ROBERT LERMAN
Urban Institute and American University, USA, and IZA, Germany

I Z A
World of Labor
Evidence-based policy making

Do firms benefit from apprenticeship investments?

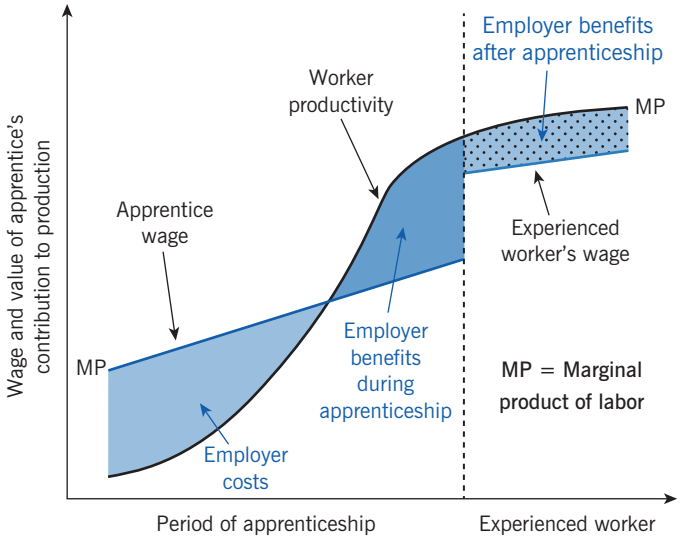
Why spending on occupational skills can yield economic returns to employers

Keywords: training, skills, apprenticeship

ELEVATOR PITCH

Economists have long believed that firms will not pay to develop occupational skills that workers could use in other, often competing, firms. Researchers now recognize that firms that invest in apprenticeship training generally reap good returns. Evidence indicates that financial returns to firms vary. Some recoup their investment within the apprenticeship period, while others see their investment pay off only after accounting for reduced turnover, recruitment, and initial training costs. Generally, the first year of apprenticeships involves significant costs, but subsequently, the apprentice's contributions exceed his/her wages and supervisory costs. Most participating firms view apprenticeships as offering certainty that all workers have the same high level of expertise and ensuring an adequate supply of well-trained workers to cover sudden increases in demand and to fill leadership positions.

A stylized model of apprenticeship training



Source: Modified figure based on [1].

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KEY FINDINGS

Pros

- The apprentice's contribution to production is large enough to offset most costs to firms.
- By retaining most apprentices, firms benefit substantially from low recruitment and training costs.
- Knowing that all trained apprentices have mastered a common set of skills is valuable to firms.
- Apprenticeship training enhances subsequent innovation within the training firm.
- Treating apprenticeship expenses as capital investments would improve measured gains.

Cons

- Most firms in advanced economies do not offer apprenticeships.
- Some firms perceive weak returns because they fear trained apprentices will be hired away by other firms and because they often pay for required education.
- Some estimates show firms recover only modest parts of their investment during the training period.
- Quantitative estimates of gains for employers are uncertain, based on only a few studies.
- Firms have trouble assessing the long-term benefits of apprenticeship investments.

AUTHOR'S MAIN MESSAGE

Apprenticeship training is usually a profitable investment for firms as well as workers. Often, firms can recoup all or most of their costs within the apprenticeship period. By providing firms with information on economic returns, by helping them set up apprenticeships, and by funding off-site training, policymakers can promote the expansion of effective career training and increased worker earnings with only modest public expenditures.

MOTIVATION

Policymakers are searching for ways to deal with the erosion of middle-class jobs, to raise productivity, and to reduce youth joblessness. Some countries face a youth employment crisis that could lead to a "scarred" generation facing long periods of unemployment and weak earnings prospects. Only 42% of 15 to 24-year-olds in the OECD were employed in 2018. Variations across countries result from differences in the share in full-time schooling as well as in job opportunities. Still, in France, fewer than one in three youth held jobs; the situation was even worse in Spain and Italy, where only 20% were employed. In contrast, 63% of young people in Switzerland, where apprenticeships are most common, had paid employment.

Another concern is that the earnings of workers in middle-wage occupations have been declining relative to low-wage and high-wage employment in many advanced economies. Yet employers in a variety of industries are complaining about a mismatch between the skills that they want and the skills that job applicants possess. Given the success that countries with robust apprenticeship systems experience in reducing youth unemployment, raising the status of middle-wage jobs, and limiting skill shortages, the OECD and the EU have called for major expansions of these programs. This article examines one barrier to this expansion (the perceived high net costs to firms) and offers empirical evidence that firms often reap positive net benefits from well-structured apprenticeship programs.

Apprenticeship

A program of courses, work-based learning, and productive employment in which workers achieve occupational mastery and industry-recognized credentials. Unlike school-based vocational education, apprenticeships involve extensive work-based learning and practice; real jobs involving production, pay, and the discipline of work; and close mentoring by professionals. Unlike on-the-job training contracts, apprenticeships include related courses and the development of occupational mastery, not simply the ability to do a particular job.

Variations in scope and scale of apprenticeships

Apprenticeship systems vary widely across countries. As of the late 2000s, Austria, Denmark, Germany, and Switzerland had 40–80% of youth participating in apprenticeships as part of a dual education system that combines work-based with school-based learning. Apprentices make up nearly 4% of the workforce in these countries and in Australia, where apprenticeships have quadrupled in recent decades. England is rapidly catching up, with apprenticeships increasing threefold and incorporating occupations in business, banking, and the creative arts. Belgium, France, and the US are among the countries with very small apprenticeship systems and with little penetration into occupations outside construction and manufacturing.

DISCUSSION OF PROS AND CONS

Theories related to apprenticeship training

Like investments in plant and equipment, increasing workers' skills requires spending today to generate a flow of returns of enhanced productivity in the future. While additional

firm-specific skills raise a worker's productivity only within the firm that provides the training, additional general skills can increase productivity in a range of firms. Labor economists have theorized that firms are likely to pay only to develop workers' firm-specific skills, since the gains from general skills will accrue to the worker through higher wages from the training firm or some other firm.

Amendments to this theory, however, suggest that employers do have an incentive to finance general training. Partly, this is because it is costly for workers to quit and for employers to replace them. Also, firms providing the training know more than other firms about the content and value of training and how well individual workers have absorbed the knowledge. Offers of training are effective recruitment tools, partly because training offers generally appeal to the most capable and motivated workers. And, firm-specific and general skills are often complementary: the more general skills a worker possesses (including occupational skills), the more productive that worker is likely to be after acquiring firm-specific skills.

Skills rarely raise productivity in isolation, however. Increases in productivity typically result when workers use their skills to complement the work of others within the organization. Economic theories have offered useful conceptual frameworks, but determining whether firms actually benefit from apprenticeship investments requires empirical estimates.

Costs and benefits to firms

Employers' net costs depend on a variety of factors: the mix of classroom and work-based training provided; skill requirements of the occupation; program duration; costs of time spent by workplace trainers/mentors; wage levels and progression; and the productivity of the apprentice while they are learning to master the required skill [2]. Direct costs include apprentice wages, the wages of trainer specialists for the time they oversee apprentices, costs of related education borne by employers, and the costs of materials and additional space required for the apprenticeship.

The benefits depend on the hours apprentices spend on tasks that would otherwise have to be performed by unskilled and by skilled workers and on the productivity of apprentices relative to unskilled and skilled workers. Benefits also arise from savings on subsequent hiring and training costs and lower turnover costs [1]. Also valuable is employers' increased certainty that apprenticeship graduates know all the relevant occupational and firm-specific skills, and can work well alongside other skilled workers. In addition, having extra well-trained workers, such as apprenticeship graduates, provides firms with valuable options for expanding production without reducing quality in response to uncertain demand shocks, and for covering unexpected absences of skilled workers [2]. The high level of occupational mastery achieved by apprentices may also increase the pace of innovation and the ease of implementing new technologies.

It would take years, if not decades, to track all the costs and benefits of apprenticeships in a large sample of employers and countries. Thus studies have not been able to quantify all the benefits that accrue to employers for many years after the apprenticeship. While some evidence is available in selected countries, detailed data from representative and large samples of employers on the costs and benefits from apprenticeships have been collected mainly in Germany and Switzerland [3]. The German data are based on 2,424 personal interviews with employers in 2000 and 2,986 interviews in 2007. Information on Swiss

apprenticeships comes from 2,300–2,400 mail surveys undertaken in 2000, 2004, and 2009. The data cover the wages of management and training personnel, wages of regular skilled and unskilled workers, wage costs of apprentices, time at the workplace, share of apprentices' workplace time devoted to tasks normally undertaken by unskilled and skilled workers, and the relative productivity of apprentices compared with regular workers. A 2019 survey of Austrian companies similar to the Swiss survey provides data on 581 companies' apprenticeships in at least 20 occupations [4].

Estimated net costs of apprenticeships differ greatly

Costs vary greatly across all countries depending on whether employers must bear the costs of the off-job instruction related to the apprenticeship. In Germany and Switzerland, where apprenticeships begin during the high school years, employers generally do not have to pay for the off-job component since high school is generally an entitlement. Typically, wage costs are also lower when apprenticeships begin at an early age. Governments may or may not fund off-job training for older apprentices.

Apprenticeships differ greatly in costs as well as in the share of salaries offset by their contribution to production. For three-year apprenticeships, the data from the 2000 surveys show gross costs per annum of €15,500 for German firms and about €18,000 for Swiss firms [5]. Although Swiss firms spent more than German firms, they derived substantially higher benefits from the value added by apprentices. Researchers derived value added by summing the amounts of time apprentices spent performing unskilled tasks times the wage of unskilled workers and the time they spent performing skilled tasks times the productivity of apprentices relative to skilled workers times the wage of skilled workers. Swiss firms gained more than €19,000 a year, more than double the €8,000 in benefits that German firms attributed to the value of production generated by apprentices. Swiss firms were thus able to recoup the €54,400 cost with benefits of €57,100, while German firms experienced a €46,600 cost but realized only €24,000 in benefits [5].

The higher Swiss costs were offset by substantially higher returns for several reasons. First, apprentices were at work for more days in Switzerland, an average of 468 days for a three-year apprenticeship, compared with 415 for their German counterparts. Second, when in the workplaces, Swiss apprentices devoted an average of 83% of their time to productive tasks, compared with only 57% for German apprentices, who engaged more in practicing tasks and in coursework [6]. Third, the differences in time spent on tasks with no direct value to the firm are substantial. In Switzerland, apprentices allocated only 13–21% of their time to these tasks, while in Germany these tasks took up 31–57% of the time.

One striking feature of apprenticeship programs in both countries is how quickly apprentices advance through their training and move from unskilled to skilled tasks. In Switzerland, the productivity of apprentices rose from 37% of a skilled worker's level in the first year to 75% in the third (final) year [6]. The increase in Germany was just as rapid, increasing from 30% to 68% of a skilled worker's productivity over the apprenticeship period [6]. Thus, in both countries, apprentices accumulated substantial and similar levels of human capital. Still, nearly all German firms with apprenticeships (93%) incurred net costs, while most of Swiss firms (60%) more than recouped their costs [5].

As of 2000, the higher in-program net costs borne by German firms were offset by higher retention of apprentices within the firm. In Switzerland, only about 36% of apprentices

remained with the firm that provided the apprenticeship training. In Germany, the corresponding figure was 50% [5]. Thus, while German firms bore much higher net costs than Swiss firms during the apprenticeship period, they were more likely to recoup these costs over time by retaining the workers they trained. This is because the German labor market embodies more regulation than does the Swiss labor market. German unions are stronger, laying off workers is more difficult, and German works councils do more to influence the training of young workers.

After 2003, as Germany implemented labor market reforms to increase flexibility, recouping in-program costs through higher retention became more difficult. German firms might have responded by reducing their use of apprenticeships. Instead, they adapted to the labor market reforms by increasing the involvement of apprentices in the production process [7]. As a result, average net costs declined by 36% and the share of firms with net benefits during the period of apprenticeship rose between 2000 and 2007 from 10% to 30%. These employer reactions demonstrate the importance of high productivity of apprentices during the training period itself. Retention of apprentices remained relatively high, at over 50%. With the cost of recruiting a skilled worker estimated at twice the monthly pay for a similar worker, high retention of apprentices completing their program is a critical benefit [7].

A separate study of apprenticeships in 100 German firms allowed employers to make a detailed assessment of the costs and benefits of apprenticeship during the training period. Unlike the larger studies cited above, this research estimated gains for most firms, as they more than recouped their investments during the training period [8]. Somewhat surprisingly, net costs were inversely related to the quality of the apprenticeship. The higher the quality of apprenticeships, the higher the gross costs, but the more likely employers were able to recoup their investment during the training period [8].

A 2019 study examines the costs and benefits for 306 Austrian firms and 703 Swiss firms offering three-year apprenticeships in ten occupations [4]. The findings confirm the pattern of Swiss firms gaining net benefits during apprenticeships. As with German companies, the Austrian firms had net costs during apprenticeships but recouped their investment by retaining a large share of apprentices and avoiding hiring costs. The main reasons found for the differences between the countries were: the ratio of apprentice pay to the pay of other workers was lower in Switzerland and the percentage of time given to undertaking skilled tasks was higher in Switzerland.

Net costs outside Austria, Germany, and Switzerland

Estimates of net costs of apprenticeship investments that are based on large, representative samples of employers are less common outside Germany and Switzerland. An extensive study of Canadian employers sponsored by the Canadian Apprenticeship Forum (2006) estimates employer costs and benefits of apprenticeships in 15 occupations [9]. The study draws on responses from 433 employers, with at least 16 per occupation. All of them were four-year apprenticeships. The average gross costs ranged from about C$78,000 for cooks to C$275,000 for construction electricians. Average in-program benefits—measured as the revenue generated by the apprentices—varied widely as well, ranging from C$120,000 for cooks to C$338,000 for construction electricians. For all 15 occupations, employers earned a positive return on their apprenticeship investments during the training period. The average benefit was 1.38 times the average cost. Any post-program benefits would add to the economic returns.

An analysis of apprenticeships in the UK examined the returns to eight employers in each of four industries—engineering, construction, retail, and business administration [1]. Training ranged from 18 months for basic credentials to two to four years for advanced apprenticeship programs. Average gross costs were higher than the average benefits during the apprenticeship period in all four industries, magnitudes varying widely by industry. Apprenticeships were most costly in engineering and construction despite the productive contributions of the apprentices that were worth about 50% of a fully qualified worker's wage. The dollar value of an apprentice's contribution to output is high but so are their wages. Still, the authors estimate that employers in all four industries at least broke even and began earning positive returns during the early post-apprenticeship period, partly because the productive contributions of apprenticeship graduates were worth more than their wages at the time and partly because of lower recruitment and training costs [2].

A study of 60 employers in Australia in 1998–1999 finds that net costs over a four-year apprenticeship were nearly 1.4 times the benefits [10]. However, net costs declined sharply over time: by the fourth year, the benefits exceeded costs. Although this analysis did not estimate the post-apprenticeship benefits that accrued to employers, the trend in productivity growth suggests that employers might have reached a break-even point by the sixth or seventh year, after factoring in reduced recruitment and training costs.

A 2016 study in the US offers qualitative and limited quantitative evidence on net costs of 13 selected apprenticeship programs [11]. Employers in all 13 programs reported their apprenticeship program was beneficial to the company but only four had data that documented positive returns. In examining the experience of two employers in detail, the study finds that the costs were often offset by idiosyncratic benefits not easily captured in standardized questionnaires. For example, medical assistants not only reduced the need for overtime but they also helped increase bookings of appointments and likely lowered turnover among doctors by relieving them of tedious paperwork tasks, thus saving substantial sums. Overall, the health facility studied generated an estimated 40% return on the investment in apprenticeships. Another example that took place in a factory setting of a large firm indicates that apprentice mechanics, with their detailed knowledge of theory, machine programming, tool design, and metallurgy, learned enough as apprentices to enhance capacity utilization, thereby generating along with other benefits an estimated 50% rate of return.

In summary, studies of the net costs to firms during the apprenticeship period indicate wide variations across countries, occupations, and time. Central to firms' ability to recoup most or all of their training costs is the amount of time apprentices spend in directly productive activities. Swiss firms are particularly effective at combining major investments in apprenticeship training with extensive use of apprentices in production. Given such low net costs (or even small net benefits), apprenticeships can be valuable to firms even if they retain only half or fewer of the graduates. As a result, most firms view their investments in apprenticeship programs as critical to their long-term success in producing high-quality goods and services.

Estimating the post-training benefits of apprenticeships

The post-training benefits of apprenticeship programs are especially important, but they are not easy to quantify. They include: reduced recruitment costs; training related to the

company's specific procedures; and enhanced wage stability (because outside hires can upset the relative wage balance).

Firms report that another advantage of apprenticeships is the "option value" of having extra well-trained workers. In a world of uncertainty about levels of production and irreversible investments in certain workers, firms that invest in apprenticeship training create "real options." When workers complete their training, firms have the option—but not the obligation—to hire some or all of the trained workers. Having additional well-trained workers with a range of skills allows firms to deal with unexpected increases in demand or losses of other experienced workers. Although difficult to quantify, the value of these options raises a firm's return on apprenticeship investments.

A survey of German employers offers some insight into post-program benefits [12]. Savings in recruitment and training costs averaged nearly €6,000 for each skilled worker trained in an apprenticeship and taken on permanently. Other benefits include reduced errors in placing employees, avoiding excessive costs when the demand for skilled workers cannot be quickly filled, and performance advantages favoring internally trained workers who understand company processes over skilled workers recruited from the job market. Taking all benefits into account appears to make apprenticeship investments a net gain for employers [2].

Another benefit to firms rarely captured in studies is the positive impact of apprenticeships on innovation. Innovations are critical to success in a competitive environment. 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 documents this connection and finds a clear relationship between the extent of in-company training and subsequent innovation [13].

Reports by apprenticeship-sponsoring firms are revealing, even if they do not provide rigorous evidence of economic returns. In the US, evidence from surveys of more than 900 employers indicates that the overwhelming majority of them believe their programs are valuable and involve net gains [14]. Nearly all sponsors reported that the apprenticeship program helps them meet their skill demands. Other benefits of apprenticeships include reliably documenting appropriate skills, raising worker productivity, increasing worker morale, and reducing safety problems. Only 5–8% of surveyed firms did not find these benefits of apprenticeships to be important.

Nearly 87% of sponsors reported that they would strongly recommend registered apprenticeships, and another 11% would recommend apprenticeships with some reservations. Only 2–3% said they would not recommend apprenticeships. Surprisingly, only one in four employers regarded "poaching"—in which non-training firms hire apprentice graduates away from the firms that trained them—as a serious problem. Even among the firms most concerned about poaching, 85% still highly recommend apprenticeships.

Especially striking are the positive attitudes of employers that have recently adopted apprenticeship training programs. England and Wales are interesting in this regard because of the large increase in the number of firms that now offer apprenticeships (well over 100,000). A study of more than 4,000 employers finds that over 80% are fairly or very satisfied with their apprenticeship program, while only about 6% are dissatisfied [15].

Nearly three-quarters of employers surveyed mentioned improved productivity as a primary benefit, with most highlighting other outcomes likely to improve profitability, product, or service improvements; better staff retention; and the introduction of new ideas and innovations. More than 40% of employers reported that apprenticeships helped them win new business. About 80% of employers reported that they expect to continue offering apprenticeships, and another 11% are considering doing so but are not certain.

Accounting practices and gains from apprenticeships

Managers often assert that the skills and commitment of their employees are their companies' most valuable assets. At the same time, they say that they can only manage what they can measure. Because human capital investments are not treated the same as physical investments on company balance sheets, managers may underestimate the gains from investing in apprenticeships. All of the spending on skill development is a cost in the current year, although the company will potentially gain benefits from these expenses over several years.

If investments in training were treated more closely in line with economic reality for measuring profits and assets (but not for tax purposes), the contributions of these investments would be measured more precisely and the benefits would become more apparent. Training investments should count as assets only to the extent that they yield a flow of future benefits to the company. The fact that companies are currently willing to finance an extensive amount of training is almost certainly an indication of their ability to capture some of the gains. Recently, the International Standards Organization issued ISO 30414 to provide guidelines for internal and external human capital reporting. It is the first international standard for reporting key metrics that are recognizable on an international scale and can provide greater transparency for all stakeholders and the public.

LIMITATIONS AND GAPS

Detailed data on large samples of firms training apprentices are available in only two countries. However, a review of evidence across several countries indicates that many firms can recoup most or all of the gross costs of apprenticeship training during the training period itself. Providing occupational training that is valuable outside the firm appears inconsistent with human capital theory's expectation that firms will pay only for specific training valuable to that firm. However, because firms recoup most of the investment within the training period, the net costs of this general training are often low, if not zero. Firms that make positive net investments capture their returns in the early post-apprenticeship period.

The quantitative estimates and qualitative reports come from employers that train or have trained apprentices. Whether these returns on apprenticeship investments would apply to firms not currently undertaking apprenticeship training is an open question. A demonstration that randomly encourages some but not other firms to use apprenticeship training would help answer that question. Other evidence can be garnered from countries in which substantial numbers of firms have recently adopted apprenticeships, such as England and the US.

SUMMARY AND POLICY ADVICE

Countries with robust apprenticeship systems are showing by example how education and training can keep youth unemployment low and enhance the quality of jobs that do not require baccalaureate degrees. International organizations are increasingly calling on other countries to expand apprenticeship programs. But will enough employers find it in their interest to offer such programs? A common argument is that by not offering apprenticeships, firms are signaling that they do not view them as economically beneficial.

Alternatively, employers may simply lack institutional support and knowledge about how apprenticeship programs can increase profitability. After all, in countries with major initiatives to help firms understand and start programs (such as Australia and England), apprenticeship programs have expanded rapidly.

Since apprenticeship training is highly effective for workers and yields external benefits that cannot be captured by the firm, it makes sense to use public resources to stimulate apprenticeships. In many countries, reallocating funding from school-based vocational programs to apprenticeship programs that emphasize work-based learning can lower the costs per worker and increase the quality and relevance of training.

While an international consensus favors expanding apprenticeships, the major policy question is this: how can countries develop and sustain large-scale apprenticeship training? Attracting workers to take advantage of existing apprenticeship opportunities is rarely a serious problem. So the question becomes: how can policies stimulate employers to increase the overall number of apprenticeships?

In countries with limited programs, government and industry leaders must develop a brand, information campaigns about the benefits of apprenticeship, and narratives showing the gains to apprenticeship for workers and employers. Success requires an effective "retail" sales and technical support effort. Workforce agencies and/or the intermediary organizations must learn how to convince firms that apprenticeships are good for business, and teach most businesses how to build an apprenticeship program and how to organize program components to gain outside public financial support. Once employers begin to adopt apprenticeships, they will likely continue to do so, thereby providing post-secondary training and education at a modest cost.

England's recent success in expanding apprenticeships demonstrates the feasibility of this approach. Apprenticeship starts jumped to more than 500,000 by 2012–2013, a fivefold increase from 1999 levels and more than double those of 2007. In the US, South Carolina's Apprenticeship Carolina initiative has also succeeded, being marketed at the state and individual firm levels, helped along by a small tax credit, and a small team of consultants working with employers to simplify the task of organizing apprenticeships. Even as the Great Recession led to job losses between 2007 and 2012, the number of South Carolina companies using apprenticeships increased from 90 to over 660, and as of 2019, numbered over 1,000.

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Foundation is gratefully acknowledged. This article is partly based on [2]. Version 2 adds further comparisons from German and Swiss studies and Austrian apprenticeships, references a US study of employer returns, mentions an ISO standard for human capital reporting, and adds new "Key references" [3], [4], [6], [7], [11], [15].

Competing interests

The IZA World of Labor project is committed to the IZA Code of Conduct. The author declares to have observed the principles outlined in the code.

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