

# Workforce Entry Including Career and Technical Education and Training

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This article reviews the basic patterns of employment and school enrollment for new labor market entrants in the period leading up to the Great Recession and in the decade thereafter. We find a persistent shift into four-year colleges that began during the Great Recession. At the same time, fewer youth are neither working nor enrolled in school. We see little change in occupational training programs during our study period, in program or in participation rates; in particular, rates of training provided via federal workforce development programs remain low among workforce entrants. The research literature on these programs has advanced but without large effects on policy or practice.

*Keywords:* workforce entry; CTE; job training; community college; sectoral training

When examining how American workers have fared over the past decade, an important group to consider is young adults in the years immediately following their high school education. We focus primarily, but not exclusively, on “non-college youth”—young adults not destined to complete a four-year college degree. Given our interest in human capital investment around the time of labor market entry, we treat non-college youth as the

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“working class” in our analysis. Our article complements Groshen and Holzer (this volume) by focusing on younger workers.

We describe young adults’ participation in the workforce and in postsecondary education, with a focus on Career and Technical Education (CTE) and occupational training. First, we describe trends in employment and education from 2005 to 2018, finding that during this period, enrollment in education increased, while the fraction of young adults not engaged in either work or education declined. The increase in education is concentrated in the four-year public sector. Next, we describe the major federal workforce development programs and trends in their participation rates. We note that these programs account for a very small proportion of individuals receiving CTE or training. Evaluations of these programs, and of related CTE programs in public two-year colleges, give mixed results on program impacts, with the largest and most statistically significant results coming from relatively narrowly focused programs that provide training for in-demand sectors, such as health care, and have substantial employer involvement. Finally, we provide additional context about how employment and education have changed in recent months as the COVID-19 pandemic and associated recession have taken hold and discuss some possible implications for the economy going forward.

## Employment and Education Trends

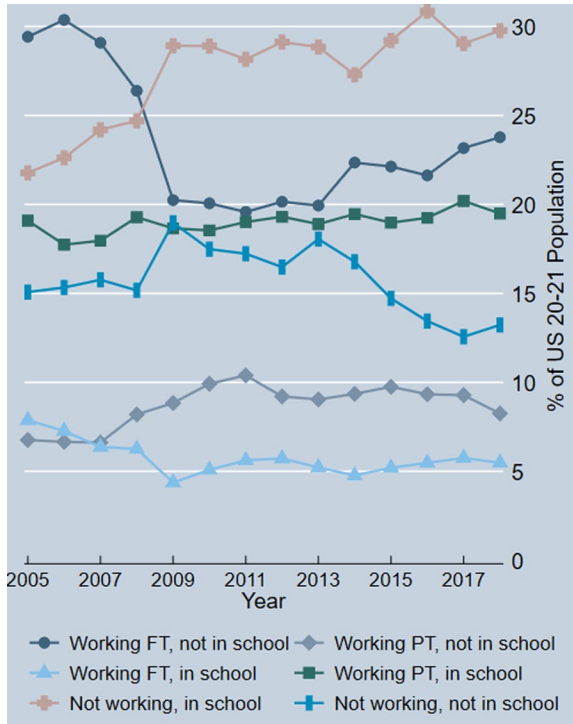
In this section, we describe broad trends in the education and employment of young adults. We concentrate on the period from 2005 to 2018 to capture patterns associated with the economy’s decline during, as well as recovery from, the Great Recession. Given our interest in the decisions that young adults make regarding starting higher education and/or entering the labor force after finishing (or dropping out of) high school, we focus first on 20- and 21-year-olds. They are old enough to have likely completed secondary schooling, yet young enough to likely still be in college if they have chosen to pursue higher education. Figure 1 shows trends in the work and education status of these young adults from 2005 to 2018. Our data source is the nationally representative Current Population Survey (CPS) October Educational Supplement (Flood et al. 2020). Each line represents a mutually exclusive category classifying 20- and 21-year-olds by their current work and enrollment status.<sup>1</sup> We classify individuals as working full time (part time) if they report that they are usually working full time (part time), regardless of their work status in the past week. They are classified as “not working” if they are unemployed or not in the labor force.

The first thing to note is that the young adult population increasingly substituted enrollment in school for full-time work around the time of the Great

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FIGURE 1  
Work and Education Status of 20- to 21-Year-Olds

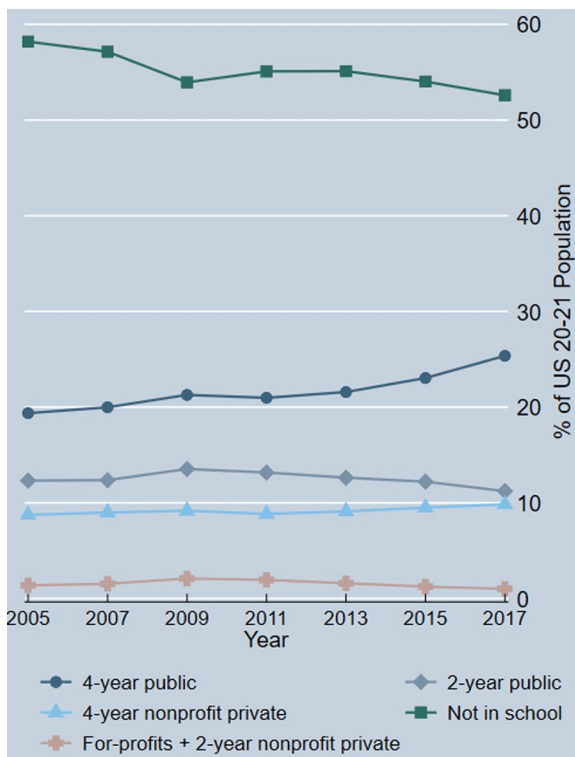


SOURCE: CPS October Education Supplement.  
NOTE: FT = full time; PT = part time.

Recession. This follows the typical pattern of college enrollment increasing during a bad labor market (e.g., Long 2004; Barr and Turner 2013). In the years following the end of the recession, the fraction of young adults engaged exclusively in schooling has remained high, hovering between 27 and 31 percent from 2009 to 2018, even though the proportion working full time and not in school also increased from 20 percent in 2013 to almost 24 percent in 2018. This corresponds to a large decrease in “opportunity youth” (i.e., young adults not engaged in either school or work) from a high of 19 percent in 2009 to just over 13 percent in 2018, with the primary decline occurring from 2013 to 2018. We do not have a good explanation for the persistence of these patterns.

Next, we focus on young adults who are attending school. Figure 2 tracks fractions of the 20- to 21-year-old population enrolled in various higher education sectors. We combine two data sources to produce the proportions in this figure. Biennial data on the number of students in each sector come from the Digest of Education Statistics (U.S. Department of Education 2020). Estimates of the population of 20- and 21-year-olds in each year come from the U.S. Census

FIGURE 2  
Education Status, 20- to 21-Year-Olds



SOURCE: Digest of Education Statistics (U.S. Department of Education) and U.S. Census Bureau.

Bureau (2018) and similar publications in other years. The “For-profits + 2-year nonprofit private” category is the summation of students in two-year for-profit colleges, four-year for-profit colleges, and two-year nonprofit private colleges, which we combined due to the small shares in each sector. Webber (this volume) provides much more detail about the for-profit sector.

The main trend to note is the number of students in four-year public colleges, which increased from 19.3 percent of 20- and 21-year-olds in 2005 to 25.4 percent in 2017. This increase appears mostly to have come from the category of young adults who were not in school, which decreased from 58 percent in 2005 to 53 percent in 2017. However, a small decline also occurred in the fraction of young adults in two-year public colleges, from 12.3 percent in 2005 to 11.2 percent in 2017.

Unfortunately, these data sources do not allow us to disaggregate students attending two-year institutions into those who are on an academic track versus a CTE track. Thus, we provide information from the National Postsecondary Student Aid Study (NPSAS), a nationally representative survey from the U.S.

TABLE 1  
Average Tuition and Aid for U.S. Postsecondary Institutions by Year and Sector (in 2018\$)

Year	Two-Year Public			Four-Year Public			Four-Year Private Nonprofit		
	Tuition	Aid	Aid % of Tuition	Tuition	Aid	Aid % of Tuition	Tuition	Aid	Aid % of Tuition
2005	\$2,983	\$1,829	61%	\$6,319	\$3,411	54%	\$25,168	\$10,746	43%
2006	\$2,956	\$1,839	62%	\$6,528	\$3,619	55%	\$25,650	\$10,773	42%
2007	\$3,045	\$1,811	59%	\$6,747	\$3,632	54%	\$26,386	\$11,099	42%
2008	\$2,996	\$1,774	59%	\$6,896	\$3,710	54%	\$27,061	\$11,566	43%
2009	\$3,117	\$2,002	64%	\$7,342	\$4,144	56%	\$28,650	\$12,488	44%
2010	\$3,255	\$2,435	75%	\$7,694	\$4,490	58%	\$29,393	\$13,782	47%
2011	\$3,344	\$3,093	93%	\$7,947	\$5,151	65%	\$29,773	\$14,785	50%
2012	\$3,556	\$3,340	94%	\$8,458	\$5,574	66%	\$30,460	\$15,071	49%
2013	\$3,645	\$3,361	92%	\$8,770	\$5,515	63%	\$31,302	\$15,442	49%
2014	\$3,709	\$3,282	88%	\$8,893	\$5,639	63%	\$31,946	\$16,081	50%
2015	\$3,800	\$3,401	89%	\$9,113	\$5,911	65%	\$32,982	\$16,750	51%
2016	\$3,879	\$3,471	89%	\$9,287	\$6,089	66%	\$33,583	\$17,257	51%
2017	\$3,993	\$3,314	83%	\$9,160	\$6,078	66%	\$34,083	\$17,441	51%

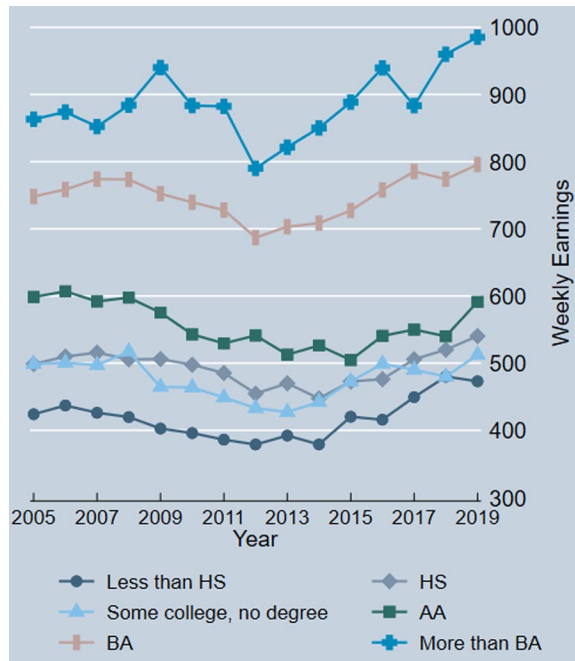
SOURCE: IPEDS.

NOTES: Tuition lists the posted average annual tuition and fees; aid gives the average annual sum of federal, state, and institutional financial aid (excluding loans). Both tuition and aid are in constant 2018 dollars, adjusted using the personal consumption index. Results are not sensitive to imputing missing values by using adjacent years.

Department of Education (hereinafter “ED”) that tracks students’ degree programs and majors. We use ED’s Classification of Instructional Programs (CIP) codes to categorize majors as either academic or occupational. Among students in programs working toward a certificate, 90 to 95 percent are in occupational majors from 2004 to 2016. In 2004, 73 percent of students in an associate degree program were in occupational majors, but the proportion had declined to 67 percent by 2016. The percent of occupational majors among students in bachelor’s programs has remained around 64 percent from 2004 to 2016.<sup>2</sup>

During this period of changing enrollment in higher education, changes in the cost of and return to college degrees also occurred. Table 1 shows the average total annual tuition and fees (the so-called posted price) and financial aid at postsecondary institutions in the United States by sector (in constant 2018 dollars).<sup>3</sup> The underlying data come from ED’s Integrated Postsecondary Education Data System (IPEDS). At four-year institutions, although tuition has grown steadily from 2005 to 2017, growth in aid has outpaced that of tuition. The public two-year sector has seen even faster growth in aid compared to tuition, with aid as a percentage of tuition peaking in 2012 and coming back down to 83 percent in 2017. Webber (this volume) complements this analysis with a discussion of student loans and changes in state appropriations.

FIGURE 3  
Real Median Weekly Earnings, 24- to 25-Year-Olds (in 2018\$)



SOURCE: CPS outgoing rotation group.

NOTE: Weekly earnings defined by IPUMS (Integrated Public Use Microdata Series) as the higher of (1) the respondent’s answer to the question, “How much do you usually earn per week at this job before deductions?” and (2) for workers paid by the hour, the reported number of hours the respondent usually worked at the job multiplied by their hourly wage rate. HS = high school; BA = bachelor of arts; AA = associate of arts.

To get a sense of the returns to various levels of education, we plot the median weekly earnings (among the employed, i.e., excluding the zeros) for 24- to 25-year-olds in Figure 3. We choose this age range to focus on workers who are mostly finished with their schooling but are still early in their careers. The figure shows that relatively little change has occurred in real weekly earnings (2018\$) for any education group over this period. Most groups saw a decline from 2005 to 2012 or so, and then increased again to end up very close to their 2005-level earnings in 2019. These trends have interesting parallels with Shambaugh and Strain’s (this volume) analysis of changes over time in the distribution of real wages. The “More than BA” category appears to have more movement than the other categories, but this may be due to the small sample sizes of this group leading to noisier estimates. Next, we note that earners with at least a bachelor’s degree maintain a consistently large advantage over workers with an associate degree or less. While the difference between the earnings of a worker with a high

school diploma and one with an associate degree never exceeds \$100 per week, the difference between the earnings of a worker with an associate degree and one with a bachelor's degree stays between \$150 to \$200 per week. Of course, these differences reflect, in part, differences in who selects into different levels of education. This selection is likely quite important for the persistent differences in earnings by education level, although we expect only modest changes in such selection during the period that we consider. We obtain similar patterns using mean weekly earnings rather than median weekly earnings. Wages (or rates of pay for salaried workers) mainly drive these differences as mean or median hours do not vary much across education groups.

## Workforce Development: Trends in Programs and Participation

This section describes the major public programs that invest in the skills of non-college youth. Unfortunately, the United States lacks good data on training provided by private firms to their workers, although we expect such training represents a major component of overall human capital investment.

Table 2 lists the current major employment and training programs along with recent funding levels.<sup>4</sup> We focus primarily on the Workforce Investment Act of 1998 (WIA), the Workforce Innovation and Opportunity Act of 2014 (WIOA), and the Job Corps. WIOA replaced WIA as the major federal employment and training program in 2015, while the Job Corps dates back to the Great Society era. Among programs outside the U.S. Department of Labor (hereinafter "DOL"), the Pell Grant program looms large. Although Pell grants primarily support students pursuing academic degrees, they also support many students pursuing occupational training at community colleges.<sup>5</sup> Expenditures on Pell grants over our time period broadly parallel enrollment trends.

The federal government provided funds for WIA, which the states and local workforce investment boards operated within broad federal guidelines and are subject to a federal performance management system. WIA had separate funding streams for adults, dislocated workers (i.e., recent job losers), and youth. It provided its services via a one-stop delivery system that colocated many workforce and social services.

WIA established three levels of service that customers were nominally required to access sequentially: core, intensive, and training. Core services included job search and placement assistance, and labor market information, which were available to all job seekers. Intensive services included comprehensive assessments, development of individual employment plans and counseling, and career planning. Training included both occupational training and training in basic skills. Adherence to the service ordering, never perfect, faded with time and ended along with WIA.

WIOA largely maintains the structure of WIA while making several smaller organizational and budgetary changes. The one change worth noting here

TABLE 2  
Funding for Major Employment and Training Programs (Fiscal Year 2019)

Program	Agency	Funding
<i>U.S. Department of Labor (DOL)</i>		
Job Corps	DOL/ETA	\$1,719 M
WIOA Dislocated Workers	DOL/ETA	\$1,176 M
WIOA Youth Activities	DOL/ETA	\$903 M
WIOA Adult Program	DOL/ETA	\$846 M
Wagner-Peyser Funded Employment Service	DOL/ETA	\$683 M
Senior Community Service Employment Program	DOL/ETA	\$400 M
Trade Adjustment Assistance (TAA)	DOL/ETA	\$401 M
Disabled Veterans Outreach Program (DVOP) and Local Veterans' Employment Representative Program (LVER)	DOL/VETS	\$180 M
H-1B Job Training Grants	DOL/ETA	\$146 M
<i>Other Federal Programs</i>		
Pell Grants	ED/OCTAE	\$6,861 M (rough estimate)
Temporary Assistance for Needy Families (TANF) Grants	HHS/ACF	\$2,881 M (FY 2018)
Adult Education Grants to States	ED/OCTAE	\$642M
SNAP Employment and Training	USDA/FNS	\$502M

NOTE: ETA = Employment and Training Administration (DOL); VETS = U.S. Department of Veteran's Employment and Training Services (DOL); OCTAE = Office of Career, Technical, and Adult Education; HHS = U.S. Department of Health and Human Services; SNAP = Supplemental Nutrition Assistance Program; USDA = U.S. Department of Agriculture; FNS = Food and Nutrition Service.

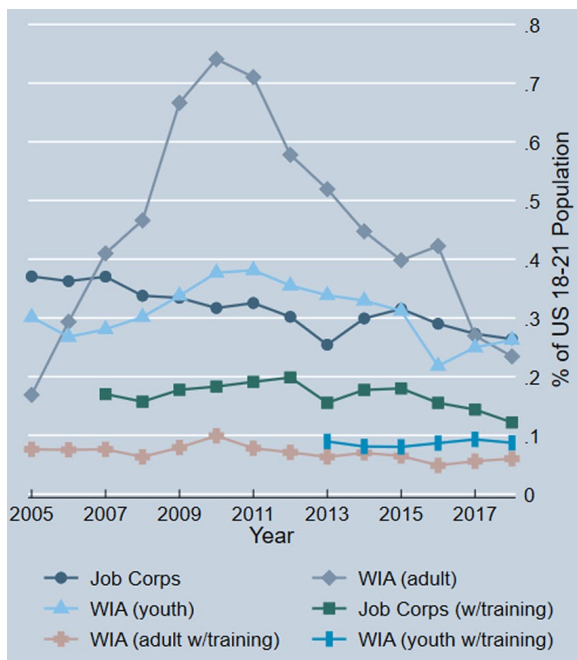
concerns WIOA's promotion of "career pathways" and "sectoral" training programs.<sup>6</sup> Both program styles represent sensible programmatic responses to experiences with earlier generations of employment and training programs. According to the DOL (2012, 1), "Career pathways programs offer a clear sequence of education coursework and/or training credentials aligned with employer-validated work readiness standards and competencies." Sectoral programs, as their name suggests, provide training aimed at particular industrial sectors, usually with strong input from employers or industry associations.

Job Corps is a largely residential education and vocational training program serving at-risk young people ages 16 through 24.<sup>7</sup> Job Corps integrates the teaching of academic, vocational, and employability skills, and social competencies through a combination of classroom, practical, and work-based learning experiences. Following training, it provides career development services. Schochet, Burghardt, and McConnell (2006) estimate that Job Corps accounts for more than 60 percent of DOL expenditures on youth employment and training services.

Figure 4 shows trends in these programs' enrollment from (approximately) 2005 to 2018. Reporting periods for Job Corps run from each July to the



FIGURE 4  
Workforce Development Program Status, 18- to 21-Year-Olds



SOURCE: Job Corp and WIA/WIOA Data Books, American Community Survey (ACS).

NOTE: Job Corp data were reported from July to June each year. WIA/WIOA was reported from April to March each year. Year on x-axis refers to the year in which the data reporting starts. In year 2016–2017, WIA/WIOA was only reported from July to March (eight months), so we multiplied counts by 1.5 to approximate a full year.

following June, and WIA/WIOA reporting periods are from April to the following March. “Year” in Figure 4 refers to the beginning of the reporting period (e.g., 2005 refers to July 2005 through June 2006 for Job Corps and April 2005 through March 2006 for WIA/WIOA). We construct each line by dividing the number of participants in each program by an estimate of the population of 18- to 21-year-olds in the United States, drawn from the American Community Survey (Ruggles et al. 2020).

Figure 4 shows that Job Corps and WIA/WIOA serve only a very small proportion of the youth population (i.e., never more than 1 percent) compared to community colleges and four-year colleges. Moreover, the proportion that receives occupational training is even smaller. In recent years, less than half of WIA/WIOA participants ages 18–21 received training, while in the Job Corps, between 45 percent and 65 percent of enrollees receive training. The much stronger cyclical pattern for WIA results from it receiving a large temporary funding increase under the American Recovery and Reinvestment Act of 2009.

## Research on Career and Technical Education and Training Programs

This section briefly considers research developments related to labor market entry, CTE, and training. On the DOL side, the last two decades feature two major experimental evaluations, one of the Job Corps and one of WIA, and a sequence of smaller experimental evaluations of subsidized “sectoral” and “career pathways” training programs. The academic side offers an improved nonexperimental literature that builds on administrative data unavailable to earlier researchers to draw compelling conclusions about CTE delivered (mainly) via two-year colleges.

The National Job Corps Study (NJCS) ran from 1993 to 2004. The experiment randomly assigned a nationally representative sample of eighty-one thousand youth, with roughly seventy-five thousand allowed access to the Job Corps as usual and the remainder excluded from the program for three years. Schochet, Burghardt, and McConnell (2006) documents the initial findings, and Schochet (2020) provides long-term impact estimates. We view the NJCS as a glass half full. Unlike most programs for youth, the program generates substantively meaningful earnings gains relative to the control condition. However, the control group catches up with the treatment group after about five years, with the result that the program as a whole fails to pass a standard cost-benefit test (though it does pass one for those 20 to 24 years old at program application). In sum, the NJCS provides some hope for the future and a reason to prefer spending on Job Corps to spending on other, less-effective youth programs.

The WIA Gold Standard Evaluation randomly assigned WIA enrollees at twenty representative sites to one of three treatment arms defined by the WIA services they could receive: core services (e.g., job search assistance) only, core and intensive (e.g., comprehensive assessments), and full WIA (core, intensive, and training). The evaluation commenced in 2008. Our discussion relies on the Fortson et al. (2017) 30-month impact report. The highly decentralized institutional environment around employment and training programs in the United States means that many enrollees in the core-and-intensive and the core-only treatment arms received training, typically from the same providers that WIA uses, but not paid for by WIA. At the same time, and as expected, many of those assigned to the full WIA arm did not receive any training. The net result: rates of training receipt in the three arms of 34 percent, 41 percent, and 50 percent, respectively. As such, we obtain from the experiment not an estimate of the effect of training versus no training, or the effect of WIA versus no WIA, but rather estimates of the effect of the *marginal* additional training received by the full WIA group relative to the other two groups, and by the core-and-intensive group relative to the core-only group.

Average earnings after the “lock-in” period (i.e., the months immediately following random assignment when participants focus on their training rather than on job search) for the full WIA and core-and-intensive groups do not differ very much; both well exceed average earnings in the core-only group. We interpret

this as indicating that the marginal training received by the full WIA group relative to the core-and-intensive group does not have economic value while the marginal training received by the core-and-intensive group relative to the core-only group does have substantial economic value (noting, of course, that the intensive services they receive may have some value as well). What differs between the training at one margin and the training at the other? Mostly what differs is who pays for training, and thus how much effort the trainee must put in to receive it, rather than the content or provider of the training. Thus, it does not make much sense to read the report as saying that “WIA training does not work.” Instead, it makes sense to say that, at the margin, WIA pays for training that it should not.<sup>8</sup>

Schaberg (2020) summarizes seven experimental evaluations of sectoral training programs; Katz et al. (2020) offers a related survey along with an empirical analysis of mediators in a particular sectoral program called “WorkAdvance,” which has been implemented (and evaluated) in multiple sites. All the sectoral programs considered in both papers provide occupational skills training to prepare their participants for (relatively) high-paying jobs in particular sectors, often health care or information technology (IT). Employers or industry groups from the target sector typically play a key role in the development of the training; see Barnow and Spaulding (2015) for more on the importance of employer involvement. The programs typically screen applicants relatively heavily prior to enrollment with the aim of serving only participants likely to complete their training and find related employment. The programs also often provide additional services (e.g., job search assistance or soft skills training) beyond the occupational training. Some operate within a career pathways framework that aims to embed workers in a sequence of training programs, better credentials, and better jobs.

The evaluations typically produce small or nonexistent employment impacts in the medium run, probably due to all the screening (on variables related to labor force attachment) prior to random assignment. Earnings impacts vary among programs in the medium run, although they trend positive. While most of the evaluations took place too recently to provide long-term impact estimates, the ones with long-term follow-up show persistent impacts. Despite the screening and the clear link between the training and good jobs, many enrollees do not complete the training and some among those who do end up with jobs in other sectors. The analysis of the four WorkAdvance sites in Katz et al. (2020) emphasizes that the impacts arise from moving workers into “higher-wage jobs in higher-earning industries and occupations.”

The strongest of the sectoral programs likely pass a cost-benefit test, although the question of how much of the training would have occurred without the government subsidy complicates the calculations. Moreover, much of the social gain may come in the form of equity (i.e., trainees from underrepresented groups get the “good” jobs) rather than increased total output. Katz et al. (2020) provide a valuable discussion of this issue and argue that the impacts represent (at least in part) an increase in total output. The applicant screening, the requirement for strong employer involvement, and the (in many programs) narrow occupational focus suggest a limited potential for scaling up these programs to the point where

they account for a major chunk of the government's workforce development effort. At the same time, room remains for program expansion relative to current levels and for more research on less selective versions of programs already shown to be effective on a highly selected population.

A final nonexperimental literature builds on the pioneering study of Jacobson, LaLonde, and Sullivan (2005). Recent examples include Jepsen, Troske, and Coomes (2014); Grosz (2020); and Leung and Pei (2020). The papers in this literature typically use state administrative data on earnings and other labor market outcomes drawn from unemployment insurance records combined with administrative data on enrollment, course of study, and degree and certificate completion from public two-year (and sometimes four-year) colleges. The administrative data allow both large samples and relatively more credible empirical strategies. The big picture conclusion from this literature: completing a recognized credential closely tied to an in-demand occupation at a public two-year college has a high earnings payoff. This broad finding has focused attention on programs designed to help students finish what they start at two-year colleges and to better match students with programs (see, for example, Miller et al. 2020).

## The Damn Pandemic

Our article thus far has focused on the time preceding the current economic recession caused by the COVID-19 pandemic (and the policy responses thereto). As we have shown, the labor market for non-college youth was strong when the pandemic struck. We chose not to integrate the effects of the pandemic recession with our other analyses because its medium- and long-term impacts remain uncertain. However, the labor market (and the economy more broadly) will continue to change in important ways due to the pandemic. Here, we offer some big picture thoughts about the current recession as it relates to workforce entry and early career skill investments.

First, the COVID recession has had an atypical effect on postsecondary enrollment. Overall enrollment (including undergraduate and graduate) declined 3 percent from the 2019–2020 academic year to the 2020–2021 academic year, with the largest declines (9.4 percent) in community colleges (National Student Clearinghouse 2020). The switch, in most cases, to less-appealing online instruction surely represents one major factor in this decline, along with household economic disruptions, particularly for students coming from households where the primary earners worked in occupations and industries hit hard by COVID and its associated recession.

Second, and more broadly, the COVID recession does not reflect any underlying economic imbalance, such as an oil price shock or a housing bubble. In principle, everything could return to its pre-COVID state once the pandemic ends. Of course, workers and firms have paid many fixed costs—for example, learning to organize workers at home and run meetings and courses online—that will change marginal costs, and thus behavior, post-COVID. Overall, we think that

this recession will imply less need for reskilling than past recessions, although of course the broad pressures toward reskilling (and upskilling) resulting from automation, globalization, and labor market regulations that raise the relative price of low-skill workers will persist.<sup>9</sup>

Other aspects of the COVID recession more closely resemble past recessions. Unemployment has rapidly increased and has disproportionately affected young workers. The unemployment rate for 16- to 24-year-old workers increased from 8.4 percent to 24.2 percent from spring 2019 to spring 2020, while unemployment for those aged 25 and older saw a corresponding increase from 2.8 percent to 11.3 percent. One of the drivers of larger unemployment impacts on young workers is their propensity to work in the sectors that experienced the largest declines, such as leisure and hospitality. Unemployment rate increases were also large for workers without a college degree (Aaronson and Alba 2020) and for Black and Hispanic workers (Gould and Kassa 2020).

In the wake of the Great Recession, the American Recovery and Reinvestment Act (ARRA) included large temporary increases in funding for WIA. The COVID recession has yet to inspire increased spending on WIOA training (or other employment and training activities) and, given the decline in enrollment in post-secondary education due to its move online, it is not clear how much demand there would be for the training prior to the end of the pandemic. Barnow (2020) and Holzer (2021) provide further thoughts on training-related responses to the pandemic and its associated recession.

## Concluding Remarks

The years between the Great Recession and the pandemic recession brought with them some modest positive trends for youth entering post-high school adulthood. We note in particular the sizable drop in the number of youth ages 20 to 21 not engaged in school, training, or work. Accompanying this shift, we documented an increase in enrollment at four-year public colleges. Mean and median earnings conditional on education also increased over these years, while the federal workforce system remained but a tiny piece of the human capital investment puzzle for this age group. The COVID recession has more than undone most of this progress. Because the pandemic has largely pushed postsecondary instruction in less desirable online directions, this recession lacks even the usual “silver lining” of increased enrollment in education and training during a time of low opportunity costs in the labor market.

## Notes

1. The U.S. Bureau of Labor Statistics defines full-time workers as those who work 35 or more hours per week. See <https://www.bls.gov/bls/glossary.htm#F> (accessed 28 November 2020).

2. NPSAS data are available every four years from 2004 to 2016. In calculating percentages of occupational majors, we omit the undecided.

3. We use the personal consumption expenditures (PCE) deflator (see U.S. Bureau of Economic Analysis [2020] for details) rather than the Consumer Price Index (CPI) because of concerns that the CPI overstates inflation and leads to substantial bias over time. See Sacerdote (2017) for more detail.

4. Barnow and Smith (2016) provide further details on program design, funding, and history.

5. Our estimate of Pell grant support extrapolates from 2015 data. Some Pell grant recipients appear as both WIOA enrollees and community college students.

6. Section 3 of the statute defines career pathways. See also Training and Employment Notice 39-11 (TEIN 39-11) issued by the Employment and Training Administration at DOL.

7. Job Corps material retrieved from <https://www.dol.gov/agencies/eta/jobcorps#:~:text=Job%20Corps%20is%20the%20largest,assists%20them%20with%20obtaining%20employment> (accessed 30 November 2020).

8. The experimental findings largely parallel those in the nonexperimental analyses by Heinrich et al. (2013) and Andersson et al. (2016), including large differences between enrollees served as displaced workers and as adults. Also relevant: the individual training account experiment in Santillano, Perez-Johnson, and Moore (2020).

9. For more on the slow but unrelenting progress of our robot overlords, see MIT Task Force on the Future of Work (2019).

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