

Building a Robust Apprenticeship System in the U.S.

Why and How?

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Skills drive productivity, competitiveness, and incomes. Economic growth is heavily dependent on the growth in human capital (Hanushek and Weissmann 2015). But what is human capital and what for that matter do we mean by “skills”? Too often, U.S. researchers have identified skills with two key measures: 1) academic attainment in terms of completion of schools and degrees; and 2) test scores on academic tests, usually tests of math and verbal capability. Any shortfall in these measures suggests the need for remedial action to help young people extend and complete schooling and to teach them better math and verbal capacities (Goldin and Katz 2008). This consensus view on skills is one reason spending on postsecondary education has grown rapidly and reached record levels per student. The [National Center for Education Statistics](#) reports that at the postsecondary level, the United States spent \$27,900 per FTE student, 89 percent higher than the OECD average of \$14,800.

Now, after mountains of student debt and enormous spending by federal, state, and local governments, the U.S. is said to face a serious skills mismatch in various occupations, especially those in technical fields. Some academics, consulting firms, and managers see weak skills of many American workers leading to skill shortages and limited economic growth (Deloitte 2011; Carnevale, Smith and Strohl 2010). One striking indication of a skills gap or mismatch is that German companies operating in the United States identify job skills as a key challenge to their success in the U.S. and encouraged the German Embassy to start a “Skills Initiative” to identify and share information about best practices in sustainable workforce development. Others assert that skills in the United States are not in short supply (Cappelli 2015; Osterman and Weaver 2014).

Unfortunately, debates on the adequacy of skills rarely incorporate an appropriately broad definition of skills. The virtual sole emphasis on academic skills as measured by math and verbal test scores and educational attainment is natural because that’s where the data are. This emphasis fails to recognize that productivity depends at least as much on occupational competencies and employability skills, such as communication, teamwork, allocating resources, problem-solving, reliability and responsibility. The myriad nature of skills raises questions about whether added schooling and a targeted focus on academic test scores are the best ways of upgrading skills. So, too, does the recognition that many young people become disengaged from formal schooling, as reflected in weak high school outcomes and high dropout rates from community colleges.

Increasingly, policymakers and policy researchers are recognizing the need to shift from the “academic only” approach to teaching skills in schools. Instead, they see enormous potential in expanding apprenticeship, a model that combines work-based learning, production under a mentor/supervisor, wages, along with related courses. A wide body of evidence suggests that apprenticeships are far more cost effective in teaching skills, especially employability and occupational skills, than pure schooling. In Switzerland, perhaps the leading apprenticeship country, an astounding 95 percent of 25-year-olds have either a BA level degree or a recognized occupational certification, mainly through apprenticeship. About 70 percent of Swiss youth take up an apprenticeship, though some go on to university programs later.

Apprenticeship systems are one of the few mechanisms for improving both the supply and demand sides of the labor market. They are especially effective in teaching occupational and employability skills. Since classroom learning is applied quickly in real-world settings, workers are more likely to retain academic as well as occupational skills. Employers are more likely to create demanding, high productivity, and good-paying jobs when they can rely on those completing an apprenticeship to have mastered an array of relevant skills and to have gained experience in using those skills.

Apprenticeship expansion has become a bipartisan goal, endorsed and acted upon by President Trump at the beginning of his term and President Obama toward the end of his two terms. The Obama Administration allocated \$175 million to 46 apprenticeship initiatives by nonprofits and community colleges. President Trump called for expanding apprenticeship at a White House ceremony last June. He endorsed a “moonshot” goal proposed by Salesforce CEO Marc Benioff to create 5 million apprenticeships in five years. Achieving 5 million apprenticeships would require a tenfold increase from today’s 440,000 apprentices in civilian sectors and 95,000 in the military. Reaching the 5 million targets might sound impractical, but in fact, it would only require that the United States attain about the same share of apprentices in its workforce that Australia and England have already achieved. The president’s first steps to achieve this goal were signing an executive order titled “Expanding Apprenticeship in America” and nearly doubling the funding for apprenticeships to \$200 million.

Recognizing the need for fundamental reforms in the nation’s apprenticeship system, the executive order establishes a task force to examine other administrative and legislative reforms, strategies for creating industry-recognized apprenticeships, and the best ways to encourage the private sector to create apprenticeships. The newly created task force is chaired by the Secretary of Labor and co-chaired by the Secretaries of Education and Commerce.¹

Meanwhile, bipartisan bills in Congress call for providing tax credits to companies that offer apprenticeships. Several Republican and Democratic governors are taking steps aimed at expanding apprenticeships. For example, Republic Governor Scott Walker recently doubled the funding for [Wisconsin’s successful youth apprenticeship program](#). And Senator John Hickenlooper, a Colorado Democrat, is playing a leading role in creating a [youth apprenticeship program](#) modelled after the Swiss system.

This paper begins by defining apprenticeships and then discusses “why” apprenticeship can be an especially cost-effective approach to increasing skills, productivity, and ultimately wages. At this point, with the increasing acceptance of the rationale for expanding apprenticeship, the paper turns to the “how” questions. Is it feasible to scale up the U.S. system to reach numbers comparable to those in Australia and England while maintaining high quality? If so, what steps are required to do so?

Defining Apprenticeship and Explaining Its Advantages

Apprenticeship training is a highly developed system for raising the skills and productivity of workers in a wide range of occupations, with demonstrated success abroad and scattered examples of success domestically. Apprentices are employees who have formal agreements with employers to carry out a recognized program of work-based and classroom learning as well as a wage schedule that includes increases over the apprenticeship period. Apprenticeship prepares workers to master occupational skills and achieve career success. Under apprenticeship programs, individuals undertake productive work for their employer; earn a salary; receive training primarily through supervised, work-based learning; take academic instruction that is related to the apprenticeship occupation; and receive a certificate of completion. The programs generally last from two to four years. Apprenticeship helps workers to master not only relevant occupational

¹ The Secretary of Labor announced the task for on October 16. For the membership of the task force, see <https://www.dol.gov/newsroom/releases/osec/osec20171016>

skills but also other work-related skills, including communication, problem solving, allocating resources, and dealing with supervisors and a diverse set of co-workers. The course work is generally equivalent to at least one year of community college.

In Austria, Germany, and Switzerland, extensive apprenticeships offer a way of upgrading the quality of jobs, especially in manufacturing, commercial, and managerial positions.² In these countries, apprenticeships begin mostly in the late high school years, absorbing 50-70% of young people on their way to valued occupational qualifications (Hoffman 2011). OECD reports (2009, 2010) highlight the role of a robust apprenticeship system in limiting youth unemployment.

Apprenticeships within the U.S. and elsewhere show how construction occupations can reach high wages and high productivity. The question is whether the model can be extended and attract firms to upgrade other occupations. Apprenticeship expansion holds the possibility of substantially improving skills and careers of a broad segment of the U.S. workforce. Completing apprenticeship training yields a recognized and valued credential attesting to mastery of skill required in the relevant occupation.

Apprenticeships are distinctive in enhancing both the worker supply side and the employer demand side of the labor market. On the supply side, the financial gains to apprenticeships are strikingly high. U.S. studies indicate that apprentices do not have to sacrifice earnings during their education and training and that their long-term earnings benefits exceed the gains they would have accumulated after graduating from community college (Hollenbeck 2008). The latest reports from the state of Washington show that the gains in earnings from various education and training programs far surpassed the gains to all other alternatives (Washington State Workforce Training and Education Coordinating Board 2014). A broad study of apprenticeship in 10 U.S. states also documents large and statistically significant earnings gains from participating in apprenticeship (Reed et al. 2012).

These results are consistent with many studies of apprenticeship training in Europe, showing high rates of return to workers. One recent study managed to overcome the obstacle that such studies tend to face where unmeasured attributes explain both who is selected for an apprenticeship and how well apprentices do in the labor market (Fersterer, Pischke, and Winter-

² For a list of occupations using apprenticeships in several countries, see the occupational standards section of the American Institute for Innovative Apprenticeship website at www.innovativeapprenticeship.org.

Ebmer 2008); the authors did so by examining how an event unrelated to the apprenticeship (the firm staying in or going out of business) caused some apprentices to have full apprenticeships while others found their apprenticeships cut short. The estimates indicated that apprenticeship training raises wages by about 4% per year of apprenticeship training. For a three- to four-year apprenticeship, post-apprenticeship wages ended up 12-16% higher than they otherwise would be. Because the worker's costs of participating in an apprenticeship are often minimal, the Austrian study indicated high overall benefits relative to modest costs.

On the demand side, employers can feel comfortable upgrading their jobs, knowing that their apprenticeship programs will ensure an adequate supply of well-trained workers. Firms reap several advantages from their apprenticeship investments (Lerman 2014). They save significant sums in recruitment and training costs, reduced errors in placing employees, avoiding excessive costs when the demand for skilled workers cannot be quickly filled, and knowing that all employees are well versed with company procedures. Because employers achieve positive returns to their investments in apprenticeship, the worker and the government can save significantly relative to conventional education and training. After reviewing several empirical studies, Muehlmann and Wolter (2014) conclude that "...in a well-functioning apprenticeship training system, a large share of training firms can recoup their training investments by the end of the training period. As training firms often succeed in retaining the most suitable apprentices, offering apprenticeships is an attractive strategy to recruit their future skilled work force..." A recent detailed study conducted by the U.S. Department of Commerce and Case Western University (Helper et al. 2016) found that 40-50 percent returns to two expensive apprenticeship programs.

One benefit to firms rarely captured in studies is the positive impact of apprenticeships on innovation. Well-trained workers are more likely to understand the complexities of a firm's production processes and therefore identify and implement technological improvements, especially incremental innovations to improve existing products and processes. A study of German establishments documented this connection and found a clear relationship between the extent of in-company training and subsequent innovation (Bauernschuster, Falck, and Heblich 2009). Noneconomic outcomes are difficult to quantify, but evidence from Europe suggests that vocational education and training in general is linked to higher confidence and self-esteem, improved health, higher citizen participation, and higher job satisfaction (Cedefop 2011). These

relationships hold even after controlling for income. An Australian study found that quality apprenticeships improve mental health (Buchanan 2016).

In the United States, evidence from surveys of more than 900 employers indicates that the overwhelming majority believe their programs are valuable and involve net gains (Lerman, Eyster, and Chambers 2009). Nearly all sponsors reported that the apprenticeship program helps them meet their skill demands—87% reported they would strongly recommend registered apprenticeships; an additional 11% recommended apprenticeships with some reservations. Other benefits of apprenticeships include reliably documenting appropriate skills, raising worker productivity, increasing worker morale, and reducing safety problems.

While apprenticeships offer a productivity-enhancing approach to reducing inequality and expanding opportunity, the numbers in the U.S. have declined in recent years to about one-tenth the levels in Australia, Canada, and Great Britain. Some believe the problems are inadequate information about and familiarity with apprenticeship, an inadequate infrastructure, and expectations that sufficient skills will emerge from community college programs. Others see the main problem as an unwillingness of U.S. companies to invest no matter how favorable government subsidy and marketing policies are. In considering these explanations, we should remember that even in countries with robust apprenticeship systems, only a minority of firms hires apprentices. Because applicants already far exceed the number of apprenticeship slots, the main problem today is to increase the number of apprenticeship openings that employers offer. Counseling young people about potential apprenticeships is a sensible complementary strategy to working with the companies, but encouraging interest in apprenticeship could be counterproductive without a major increase in apprenticeship slots.

Apprenticeships are a useful tool for enhancing youth development. Unlike the normal part-time jobs of high school and college students, apprenticeships integrate what young people learn on the job and in the classroom. Young people work with natural adult mentors who offer guidance but allow youth to make their own mistakes (Halpern 2009). Youth see themselves judged by the established standards of a discipline, including deadlines and the genuine constraints and unexpected difficulties that arise in the profession. Mentors and other supervisors not only teach young people occupational and employability skills but also offer encouragement and guidance, provide immediate feedback on performance, and impose discipline. In most apprenticeships, poor grades in related academic courses can force the

apprentice to withdraw from the program. Unlike community colleges or high schools, where one counselor must guide hundreds of students, each mentor deals with only a few apprentices.

The high levels of apprenticeship activity in Australia, Great Britain, and Canada demonstrate that even companies in labor markets with few restrictions on hiring, firing, and wages are willing to invest in apprenticeship training. While no rigorous evidence is available about the apprenticeship's costs and benefits to U.S. employers, research in other countries indicates that employers gain financially from their apprenticeship investments (Lerman 2014).

Although apprenticeship training can prepare workers for a wide range of occupations, including engineering and architect³, apprenticeships are especially appropriate for skilled positions that do not require a B.A. degree.

Are Apprenticeship Skills Portable?

Concerns about whether the skills learned in apprenticeships bring the portability required to adapt to technical changes have recently surfaced (Hanushek, et al. 2017). Using cross-country regressions, the authors find countries that emphasize vocational education improve labor market outcomes in the short-run, but not in the long-run. While impacts are likely to vary by occupation, detailed studies indicate a high degree of skill portability associated with apprenticeship training.

To operationalize the concept of skill specificity, Geel and Gelner (2009) and Geel, Mure, and Gellner (2011) borrow an insight from Lazear (2009) that all skills are general in some sense, and occupation-specific skills are composed of various mixes of skills. The authors compile the key skills and their importance for nearly 80 occupations. They then use cluster analysis to estimate how skills are grouped within narrow occupations. This approach recognizes that skills ostensibly developed for one occupation can be useful in other occupations. It identifies occupational clusters that possess similar skill combinations within a given cluster and different skill combinations between clusters. Next, indices for each narrow occupation measure the extent to which the occupation is relatively portable between occupations within the same cluster and/or relatively portable between the initial occupation and all other occupations. The authors use

³ The United Kingdom features an array of apprenticeships with college degrees in a variety of fields. See <https://www.instituteforapprenticeships.org/apprenticeship-standards/?levelFrom=5>

these indices to determine how portability affects mobility, the wage gains and losses in moving between occupations, and the likelihood that employers will invest in training.

The authors test their hypotheses based on empirical analyses of German apprentices. One finding is that while only 42% of apprentices stay in their initial occupation, nearly two-thirds remain with either the occupation they learned as an apprentice or another occupation in the cluster using a similar mix of skills. Second, those trained in occupations with more specific skill sets are most likely to remain in their initial occupation or move to occupations within the same cluster. Third, apprentices increase their wages when moving to another occupation within the same cluster but lose somewhat when moving to another cluster. Fourth, as Geel, Mure, and Gellner (2011) show, employers are especially likely to invest in apprenticeships with the most specific skill sets.

Other strong evidence of the high returns and transferability of German apprenticeship training comes from Clark and Fahr (2001). They examine the returns to apprenticeship for those who remain in the original apprentice occupation as well as losses that do or would occur from transferring to another occupation. The overall rates of return to each year of apprenticeship range from 8-12% for training in firms of 50 workers or more and from about 5.5-6.5% for firms of two to 49 workers. Transferring to another occupation can offset these gains, but the reduction is zero for those who quit and only 1.7% for those who are displaced from their job and shift to another occupation.

As found by Geel and Gellner (2009), the wage penalty varies with the distance from the original occupation. There is no penalty at all from displacement into a somewhat related occupation. Göggel and Zwick (2012) show the net gains or losses from switching employers and occupations differ by the original training occupation, with apprentices in industrial occupations experiencing wage advantages, while those in commerce, trading, and construction see modest losses. Finally, Clark and Fahr (2001) present workers' own views on their use of skills learned in apprenticeship training on their current jobs. Not surprisingly, 85% of workers remaining within their training occupation use many or very many of the skills they learned through apprenticeship. This group constitutes 55% of the sample. But, even among the remaining 45%, about two of five workers reported using many or very many of the skills from their apprenticeship and one in five used some of the skills. Overall, only 18% of all former apprentices stated they used few or no skills learned in their apprenticeships.

The findings show that the skills taught in German apprenticeship training are often general. Even when bundled for a specific occupation, the skills are portable across a cluster of occupations. Moreover, apprentices are quite likely to remain in occupations that use the skills they learned in their initial occupation. Apprenticeship skills do vary in terms of specificity and portability. But when the skills are less portable, firms are more likely to make the necessary investments and workers are less likely to change occupations significantly.

The general component of training is presumably stronger in school-based programs, because they are financed by government and/or individuals themselves. Yet, it is far from clear that these programs, especially the purely academic tracks in U.S. secondary schools and U.S. community colleges, offer more mobility. A high percentage of students drop out of both academic secondary and community college programs. Also, many of the community college programs are at least as specific as apprenticeship programs. Certificate programs within community colleges are almost entirely devoted to learning a narrow occupational skill, such as courses to become a phlebotomist, childcare assistant, or plastics-processing worker. Many U.S. school-based programs take place in for-profit colleges offering narrow programs, such as truck driving, medical assistant, and medical insurance billing and coding. Furthermore, skills often erode when they go unused. To the extent students learn general skills but rarely apply them and wind up forgetting them, their training is unlikely to offer upward mobility.

While community college and private for-profit students often take highly specific occupational courses, apprentices all take some general classroom courses. Thus, apprentice electricians learn the principles of science, especially those related to electricity. In most countries, collaboration takes place between public vocational schools and apprenticeship programs. In the U.S., apprentices often take their required “related instruction” in classes at community colleges or for-profit colleges (Lerman 2010). From this perspective, apprenticeship programs should be viewed as “dual” programs that combine work- and school-based learning, albeit with an emphasis on work-based learning.

Can the U.S. Scale Up Apprenticeships?

With the desirability of expanding apprenticeships gaining widespread support, the issue is now becoming one of feasibility. Can the U.S. scale apprenticeships and thereby widen the routes to rewarding careers and raising the quality and productivity of jobs? If so, how?

A common argument was that the U.S. lacked the cultural legacy of guilds common in parts of Europe, especially in Austria, Germany, and Switzerland. Another was that U.S. employers will never invest in the in-depth training of their workers. Both arguments have been weakened by experience. In the last two decades, Australia and England, two Anglo countries without the Continental European cultural legacy, have more than tripled their apprenticeships almost to the proportions of the labor force found in Austria, Germany, and Switzerland. In the U.S., South Carolina managed to increase the number of companies adopting apprenticeship programs from 90 in 2007 to over 800 in the subsequent eight years, using a combination modest funding and a high- quality marketing and sales initiative.

The biggest reason for lacking a robust apprenticeship system in the U.S. is the failure to try. Today, even after recent allocations demonstration funding, government spending on apprenticeships is minimal compared with spending by other countries as well as compared with what it costs to pay for less effective career and community college systems that provide education and training for specific occupations. While total government funding for apprenticeship in the U.S. has only been about \$100 to \$400 per apprentice annually, federal, state, and local government spending annually per participant in two-year public colleges was approximately \$11,400 in 2008 dollars (Cellini 2012). Not only are government outlays sharply higher, but the cost differentials are even greater after accounting for fact that the foregone earnings of college students as they learn far exceed any forego earnings apprentices experience. Nearly all other countries with significant apprenticeship programs pay for the off-job courses required in an apprenticeship. The U.S. rarely does so.

Overall, the federal government has been spending less than \$30 million annually to supervise, market, regulate, and publicize the system. Many states have only one employee working under their OA. Were the U.S. to spend what Britain spends annually on apprenticeship, adjusting for the differences in the labor force, it would provide at least \$9 billion per year for apprenticeship. Note that the Federal Pell Grant program for low- and lower-middle income college students costs about \$33 billion per year, with a good chunk of the spending going toward career-focused programs in community and career colleges. Thus, at least some of the low apprenticeship penetration to a lack of public effort in promoting and supporting apprenticeship and to heavy subsidies for alternatives to apprenticeship.

Still, other barriers to expansion are significant. One is limited information about apprenticeship. Because few employers offer apprenticeships, most employers are unlikely to hear about apprenticeships from other employers or from workers in other firms. Compounding the problem is both the difficulty of finding information about the content of existing programs and the fact that developing apprenticeships is complicated for most employers, often requiring technical assistance that is minimal in most of the country.

Another barrier is employer misperceptions that apprenticeship will bring in unions. There is no evidence that adopting an apprenticeship program will increase the likelihood of unionization, but reports about such close links persist. An additional barrier is the asymmetric treatment of government postsecondary funding, with courses in colleges receiving support and courses related to apprenticeship receiving little financial support. Policies to reduce the government spending differentials between college subsidies and apprenticeship subsidies can help overcome this barrier.

Whether to emphasize apprenticeships beginning in late high school or after high school involves tradeoffs. High school programs improve the likelihood of government funding for academic courses related to apprenticeships. Given the consensus that the government should fund students through secondary school, paying for the related instruction of high school apprentices becomes a nondiscretionary part of budgets. When apprentices are beyond high school, government funding for related instruction must come out of discretionary expenses. International experience demonstrates the feasibility of youth apprenticeships; youth can attain serious occupational competencies while completing secondary education.

Apprenticeships in the late teenage years improve the nonacademic skills of youth at a critical time. In countries with little or no youth apprenticeship, structured work experience is less common, limiting the ability of youth to develop critical employability skills such as teamwork, communication, problem solving, and responsibility. Early apprenticeships can help engage youth and build their identity (Halpern 2009). Apprentices work in disciplines that are interesting and new; they develop independence and self-confidence through their ability to perform difficult tasks. Youth try out new identities in an occupational arena and experience learning in the context of production and making things.

From an economic perspective, apprenticeships for youth can be less costly for employers. Wages can be lower partly because youth have fewer medium- and high-wage alternatives and partly because youth have fewer family responsibilities, allowing them to sacrifice current for future income more easily. While Swiss firms invest large amounts of dollars in their apprenticeship programs, they pay their young apprentices very low wages during the apprenticeship period. Another economic advantage is that starting earlier in one's career allows for a longer period of economic returns to training.

For the U.S., scaling apprenticeship in the last years of high school is difficult. The aversion to tracking students too early into an occupational sequence is a common objection to youth apprenticeship. Importantly, high school officials are generally averse to adding youth apprenticeship to their already extensive agenda, including implementing Common Core standards and school and teacher accountability standards as well as dealing with charter schools and vouchers. In the early 1990s, opposition to youth apprenticeship in the U.S. came from unions and others who worried about eroding the apprenticeship brand with less intensive training programs.

While the verdict is still out on whether the U.S. can achieve scale in apprenticeships, its best chance is to assess where the system needs to go and to take incremental steps to get there.

Ten Elements for a Robust Apprenticeship System

Broad political and industry support are necessary but not sufficient to build and sustain a robust apprenticeship system. In addition, several elements are required for the system to work well. These include:

1. Effective branding and broad marketing
2. Incentives for selling and organizing apprenticeships to private, public employers
3. Programs to develop credible occupational standards with continuing research
4. End-point assessments of apprentices & programs
5. Certification body to issue credentials
6. Making apprenticeships easy for employers to create and to track progress
7. Funding for off-job classes quality instruction
8. Counseling, screening prospective apprentices to insure they are well-prepared
9. Training the trainers for apprenticeship

10. Research, evaluation and dissemination

Branding Apprenticeship. Recent successes in Britain and South Carolina have been accompanied by a concerted effort to create apprenticeship as a distinctive brand. South Carolina chose to link apprenticeship with local pride with the brand name of “Apprenticeship Carolina”. Britain began its growth with the name “Modern Apprenticeships” but subsequently allowed the apprenticeship label to stand on its own while copywriting the term. It is now illegal to call an employer training program an apprenticeship unless it is under the official apprenticeship system. At the same time, Britain spent millions of dollars advertising apprenticeships, including advertisements on the London subways.

Selling and organizing apprenticeships. Branding and broad marketing will not suffice without a well-developed system for selling and organizing apprenticeships. An employer convinced by an advertisement must have a place to call to learn about and implement an apprenticeship in the organization. Britain’s success in expanding apprenticeships offers one example for how to create successful national and decentralized marketing initiatives. Alongside various national efforts, including the National Apprenticeship Service and industry skill sector councils, the British government provided funding for the off-job instruction in apprenticeships to private training organizations and to Further Education colleges. These funds were sufficient to encourage these organizations to sell and organize apprenticeships with employers. In fact, the British approach has buttressed an [association of private companies](#) that engage in the kind of retail marketing required to persuade employers to offer apprenticeships. Another step is the British government’s initiative to create apprenticeships within the civil service, specifying that apprentices should constitute 2.3 percent of government employment.

The success of South Carolina in selling and organizing apprenticeships has depended on the skills of small staff built originally by Ann-Marie Stieritz, the director of Apprenticeship Carolina. She hired individuals who understand businesses, who are engaging, who had worked in companies, ideally the business services industry, and who knew how to develop and manage relationships. She did not require knowledge or experience of apprenticeship. For the first two weeks, the staff engaged in a total immersion learning process about apprenticeship, where they learned about the concept of apprenticeship, apprenticeship regulations and forms, and saw apprenticeship programs first hand. The staff worked closely with Ron Johnson, a career employee and the federal apprenticeship’s office representative for South Carolina. The presence

of Johnson and his flexibility in pushing for the approval of company programs was important in the initiative's ability to expand within the context of the registered apprenticeship system.

The expansion of apprenticeship has involved reaching out across broad industry sectors, including advanced manufacturing, health care, and information technology. Apprenticeship marketing often takes place in the context of state and local economic development efforts to attract new businesses. The program's work with companies on their training needs is marketed as a reason for a firm to locate in South Carolina. Workforce Innovation and Opportunity (WIOA) agencies are also cooperating, sometimes providing on-the-job training subsidies in the context of apprenticeship. The chamber of commerce publicizes apprenticeship through forums, newsletters and committee meetings. The value added by Apprenticeship Carolina comes mainly from the program's ability to work with business to diagnose their skill demands, including what they see as an ideal set of skills that they want workers to master.

Credible occupational standards. Nearly all countries with robust apprenticeship systems create occupational frameworks for apprenticeship that all employers training in the relevant occupation mainly follow, with modest additions relating to their own organization. The current US "registered apprenticeship" system is unique in requiring individual companies or other sponsors (such as unions) that wish to register their programs to supply their own skill frameworks and curriculum. In half of the states, the approval process is subject to the preferences of state agencies that are often highly restrictive and that require excessive numbers of journeymen/mentors (people who have completed an apprenticeship in the field or have occupational expertise developed elsewhere) per apprentice. Pennsylvania, for example, mandates a ratio of four to one.

The structure for registered apprenticeships in the U.S. leads to skill frameworks that are often uneven and highly variable. While joint employer-union construction apprenticeship programs generally use common frameworks for each occupation, even union programs can vary from state to state.

Employers on their own rarely have the time nor common vision across employers to develop frameworks on their own. Moreover, the frameworks should reflect the interests of the apprentices as well as the interests of the employers. This is especially the case if the public sector

provides some funding for the programs to take account of the general skills (skills that have value outside the training firm) taught.

Countries vary in their approaches but all rely on the cooperation of the public and private sectors. The [Institute for Apprenticeship](#) in England recently began operating, with the responsibility to oversee skill frameworks initially created by leading employers using the occupation. In Switzerland, the Federal Office for Professional Education and Technology, together with cantons, employers, trade associations and unions, participate in framing the occupational standards for about 250 occupations (Hoeckel, Field and Grubb 2009). The canton vocational education programs implement and supervise the vocational schools, career guidance, and inspection of participating companies and industry training centers. Professional organizations develop qualifications and exams and help develop apprenticeship places. Occupational standards in Germany are determined primarily by the “social partners”, including government, employer, and employee representatives (Hoeckel and Schwartz 2009). The chambers of commerce advise participating companies, register apprenticeship contracts, examine the suitability of training firms and trainers, and set up and grade final exams.

The content of skill requirements in apprenticeships includes academic courses and structured work-based training. In each field, the requirements are to complete the coursework in a satisfactory manner and to demonstrate the apprentice’s ability to master a range of tasks. In some systems, there are a set of general tasks that apply to a family of occupations (say, metalworking) and tasks that apply to a specific occupation (say, tool mechanics or metal construction and shipbuilding). While the tasks vary widely across occupations, all involve the application of concepts and academic competencies.

Under a contract from the U.S. Department of Labor, the Urban Institute in collaboration with the American Institute for Innovative Apprenticeship has begun publishing competency-based occupational frameworks for apprenticeships in several occupations.⁴ This approach could form the foundation for what President Trump’s executive order calls “industry-recognized apprenticeships.” The idea of moving away from the registered apprenticeship approach of recognizing and registering occupational apprenticeship programs on a company-by-company basis has been criticized loosening quality standards. The argument is that limiting the

⁴ See <https://innovativeapprenticeship.org/us-apprenticeships/> for examples.

government role in approving programs will lower the quality of apprenticeships. In fact, developing broad-based industry standards is likely to raise quality and to move the US system toward national frameworks that are common in all other countries with robust apprenticeship programs.

Assessments and Certifications. The extent to which systems develop third-party assessments varies across countries. In Germany, each apprentice is subject to an examination by six to nine experts in the occupation, including representatives from Chambers of Commerce and educators. Several organizations in Britain provide what are called end-point assessments as well as interim assessments. One of the largest is [City and Guilds](#), a private organization that provides curricula as well as assessment services for a large number of apprenticeships. In addition, most countries provide audits of overall programs, including the on-the-job learning and the quality of off-job related instruction.⁵

In the U.S., federal and state offices lack the staff to audit programs for quality or to provide third-party assessments of apprentices. State and federal apprenticeship agencies do award certifications of completion based on the reports by employers of the progress of apprentices through their programs. Although completion certificates under the registered apprenticeship system (both state and federal) are supposed to be portable throughout the U.S., not all states recognize completers from state or federal programs they view as subpar.

Making Apprenticeships Easy for Employers to Create. Marketing to firms through existing federal and state agencies has not worked to scale apprenticeships so far. Although the lack of staff and minimal funding for even the off-job components of apprenticeships play major roles, the system's complexity can also be a barrier. South Carolina's sales representatives show that it is possible in some contexts to simplify the process of developing an apprenticeship occupational framework and doing all the paper work necessary to register the program. The state apprenticeship tax credit of \$1,000 per apprentice per year is also simple to claim. However, the case of South Carolina is an exception. One reason is that the absence of common occupational frameworks that are well-recognized as yielding quality outcomes. Another is the federal-state

⁵ In England, [Ofsted](#), an agency that reports directly to the Parliament, rates the quality of apprenticeship providers.

approval process. And a third is the absence of talented people who can sell and organize apprenticeships as they become human resource consultants.

Funding for off-job classes related to the apprenticeships. One can make a strong theoretical and practical case for the training firm not funding the off-job learning in an apprenticeship. Theoretically, the skills learned in the off-job courses are general in the Becker sense that the added productivity of the worker can be applied not only to his or her current employer but to many other employers. For this reason, the employer cannot recoup the provision of this general training. The worker gains the benefit, but the government shares his or her gain in the form of higher taxes and reduced transfers. On the practical side, the government already funds a significant share of the costs of courses aimed at teaching occupational skills but does so in a way that is far less cost-efficient than apprenticeship.

Judging by the case of England, financing the cost of delivering courses for apprenticeships by training organizations could be enough to encourage them to sell employers on apprenticeships. Using a pay for performance model, technical education and training organizations would earn revenue only for apprenticeships that each college or organization stimulates.

The government could reap savings from this approach since every apprenticeship slot stimulated by an already funded college/training organization increases the work-based component of training borne by the employer and reduces the classroom-based component often borne by government. Consider the following example for community colleges. Assume the work-based component amounts to 75% of the apprentice's learning program and the school-based courses are only 25% of the normal load for students without an apprenticeship. By allowing training providers to keep more than 25% of a standard full-time-equivalent cost provided by federal, state, and local governments in return for providing the classroom component of apprenticeship, the community colleges and other training organizations would have a strong incentive to develop units to stimulate apprenticeships.

Another possibility is to emphasize apprenticeships in the context of existing high school-based career and technical education programs. Since high school CTE courses are already financed as an entitlement, the funds to complement work-based learning in apprenticeships would be readily available. Good places to start are career academies—schools within high schools

that have an industry or occupational focus—and regional career and technical education (CTE) centers. Over 7,000 career academies operate in the U.S. in fields ranging from health and finance to travel and construction (Kemple and Willner 2008). Career academies and CTE schools already include classroom-related instruction and sometimes work with employers to develop internships. Because a serious apprenticeship involves learning skills at the workplace at the employer's expense, these school-based programs would be able to reduce the costs of teachers relative to a full-time student. If, for example, a student spent two days per week in a paid apprenticeship or 40% of time otherwise spent in school, the school should be able to save perhaps 15% to 30% of the costs. Applying these funds to marketing, counseling, and oversight for youth apprenticeship should allow the academy or other school to stimulate employers to provide apprenticeship slots. Success in reaching employers will require talented, business-friendly staff who are well trained in business issues and apprenticeship.

Allowing the use of Pell grants to pay at least for the classroom portion of a registered apprenticeship program makes perfect sense as well. Currently, a large chunk of Pell grants pays for occupationally oriented programs at community colleges and for-profit career colleges. The returns on such investments are far lower than the returns to apprenticeship. The Department of Education already can authorize experiments under the federal student aid programs (Olinsky and Ayres 2013), allowing Pell grants for some students learning high-demand jobs as part of a certificate program. Extending the initiative to support related instruction (normally formal courses) in an apprenticeship could increase apprenticeship slots and reduce the amount the federal government would have to spend to support these individuals in full-time schooling.

The GI Bill already provides housing benefits and subsidizes wages for veterans in apprenticeships. However, funding for colleges and university expenses is far higher than for apprenticeship. Offering half of the GI Bill college benefits to employers hiring veterans into an apprenticeship program could be accomplished by amending the law. However, unless the liberalized uses of Pell grants and GI Bill benefits are linked with an extensive marketing campaign, the take-up by employers is likely to be limited.

Counseling, screening prospective apprentices to insure they are well-prepared. Apprenticeships typically require apprentices and employers to commit to a long-term, 2-5-year training program. Before making any commitment of this duration, apprentices should have a clear understanding of the occupation they are entering, the production and learning activities they will undertake during

the apprenticeship, and the long-term career opportunities that completing the apprenticeship will afford.

In the U.S., formal counseling does take place in high schools, usually during sophomore year, for those considering entering a youth apprenticeship program. But, typically U.S. workers enter registered apprenticeships well after high school in their mid-to-late 20s. Although some workers may receive counseling services from American Job Centers, most learn about apprenticeships informally, having bounced various occupations and jobs. They learn from media, friends and families about apprenticeship openings and apprenticeship occupations. The informal knowledge may not be enough for apprentices to appreciate fully what the job, career, and work atmosphere will entail. Still, unlike those going through a degree program before entering a profession, apprentices will learn about the occupation within the first few months of their education and training.

Typically, the screening process brings out information on the test scores in math and verbal, work experience, and some gauge of how enthusiastic apprentices are when applying to an employer. However, increasing opportunities for apprentices and employers to learn more about each other before an agreement is formalized should be on the agenda for expanding apprenticeships in the U.S. Improved systems for matching prospective apprentices with current and future apprenticeships offered by employers could improve this process.⁶

Train the Trainers. The quality of trainers is an important element in the success of apprenticeships. That is one reason why several European systems devote considerable time to training and certifying trainer/mentors of apprenticeship. In the late 1990s, the European Centre for the Development of Vocational Education (Cedefop), decided to promote the sharing of best practices for training trainers and other vocational education instructors across 22 national networks.

In Germany, anyone who wishes to serve as a trainer in the apprenticeship system must demonstrate both technical qualifications and appropriate personal attributes. Trainers are skilled workers who have several years of professional experience and have taken a two-week course at a chamber of industry and commerce or chamber of crafts and trades to prepare for the AEVO exam. Trainer aptitude includes the ability to independently plan, conduct, and monitor vocational

⁶ For an example of apprenticeship matching site, see <https://www.loveapprenticeship.com/>.

training, as well as to plan and prepare training programs, to collaborate in the hiring of apprentices, and to conduct and conclude training. Today, some 90,000 people per year take the trainer aptitude examination.

A trainer must be able to examine the capacity of the company to offer training in the desired certified trade; to create a company training program on the basis of a training regulation geared toward the job-specific work and business processes; to create the necessary conditions and foster a motivating learning environment; to select training methods and materials appropriate to the target group and to deploy them in specific situations; to support apprentices with learning difficulties through customized training design and counselling; to prepare apprentices for the final and journeyman examination; and finally to bring the training program to successful conclusion.

The U.S. lacks any formal system for insuring trainers of apprentices have the requisite skills and personal attributes to perform well.

Research, evaluation and dissemination. An infrastructure for research, evaluation, dissemination, and peer support can play an important role in scaling up and continuously improving the apprenticeship system. Such functions offer clear externalities to workers and employers. The federal government should sponsor the development of a public/private partnership that houses an information clearinghouse, a peer support network, and a research and evaluation program on apprenticeship. Research could be conducted on the effectiveness of apprenticeships in insuring that workers learn the key occupational, employability, and academic skills, on the short-term and long-term impacts on earnings compared with other approaches to education and training, and on the regulatory aspects of apprenticeship. Also important are topics especially relevant to employers, such as the return to apprenticeship from the employer perspective and the net cost of sponsoring an apprentice after taking account of the apprentice's contribution to production. The evaluations should cover best practices for marketing apprenticeship, incorporating classroom and work-based learning by sector, and counseling potential apprentices.

An information clearinghouse can document international experience with apprenticeship, including skill frameworks for apprenticeships used in various countries. Finally, the public/private institute would engage in dissemination about the impacts of apprenticeships and best practices in apprenticeship.

Summing Up

Expanding apprenticeship is a potential game-changer for improving the lives of millions of Americans and preventing further erosion of the middle class. Apprenticeships widen routes to rewarding careers by upgrading skills, including occupational skills but also math, reading, and employability skills. Taking math, reading, and writing in the context of using these competencies in the workforce will increase the motivation of many workers and the efficacy of the delivery process. Given the ability of workers to learn more, remain well motivated, and notice how to make innovations at the workplace, firms will have an increased incentive to adopt “high road” strategies and make them work. Such an approach may be one of the only ways the firm can attract and sustain workers.

Yet, today, funding for the “academic only” approach to skill development dwarfs the very limited amounts available to market and support apprenticeship. Instead of spending well over \$11,000 per year on students in community college career programs, why not shift resources toward far more cost-effective apprenticeship programs? Apprenticeship programs yield far higher and more immediate impacts on earnings than community or career college programs yet cost the student and government far less. Community college graduation rates, especially for low-income students, are dismally low. Even after graduating, individuals often have trouble finding a relevant job. For students in postsecondary education, foregone earnings are one of the highest costs and many incur considerable debt. In contrast, participants in apprenticeships rarely lose earnings and often earn more than if they did not enter an apprenticeship. Rarely must apprentices go into debt while they learn. And apprentices are already connected with an employer and can demonstrate the relevant credentials and work experience demanded by other employers. Another advantage is the net gains flowing to employers from apprenticeship programs.

Structural barriers require some up-front government investments to help build robust apprenticeship system in the U.S. Investments in marketing and standard development, along with ongoing support for the off-job costs of apprenticeship, are likely to attract large numbers of employers. As more employers adopt apprenticeship strategies successfully, network effects could well take over, with employers learning from each other about the value of apprenticeship. At some point, we may see a tipping point when government spending on marketing becomes far less necessary. Institutional change of this magnitude is difficult and will take time but will be

worthwhile in increasing earnings of workers in middle-skill jobs, widening access to rewarding careers, enhancing occupational identity, increasing job satisfaction, and expanding the middle class.

It is past time for federal and state governments to make a genuine effort to build an extensive and high value apprenticeship system. Without such an effort, we are not likely to upgrade skills and jobs and we are likely to continue to expend vast resources on a college-based, academic-only system that fails millions of students. With such an effort, I believe U.S. employers will follow their counterparts in other countries, create a significant number of apprenticeship slots, and realize gains in recruitment, workforce quality, and improved productivity. Institutional change of this magnitude is difficult and will take time but will be worthwhile in increasing earnings of workers in middle-skill jobs, widening access to rewarding careers, raising national productivity, enhancing occupational identity, increasing job satisfaction, and expanding the middle class.

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