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Robert I. Lerman

September 2012

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Policy Paper No. 46  
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## ABSTRACT

### **Can the United States Expand Apprenticeship? Lessons from Experience**

Can expanded apprenticeship reduce the concerns about the U.S. workforce? The U.S. labor market faces a rise in unemployment rates, sharp declines in the employed share of U.S. adults, extremely high youth unemployment, high wage inequality, and low or stagnant wage growth for workers below the BA degree. Currently, the primary solution advanced by policymakers – helping more people go to college – is both expensive and of limited effectiveness. Unfortunately, the U.S. policy debate is rarely informed by international experience with systems that prepare young people for careers, especially for technical occupations. Few if any cite the experience in Germany, Switzerland, and Austria in achieving high levels of income and relatively low levels of earnings inequality without a college graduation rate above the OECD average. Americans know little about the success of apprenticeship systems abroad nor are they or their political leaders aware of the growth of apprenticeship programs in Australia, England, and other advanced economies. Given the potential for expanded apprenticeship to deal effectively with skill mismatches, wage inequality, declines in manufacturing employment, and high youth unemployment, why has the U.S. failed to mount a significant apprenticeship initiative? A number of reports, including the Organization for Economic Development and Cooperation (OECD 2009) review of youth employment, have recommended expanding apprenticeship training yet failed to stimulate significant action. Apprenticeship training would seem consistent with American values of pragmatism and extensive use of the market and public-private collaborations, and a limited role for government. The paper begins by describing the existing U.S. apprenticeship system, how the system evolved, and measures of its effectiveness. The next sections examine the multiple barriers to expanding apprenticeship in the U.S., highlighting both ideological and practical obstacles. The final section describes how best to take advantage of the opportunities for expansion.

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Concerns about the U.S. workforce take many forms. The most obvious problems are the rise in unemployment rates and the sharp declines in jobs and the employed share of U.S. adults. As of August 2012, only 58.3 percent of the U.S. population was working, down from 63.1 percent in August 2006. The recession hit young people especially hard, causing the employed share of 20-24 year-olds to fall 11 percent. As of late 2011, fewer than half of 16-24 year-olds held jobs. Only four years ago, unemployment rates were less than five percent, well below the OECD-Europe average of 9 percent. Construction and manufacturing industries have shed the most jobs, 28 percent of construction and 16 percent of manufacturing jobs.<sup>1</sup> These industries employ a significant share of non-college male workers, a group that has already experienced stagnant wages for decades.

Added to joblessness is the high and rising level of wage inequality. The recent series in the Financial Times (2011) “Is America Working?”, highlights both the weaknesses in the U.S. job market, not only in creating sufficient numbers of jobs but also in insuring jobs with adequate pay. The Gini coefficient of earnings of all workers jumped by over 20 percent between .38 to .47 (Kopczuk, Saez, and Song 2010). And the wage gap between college and high school graduates widened from about 45 percent in the early 1980s to over 65 percent by 2000 and through 2009 (Acemoglu and Autor 2010).

A central question about today’s U.S. job market is the importance of the structural character of unemployment—joblessness that results from skill and geographic mismatches. One recent news article (Weitzman and Harding 2011) reports the case of Marlin Steel Wire Products, a company in Baltimore with 30 employees, that cannot find sufficient qualified workers to maintain high levels of growth, despite offering a compensation package of more than \$80,000 per year. Data from a 2011 Manpower Group survey indicate that more than half of employers had difficulty filling jobs and nearly half blame the lack of hard, technical job skills. Moreover, the hardest jobs to fill in 2011 were for workers

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<sup>1</sup> The figures in this paragraph come from the U.S. Bureau of Labor Statistics ([www.bls.gov](http://www.bls.gov)).

qualified in skilled trades, including machinists and machine operators. Rahm Emanuel (2011), the Democratic mayor of Chicago and former chief of staff of President Obama, recently cited the skills mismatch to explain why a local aviation parts manufacturer is having trouble filling 600 openings for welders and mechanics.

These and other examples show the existence of skill mismatches, especially for many technical jobs requiring mastery of specific occupational tasks. Yet, the focus of policy is primarily on increasing academic attainment, especially college. A prime example is President Obama's goal for the U.S. to reach the highest proportion of college graduates in the world by 2020.<sup>2</sup> Achieving the goal would require raising the share of young people graduating a 2-year or 4-year college from about 40 to about 60 percent. This prescription is in accord with recommendations by many academic economists. Claudia Goldin and Lawrence Katz (2008) are good examples. They argue that the slowdown in the growth of college graduates, together with expanding demand for skill linked to technological change, played the central role in rising college-high school wage differentials. By implication, resuming healthy growth in college completion is likely to reduce or at least slow the increase in wage inequality. Others explicitly make the connection between raising the number of college graduates and reducing the college-high school wage gap (Carnevale and Rose 2011).

Surprisingly, the U.S. policy debate is rarely informed by the international experience with systems that prepare young people for careers, especially for technical occupations. Neither President Obama nor other major political leaders cite the experience in Germany, Switzerland, and Austria in achieving high levels of income and relatively low levels of earnings inequality without a college graduation rate above the OECD average. Americans know little about the success of apprenticeship systems abroad nor are they or their political leaders aware of the growth of apprenticeship programs in Australia, England, and other advanced economies. Though many worry about the loss of a

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<sup>2</sup> See [http://www.whitehouse.gov/sites/default/files/completion\\_state\\_by\\_state.pdf](http://www.whitehouse.gov/sites/default/files/completion_state_by_state.pdf)

manufacturing base in the U.S.<sup>3</sup>, debates about how to sustain manufacturing in the U.S. rarely take account of the advantage in job creation for manufacturing in countries with robust apprenticeship systems. In two major apprenticeship-oriented countries, manufacturing industries employed over 22 percent of German workers and nearly 16 percent of Swiss workers in 2008. In the U.S., less than 10 percent of workers held jobs in manufacturing.<sup>4</sup> If the U.S. matched the German manufacturing share of employment, then the U.S. would have generated 18 million additional manufacturing jobs.

Another long-term problem for the U.S. is high youth unemployment, especially among minorities and low-income youth. In the 1960s, President Johnson's War on Poverty included two major youth employment and training programs—the Neighborhood Youth Corps and the Job Corps. In the late 1970s, when black teens faced unemployment rates of 40 percent, the Congress passed the Youth Employment Demonstration Projects Act to determine the best ways of promoting youth employment and improving career options. In the Great Recession of 2008-2010, when the unemployment rates of teens and 20-24 year-old men reached record highs, the youth employment issue attracted little attention from policymakers. In particular, policymakers have shown little interest in successes of other countries, such as Germany, Switzerland, and Denmark, who use the dual system of education and training to restrain youth unemployment while investing in useful career skills.

Given the potential for expanded apprenticeship to deal effectively with skill mismatches, wage inequality, declines in manufacturing employment, and high youth unemployment, why has the U.S. failed to mount a significant apprenticeship initiative? A number of reports, including the Organization for Economic Development and Cooperation (OECD 2009) review of youth employment, have recommended expanding apprenticeship training yet failed to stimulate significant action. This paper

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<sup>3</sup> For example, in mid-2001, President Obama launched an initiative to revitalize manufacturing in the United States. See <http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-advanced-manufacturing-june2011.pdf>.

<sup>4</sup> These figures come from OECD website, "Employment by activities and status (ALFS)" dataset, a subset of the Annual Labour Force Statistics (ALFS).

asks why. Apprenticeship training would seem consistent with American values of pragmatism and extensive use of the market and public-private collaborations, and a limited role for government. The paper begins by describing the existing U.S. apprenticeship system, how the system evolved, and measures of its effectiveness. The next sections examine the multiple barriers to expanding apprenticeship in the U.S., highlighting both ideological and practical obstacles. The final section considers how best to take advantage of the opportunities for gradual expansion.

### **An Overview of the U.S. Apprenticeship System**

As in other countries, apprenticeship has long been used in the U.S. to prepare workers to master occupational skills. Apprentices earn a salary while undertaking productive work and undergoing training through supervised, work-based learning with related academic instruction. Employers, joint, union-employer agreements, government agencies, and the military all sponsor apprenticeship programs. The learning experiences are intended to demonstrate proficiency in a large number of tasks. The U.S. programs usually last three to four years and require apprentices to complete course work that includes math, verbal, and occupation-specific content. In completing apprenticeship training, workers earn a recognized and valued credential attesting to their mastery of skill required in the relevant occupation. Unlike programs in many countries, the U.S. system has little linkage with secondary schools and generally recruits adult workers. Only about one in five apprentices are under age 25 and the average age is about 30 (Lerman and Rauner 2012).

The U.S. apprenticeship system is highly decentralized, although most programs are governed by the “Registered Apprenticeship” system. These registered programs operate under the supervision of the U.S. Labor Department’s Office of Apprenticeship (OA) and State Apprenticeship Agencies (SAAs). The responsibilities of the OA include approving skill standards for apprenticeable occupations, issuing certificates of completion to apprentices, protecting the safety and welfare of apprentices, providing guidance and technical assistance to program sponsors, monitoring program equal opportunity plans to



prevent discrimination against women and minorities, and expanding the use of apprenticeship by employers. In about half the states, the SAAs undertake many of these tasks, including approval of the apprenticeship programs proposed by individual firms or joint union-employer programs. As of 2008, about 27,000 registered apprenticeship sponsors were training about 480,000 apprentices. Apprentices make up only about 0.3 percent of total work force and nearly 4 percent of a cohort's entrants to the work force. Though only a fraction of the students in colleges and universities, the number of registered apprentices is comparable to the combined number of individuals receiving training through other U.S. Department of Labor programs.

The budget for the federal Office of Apprenticeship is tiny and has declined sharply in real terms. The funding is far too low to adequately market, monitor, and provide technical assistance for apprenticeship. In Indiana, an industrial state with over 6 million people, only two government staff is engaged in overseeing and expanding registered apprenticeship.

Apprenticeship in the United States focuses primarily on construction and manufacturing occupations, with large scale programs in electrical, pipe-fitting, carpentry, shipbuilding, maintenance, machining, and welding. This type of training is particularly relevant today as a way of dealing with the current mismatch between available workers and openings for skilled occupations in manufacturing and other industries. Tens of thousands of apprenticeships are learning occupations in other fields as well, including utilities, auto and truck repair, police and fire, trucking, child care and long-term care. The range of occupations with extensive apprenticeship training is far less than in several Western European countries, where apprenticeship is a mainstream route to career success.

Not all apprenticeships in the U.S. are "registered" with the U.S. Department of Labor. Although several major companies offer these unregistered formal apprenticeships, the number of such positions is uncertain. In one national survey—the National Household Education Survey (NHES)—respondents are asked, "During the past 12 months, were you in a formal apprenticeship program leading to

journeyman status in a skilled trade or craft?” Of the 9,000 respondents, about 90 or 1 percent reported having been in an apprenticeship.<sup>5</sup> When weighted to reflect the population, the estimate is that 1.8 million workers were in an apprenticeship, implying over 1 million in unregistered programs. While this figure seems implausibly high, no other survey-based estimates are available.

### **Is Apprenticeship Effective in the U.S.?**

Evidence is accumulating to document the value of apprenticeships for U.S. workers and employers. The gains for the workers are showing up in research comparing alternative modes of training. In one careful study that compared matched groups of workers entering job centers in Washington state, Hollenbeck (2011) finds that the returns to apprenticeship training far exceed the returns to other types of training, including two- year, community college programs. For apprentices, the present value of their post-program increases in earnings, net of any earnings foregone during the training period itself, amounted to over \$50,000 for the first 2.5 years after exiting their program. In contrast, estimates using the same approach for workers entering community college occupational programs indicated gains of only about \$8,000 or less in the short term. The estimated long-term gains to community college occupation programs are certainly substantially higher (\$104,000 to \$130,000 for workers through age 65), but still far less than present value of long-term gains to apprenticeship training of about \$266,000. Moreover, the public costs of community college were about \$5,000 more than the public costs of apprenticeship. Of course, as in the case of any postsecondary education and training, the net gains are likely to vary, depending on the occupation and geographic area.

A broader study of 10 states also documents large and statistically significant earnings gains from participating in apprenticeship (Reed 2011). This analysis estimates how the length of participation in an apprenticeship affected earnings, holding constant for pre-enrollment earnings of apprenticeship participants. Put another way, of workers with the same annual earnings in the four years before

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<sup>5</sup> Tabulations by author from the Adult Literacy module of the National Household Education Survey. For more detail on NHES, see <http://nces.ed.gov/pubs2006/2006077.pdf>.

entering an apprenticeship, the study finds that who stayed longer in their apprenticeship program earned much more over the nine years after entering the program. Using this “dosage” model, the author obtains estimates of what the level of earnings would be for comparable workers who did not participate in apprenticeship at all. This approach would be especially hazardous for very young workers with few years in the work force. However, because the U.S. apprenticeship system draws workers in their late 20s, matching workers based on four years of their pre-program earnings makes a good deal of sense. The estimated impacts are consistently and highly positive. At six years after starting a program, earnings of the average apprenticeship participant (average duration in an apprenticeship) stood at 1.4 times the earnings of non-participants with the same pre-apprenticeship history. The gains were highly consistent across states although the earnings advantages narrowed between the 6<sup>th</sup> and 9<sup>th</sup> year after program entry.

The Reed study includes a cost-benefit analysis. On the cost side, it takes account of government administrative and oversight costs as well as the costs of government-funded classroom instruction. Employer and union-management sponsors of apprenticeship generally receive no direct support, though some of their apprentices obtain subsidies through community colleges. Since apprentices earned as much while in training as they would have otherwise, there are no costs associated with earnings foregone during the training. On the benefit side, the study uses estimates of earnings gains along with savings in administrative costs from reduced use of social benefit and unemployment insurance programs. Given the very low costs associated with apprenticeship, the net social benefits from apprenticeship mirror the gross benefits associated with earnings gains. The study finds that apprenticeship returns nearly \$28 in benefits for every dollar of costs. The net dollar gains over a worker’s career amounted to about \$125,000.

Neither the Hollenbeck nor the Reed study examines the benefits and costs of apprenticeship from the employer perspective. However, other work strongly suggests that apprenticeship training is a

sound approach for employers as well. One body of evidence comes from a 2007 survey of sponsors of registered apprenticeship programs conducted for the U.S. Department of Labor's Employment and Training Administration (Lerman, Eyster, and Chambers 2009). The survey obtained data from 947 sponsors concerning the sponsor's program characteristics, benefits of registered apprenticeship, drawbacks or costs of registered apprenticeship, views on the apprenticeship system, interactions with the larger workforce investment system, and related instruction. The results showed strikingly positive attitudes by sponsors. Nearly all reported they would recommend the program to others, with 86% stating they would "strongly" recommend it and 11% indicating they would recommend it with reservations, due primarily to problems with accessing related instruction.

The benefit cited by over 80% of sponsors was the apprenticeship program's role in meeting the demand for skilled workers. Another major benefit was that the apprenticeship programs show reliably which workers have the skills needed. Other benefits, cited by 68% of sponsors as very important, were raising productivity, strengthening worker morale and pride, and improving worker safety. A majority of sponsors also reported benefits in worker recruitment and retention and in meeting licensing requirements.

One common concern about encouraging intensive, employer-led training is that firms will be unable to recoup the costs of training because other firms will drive up the wages of the newly skilled workers. The process by which competitor firms bid away trained workers after their apprenticeship is commonly called "poaching"; it is viewed as a major disincentive to employer involvement in any training that raises the productivity of workers outside the firm. Some apprenticeship sponsors viewed poaching as a significant problem, but surprisingly, 46% of sponsors did not perceive it as a problem at all. Moreover, even among sponsors who perceived poaching as a problem, about 85% would still strongly recommend apprenticeship to others.

Sponsors generally did not find costs to be a significant problem. Sixty-three percent of sponsors said related instruction costs were not a problem, although 30% viewed costs as a minor problem and 6% as a major problem. Similarly, only 7% of respondents saw the cost of experienced workers' time to instruct apprentices as a significant problem, while 34% indicated it was a minor problem.

Given the large benefits and low government costs associated with apprenticeship, one might expect big increases in federal support for apprenticeship training. Yet, in fact, the federal budget for apprenticeship has been declining in real terms and amounts to a tiny fraction—less than 1 percent—of the U.S. Department of Labor's training budget. The budget for one program alone (the Job Corps, that serves about 60,000 disadvantaged 16-24 year-olds) is well over \$1 billion per year. Training-related outlays under the Workforce Investment Act for programs for youth, adults, dislocated workers, and ex-offenders cost at least another \$1 billion; training expenses under the Trade Adjustment Assistance program add over another \$400 million. Meanwhile, the federal investment in apprenticeship training—an approach that reaches over 400,000—is less than \$30 million.

What explains the failure of the U.S. to take greater advantage of the apprenticeship approach? Can the barriers to expanding U.S. apprenticeship be overcome and if so, how? The rest of the paper examines these two questions.

### **Timing, Knowledge, and Past Failures**

Countries with robust systems of vocational education incorporate apprenticeships into the upper secondary and immediate post-secondary education systems. Young people combine classroom and work-based learning toward some occupational expertise and credential as part of a dual vocational educational system. They enter apprenticeships between ages 16 and 19 while others are going directly to work or continuing full-time schooling. In contrast, U.S. formal apprenticeships overseen by the government (registered apprenticeships) typically begin only when workers are in their late 20s; they have virtually little connection to secondary school vocational education and only modest linkages with

vocational post-secondary colleges. U.S. sponsors of apprenticeships—either employers or union-management joint programs—have wide discretion over the content of the program and over which institution supplies the classroom-based component. The relatively high age of entry into most U.S. apprenticeship programs along with apprenticeship’s limited linkages with high schools and colleges, are reasons why they are largely invisible to education providers and policymakers.

More broadly, Americans know little about apprenticeships. Those that do so believe they are only relevant to workers in construction trades. For elites, who have no relatives or friends who have completed an apprenticeship in construction or manufacturing, they are viewed as anachronism. Still, in my conversations with a cross section of people, once the concept is explained, they recognize the value of the concepts embodied in apprenticeship, such as contextualized learning, work-based learning, and the incentives built into structured programs leading to occupational mastery and certification. Moreover, people realize that apprenticeship approaches are used in prestigious occupations. Medicine requires work-based learning in medical schools, internships, and residencies. Law students typically spend summers between school years at law firms learning practical skills.

In the late 1980s and early 1990s, certain researchers and advocates began an effort to inform and influence policymakers about the advantages of incorporating formal apprenticeships into a revamped vocational education system. Commissions published national reports highlighting the weaknesses in the U.S. school-to-work (STW) and their negative impact on the career outcomes of young people not bound for college. For example, the Commission on the Skills of the American Workforce (1990) expressed concern about the weak skill levels of U.S. workers relative to workers in other advanced countries, attributing the problem partly to the fact that... “America may have the worst school-to-work transition system of any advanced industrial country.” (p. 4) At a December 1990 conference entitled, “Youth Apprenticeship American Style,” the keynote speaker was Governor Bill

Clinton of Arkansas. Key educators, including Albert Shanker (president of the American Federation of Teachers) and Herbert Grover (leader of the Chief State School Officers), supported the approach.

In response, the first Bush administration sponsored youth-apprenticeship demonstration projects and proposed the National Youth Apprenticeship Act of 1992. School-to-work initiatives were also developing at state and local levels—in Oregon, Wisconsin, and Arkansas, and in Boston, Rochester, and Tulsa, Oklahoma. The Clinton administration proposed and the Congress enacted the School-to-Work Opportunities Act (STWOA) with large majorities in both houses. STWOA became law in May 1994, or about 4-6 years after various reports called for radical change in America’s approach to school-to-work transition. The law allocated funding mainly to states so they could create the institutions and reforms. At the same time, Congress passed the National Skill Standards Act (NSSA) of 1994 to develop a voluntary national system of skill standards. Though separate measures, STWOA and NSSA were complementary. The standards created through NSSA would give STW programs (including youth apprenticeship) attainable goals and help determine which skills to teach.

Unfortunately, the goal of creating a new, effective STW system went unrealized. In spite of initial bipartisan support for STW, generous funding to states, and the complementary NSSA, the initiative eventually lost momentum, at least at the federal level. By 2000, neither the Clinton Administration nor major congressional figures proposed extending STWOA beyond the 2001 expiration built into the original law.

How did this bipartisan effort to raise the quality of non-college careers falter and lose political support? In retrospect, tensions had already surfaced when the Clinton Administration bill unfolded, especially over whether to emphasize a youth-apprenticeship system. Unions generally opposed youth apprenticeship, because they might lose control over registered apprenticeship programs and because weak youth-apprenticeship programs would devalue the “apprenticeship” name. Second, some former advocates of youth apprenticeships worried that youth apprenticeship would (a) force students to make

crucial decisions about careers too early, (b) involve unproductive early tracking, (c) generate opposition from parents resistant to non-college alternatives for their children, (d) compel students to switch high schools to attain the scale required to justify classes in specific skills, (e) come too soon for students lacking academic preparation for a demanding apprenticeship, and (f) yield too few apprenticeship slots from employers. Third, the initiative did little to neither attract support from existing high school vocational programs nor define the new roles vocational teachers might play. In part, this was because of the conventional view that vocational education in the U.S. was highly uneven in quality and often a dumping ground for students unable to perform well in academic classes.

By the time the bill ultimately became law, youth apprenticeship was downplayed as a major intervention. Instead of focusing on youth apprenticeship with its combination of school-based and work-based components, the act emphasized career majors, which are school-based program of several courses on a broad occupation or industry area. The bill mentioned work-based learning (WBL) but mainly in the context of having career majors integrate classroom learning and WBL. Still, career majors were to result in a skill certificate that could be used as a nationally-recognized industry credential certifying that a student had mastered skills endorsed by the National Skill Standards Board (NSSB). The skill certificate requirement offered some encouragement to programs resembling the original youth-apprenticeship vision.

The slow development of skill standards by NSSB posed a key barrier. STWOA mandated that the skill certificates linked to career majors required students to master skills at levels “at least as challenging as skill standards endorsed by the National Skill Standards Board.”<sup>6</sup> Unfortunately, the NSSB took an inordinately long time generating standards and made little effort to integrate them into a

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<sup>6</sup> See part (22) of section 4 of the text of the School-to-Work Opportunities Act of 1994.  
<http://www.fessler.com/SBE/act.htm>



school-to-career delivery system (King 2012). As of 1999, NSSB had selected voluntary partnerships to define occupational clusters, but none had proposed specific skill standards (Haimson and Hulse, 1999). This failure of NSSB to produce skill standards frustrated STWOA's provisions for skill certification. Without such standards, each state would have to develop its own, a costly process that would hinder portability.

Looking across a range of states, Hershey (2003) found that the STWOA encouraged local school systems to increase their collaborations with employers but mainly in low intensity activities, such as job shadowing and mentoring. It did not increase the amount of work-based learning linked to schools, though the jobs induced through STW programs embodied more training, career information, evaluation of their performance, closer links between work experience and classroom activity, and exposure to a wider diversity of jobs.

A few states, notably Wisconsin, Georgia, and Maine, did attach high priority to youth apprenticeships. In Wisconsin in the early 1990s, top elected officials from each political party—Republican Governor Tommy Thompson and Democratic State School Superintendent Herbert Grover—learned about, visited, and came to admire the German dual system. They collaborated on developing Wisconsin's Youth Apprenticeship System. Wisconsin's effort is especially notable since it began before passage of the federal STWOA. Wisconsin developed standards, worked closely with employer groups, and implemented a youth apprenticeship program that remains operational, though of modest scale.<sup>7</sup>

State agencies, collaborating with industry and labor groups, developed about 23 skill standards in fields ranging from the printing and automotive industries to biotechnology and finance. The standards require high-level competencies achieved at the workplace as well as related academic instruction, often delivered through technical colleges. Students are exposed to career exploration and allowed to choose apprenticeships beginning in 11<sup>th</sup> grade (about age 17). The program has remained

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<sup>7</sup> As of 2008, there were nearly 1,800 youth apprentices involving over 1,300 employers and 247 high schools. This is a large absolute number but is small in comparison to the over 70,000 Wisconsin students in 11<sup>th</sup> grade.

small in percentage terms, but the reason seems not low student interest or weak employer demand. Indeed, over 90% of employers reported they would recommend the program to other employers (Phelps and Jin, 1997). In a 2003 follow-up, participating employers reported great satisfaction with the program, with nearly all employers saying they would recommend the program to others and 85 percent saying it was beneficial to the company (Burton 2009). Evidence from a follow-up study of high school students who participated in a Wisconsin youth apprenticeship in printing documented participant earnings levels substantially above expected earnings for similar youth (Orr 1995). More recently, Halpern (2009) found that youth apprenticeship helps young people develop independence and self-confidence through their ability to perform difficult tasks. He notes that, "Apprentices learn through observation, imitation, trial and error, and reiteration; in other words through force of experience." (p.6) While apprentices are expected to demonstrate professionalism and care, they are not expected to be perfect.

Unfortunately, for the country as a whole, STWOA shifted the focus away from intensive STW by enunciating a large array of goals and having minimal involvement of employers. Although states had wide discretion over the shape of their programs, the Clinton Administration gave priority to reaching all students, including the college-bound. As a result, thin interventions touching many students, such as career exploration and job shadowing, dominated. In-depth interventions for those students interested in apprenticeships or other forms of structured, work-based learning were uncommon. By 12th grade (about age18), less than 10 percent of students were engaged in intensive, work-based learning activities (Haimson and Bellotti 2001). No more than 3 percent were participating in a school-linked, structured, long-term (one to two years or longer) experience demanding the learning of new skills at the workplace and leading to any type of certification (Hershey et al. 1999).

When the Congress chose not to reauthorize the STWOA, the program expired at the federal level. Some of the program's initiatives to bring schools and employers together managed to continue

but building a well-functioning system for school-to-work transitions soon became less of a national priority. The push for youth apprenticeships that peaked in the late 1980s and early 1990s had failed to exert a serious impact on the initial career training and placement of American young people.

### **Academics Only and the College for All Mentality**

Concerns about academic standards and educational attainment have supplanted worries about high youth unemployment in recent years. Attention has shifted away from the school-to-career transition and toward how well elementary and secondary student perform on academic tests as well as the barriers to college enrollment and completion. One example is President Obama's focus on restoring U.S. leadership in college completion by raising the U.S. college graduation rate to 60 percent. In speeches, he argues that, "In a single generation, we've fallen from first place to 12th place in college graduation rates for young adults," citing data on the percentage of a young adults who hold at least an associate's degree. While about 40 percent of 25-34 year-olds held an Associates' or BA degree in the U.S., this rate is well below the 56 percent levels in Canada, South Korea, and Russia.

The 2008 book by Goldin and Katz, *The Race Between Education and Technology* provides a well-respected source of academic support for expanding college completion. Goldin and Katz argue that the slowdown in the growth of educational attainment has played a major role in the rising inequality of earnings of American workers. From the perspective of James Rosenbaum (2002), the U.S. has embarked on a "college for all" policy. The open admissions policies of many colleges, together with high school counselors unwilling or afraid to tell weak students that they are unlikely to succeed in college, reinforces a public perception that college is the appropriate activity for students. Student expectations follow this pattern. Even among the high school seniors in the bottom quarter of their high school class, over 90 percent expected to go to college.

It is not so much that students who had poor or mediocre grades in high school suddenly have new capabilities and a sudden awakening that turns them on to academic pursuits, concentrating in

class, and rigorously completing their homework. Rather, it is the paucity (at least from their perspectives) of alternative paths to career success.

The focus on academic approaches is evident elsewhere. The National Governors Association and the Obama Administration have pushed states to raise graduation standards in high schools by adopting “common core academic standards,” a curriculum initiative to increase the number and rigor of high school courses. All but five states have already adopted the common core approach. Another example is in funding. While the Congress and the Obama Administration have sharply increased funding for schools, they have done little to expand budgets for work-related education programs. The latest example of the academic focus is President Obama’s recent proposal to raise the age at which students can leave schools to 18 without adding any work-based components to schooling. The primary bases for judging and holding schools accountable are student performance on academic tests and, to a lesser extent, on attaining high school and college diplomas. There is no effort to judge student outcomes based on their career success. The assumption is that raising academic outcomes will translate into improved career outcomes.

The common core initiative is a good example of this outlook. To its advocates, adding academic courses and academic content to the requirements for a high school diploma will assure that all students leave high school ready for college or work. The claim is that “...all students— those attending a four-year college, those planning to earn a two-year degree or get some postsecondary training, and those seeking to enter the job market right away—need to have comparable preparation in high school (p.1).” (Achieve 2004).

This claim is inaccurate. Virtually all serious studies of the workplace show skills differ widely across occupations and that for most occupations, several of the common core courses are not required for career success. About 15 years ago, Murnane and Levy (1996) described the academic skills they believe students must master to gain access to middle class jobs. Rather than calling for the upper level

math, science and English as graduation requirements, as recommended under the Common Standards project, Murnane and Levy argued for achieving the more modest objectives of insuring that all students gain the ability to read at least at the ninth-grade level, the ability to do math at least at the ninth grade level, and the ability to solve semi-structured problems where hypotheses must be formed and tested. Murnane and Levy also argued for the importance of selected non-academic skills, particularly the ability to work in groups with persons of various backgrounds, the ability to communicate effectively, both orally and in writing, and the ability to use personal computers to carry out simple tasks.

Evidence from Michael Handel's Survey of Workplace Skills, Technology, and Management Practices (STAMP) reinforces these conclusions for the workforce as a whole. The survey offers data on the proportion of workers who use the skills covered in high school and college courses. For example, in math, respondents are asked questions of the form: "At your job, do you use... [say, simple algebra for unknown values]?" The levels (last part of the question) rise from using addition or subtraction to calculus or other advanced mathematics. In reading and writing, the question is of the form, "As part of your job, do you read..." The levels extend from anything at work, even very short notes or instructions to work-related books. In writing, the levels run from writing anything at work to books or articles for scholarly journals.

Nearly all workers use some math and 68 percent use fractions, but less than one in four uses anything more advanced than fractions. Only 19 percent use the skills developed in Algebra I and only 9 percent use the skills for Algebra II.<sup>8</sup> Even among upper white collar workers, professionals and managers, the use of middle to upper level high school math is strikingly low. Only 14 percent of these managerial, professional or technical workers report using Algebra II and only 22 percent report using statistics. The share using these math tools among workers in all other job categories is generally in the

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<sup>8</sup> Algebra I typically includes ratios, exponents, square roots, solving simple equations for unknown variables and graphic variables. Algebra II incorporates logarithms, quadratic equations, graphs of solutions to systems of equations, and manipulating finite and infinite geometric series.

single digits. Upper blue collar workers use Algebra I (36 percent) and geometry and/or trigonometry (29 percent) at rates higher than all other groups of workers, including upper white collar workers. The Common Core mathematics standards encourage states to mandate upper level math for high school students on topics that are used by a very small percentage of the workforce.

In the case of reading, nearly all workers use reading and about half (53 percent) read work-related books or instruction manuals or reference materials, but only about half the workers read material at least 5 pages long. Writing requirements are exceedingly low. Except for workers in upper white-collar jobs, less than half write anything at least one page long. Less than 15 percent of these workers write anything five pages or more; for upper white-collar workers, the proportion is only 47 percent, a surprisingly low figure. One skill that varies in interesting ways by occupation is the reading and creation of visuals, such as maps, diagrams, floor plans, graphs, or blueprints. Upper blue-collar workers are the most likely to read and create such visuals (82 percent and 62 percent, respectively), rates far higher than among upper white-collar workers. Even among lower blue-collar workers, 55 percent commonly read these visuals and 22 percent create them.

Requiring significantly higher course standards (including more advanced math and science) and expecting all or nearly students to achieve them follows a U.S. tradition of proclaiming grandiose education goals that are unlikely to be attained.<sup>9</sup> In the case of the common core, the policy can be damaging for several reasons. First, the new curriculum might well discourage students from staying in school and increasing the already high dropout rate from secondary schools. Second, it is likely to divert some students away from pursuing a high school diploma (with its newly increased requirements) toward the alternative high school credential (the GED) that has easier to complete but has less value in the job market. Third, the added academic courses crowd out courses oriented toward occupational skills as well as initiatives to help students learn important non-cognitive skills.

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<sup>9</sup> In 1992, the Congress set national goals for 2000 that included having U.S. students be first in the world in science and math achievement and having every school free of drugs and violence.

Given the college-for-all mentality, schools are increasingly judged by whether their students are ready for and go on to college. For example, a report on New York City high schools focused on the low proportion (25%) of students who are “college ready”(Santos 2011). This approach devalues programs that successfully teach valuable occupational skills and help students directly enter rewarding careers.

One awkward element of the college-for-all strategy is confusion over what constitutes college. In the U.S., college has traditionally meant a 4-year program leading to a bachelors’ degree, but in recent years, college also refers to 2-year community college programs leading to an associates’ degree and for-profit vocationally-oriented colleges with programs less than 2 years. Only 44 percent of students entering a college start in a 4-year BA program. Yet, under the common core standards, all students would be required to complete a high school curriculum that prepares them for 4-year colleges.

Another concern is that pursuing the college-for-all strategy diverts the nation’s attention away from the most serious educational problems—students dropping out of high school, low basic skills, and low employability skills. Nearly 3 in 10 high school students fail to complete a high school diploma; the graduation rate is likely to decline when pending increases in academic requirements take hold. Prose and quantitative literacy tests of the adult U.S. population show about 22 percent are “below basic” in quantitative tests, indicating that they cannot calculate the weekly salary for a job based on hourly wages or locate two numbers on a bar graph and calculate the difference between them (Kutner et al 2007). Nearly half of black and Hispanic workers are in this below basic category.

The college-for-all approach ignores widespread evidence that weak workplace and occupational skills are at least as important as limited academic skills in explaining the gaps between worker capabilities and employer demand. In a survey of 3,200 employers in four large metropolitan areas taken in the mid-1990s, employers ranked key workplace skills and personal qualities as responsibility, integrity and self-management are as high or higher than basic skills (Holzer 1997). In

another employer survey undertaken in the mid-1990s of 3,300 businesses (the National Employer Survey), employers placed attitude, communication skills, previous work experience, employer recommendations, and industry-based credentials above years of schooling, grades, and test scores administered as part of the interview (Zemsky 1997). A 2007 survey of employers in Washington State found that 60 percent of employers reported some difficulty in hiring and that the most difficult skills to find were occupational and workplace skills such as teamwork, communication, and positive work habits.

Recent evidence highlights the large payoffs from occupational skills (Sullivan 2010). Kambourov and Manovskii (2009) offer rigorous evidence that it is occupational experience and not tenure with an industry or specific employer that affects wages. They estimate that the first five years of occupational experience is associated with a 12-20 percent increase in wages. Extending the analysis to eight years and looking at their most detailed occupational grouping (the 3 digit occupational category), the authors find wage returns ranging from 17 to 28 percent. These estimates may understate returns to specializations within occupations, since the data are only available at the 3 digit level. In addition, the results yield evidence for all occupations—including relatively unskilled fields—and do not necessarily capture the level of mastery of skills within the specific occupation.

Another indication of significant returns to occupational skills is the high returns associated with occupational licensing in the U.S. Kleiner and Krueger (2009) estimate that 35 percent of U.S. workers are either licensed or certified by the government. The wage gains from licensing are substantial, yielding about a 14 percent wage premium. Worker reports document the critical role of occupational experience. Workers confirm the importance of occupational expertise, with upper blue collar workers reporting that it takes nearly 8 years of work experience to do their jobs well (Handel 2007).

Finally, analyses of job trends reveal that nearly half of all jobs in the coming decade will be in what I and Harry Holzer term “middle-skill” occupations (Holzer and Lerman 2009). High academic skill



occupations (mainly professional/technical and managerial categories) will account for about one-third of all jobs. In addition, workers in some other occupations will no doubt benefit from academic college degrees. However, the structure of future jobs is unlikely to accommodate effectively big increases in the proportion of four-year college graduates. The current share of workers (25 and over) with a BA or higher is already nearly 40 percent in the U.S.

### **Community Colleges and Other Competing Institutions**

With limited apprenticeship but continuing demand for workers in middle skill occupations, how does the U.S. train workers for these fields? As described by Stone (2012), the U.S. has several career and technical education (CTE) subsystems with few connections between them. Training other than apprenticeship takes place in high school CTE programs, community colleges, federal training programs for disadvantaged and displaced workers, and business-based training programs.

High school CTE programs have declined significantly in importance in the face of the increased emphasis on academic courses. Between 1984 and 2004, academic credits jumped from 12.9 to 19 while CTE course credits dropped from 4.7 to 3.5 courses. (A half credit requires a one semester course, usually meeting for 45-60 minutes per day. A full credit can be earned by passing a full year course.) A concentration in an occupational field now only requires only 3 courses, down from 4. Concentrations in business topics are down, while those in health occupations are up. Overall, about one in five high school graduates earned 3 credits or more in an occupational area, down from nearly 25 percent. Only 5 percent of students have concentrated in construction, repair or transportation, engineering, or manufacturing. Despite the good earnings gains generated by past high school CTE programs, policymakers generally do not view these programs as adequate for preparing young people for careers. High school CTE students gain little complementary workplace training and rarely do programs prepare students to gain valuable credentials. Still, there is little interest in expanding or upgrading high school

CTE. The shift away from occupational-related high school courses is mainly the result of the “college-for-all” policy and concerns that 16-18 year-olds are too young to specialize in an occupational field.

One occupation-related high school initiative that has attracted wide attention is the Career Academies model. Career Academies are high schools organized around an occupational or industry focus, such as finance (22 percent), information technology (14 percent) and hospitality and tourism (12 percent). The over 1,588 academies try to weave related occupational or industrial themes into a college preparatory curriculum. Students take two to four classes a year in the Academy taught by a common team of teachers, and at least one course is career- or occupation-focused. Academies attempt to use applied learning in academic courses as well as career-focused courses. Academies try to form partnerships with employers and local colleges, but do not emphasize work-based learning in real jobs. Still, compared to other high school students, Career Academy students experience more activities linked to careers, such as job shadowing, career fairs, internships in an industry related to the Academy’s theme, and how to look for a job, prepare a resume, and take an interview.

Rigorous evidence drawn from a random assignment evaluation suggests that Career Academies have a significant impact on the labor force outcomes, though not on educational attainment or academic test scores (Kemple and Willner 2008). In the period between four and eight years after applying for the academies, young men who had access (and mostly enrolled) in an Academy were earning 17 percent more than those in the control group, an increase in earnings of about \$3,700 per year. Young women did not experience any statistically significant gains in earnings. The reasons are unclear. Perhaps because young men perform worse in conventional school settings than young women, they benefit more from seeing close linkages to careers. The percentage gains in earnings were highest for the students facing the highest risk of dropping out of school. The longevity of the gains is further indicated by the fact that the treatment groups (in all risk groups) reported a significantly higher likelihood of promotion than the control groups. Improvements in non-academic skills appear to have

played a central role in these earnings gains, since the Academies exerted no statistically significant impacts on academic test scores or on years of schooling. Although Career Academies are promising, especially for the most at-risk students, they are no substitute for apprenticeship training. They involve far less work-based learning and rarely lead to a valued credential that signals mastery of an occupational field.

The main rivals to apprenticeship training for middle-skill workers are community colleges and, to a lesser extent, for-profit career colleges. The number enrolled in community colleges—over 7 million in the fall of 2009—far exceeds participation in apprenticeship programs or for-profit career colleges. Public community colleges (mostly 2-year programs) awarded 58 percent of all sub-BA career and technical education credentials. At the same time, significant and rising shares of these are earned in for-profit career colleges. For-profit schools accounted for about 36 percent of these credentials in 2006, up from 30 percent in 1997, but the figure could be substantially higher because National Center for Education Statistics tracks only certain types of career colleges.<sup>10</sup> All of these institutions and programs offer training and credentials that qualify students for a variety of occupations, from health to technical trades, from travel and hospitality to computers and business. In the case of many occupations, it is possible to earn certification through any of these routes. In this sense, the institutions are competing. But, some collaboration takes place as well. For example, apprentices often take classes at community colleges or for-profit colleges.

Federal and state government officials have placed great hope in community colleges as a major element in their strategy for training workers for good jobs. States largely fund community colleges, subsidizing tuition substantially. Average annual tuition is less than \$2,300, well below the in-state level of \$8,100 for 4-year public colleges \$25,500 for 4-year non-profit colleges (National Center for Education Statistics, 2010). Other subsidies come from federal government grants and loans to low- and middle-

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<sup>10</sup> While the NCES reports about 2,100 for-profit career schools offering programs of 2 years or less, Cellini (2009) finds about 3,800 in California alone.

income students. As part of its 2009 stimulus program, the Obama Administration provided direct funding of at least \$3 billion in special training programs and expanded student grants for community colleges by another \$3.5 billion.

Community colleges provide a mix of courses, pathways, and certifications. They range from extensive and well-connected occupational programs, to academic programs focusing on allowing two-year graduates to transfer to BA programs, to generic studies in sales and administration, to occasional courses on hobbies (such as photography and music), and to customized training for a specific employer.

Although estimates generally show positive average returns to community college (Belfield and Bailey 2011), the primary benefits appear to go to those who complete occupational and technical programs. However, even in the case of occupational programs, apprenticeship programs may outperform community colleges. A study of Washington state found that suggests the economic gains to apprenticeship programs were far more cost-effective than the gains to community college (Hollenbeck 2010). Moreover, the gains to entering community college are clearly weak for a large segment of students who fail to complete any college credits. The weak counseling and placement functions in community colleges contribute to these problems (Rosenbaum, Deil-Amen, and Person 2006). In recent years, community colleges have become overcrowded with long waiting lists for many occupational programs and large classes. The rising enrollment has worsened the problem of an inadequate number of advisers to provide information and guidance to students.

Despite the uneven outcomes for community colleges, they attract widespread support among policymakers in terms of funding and policy. In a recent interview, Alan Krueger (2011), the Chair of President Obama's Council of Economic Advisors, argued that "...a big advantage for the U.S. in terms of training compared to other countries is a widespread community college network..." He cited Administration actions to allow unemployment insurance claimants to obtain grants to pursue

community college training. No similar provision has been undertaken to encourage more apprenticeship training.

### **Unionization**

Another distinctive element of the U.S. system is that unions play a central role in negotiating and operating apprenticeship programs as well as in influencing their political direction. Although less than 8 percent of U.S. private sector workers are represented by unions, over half of apprentices are in programs with union involvement. (Most apprenticeship programs have no any union involvement but union-connected programs are about five times as large as non-union programs (Lerman, Eyster and Chambers (2008).)

Unions play a significant role in the governance of state apprenticeship agencies (SAAs) and in the federal Advisory Committee on Apprenticeship (ACA). For example, as of late 2010, the federal ACA includes 11 members representing unions, fewer ostensibly representing employers, and a number of public interest representatives. State Apprenticeship Agencies that have been delegated the power to approve new apprenticeship programs are often even more heavily dominated by unions. One potential result is that the goal of expanding apprenticeship might be colored by the competing goal of strengthening unions or union members. In the late 1990s, a provision in California law passed—no doubt heavily influenced by unions—specifying that the apprenticeship council could only approve a program if there are no existing apprenticeship programs serving the same craft and providing sufficient numbers of apprentices in the geographic area. As a result, in 2007, the U.S. Department of Labor (under a Republican Administration) was able to decertify the California council as its agent and allow (sometimes even require) companies to register under the national authority. In a 2010 case, a non-union employer trying to start a photovoltaic installer apprenticeship program had his application for an apprenticeship program approved in California, but had to overcome objections by a number of unions who claimed that they already provided apprenticeships in the relevant field (Associated Builders and

Contractors 2010). In other states, laws and regulations limit the number of apprentices that can be trained per journeyman, in some cases requiring three certified journeymen for one additional apprentice (Frisman 2001).

Given the contentious nature of labor relations in the U.S., some employers may be reluctant to adopt an apprenticeship program for fear that it will open the way to unionization. On the other hand, some union officials are wary of providing financial support to non-union employers for creating and sustaining apprenticeships.

### **How Can the U.S. Expand the Role of Apprenticeship Training?**

Notwithstanding these formidable barriers to expanding apprenticeship, opportunities for expansion are emerging as well. The rising price of university education is stimulating many commentators and public officials to look for viable alternative routes to rewarding careers. concern about In one effort to change the intellectual climate concerning education and the workplace, the Harvard Graduate School of Education published a 2011 report highlighting the current problems of young workers in the U.S. and recommending using work-based learning to widen the pathways to successful careers (Schwartz, Ferguson, and Symonds 2011). The report specifically cites the positive experience of countries with well-developed apprenticeship programs. Leaders in several states have responded to the report by trying to implement new, apprenticeship-type programs.<sup>11</sup>

A critical question in any expansion effort is, which apprenticeship approach should take priority? The current registered apprenticeship system primarily recruits workers in their mid-20s, has virtually no relationship with high schools, and only a modest interaction with community colleges. In contrast, apprenticeships at the high school or immediate post-high school period are far less common.<sup>12</sup> While a sound policy to expand apprenticeships may need to target either existing programs

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<sup>11</sup> Conversations with Robert Schwartz, one of the authors of the report.

<sup>12</sup> An example of a continuing apprenticeship program at the high school level is the Wisconsin Youth Apprenticeship program.

or build more at the high school level, increasing all types of apprenticeships so they become more common and well-known may be the best strategy at this point.

A good example of a state initiative that has expanded “registered apprenticeships” is Apprenticeship Carolina, taking place in South Carolina. Stimulated by studies and public affairs efforts of South Carolina Chamber of Commerce, the state government funded a \$1 million a year initiative that now employs a small staff to attract employers to registered apprenticeship. The South Carolina government funded annual employer tax credits of \$1,000 per apprentice per year beginning in 2007. Since that time, the Apprenticeship Carolina Division of the South Carolina Technical College System has stimulated the registration of an average one new employer-sponsored apprenticeship program per week and more than doubled the number of apprentices in the state.

This expansion has created opportunities across broad industry sectors including advanced manufacturing, health care, and information technology. Moreover, the effort is adding to the linkages between the technical colleges and the business community. Although the technical college system’s career programs generally have business groups that offer advice on curriculum and program development, the direct linkage between the technical college and the apprenticeship system raises collaboration to an unusually high level.

Although Apprenticeship Carolina™ is based at the technical college system, the outreach to employers is in place for businesses to establish registered apprenticeship programs, whether or not they wish to use the technical college for their job-related education. Of the new programs established under the initiative, 55 percent use the technical college for at least some portion of their training, 60 percent of which are in credit-bearing courses and some through the continuing education branches of the colleges. About 15 percent of the programs incorporate an associate’s degree into their apprenticeship requirements.

Other states are providing tax credits for apprenticeship as well. Connecticut offers employers 50 percent of the wages of apprentices up to \$4,800, but only for apprentices in the manufacturing, construction, or plastics-related trades. In Michigan and Arkansas, tax credits of up to \$2,000 are offered for apprentices who are in school and between the ages of 16 and 20. Michigan's credits are restricted to apprentices in high school or a GED program. Rhode Island offers an incremental credit of up to \$4,800 for each apprentice hired that exceeds the average number hired for the prior years, but only for apprentices in the machine tool, metal trade, and plastics.

The South Carolina example proves that increased marketing and technical assistance efforts can persuade many employers to adopt apprenticeship as a viable training strategy. This evidence, together with the studies showing highly positive economic returns to apprentices, should be sufficient to expand significantly the very small budget of the Office of Apprenticeship in the U.S. Department of Labor and state programs as well. Federal subsidies to employers adopting or expanding apprenticeship can help but effective marketing of the apprenticeship concept will remain a critical ingredient. According to staff in South Carolina, the availability of the modest \$1,000 per year tax credit for each apprentice for each year opens the door to conversations about establishing an apprenticeship program. One way to target such subsidies in ways that do not pay for all the existing apprenticeships is to use a marginal credit, whereby employers would receive tax credits of perhaps \$4,000 for each new apprenticeship position beyond 80 percent of last year's level.

A federal subsidy for expanding apprenticeship makes sense on several grounds. First, while apprenticeships significantly increase human capital at least as much as community colleges, they currently receive no direct governmental support. Subsidies to the general educational component of apprenticeships are as justified as subsidies to college and university education. Second, the expected benefits from subsidies to stimulate added apprenticeships are likely to far exceed the costs.



Collaborative arrangements with community colleges are another potential strategy. In South Carolina, the technical college location allows for neutrality with regard to unionization and thus makes apprenticeship accessible and attractive to non-union as well as union firms. In addition, while the apprenticeship staff does not insist on having the apprenticeship programs use technical colleges, apprenticeship sponsors are much more likely to do so when staff can help make the appropriate connections with participating colleges.

### **Conclusions**

Currently, apprenticeship yields high social returns in the U.S., but the system is not well enough known to the general public to attract the necessary funding to market and strengthen the system's infrastructure. Moreover, the U.S. registered apprenticeship system is mainly an adult training program and closely identified with construction and a few other occupations. At the same time, expanding apprenticeship is critical to dealing with several structural problems plaguing the U.S. These include too many young people leaving school without a qualification or adequate employability skills, shortages of workers in skilled trades, widening earnings inequality, and the sharply rising costs of college. Some political leaders, policymakers, and business leaders are beginning to recognize that expanding apprenticeship can help generate a high skilled workforce and integrate the many workers who learn best by doing. Making major progress will depend on a greater recognition that employability and occupation skills deserve as high a priority as academic skills. Finally, policymakers and the public will find it increasingly difficult to ignore the success of apprenticeship in other advanced countries in diversifying routes to rewarding careers and helping the vast majority of workers achieve success in the labor market.

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