technical education* [Policy Brief]. Center for Law and Social Policy (CLASP).
- Cleary, J., & Fitchner, A. (2005). *Deploying community colleges to strengthen state economic development: A national study*. Rutgers, The State University of New Jersey, John J. Heldrich Center for Workforce Development.
- Cleary, J. L., Kerrigan, M. R., & Van Noy, M. (2017). Towards a new understanding of labor market alignment. *Higher Education: Handbook of Theory and Research: Published under the Sponsorship of the Association for Institutional Research (AIR) and the Association for the Study of Higher Education (ASHE)*. 577–629.
- Corbin, R., & Thomas, R. (2019). *Community colleges as incubators of innovation: Unleashing entrepreneurial opportunities for communities and students*. Stylus Publishing.
- Cullison, W. (1993). Public investment and economic growth. *FRB Richmond Economic Quarterly*, 79(4), 19–33.
- Daugherty, L., & Anderson, D. M. (2021). *Stackable credential pipelines in Ohio: Evidence on programs and earnings outcomes*. RAND Corporation. <https://doi.org/10.7249/RR-A207-1>
- Dearden, L., Reed, H., & Van Reenen, J. (2006). The impact of training on productivity and wages: Evidence from British panel data. *Oxford Bulletin of Economics and Statistics*, 68(4) 397–421.
- Dougherty, K., & Bakia, M. (1999). *The new economic development role of the community college*. Columbia University, Community College Research Center.
- ECB. (2017). *How does innovation lead to growth?* European Central Bank.
- Friedel, J. N., & Reed, J. W. (2019). Community colleges: Drivers of economic development in small rural communities. *New Directions for Community Colleges*, 187, 19–29. <https://doi.org/10.1002/cc.20366>
- Galbraith, J. K. (1964). *Economic development* [rev. ed.]. Harvard University Press. <https://www.hup.harvard.edu/catalog.php?isbn=9780674333062>
- Giloth, R. P. (2000). Learning from the field: Economic growth and workforce development in the 1990s. *Economic Development Quarterly*, 14(4), 340–359. <https://doi.org/10.1177/089124240001400402>
- Goldsmith, S., & Coleman, K. M. (2022). *Growing fairly: How to build opportunity and equity in workforce development*. Brookings Institution Press.

- Grubb, W. N., Badway, N., Bell, D., Bragg, D., & Russman, M. (1997). *Workforce, economic, and community development: The changing landscape of the entrepreneurial community college*. Columbia University, Community College Research Center.
- Hanushek, E. A., & Kimko, D. D. (2000). Schooling, labor-force quality, and the growth of nations. *American Economic Review*, 90(5), 1184–1208. <https://doi.org/10.2307/2677847>
- Hanushek, E. A., & Wößmann, L. (2007). *The role of education quality for economic growth* [Policy Research Working Paper]. World Bank.
- Hanushek, E. A., & Woessmann, L. (2012). Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation. *Journal of Economic Growth*, 17(4), 267–321. <https://doi.org/10.1007/s10887-012-9081-x>
- Hanushek, E. A., & Woessmann, L. (2015). *Universal basic skills: What countries stand to gain*. OECD.
- Harmon, H. L., Bergeron, L. J., & Johnson, J. D. (2022). Engaging community colleges in rural development: A meta-synthesis of doctoral dissertations. *Community College Review*, 50(3), 316–338. <https://doi.org/10.1177/00915521221087280>
- Harmon, R., & MacAllum, K. (2003). *Documented characteristics of labor market-responsive community colleges and a review of supporting literature*. Office of Vocational and Adult Education.
- Hendricks, L., & Schoellman, T. (2018). Human capital and development accounting: New evidence from wage gains at migration. *Quarterly Journal of Economics*, 133(2), 665–700.
- Hoops, J., & Wilson, R. (2010). *Expanding the mission: Community colleges and the function of workforce intermediaries*. Jobs for the Future.
- Ichniowski, C., & Shaw, K. L. (2009). *Insider econometrics: Empirical studies of how management matters* [No. w15618]. National Bureau of Economic Research.
- Jacobs, J. (2012). *The essential role of community colleges in rebuilding the nation's communities and economies: Universities and colleges as economic drivers: Measuring higher education's role in economic development*. SUNY Press.
- Jones, B. F. (2014). The human capital stock: A generalized approach. *The American Economic Review*, 104(11), 3752–3777.
- Kane, T. J., & Rouse, C. E. (1993). *Labor market returns to two-and four-year colleges: Is a credit a credit and do degrees matter?* [NBER Working Paper No. 4268]. National Bureau of Economic Research. <http://www.nber.org/papers/w4268.pdf>
- Katsinas, S. (1994). A review of the literature related to economic development and community colleges. *Community College Review*, 21, 67–80.

- Katsinas, S. G., & Lacey, V. A. (1989). *Community colleges and economic development: Models of institutional effectiveness*. American Association of Community and Junior Colleges Publications.
- Ketels, C. (2007). Industrial policy in the United States. *Journal of Industry, Competition and Trade*, 7(3), 147–167. <https://doi.org/10.1007/s10842-007-0017-7>
- Kisker, C. B. (2021). *Creating entrepreneurial community colleges: A design thinking approach*. Harvard Education Press.
- Kline, P., & Moretti, E. (2014). People, places, and public policy: Some simple welfare economics of local economic development programs. *Annual Review of Economics*, 6(1), 629–662.
- Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, 99(3), 483–499.
- Kruss, G., McGrath, S., Petersen, I. H., & Gastrow, M. (2015). Higher education and economic development: The importance of building technological capabilities. *International Journal of Educational Development*, 43(July), 22–31. <https://doi.org/10.1016/j.ijedudev.2015.04.011>
- Leigh, D. E., & Gill, A. M. (2007). *Do community colleges respond to local needs?: Evidence from California*. W. E. Upjohn Institute.
- Leonardi, P. M. (2007). Activating the informational capabilities of information technology for organizational change. *Organization Science*, 18(5), 813–831.
- Lucas Jr., R. E. (2015). Human capital and growth. *American Economic Review*, 105(5), 85–88. <https://doi.org/10.1257/aer.p20151065>
- MacAllum, K., Yoder, K., & Poliakoff, A. R. (2004). *The 21st-century community college: A strategic guide to maximizing labor market responsiveness* (vols. 1–3). Academy for Educational Development.
- Malecki, E. J. (1997). *Technology and economic development: The dynamics of local, regional, and national change*. Ohio State University, School of Public Policy and Management.
- Malizia, E. E., & Feser, E. J. (1999). *Understanding local economic development*. Center for Urban Policy Research.
- Miranda, J. (2022). *CHIPS & Science Act: What's in it for community colleges, and what items were left out?* ACCT Now. <https://perspectives.acct.org/stories/chips-and-science-act-what-s-in-it-for-community-colleges-and-what-items-were-left-out>
- Minzner, A. (2020). Measuring the effectiveness of equitable economic development strategies. *The Foundation Review*, 12(4). <https://doi.org/10.9707/1944-5660.1540>
- National Science Board. (2019). *The skilled technical workforce: Crafting America's science & engineering enterprise* [Report No. NSB-2019-23]. <https://www.nsf.gov/nsb/publications/2019/nsb201923.pdf>

- Petrakis, P. E., & Stamatakis, D. (2002). Growth and educational levels: A Comparative analysis. *Economics of Education Review*, 21(5), 513–521. [https://doi.org/10.1016/S0272-7757\(01\)00050-4](https://doi.org/10.1016/S0272-7757(01)00050-4)
- Porter, M. E. (1990). *The competitive advantage of nations*. New York Free Press.
- Porter, M. E. (1998). Clusters and the new economics of competition. *Harvard Business Review*, 76(6), 77–90.
- Quilantan, B. (2023). *How community colleges fit in to the promise of the CHIPS and Science Act*. Politico. <https://www.politico.com/newsletters/weekly-education/2023/01/09/how-community-colleges-fit-in-to-the-promise-of-the-chips-and-science-act-00076949>
- Raspe, O., & Van Oort, F. (2006). The knowledge economy and urban economic growth. *European Planning Studies*, 14(9), 1209–1234.
- Roueche, J. E., & Jones, B. R. (Eds.). (2005). *The entrepreneurial community college*. American Association of Community Colleges.
- Saxenian, A. (1996). *Regional advantage: Culture and competition in Silicon Valley and Route 128*. Harvard University Press. <https://doi.org/10.2307/j.ctvjnrsh>
- Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1–17.
- Schumpeter, J., & Backhaus, U. (2003). The theory of economic development. In J. Backhaus (Ed.), *J. A. Schumpeter: Entrepreneurship, style, and vision* (EHES vol 1, pp. 61–116). Springer. https://doi.org/10.1007/0-306-48082-4_3
- Schwartz, R. B., & Lipson, R. (2023). *America’s hidden economic engines: How community colleges can drive shared prosperity* [Work and Learning Series]. Harvard Education Press.
- Self, S., & Grabowski, R. (2004). Does education at all levels cause growth?: India, a case study. *Economics of Education Review*, 23(1), 47–55. [https://doi.org/10.1016/S0272-7757\(03\)00045-1](https://doi.org/10.1016/S0272-7757(03)00045-1)
- Spence, C. (2007). *Career pathways: A strategy for transforming America’s workforce education systems to support economic growth*. Education Commission of the States.
- Walsh, M., O’Kane, L., Noronha, G., & Taska, B. (2019). *Where credentials meet the market: State case studies on the effect of high school industry credentials on educational and labor market outcomes*. Foundation for Excellence in Education.
- Wilson, R. (2015). *A resource guide for engaging employers*. Jobs for the Future.
- Wolf-Powers, L., & Andreason, S. (2013). Aligning secondary and postsecondary credentialization with economic development strategy, or “If low educational attainment = poor metropolitan competitiveness, what can be done about it?” In L. Perna (Ed.), *Preparing today’s students for tomorrow’s jobs in metropolitan America* (pp. 224–244). University of Pennsylvania Press. <https://doi.org/10.9783/9780812208436.224>

Yarnall, L., Tennant, E., & Stites, R. (2016). A framework for evaluating implementation of community college workforce education partnerships and programs. *Community College Journal of Research and Practice*, 40(9), 750-766.

Young, J. W. (1997). Community economic development through community colleges. *New Directions for Higher Education*, 97, 74-83.

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