April 2014

EXPANDING APPRENTICESHIP TRAINING IN CANADA

Perspectives from international experience

Robert I. Lerman

About the Author

Dr. Robert I. Lerman is a professor of economics at American University, the Urban Institute's first Institute fellow in labor and social policy, and a Research Fellow at the Institute for the Study of Labor in Berlin. His work deals with how education, employment, and family structure work together to affect economic well-being. He has served on a variety of panels and commissions, including the U.S. National Academy of Sciences panel looking at the nation's postsecondary education and training system for the workplace and the board of the National Fatherhood Initiative. He has testified before U.S. congressional committees on youth apprenticeship, child support policies, and the information technology labor market. His recent research deals with the impact of family structure on employment and earnings, with assets for low-income families, and with apprenticeship in the United States and other countries. Dr. Lerman earned his Bachelor of Arts at Brandeis University and his doctorate in economics from the Massachusetts Institute of Technology.

About the Initiative

This paper is one of a series of reports commissioned for **Taking Action for Canada: Jobs and Skills for the 21st Century***, an initiative of the Canadian Council of Chief Executives (CCCE). The goal of the initiative is to bring together business, government and educators to develop solutions, share best practices and engage the next generation of Canadian workers.*

The Canadian Council of Chief Executives is the senior voice of Canada's business community, representing 150 chief executives and leading entrepreneurs in all sectors and regions of the country. Its member companies collectively employ 1.5 million Canadians and are responsible for most of Canada's private sector investments, exports, workplace training and research and development.

The opinions in this paper are those of the author and do not necessarily reflect the views of the CCCE or its members.

Contents

Introduction

Concern about a rising "skills gap" alongside high unemployment is emerging as a key competitiveness issue in North America. Both in Canada and the United States, companies report that it is becoming increasingly difficult to match job openings to available applicants. In an Accenture survey of large Canadian companies, 59 per cent of department executives expressed concern about the availability of needed skills over the next two years. In the United States, 46 per cent of companies worry about filling positions with qualified individuals over the next two years.

One common response is to focus on the education system's seeming inability to equip students with the capacity to perform well on competency tests. Education reforms have proliferated in the United States, usually with the political if not financial support of large companies. Yet increased support for schools has not been matched by additional career-focused education and training initiatives for young people who leave school without a college degree.

Another approach – one that is attracting policy analysts and policymakers throughout the world – emphasizes a revival of technical and vocational education and training (TVET), especially apprenticeships. A wide range of international organizations recommend the expansion of such programs.[1] Apprenticeships combine work-based learning with classroom instruction in a structured program that leads to a recognized and valued occupational credential. Trainees earn money and contribute to production while they learn. Employers bear most of the training cost, but recoup their investments when the value of work performed by apprentices exceeds their wages.

Apprenticeship and TVET initiatives have been launched in several developed countries, including Australia and the United Kingdom, as well as in emerging economies such as India and China (Smith 2013). Although apprenticeships are most common and cover 55 to 70 per cent of the young adult population in Austria, Germany, and Switzerland—countries with a long history of guilds and craft work—the role of apprenticeships has been growing rapidly in other countries as well. The number of apprenticeships has tripled in Australia since 1996 and has jumped by a factor of 16 to more than 800,000 in the United Kingdom since 1990. Calls to expand apprenticeship training have come from a variety of groups and institutions, including the G20 Labor

[1] See reports by the Organisation for Economic Cooperation and Development (OECD), the International Monetary Fund (IMF), and the International Labour Organization (ILO).

and Employment Ministers, the G20 Leaders Summit, the International Labor Organization (ILO), the Organization for Economic Cooperation and Development (OECD), and the International Monetary Fund (IMF). The G20 in particular attaches high priority to expanding apprenticeships for youth.

One reason is that youth unemployment rates tend to be lowest where apprenticeships are most common. In Austria, Germany, and Switzerland – countries with robust apprenticeship systems – the unemployment rate of 15-24 year-olds is well under nine per cent, far below the 24 per cent rate in France, the 35 per cent in Italy, and 18 per cent in Finland. A second rationale is that apprenticeship training tends to promote higher employment in manufacturing; the manufacturing sector accounts for 22 per cent of German employment, 16 per cent of Swiss employment, but only 10 per cent of U.S. employment. A third is the perception of a skills mismatch that is more serious in countries that lack extensive apprenticeship programs. German companies operating in the United States are so concerned about finding workers with appropriate occupational skills that they have stirred the German embassy in Washington, D.C., to launch its own skills initiative, bringing together German and U.S. companies, local chambers of commerce, colleges and other training providers. The goal of the initiative, the embassy says, is to "identify and spread best practices in sustainable workforce development," and "spread the message about the German apprenticeship system" and its potential benefits for the U.S. economy.

Until recently, policymakers tended to define skills in terms of academic attainment and measured skill levels based on years of schooling, degrees, and scores on literacy and numeracy tests. Data on these measures are readily accessible and allow comparisons over time and between countries. A good example of such a test is the Program for International Student Assessment (PISA), which compares competencies of 15 year-olds across countries based on reading, math and science test scores.[2] Both in Canada and the United States, the bias against career-focused education is strong, especially among educators and policymakers. As Roger Hargreaves (2013) recently pointed out,

> …many teachers appear to continue to value the success of students in the academic tracks more highly than those in vocational or work-oriented options. Canadian educators generally understand the needs of students who perform well in academic subjects and plan to follow the mainstream route from school to university. There appears to be less support and guidance for the students *not* choosing this pathway.

[2] See http://nces.ed.gov/surveys/pisa/pisa2012/index.asp

Still, many policymakers are beginning to recognize that any discussion of skills must go well beyond academic attainment. There is increasing evidence that countries with robust apprenticeship systems are more likely than other jurisdictions to achieve low unemployment alongside high incomes.[3] A wide range of reports highlights the employer demand for workers with strong occupational and employability skills, especially in selected manufacturing fields.[4]

Many of these skills *cannot* be learned effectively within the classroom alone, for several reasons. First, gaining sufficient skill to master an occupational task generally requires applying what one knows in the context of the task. Skilled workers in almost all fields – from surgeon to master chef to industrial engineer – need hands-on experience. Second, most students learn faster and retain more when practical experience is part of the learning process. Third, the nature of employability skills differs to some extent by profession. The communication skills required by a salesperson are different than those needed by a programmer or an auto repair technician.

From the standpoint of an employer, apprenticeships enable the development of a productive and adaptable workforce. Apprenticeship qualifications offer employers a high level of assurance about a worker's abilities, and the knowledge that all employees within an occupational category have a common set of skills (Lerman, Eyster, and Chambers 2009). Apprentices are generally productive workers during their training under the supervision of mentors. Apprenticeships allow firms to assess, over time, a candidate's ability to contribute to the organization before deciding whether to offer that person a permanent job.

Apprenticeship training represents an investment that yields returns in reduced recruitment and initial training costs and higher productivity. In a world of uncertainty about levels of production and investment, firms that invest in apprenticeship training create what economists sometimes call "real options" – meaning that when apprentices complete their training, firms have the option—but not the obligation—to hire some or all of them. That increases the firm's ability to deal with unexpected increases in demand or losses of other experienced workers. Though hard to quantify, the value of these real options raises the firm's returns on apprenticeship investments.

[3] For a recent argument for why apprenticeship contributes to lower youth unemployment in Germany than France, see Pierre Cahuc**,** Stéphane Carcillo**,** Ulf Rinne[*] **and** Klaus F Zimmermann (2014)
[4] See, for example, Deloitte and Touche (2013).

The net costs of apprenticeships to employers vary widely and in many cases can be very low. In terms of direct outlays, employers pay the wages of apprentices, the wages of trainer specialists for the time they oversee apprentices, and the costs of any additional workspace or materials that might be required during the period of apprenticeship (Wolter and Ryan 2011). However, employers can recoup a large share of these costs thanks to the productivity of the apprentices. Initially, apprentices cost more than the value of their production. But as they acquire skills, the value of the work they perform approaches or exceeds the wages the costs borne by the employer. As a result, many studies conclude that employers experience zero or near-zero net costs.

The goal of this paper is to examine the rationale for expanding apprenticeship training in Canada and the implications for policy and practice. The paper will begin by considering the benefits of a robust apprenticeship system, as well as potential concerns about apprenticeship, and differences in the approaches taken by various jurisdictions in promoting apprenticeship. Next, we will review the scale and composition of the current Canadian apprenticeship system. We will conclude with recommendations aimed at increasing the availability of apprenticeships in Canada and the overall level of interest in apprenticeship training in Canada.

A brief description of selected apprenticeship systems

Apprenticeship systems vary widely across countries. They reach 55 to 70 per cent of youth in Austria, Germany, and Switzerland. As a share of the total labor force, apprenticeships account for between 3.7 and 3.9 per cent in Australia and Germany, 2.7 per cent in the United Kingdom, 2.2 per cent in Canada, 1.7 per cent in France but only about 0.3 per cent in the United States.

Apprenticeships typically offer a mix of academic courses and structured, work-based training. In each field, the apprentice is required to complete the coursework in a satisfactory manner and to demonstrate his or her ability to master a range of tasks. While the tasks vary widely across occupations, all involve the application of concepts and academic competencies.

Some apprenticeship systems function as school-to-work programs and involve close coordination between employers and the public education system. In Austria, Germany and Switzerland, apprenticeships and secondary schools are closely linked. In most other countries, apprenticeships begin after secondary schooling. Often, candidates for apprenticeship are drawn from an employer's existing workforce.

Switzerland is especially effective at easing the path from apprenticeship training to higher education. Australia and Germany have created similar pathways, especially in engineering. In some countries, most notably Germany, the expectation is that some apprentices will progress to senior management positions in companies.

Apprenticeship occupations extend well beyond the traditional construction-related crafts. In the United Kingdom, for example, apprenticeships are available within such broad occupational categories as business, administration and law; arts, media, and publishing; health and public services; retail and commercial enterprise; and information technology and communication. Common apprenticeships in Switzerland include information technology specialists, commercial employees, pharmacy assistants, and doctors' assistants. German standards cover more than 300 occupations, including lawyer's assistant, bank branch worker, industrial mechanic, industrial manager, retail worker, commercial sale representative, and computer networking specialist. While much of the training is occupation specific, nearly all fields learn skills in closely related occupations. For example, apprentices in industrial management learn accounting, procurement, production planning, staffing, and logistics.

Some apprenticeship programs rely on a relatively narrow approach to learning. Fuller and Unwin (2006) draw attention to differences at the firm level between a more "restrictive" skill development approach and the broader approach used in "expansive" work environments. Expansive approaches allow apprentices to acquire experience in a wide array of occupational areas, to learn about practices across the company, to gain access to a range of qualifications, to link easily to higher education, and to see potential for progression over a career.

The organization of apprenticeship programs varies widely as well. In Switzerland, the Federal Office for Professional Education and Technology works with local governments, employers, trade associations and unions in framing standards and overseeing apprenticeships in about 250 occupations (Hoeckel, Field and Grubb 2009). Professional organizations develop qualifications and exams, and encourage the creation of apprenticeship places. In Germany, governments, employers, and employee representatives determine occupational standards (Hoeckel and Schwartz 2009). Chambers of commerce advise participating companies, register apprenticeship contracts, examine the suitability of training firms and trainers, and set up and grade final exams.

In the United Kingdom, Skills Councils in a variety of sectors, working with their member companies, define the content and structure of each apprenticeship based on a national Apprenticeship Blueprint (Miller 2012). As of 2012, there were 200 active apprenticeship frameworks and another 118 under development. At the same time, employers have considerable flexibility in implementing their apprenticeship programs. Training organizations, including further education colleges, have played a key role in marketing apprenticeships. They have a financial incentive to do so because they can charge the government for the costs of the related classroom training. While the United Kingdom has been highly successful in expanding the supply of apprenticeships, some critics have argued that their quality is uneven. Responding to a report on U.K. apprenticeships, the government has introduced changes aimed at increasing the involvement of firms in training decisions and measures aimed at upgrading the quality of apprenticeships.

France uses Apprenticeship Training Centers to help design and deliver the classroom-based components of apprenticeship, with skill standards often developed by Professional Consultative Committees (Dif 2012). They operate under frameworks established by the National Commission for Vocational Qualifications.

In the United States, the Office of Apprenticeship within the federal Department of Labor operates a national Registered Apprenticeship system for states that lack their own apprenticeship registration programs. (Twenty-six states have created state-level Apprenticeship Agencies to oversee registration of apprenticeship programs, provide technical assistance and monitor compliance with regulations.) At the federal level, the expectations are broad. Apprenticeships programs are required to include: a schedule of work processes for which the apprentice will train; 144 hours per year of organized (usually classroom-based) instruction; progressive wage increases over the training period; supervision of, and adequate facilities for, training; and no discrimination. Beyond these features, the Office of Apprenticeship approves specific plans put forward by employers or joint programs when they meet reasonable criteria for occupational mastery. Because the specifics of programs are designed in a decentralized fashion, there is a wide range of individual occupational profiles—more than 900.

In Canada, the Interprovincial Standards Red Seal Program helps develop occupational standards that allow for effective harmonization of apprenticeship training and assessment across each province and territory (Miller 2012). The Red Seal program's standards incorporate essential skills (reading, document use, writing, numeracy, oral communication, thinking, digital technology, and lifelong learning), common

occupational skills (that apply to a small range of occupations), and specific occupational skills.[5]

Benefits and costs of apprenticeship

The OECD's *Learning for Jobs* (2009) provides an overview of vocational education systems in 17 countries, but cites only a few studies that examine benefits and costs. The OECD's *Off to a Good Start: Jobs for Youth* (2010) highlights the role of apprenticeships in smoothing the transition from school to work and in maintaining low youth unemployment.

Two Canadian studies indicate a high wage premium for apprenticeships for men but not for women (Boothby and Drewes 2010; Gunderson and Krashinsky 2012). Apprenticeship completion is the highest educational attainment for only about seven per cent of Canadian men. According to both studies, male apprenticeship completers earn substantially more than men who have only completed secondary school, and nearly as much as men who have completed a non-university post-secondary program. Booth and Drewes find income gains for men from apprenticeship training in the range of 17 to 20 per cent. Even 20 years after their apprenticeships ended, workers in most occupations earn wages 12 to 14 per cent higher than their peers who did not complete an apprenticeship. Gunderson and Krashinsky estimate earnings gains of 10 per cent from apprenticeship for Canadian men compared to all other pathways combined. However, the same study did not find positive earnings gains from apprenticeship for women.

These results may underestimate the benefits of apprenticeship training in Canada. Apprentices earn while they learn, and for that reason investing in an apprenticeship is typically far less expensive than investing in a conventional college courses. Indeed, apprentices sometimes make more than money in the apprenticeship than they would have made in a full-time job that did not involve apprenticeship. Of course, the returns may be overstated given that apprenticeships in Canada tend to be concentrated in well-paid fields, such as construction.

A broad study of apprenticeship in 10 U.S. states also documents large and statistically significant earnings gains from apprenticeship (Reed 2012). Six years after starting a program, earnings of the average apprenticeship participant were 1.4 times those of

[5] See the documents linked with http://www.red-seal.ca/tr.1d.2@-eng.jsp?tid=51 for examples.

non-participants with the same pre-apprenticeship history. The gains were highly consistent across states although the earnings advantages narrowed between the sixth and ninth year after program entry. Overall, the study found that apprenticeship returns nearly $28 in benefits for every dollar invested by government and workers themselves. The net gain projected over a worker's career was $125,000. A study of apprentices in Washington found even more impressive gains in earnings. Within two and one-half years of completing the program, apprentices accumulated $78,000 more in earnings than a comparison group (Hollenbeck 2008; Washington State Workforce and Education Coordinating Board 2014).

Many studies have examined the earnings gains from apprenticeship training in European countries. They generally find high rates of returns for workers, often in the range of 15 per cent (Clark and Fahr 2001; Fersterer, Pischke, and Winter-Ebner 2008; Geel and Gellner 2009). Unfortunately, few studies are able to isolate the net impact of apprenticeship rigorously. They are generally unable to account for a major concern of existing studies: the role of selection bias that results from the employer's selection of young workers who are inherently more capable than their older counterparts.

One study of the returns to apprenticeship training in small Austrian firms (Fersterer, Pischke and Winter-Ebmer 2008) overcomes much of the selection problem. By focusing on apprentices who were employed by companies that went out of business during the period of apprenticeship, the authors were able to examine a group of trained workers who spent varying lengths of time in apprenticeship. The results showed a significant wage effect from longer durations of apprenticeship. For a three- to four-year apprenticeship, post-apprenticeship wages were 12 to 16 per cent higher than would otherwise have been the case.

A skeptical view of returns to apprenticeship emerges in Hanushek, Wößmann and Zhang (2011). They argue that vocational education (including apprenticeships) improves employment and earnings outcomes of young people but that the advantage disappears as the worker ages. The erosion of gains at older ages is clearest in countries that emphasize apprenticeship, such as Denmark, Germany and Switzerland. Even so, the advantage in employment rates remains through approximately age 60 (Table 6). In countries that emphasize apprenticeships, men with vocational education experience a nine percentage point employment rate advantage at age 40 and a four-point advantage at age 50.

Costs and benefits for employers

For employers, the net cost of an apprenticeship depends on factors such as the mix of classroom and work-based training, the rate of skill and wage progression, and the productivity of the apprentice while in training. Direct costs include the wages of the apprentice and his or her trainer(s), materials required for training, and any additional workspace requirements (Wolter and Ryan 2011). The benefits to the employer can include lower hiring and training costs, reduced turnover and enhanced productivity. As Wagner (1999) points out, the savings in recruitment and initial training are often substantial, in part because apprentices tend to reach full proficiency faster than other new hires.

The most extensive studies of net costs of apprenticeships involve German and Swiss employers. One analysis compared the results from surveys of 1,825 German firms and 1,471 Swiss firms (Muehlemann et al. 2010). The study did not include the costs of school-based learning linked to apprenticeships. On average, the German firms incurred gross costs €15,500 per year for each apprentice; the comparable figure for Swiss firms was €18,000. Although the Swiss firms spent more than German firms, they realized substantially higher benefits in the form of value-added per apprentice. The Swiss firms gained, on average, €19,000 per year in increased production per apprentice, more than double the €8,000 average benefit reported by German firms. Over the course of a three-year apprenticeship, Swiss firms recouped the €54,400 cost with benefits of €57,100, while German firms experienced €46,600 in gross costs against only €24,000 in benefits. While the wages paid to apprentices were higher in Switzerland than in Germany, apprentices put in more days of work in Switzerland than in Germany (468 vs. 415 for a three-year apprenticeship). Further, Swiss apprentices devoted 83 per cent of their time on the job to productive tasks, compared to only 57 per cent among German apprentices.

One striking feature of apprenticeships in both countries is how quickly apprentices progress from unskilled to skilled tasks. In Switzerland, the productivity of apprentices rises from 37 per cent of a skilled worker's level in the first year to 75 per cent in the final year; in Germany productivity increases from 30 per cent to 68 per cent over the apprenticeship period. Still, nearly all German firms with apprenticeships (93 per cent) reported incurring net costs, while 60 per cent of Swiss said they more than recouped their costs.

Are the higher in-program net costs to German firms offset by any advantage after the apprenticeship period? The study indicates retention of apprentices within the firm is much higher in Germany than in Switzerland. Thus, while German firms bear much higher net costs than Swiss firms during the apprenticeship period, they reap higher returns during the post-apprenticeship period.

Evidence from the Germany surveys of employers offers some insight into post-program benefits (Beicht and Ulrich 2009). Recruitment and training cost savings average nearly €6,000 for each skilled worker trained in an apprenticeship and taken on permanently. The report cites other benefits, including 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 outside. Taking all of these benefits into account, the apprenticeship investment clearly generates a net gain for employers.

Not all recent studies indicate high net costs of apprenticeships in Germany. For example, Mohrenweiser and Zwick (2009) find that for many occupations, the gains to the firm during the apprenticeship period more than offset the costs. They draw their conclusions by estimating the impact of apprenticeships on company profits. For apprenticeships in trade, commercial, craft, and construction occupations, the estimates show a positive impact on profits. Moreover, the gains come from the higher productivity of apprentices (relative to unskilled or semi-skilled workers) and not from lower wages. Only in manufacturing is the effect on current profits negative, indicating a net cost during the apprenticeship period that is presumably offset by post-program benefits. In another careful study of German apprenticeships, Rauner et al. (2010) finds that the majority of the 100 firms in the sample recouped their investment in apprenticeships during the training period. The Rauner *et al.* study finds that most firms experience low net costs or even net benefits from sponsoring apprenticeships. However, the net costs vary widely, with some firms gaining more than €10,000 and others incurring net costs. High-quality apprenticeships are associated with higher gross costs, but are much more likely than low-quality apprenticeships to yield a net gain for the employer during the training period.

An extensive study of Canadian employers sponsored by the Canadian Apprenticeship Forum (2006) estimated employer costs and benefits of four-year apprenticeships in 15 occupations. The study drew on responses from 433 employers. The average gross costs varied widely, ranging from about $78,000 for a cook to $275,000 for a construction electrician. Average in-program benefits—defined as the additional

revenue generated as a result of work performed by apprentices—varied widely as well, ranging from $120,000 for a cook to $338,000 for a construction electrician. For all 15 occupations, employers earned a positive return on their apprenticeship investments even without taking into account any post-program benefits.

In a recent analysis of apprenticeships in the United Kingdom based on eight employers, Hasluck and Hogarth (2010) estimated that the average gross costs were higher than the average benefits during the apprenticeship period in all four industries. The gross costs were only modestly higher than the in-program benefits in retail and business administration, but much higher in engineering and construction. Still, the authors estimate that employers at least break even during the early post-apprenticeship period, when the contributions to production of apprenticeship graduates are worth more than their wages.

In the United States, there are no rigorous studies with estimates of employer costs and benefits of apprenticeships. However, evidence from surveys of more than 900 employers indicates that the overwhelming majority of apprenticeship sponsors believe their programs are valuable and generate net gains (Lerman, Eyster, and Chambers 2009).

Evidence on innovation and competitiveness

Another benefit to firms that is rarely captured in studies is the positive impact of apprenticeships on a firm's ability to innovate. 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 more likely to identify and implement technological improvements, especially incremental innovations to improve existing products and processes. A study of German establishments by Bauernschuster *et al* (2009) documents this connection. Among establishments that did not train continuously, the authors found that only 28 per cent reported innovations; in comparison, innovative activity took place at 59 per cent of firms that train continuously. These descriptive data do not prove causation but the authors uncovered a robust, causal relationship between the extent of in-company training and subsequent innovation: each percentage-point increase in training intensity was associated with slightly more than a one per cent increase in the likelihood of innovating.

The precise role of apprenticeship training in affecting the innovation process is still unclear. Nonetheless, evidence to date suggests that apprenticeship does positively influence a firm's innovation performance and competitiveness.

Concerns about apprenticeship

Alongside the many advantages of apprenticeship are two major concerns. The first is that apprenticeship training tends to be too specific for an era of rapid advances in technology and uncertainty about occupational demands. Perhaps workers who complete apprenticeships or vocational education are less adaptable than workers who receive a good general education. Perhaps the skills acquired through apprenticeship are not sufficiently portable.

The second major concern is that companies can lose their investments in apprenticeship if other firms step in and hire workers who have completed their training. Some human capital theorists suggest that firms will decline to hire apprentices to the extent that the skills taught are general in nature and can be used outside the firm (Becker 1980).

What does the evidence show concerning these two potential limitations?

Occupational mobility and apprenticeship

The issue of skill portability is complex. As Geel and Gelner (2009) point out, learning even a highly specific skill can yield benefits outside the narrow occupation:

> For example, an adolescent who wants to become a clockmaker should not necessarily be considered poorly equipped for future labor market requirements, even though his industry is small and shrinking. Rather, he is well equipped because his skill combination is very similar to skill combinations of other occupations in a large and growing skill cluster, which includes, for example, medical technicians or tool makers. Despite a seemingly very narrow and inflexible skill combination in his original occupation, he is nonetheless very flexible and well prepared for future labor market changes due to the sustainability of his acquired skills and his current skill cluster.

To better understand the concept of skill specificity, Geel and Gellner (2009) and Geel, Mure, and Gellner (2011) begin with an insight borrowed from Lazear (2009) that all skills are general in some sense and that occupation-specific skills represent various mixes of skills. The authors document 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 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 skills are portable between occupations within the same cluster and/or capable of being applied to other occupations. The authors use 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 on the basis of empirical analyses of German apprentices. One finding is that while only 42 per cent of apprentices stay in their initial occupation, nearly two-thirds remain with the occupation they learned as an apprentice or move to another occupation that requires 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 actually 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.

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 occur or would occur from transferring to another occupation. The overall rates of return to each year of apprenticeship range from eight to 12 per cent for training in firms of 50 workers or more and from about 5.5 to 6.5 per cent for firms with between two and 49 workers. Although transferring to another occupation can offset these gains, the reduction is zero for those who quit and only about 1.7 per cent for those who are displaced from their jobs and shift to other occupations. As found by Geel and Gellner (2009), the wage penalty varies with the distance away 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 actually experiencing wage advantages while those in commerce, trading, and construction see modest losses.

Finally, Clark and Fahr (2001) present workers' own views on the relevance to their current jobs of skills acquired in apprenticeship training. Not surprisingly, 85 per cent of

workers who remained within their training occupation reported using many or very many of the skills they learned through apprenticeship. This group constituted 55 per cent of the sample. Among the remaining 45 per cent, about two in five reported using many or very many of the skills from their apprenticeship and another 20 per cent reported using some of the skills. Only 21 per cent of all former apprentices said that they used few or no skills learned in their apprenticeships.

Overall, these studies should ease concerns that apprenticeship training inhibits mobility. The occupational and employability skills learned in apprenticeship are sufficiently general that they remain useful throughout a worker's career, even when the worker switches to a new occupation.

Employer incentives and the poaching problem

How difficult is it for employers to recoup their training costs for apprenticeships given the risk that they will lose their trainees to other firms? This process, called "poaching", is apparently not as common as some imagine. In a major survey of U.S. apprenticeship sponsors, 46 per cent of sponsors did not see poaching as a problem and another 29 per cent saw it as only a minor problem (Lerman, Eyster, and Chambers 2008). Only about one-quarter of apprenticeship sponsors said that poaching was a significant problem. Notwithstanding these results, one should not dismiss concerns about poaching. First, it may be an especially difficult problem for one in four sponsors to overcome and to maintain healthy apprenticeship programs. Second, the prospect of poaching may deter other companies that might offer apprenticeships but currently do not (and therefore would not be captured in a survey of apprenticeship sponsors).

On the other hand, nearly 87 per cent of sponsors reported that they would strongly recommend registered apprenticeships and another 11 per cent would recommend apprenticeships with some reservations. Only about two or three per cent said they would not recommend apprenticeships. Even among the firms most concerned about poaching, 85 per cent still highly recommend apprenticeships.

In many cases, the risk of poaching is offset by the company's ability to recoup most of its costs during the apprenticeship period or soon after. The fact that the employer has had a chance to evaluate the apprentice on the job also means that there is a much lower risk that he or she will prove to be a poor fit and will have to be replaced. In addition, interactions with existing workers provide apprentices with the opportunity for informal learning about occupational skills and company practices that are difficult to codify and teach in a formal setting. Often, existing workers themselves learn from the

teaching and mentoring process, as they reflect on what is required to perform tasks at a high level. Finally, companies that do not provide training and instead try to poach skilled workers usually must pay a premium to do so.

The scale, composition, and governance of apprenticeship training in Canada

Apprenticeship training is more widely available in Canada than in the United States and many other countries. The number of apprentices doubled over the 25 years between 1977 and 2002 and has more than doubled since 2002, reaching about 426,000 in 2011. Apprentices account for about 2.4 per cent of total employment in Canada and more than 20 per cent of post-secondary enrolment. By comparison, registered apprentices represent only about one-quarter of one per cent of total U.S. employment. Nearly half of all Canadian apprentices are in one of four occupations: automotive service technician, carpenter, electrician, and plumber (including pipefitter and steamfitter). Notwithstanding this concentration in construction-related fields, the number and diversity of apprentice occupations have growth sharply, with the number of apprenticeship programs doubling to 300 between 1997 and 2012. Many of the new apprenticeship opportunities are in technology-intensive sectors, including film and aerospace (Miller 2013).

In contrast to the approach taken in Austria, Germany and Switzerland, apprenticeship in Canada is primarily geared to adults. Only about seven per cent of Canadian apprentices are under age 20; another 28 per cent are between 20 and 24 years of age. Just over half of all Canadian apprentices are in their 20s and more than 40 per cent are 30 or older. Hence, the apprenticeship system in Canada does little to ease the transition between secondary education and the labour market.

Some provinces have put in place apprenticeship programs for students in the late high school years, but the numbers participating are small. Manitoba's High School Apprenticeship Program (HSAP) allows students to attend high school full-time while simultaneously acquiring on-the-job training on a part-time basis, but the program does not allow students to receive certification in their field of study by the time they complete high school. Employers who participate in HSAP receive a tax credit for the wages they pay, to a maximum of $2,000 per year for each apprentice. The credit varies by region in the province with employers in Winnipeg eligible to claim 15 per cent of wages while

those in northern Manitoba can claim 20 per cent. Still, as of early 2013 only 1,142 of Manitoba's nearly 10,000 apprentices were attending high school.

In Canada, provincial governments are largely responsible for administering and funding apprenticeships. Each province is free to decide which types of employment qualify as apprentice occupations; provinces also set the standards that apprentices are required to meet before they are certified. Apprenticeship authorities in each province administer the certification examinations that apprentices must past.[6] In some cases, provincial governments limit the ability to practice certain occupations to apprentices and workers with a completion certificate.

In addition to the provincial level standards, Canada's Interprovincial Red Seal Examination is commonly used to certify the skills of apprentices. The Canadian Council of Directors of Apprenticeship designates a trade as meeting the Red Seal standards partly in response to industry requests. The standards and competencies for an occupation are developed through a National Occupational Analysis and subsequently validated at the provincial level. Passing the Red Seal exam earns the apprentice a Red Seal Certificate of Qualification that is recognized across Canada and gives employers increased confidence that the worker does not require additional training. Close to half of the completion certificates issued in 2011 – 25,711 out of a total of 55,422 – came with the Red Seal endorsement.[7] To put that in context, only 53 of the 300 apprentice occupations have a Red Seal designation. In those trades, 60 per cent of completions carry the Red Seal certification (Miller 2013).

Funding for the Canadian apprenticeship system comes from both the federal and provincial governments. The grants provided by the federal government include the:

- Apprenticeship Incentive Grant (up to $2,000 to apprentices who complete levels 1 and 2 of an apprenticeship program in one of the Red Seal trades),
- Apprenticeship Completion Grant ($2,000 upon completing an apprenticeship in a Red Seal trade), and
- Apprenticeship Job Creation Tax Credit (designed to encourage companies to create jobs for apprentices in Red Seal trades, worth up to $2,000 a year for each eligible worker during the first two years of the apprenticeship).

[6] See http://www.red-seal.ca/c.4nt.1cts@-eng.jsp?#contact_4 for a list of provincial apprenticeship authorities.
[7] http://www.statcan.gc.ca/daily-quotidien/130611/dq130611b-eng.pdf

Provincial governments offer varying amounts of additional funding. In Ontario, for example, the government offers two distinct incentives to firms that are certified to train workers in a specific field:

- an Employer Signing Bonus of $2,000 to register apprentices in sectors where there is a high demand for skilled workers, and
- an Apprenticeship Training Tax Credit that allows employers to claim between 35 and 45 per cent of an apprentice's wages and benefits, up to a maximum of $10,000 a year for four years.

In 2004, the federal and provincial governments combined provided an estimated $1,228 in support per apprentice. Multiplying this figure by the number of apprentices in 2011 yields a figure of $528 million. Even if this figure is not precisely accurate, the scale of government funding for apprenticeships is substantial and, adjusted for population, is far greater than the figure for the United States.

Industrial patterns and unionization

Employment in Canada is heavily weighted toward the service sector. The goods-producing sector in Canada accounts for 22 per cent of all jobs (including the self-employed); this figure is somewhat larger than the 19.5 per cent figure for the U.S. The share of jobs in manufacturing is virtually identical, at about 10 per cent; mining and construction provide 9.5 per cent of employment in Canada, compared to seven per cent in the U.S.

Thirty-one per cent of Canadian workers belong to unions, far higher than the 12.5 per cent level in the United States. Much of the differential stems from the fact that unions represent 74 per cent of public sector employees in Canada but only 40 per cent in the United States. In the private sector, the gap is smaller but still significant: 17 per cent in Canada compared to seven per cent in the U.S. Unionization is especially prevalent in Canada in the construction trades and other private sector occupations that rely on apprenticeship. For example, 63 per cent of electricians, 42 per cent of machinists, and 39 per cent of carpenters are unionized.

Unionization is relevant to apprenticeship for several reasons. Unions tend to stimulate apprenticeship because they encourage training and career opportunities for their members by extracting high wages that can only be offset by the productivity of well-trained workers and offering help in the governance of apprenticeship programs. In fact,

about one in three apprentices are union members by the time they complete their programs. Although this figure is similar to the overall unionization rate in Canada, it is much higher than the 17 per cent union share of the private sector.

Key issues in Canadian apprenticeship

In Canada, provincial governments generally regulate the size of apprenticeship classes, the required ratio of skilled mentors to apprentices, the required number of hours of work-based learning and the amount and composition of classroom-based instruction.

One key issue is whether Canada's apprenticeship system should attempt to integrate people into careers at a younger age, easing the transition between postsecondary education and full-time employment. As previously noted, apprenticeships in Canada are primarily geared to training people who are 25 or older; only seven per cent of apprentices are under age 20. This suggest that Canada has not done a good job of integrating apprenticeship training into secondary-school programs or even into the early years of post-secondary education. A more extensive system of apprenticeship in Canada would require close collaboration between high schools and employers. Importantly, it would require extensive counseling on apprenticeship and other career-oriented options by grade 10.

A related issue concerns wage rates. During their high school or early post-secondary years, workers typically command wages that are much lower than they can expect later in life. Increasing the availability of apprenticeships in those early years would therefore imply lower wage costs for employers, which might in turn encourage more companies to hire apprentices. Creating more apprenticeships for young people might also encourage the adoption of essential skills such as responsibility, punctuality, teamwork and the ability to listen while limiting the likelihood that workers will develop bad habits. (On the other hand, some firms would undoubtedly prefer to hold off until workers have demonstrated good work habits and a commitment to the training occupation before they offer an apprenticeship slot.)

The required ratio of skilled workers to apprentices is a particularly contentious issue. The variations across provinces and occupations are wide, with many requiring more than one skilled worker for each apprentice. One striking variation is the difference between the required ratio for the first apprentice and the ratio that applies to the second and subsequent apprentices. In the case of boilermakers in Saskatchewan, for

example, the first apprentice can be hired under the supervision of a single skilled worker, but five apprenticeship completers are required to oversee each additional apprentice. Ontario's College of Trades provides a transparent look at judgments of review panels concerning the rationale for ratio levels. Although some of the decisions are influenced by concerns about workplace safety, many others are driven by purely economic considerations, including a desire to limit competition in the market for skilled trades.

A recent study conducted for the C.D. Howe Institute examined the impact of various regulatory actions on the number of people employed in a given occupation and province, on the incomes of those employed, and on the share of skilled workers with an apprenticeship qualification. The authors found that high ratios of skilled workers to apprentices – above 1:1 -- led to sharp decreases in apprenticeship opportunities and in the occupation's share of total Canadian employment. They also found a link between such ratios and average incomes, indicating that restrictions on entry into a field ultimately lead to higher wages for existing workers.

There is little justification for the apprenticeship ratios that currently exist in Canada. Requiring that someone work under the supervision of several journeymen instead of one does not ensure high-quality training. Nor does it necessarily increase workplace safety. It is as though the regulators are focusing on the input process rather than the output. The authors of the C.D. Howe report recommend replacing the ratio requirements with a robust set of regulations on the quality and safety of work performed by apprenticeship completers. In addition, they suggest using the government's signaling capabilities to certify high-quality service providers while at the same time allowing customers to purchase services from uncertified, presumably lower-cost providers.

Another critical issue is the low completion rate for apprentices. In the early 1980s, more than 60 per cent of Canadian apprentices completed their programs and earned certification. The completion rate dropped over the next 20 years to below 40 per cent in 2001, then recovered to about 50 per cent for the 2005 cohort. Completion rates vary dramatically by occupation and substantially by province as well. One study examined the factors influencing completion rates for specific occupations by province. It looked specifically at apprenticeship characteristics (age and sex) and program characteristics (education and work experience requirements, duration, and whether apprenticeship was mandatory for certification). The results showed that mandatory certification was most closely associated with high completion rates but that program duration did not

matter and educational requirements mattered only modestly. A higher age at entry reduced the completion rate.

In some provinces, completion rates are reasonably high. A recent study by the Saskatchewan Apprenticeship and Trade Certification Commission found that nearly two-thirds (65 per cent) of apprentices who completed their first year went on to finish their programs within two years of the expected completion date.[8] For occupations with a mandatory apprenticeship requirement – such as electrician, plumber, refrigeration mechanic and sheet-metal worker – the completion rate reaches 75 per cent. The analysis excluded apprentices who left before completing their first year, reasoning that many were just trying out a career or registering for an apprenticeship as a condition of employment. (Including all apprentices, Statistics Canada reports average completion rates of about 50 per cent.)

There are many unanswered questions about the factors that encourage people to sign up for apprenticeships and the reasons why so many of them fail to complete their programs. How can governments and employers make it easier for young people to learn about an occupation before deciding to sign up for an apprenticeship? Is the availability of counseling adequate? How well-trained are the mentors and trainers? Are people dropping out of apprenticeship programs because they believe they have already learned enough to land a skilled job at a good wage? These questions would be of interest even in the absence of broader concerns about the overall availability of apprenticeships.

Government funding

Canada's federal and provincial governments provide considerable support for apprenticeship training. Funding comes from several sources. At the federal level, direct government support for apprenticeships amounted to about $185 billion in the 2011-12 fiscal year. Additional support comes in the form of employment insurance for apprentices ($172 million in 2011-12) and the skills development components of Labour Market Development Agreements with individual provinces. As noted above, the provinces offer a variety of different grants for apprenticeships and, in the case of Ontario, an employer tax credit equal to 35 to 45 per cent of the cost of hiring an apprentice.

[8] http://www.saskapprenticeship.ca/wp-content/uploads/2013/11/Completion-Rates-Presentation-13-11-08.pdf

Expanding apprenticeship training in Canada

Expanding the availability of apprenticeships would yield significant economic and social benefits for Canada. It would provide young people with more pathways to rewarding careers, better align worker skills with employer needs, increase career opportunities for those who learn best by doing rather than through classroom study, raise income levels for workers in "middle-skill" jobs and, potentially, reduce youth unemployment. In addition, a more robust apprenticeship system would relieve some of the pressure on governments to increase spending on colleges and universities. That is because it is generally far less expensive to educate and train workers through apprenticeships than it is to keep them in school full-time. * Of course, there is a strong financial incentive for apprentices as well, since they are not required to forego earnings while acquiring new knowledge and skills. Apprenticeship combines learning and the production of goods and services in ways that lower the overall cost of training. Finally, the gains for firms can be significant, including possible increases in incremental innovations.

In short, the advantages of apprenticeship are significant – but is a large-scale expansion of Canada's apprenticeship system feasible? If so, how can governments and the private sector promote an expansion that preserves the quality and reputation of apprenticeship training and certification? Compared to the United States, Canada already has a substantially larger share of its workforce in apprenticeship programs, a higher degree of government support, a more extensive research base, and a more active set of sub-national apprenticeship agencies. As a result, Canada is well-placed to mount an expansion effort that penetrates a wider array of occupations and that reaches a larger number of young people. The rest of this paper will consider options for achieving a meaningful expansion.

Expanding the number of apprenticeship slots

Apprenticeships require direct employer participation. Absent a meaningful increase in the number of apprenticeship opportunities provided by employers, any effort to attract more workers into apprenticeship programs is likely to fail, and could even prove counterproductive.

What are the barriers to expansion? One is the effort that is required to design a new apprenticeship program. Companies that wish to introduce new occupational training programs, especially formal apprenticeships, must define content standards – the skills that apprentices are expected to learn – design a curriculum, determine the appropriate

balance between classroom- and work-based learning, assign mentors, and devise a system for determining when a trainee has achieved sufficient mastery in an occupation. Measuring and evaluating training impacts is difficult, although several worthwhile approaches have been developed (Bassi and McMurrer 2006).

Another barrier is scale. Setting up a formal training program and exposing workers to a wide range of tasks is especially difficult for small companies. Small firms often lack the expertise to do so, and the cost per worker tends to be prohibitive given that only a few workers will participate in the training. Still, such challenges can be overcome. For example, governments could offer technical assistance to companies that agree to establish apprenticeship programs. Alternatively, a group of employers in the same industry could pool their resources, perhaps working in partnership with a public agency. Yet another option is for a major employer to assist in the training efforts of small firms that are its customers or suppliers. An example of the latter approach is the Cisco Networking Academy, a program that blends classroom training and on-line learning to train students and help them prepare for industry-recognized certifications in information and communication technology careers.[9]

One way to expand Canada's apprenticeship system is to develop standards for additional occupations; another is to increase participation in existing apprentice occupations. Currently, the Red Seal occupations provide a national framework for nearly 60 occupations, but many other apprenticeship programs exist at the provincial level. The result is that apprenticeship in some occupations is not well documented. Extending the Red Seal to a greater number of occupations would likely go a long way toward increasing awareness of apprenticeship opportunities. Another approach would be to develop a clearinghouse with information on apprenticeship occupations in other countries, especially Germany, Switzerland and the United Kingdom. Provincial governments, employment agencies and employers could draw upon this information to help launch new apprenticeship programs.

The regulatory structures that frame apprenticeship obviously influence the attractiveness of apprenticeship training. The regulation of ratios provides a good example that raises broader questions about the degree to which regulation should limit the flexibility of apprenticeship training. Too little regulation can undermine confidence in the skill level of graduates; too much can limit the flexibility of firms to train workers cost-effectively – or, even worse, drive employers away from the system. Policymakers and

[9] See http://www.cisco.com/web/learning/netacad/academy/index.html for a description of the program.

regulators are often focused on several objectives, some of which are poorly defined. Left unclear are the appropriate standards for defining new occupations, reclassifying groups of occupations, setting ratios, and granting credit for past experience and knowledge. Should the priority be to expand apprenticeship opportunities? To attract more employers into contributing to the skill-building process? To reduce youth unemployment by increasing the involvement of young people and their educational institutions, including high schools? To limit entry into skilled trades? Evidence suggests that competing objectives are common in Canada's apprenticeship system and reduce its overall effectiveness.

A well-developed marketing strategy to promote apprenticeship is critical in building a robust apprenticeship system. Incentives alone cannot achieve this objective, in part because many if not most employers have only a limited understanding of how to create a successful apprenticeship program. Here is where examples from abroad can play an important role. Recent marketing initiatives in South Carolina and the United Kingdom are particularly instructive.

The case of South Carolina

In much of the United States, the federal and state offices that oversee and support apprenticeship are understaffed. In South Carolina, a single federal employee was for many years responsible for marketing, monitoring, keeping records, and providing technical assistance to companies that employed apprentices. Often, calls from employers for information or help in setting up an apprenticeship program went unanswered. This changed after the South Carolina Chamber of Commerce appealed to the state technical college system to establish a statewide apprenticeship program, leading to the launch in 2006 of Apprenticeship Carolina. The technical colleges were quick to recognize the value of a private-sector partner in strengthening their outreach to employers. For its part, the Chamber of Commerce recognized that situating the office within the technical college system would enhance the reputation of apprenticeship as a "high skills" option and position it as an educational opportunity.

Branding the initiative as Apprenticeship Carolina connoted local ownership and eliminated any reference to the state or federal government. A key decision, early on, concerned the recruitment of staff who would be responsible for marketing the program to employers. The director of Apprenticeship Carolina chose to hire individuals who had a business background, were engaging, and knew how to develop and manage relationships. Once hired, these individuals took part in a two-week immersion program

during which they learned about the concept of apprenticeship, studied apprenticeship regulations and forms, and saw apprenticeship programs first-hand.

Although the initiative included advertising and the creation of a website, the key to marketing Apprenticeship Carolina was direct contact between its staff and individual employers. One important tool for the staff in raising awareness of the program was the availability of a $1,000 state tax credit; it helped to ensure that employers would take the time to talk with Apprenticeship Carolina staff. Typically, the staff would begin by asking employers about their existing training approaches, about the idea of benchmarking their workers' skill levels, and about their willingness to consider the adoption of a more formal approach to training.

The expansion of apprenticeship in South Carolina reached across industry sectors, including advanced manufacturing, health care, and information technology. Construction-related occupations represent a large proportion of U.S. registered apprenticeships, but they accounted for only a small share of Apprenticeship Carolina's focus. Traditional registered apprenticeships require three to four years of training, but Apprenticeship Carolina has shown great flexibility in registering shorter apprenticeships in occupations that do not require such extensive training. This flexibility is particularly important for workers and employers in certain health, hospitality and manufacturing fields. The program takes full advantage of regulations that allow companies to substitute competency-based or hybrid (time and competency) standards for time-based requirements.

In South Carolina, apprenticeship marketing tends to take place in the context of state and local efforts to attract new business investment. Proponents emphasize the program as a reason why firms should opt to locate in the state. Workforce Investment Act (WIA) 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 main value of Apprenticeship Carolina lies in its ability to work with businesses to diagnose their human resource demands and define a set of skills that they need workers to master. In determining the appropriate skill mix and the combination of classroom- and work-based learning required to attain this skill mix, staff can draw on experts from the state technical college system. That leads to the establishment of content standards for apprenticeships, after which Apprenticeship Carolina staff can move forward with an application to establish the program as a "registered"

apprenticeship within the United States. Employers value these services because they keep the process simple. Without the help of Apprenticeship Carolina in defining standards and curricula and handling the burden of paperwork, many firms would likely opt out of the program.

One illustration of Apprenticeship Carolina's creativity is its recent push to expand opportunities for youth. Increasingly it is working with companies to encourage the creation of apprenticeships for young men and women who are still in high school. This model is far closer than most U.S. (or Canadian) apprenticeship programs to those operating effectively in Germany and Switzerland.

Apprenticeship Carolina's success during a period of economic weakness demonstrates that U.S. employers are prepared to invest in training for new hires under a well-structured apprenticeship framework. With sufficient business and community college support, there appears to be no reason why this model could not be replicated elsewhere.

The case of the United Kingdom

Like South Carolina, the United Kingdom has successfully used marketing, technical assistance and modest financial incentives to increase the supply of apprenticeship slots. The number of apprentices tripled from 172,600 to 515,000 in the six years between 2005-06 and 2011-12, despite a serious recession. By the end of 2013, the number of workers in apprenticeships reached 868,000. Along with the expansion in apprenticeships has come an increase in the number of apprenticeship occupations. Some 200 apprenticeship frameworks are currently available and another 118 are under development. The range of occupations is broad, covering not only traditional construction and manufacturing jobs but also banking, information technology, and management.

The successful expansion of apprenticeships in the U.K. involved extensive marketing at the national and local levels along with a system that encourages training providers, such as further education colleges, to help employers set up apprenticeships. Politicians from all major parties publicly and frequently endorse apprenticeship. A wide variety of activities and events, including visits by the Prime Minister and other officials to workplaces, take place during Apprenticeship Week in March every year. Publicity campaigns underscore the importance of apprenticeships to the national economy and spotlight companies that expand their commitment to apprenticeship or hiring a new

crop of apprentices. The Apprenticeship Service's website (www.apprenticeships.org.uk) is attractive, informative and even cool. It highlights the occupational clusters and specific occupations within clusters that offer apprenticeships.

Although literature is sparse on the subject, the direct marketing to individual employers appears to have been critical to the U.K.'s success in expanding apprenticeships. Financial incentives alone generally will drive employers to change their hiring and training processes. However, financial incentives alongside the retail marketing of apprenticeship can be highly effective. Until recently, the responsibility for marketing fell largely on training providers. The government subsidizes the classroom training component of apprenticeship so that employers bear only the wages and work-based learning components. However, the subsidies serve mainly to motivate training providers. By encouraging employers to hire a sufficient number of their students, the training providers can earn a good return on the courses financed by the government in support of apprenticeship. For example, the City of Westminster College worked with a variety of employers to develop advanced apprenticeships in business, customer service, community arts management, electrotechnical engineering and technical theatre (lighting, rigging and sound).

Training the trainers

Trainers in the workplace are critical to the success of any apprenticeship program. As well as teaching relevant skills, trainers monitor and grade apprentices and ensure that they are ready to be tested and certified. Despite their importance, however, most countries lack a consistent approach to setting competency requirements for trainers. Instead, the role tends to be filled by skilled workers who possess at least some work experience and are trusted by the employer.

Recently, a few countries have introduced formal certification programs for trainers. For example, Ireland now offers a "train the trainer" certificate in the context of its National Framework of Qualifications. The voluntary program is aimed at ensuring that in-company trainers are equipped with the skills necessary to design, deliver, assess and evaluate apprenticeship training programs.

Germany introduced a certification for vocational teaching in 2009 that provides a governing structure for training in-company trainers. Endorsed by the German Chambers of Commerce, the certifications range from entry-level to master artisans in industrial production The programs run from six to 30 months and the examination

process includes written components, an interview with experts, project work, and a presentation. The result is a certified vocational trainer capable of organizing and implementing training; counseling, assessing and guiding trainees during and after the training programs; and identifying and integrating new qualifications into work-based and formal learning processes.

Caution is appropriate before going too far to formalize the trainer role in apprenticeships, especially given the variety of occupational programs. However, good trainers play a critical role not only in guiding workers to master key occupational skills but also in encouraging completion, monitoring an apprentice's progress and providing career guidance. In Canada, there is a clear need for more research on the competency of in-company trainers and how best to improve the quality of training. Further research is also needed to determine, on a sector-by-sector basis, the appropriate number of trainers per apprentice – in other words, the ratio requirement.

Other approaches to employer expansion

In countries where relatively few companies hire apprentices, marketing campaigns directed at individual firms are critical. First and foremost, firms need to be convinced that employing apprentices can be advantageous to the business. They also need access to practical advice on how to implement apprenticeship at their work sites. General information such as can be made available on websites is useful,* but without direct contact between employers and those with apprenticeship expertise, few companies are likely to take the plunge.

Beyond that, industry groups can play a useful role in designing and promoting apprenticeships. One randomized U.S. trial indicated that workers' participation in sector-based apprenticeship programs yielded high rates of return. One aim of these programs is to encourage employer-led training among low-skill, low-wage workers. A large public initiative is currently underway to involve employers in training members of disadvantaged groups for occupations in the health sector.[10] The focused nature of the training, the linkages with employers, the development of pathways for entry-level workers, and the expertise gained by training organizations have all likely contributed to the apparent success of the sectoral strategy approach.

[10] See http://www.acf.hhs.gov/programs/ofa/programs/health-profession-opportunity-grants-hpog for details.

But while sometimes effective, sectoral strategies are difficult to mount, usually time-consuming and often require considerable external funding. Moreover, committees involving labor representatives, employers, community organizations, and government partners are rarely sufficient. Ultimately, individual employers will decide whether to adopt apprenticeship as a primary method for recruiting and training skilled workers.

Financial incentives represent another option for stimulating apprenticeships and other forms of employer-led training. But as noted above, there are limits to their effectiveness. For example, Netherlands and Austria allow firms to deduct 120 per cent of their training costs, but there is little sign that this level of subsidy has yielded any increase in training activity.[11] The evidence that does exist on subsidy schemes suggests several lessons. Information about the subsidy must be communicated effectively, and the focus should be on small businesses since they are generally less inclined to invest in training. Administrative burdens should be kept to a minimum. Incentives should be substantial, but firms should be required to bear some of the costs of training. Finally, incentive schemes that reward companies for *increases* in training are a good way to ensure that tax dollars do not simply substitute for investments that employers would have made even without a subsidy.

Several countries have implemented training levies on specific industries, with mixed results. The U.K. government created the Sector Skills Development Agency in 2001 to fund, support, and monitor 24 Sector Skills Councils, composed of employers and union representatives. Two of the councils, those linked to the construction and audiovisual industries, impose training levies on employers. The rates vary, depending on the firms' own training activities, and the money collected is distributed as grants to firms for training. Some evidence suggests that the construction council's activities have significantly increased the amount of training activity in the sector, especially among small firms. But a study of various industries in the Netherlands in which companies are required to contribute to sectoral training funds found that training levels were no higher than in industries that lacked such funds. (Kamphuis, Glebbeek and van Lieshout 2010).

Finally, peer networks may be another means to promote training, especially apprenticeship training. Although I am not aware of any operating models, the creation of web-based industry networks would allow companies to learn from their peers how to

[11] Netherlands added an extra 20% deduction for training workers over 40, but an evaluation showed this policy led only to a delay in training those below 40 and not increase in overall training (Leuven and Osterbeek 2004).

design and implement apprenticeship programs. Governments or industry groups themselves could take the lead in setting up these knowledge-sharing networks.

Financial accounting for upgrading human resources

One potential strategy for encouraging firms to invest more heavily in training, including apprenticeship training, is to promote a new approach to financial accounting for human capital. Company leaders often profess that their employees are their most important assets. But another old management adage says that you get what you measure. Unfortunately, nearly all financial reporting systems fail to treat increases in human capital – the knowledge and skills of a company's workforce – as an asset on a balance sheet. As with many other investments, the benefits of training accrue over several years. Yet the income statement assigns the full cost of investments in people to the year in which the outlays occur. This policy may be appropriate for tax purposes, since it reduces the immediate after-tax cost of training. However, it also lowers apparent profits and weakens the company's balance sheet. A good compromise would be to retain the current tax treatment of training expenses while encouraging companies to treat investments in human capital investments the same way they treat investments in physical capital for the purposes of financial accounting.

Expanding student interest in and qualifications for apprenticeships

Matching students with jobs and careers is a complex task. In the context of apprenticeship, the experience from a number of countries suggests that young people are eager to participate in well-structured training programs that involve work-based learning and that leads to a valued credential. Canada already has a sizable apprenticeship system, but it is worth asking whether governments should seek to expand the availability of apprenticeships for high school students and young adults – among, say, 17 to 22 year-olds. If so, what steps can be taken to generate this expansion?

A common argument against expanding apprenticeship for youth is that it is important not to limit an individual's options early in life. Although the evidence is inconclusive, some studies have found that former apprentices who switch occupations experience little or no worsening of career outcomes or earnings potential. One study cited above (Clark and Fahr 2001) reports that 79 per cent of former apprentices make use, in their current jobs, of at least some of what they learned as apprentices.

Studies that attempt to measure the effect of an individual's decision to enter or exit an apprenticeship tend to overlook the broader impacts of a major expansion of apprenticeship opportunities. Apprentices and non-apprentices alike may benefit if education and training is more closely aligned with learning styles and interests. For example, the overall quality of classroom education may improve if individuals who are poorly suited to classroom learning choose instead to pursue an apprenticeship.

Broader availability of workplace-based training opportunities can be particularly useful as a way of accommodating gender differences in learning styles. In Canada as in many other developed countries, young women now outperform young men in completing high school and bachelor-level degrees. Among 25- to 44-year-olds, 29 per cent of young men but only 21 per cent of young women have no education beyond high school. At the top end, 37 per cent of young women but only 29 per cent of young men have an undergraduate or higher degree. The gap in post-secondary attainment would be even greater without Canada's existing apprenticeship system, since apprentices are almost 10 times as likely to be men as women.

Apprenticeship initiatives geared specifically to youth already exist in several Canadian provinces. One example, noted above, is Manitoba's High School Apprenticeship Program (HSAP), operating under the umbrella of Apprenticeship Manitoba. To participate in HSAP, students must be at least 16 and currently enrolled in grade 10, 11 or 12. The program covers more than 40 qualifying trades, including industrial trades, transportation trades, construction trades, and service trades. Still, even in Manitoba, youth apprenticeship is unusual. As of March 2013, the HSAP program accounted for only about 10 per cent of the province's apprentices.

It is difficult to say whether the low number of youth apprentices in Canada is a product of weak linkages between the education system and the labour market, a lack of interest among employers, or a lack of interest among students. It appears that many if not most high school students are misinformed about apprenticeship. A survey in Ontario found that most youth did not clearly understand how to enter an apprenticeship, are most did not realize that apprentices are paid by employers (Hines 2013).

One thing that almost certainly constrains interest in Canadian apprenticeships is the widespread notion that they apply only to the "trades." In fact, in Canada as in many other countries apprenticeship programs have been introduced for a variety of white-collar and service-industry occupations; examples include information technologist,

chef, arborist, and child development practitioner. That said, Canada could certainly do more to encourage the use of apprenticeship in a broader range of fields, such finance and commerce. (In the United Kingdom, by way of example, Barclays Bank employs more than 1,000 apprentices across its various operations.)

Broadening student interest in apprenticeships may well be a lower priority than expanding the number of slots offered by employers. In the United States, demand for apprenticeships far exceeds the supply; in many programs, the number of applications is eight to 10 times greater than the number of openings. In the United Kingdom, the number of people willing to enter apprenticeships has increased as employers offer additional slots. A slight majority of U.K. youth now favor apprenticeships over university.

In Canadian high schools, information about apprenticeship is generally available from career counselors. Stronger links between high schools and employers, however, would motivate businesses to offer and young people to seek apprenticeships. Students in middle school or early high school should learn what is required to enter various apprenticeship programs. Ensuring that such information is widely available can encourage young people think about careers and enhance academic achievement, since students would better understand what they need to learn to qualify for an apprenticeship.

Conclusions and policy recommendations

At 2.2 per cent of the labour force and a total of 426,000 apprentices, apprenticeship already plays a significant and growing role in Canada's labor market. Canada's apprenticeship penetration rate, however, ranks below the levels in Australia (3.7 per cent) and the United Kingdom (2.7 per cent). Moreover, the range of apprenticeship occupations is narrow in comparison to what is available in other countries. In addition, apprenticeship reaches few people at a young age when their wage needs are low, they have ready access to free or low-cost education, and they have yet to develop bad work habits. These shortcomings undoubtedly contribute to employment shortfalls that are higher than necessary. Outside oil-producing provinces, joblessness among men aged 25 to 34 who are not full-time students doubled between 1981 and 2012, from nine to 19 per cent (Galarneau et al. *2013)*. For non-student males, aged 15 to 24, joblessness rose from 29 per cent to 46 per cent over the same period. (In oil-producing provinces, the rates were lower but the trend was still toward higher unemployment.) At the same time, business leaders voice concerns about the future availability of skilled workers.

Can Canada do better? What mix of policies would contribute to a significant expansion of apprenticeship, especially for youth? How can apprenticeship become a mainstream option for young Canadians and a common recruitment and training approach for employers?

Build it and they will come

Encouraging young people to pursue apprenticeships will backfire unless sufficient apprenticeship slots are available – so the obvious question is how to expand the number of apprenticeship opportunities. Experience in both the United Kingdom and South Carolina suggests the importance of both a broad marketing/branding strategy and a more focused one-to-one campaign in which highly qualified representatives promote apprenticeships to individual employers. In the United Kingdom, training organizations performed the retail marketing role. South Carolina drew on a talented group of business-savvy individuals to make the business case for apprenticeship to a wide range of firms. Either approach could work well in Canada – but first, more research is required on the factors that limit interest in apprenticeship, both among employers and students. One obvious point is that continuing the emphasis on "trades" is counterproductive since it suggests that apprenticeships are limited to a relatively narrow range of occupations.

In developing new apprenticeships—involving new occupations, new target groups and/or new institutions—the public and private sectors will each have to take more initiative. One possibility is for governments to spearhead efforts to develop new apprenticeships within a few industries. Industry associations could help by defining the skill requirements of a specific set of occupations. Provincial governments could then fund pilot projects within those occupations, working in partnership with industry associations and educators at the high school or post-secondary level. Financial incentives could be provided to community colleges to offer related instruction and to undertake the job of marketing apprenticeship to individual firms. Any such project should include a robust evaluation component that examines implementation issues and assesses the costs and benefits for employers as well as apprentices.

Another option is to examine the suitability of apprenticeships for government jobs and careers. Careers in administration, natural resource management, air traffic control, accounting and security are examples for which apprenticeship training might apply. Health careers offer other opportunities for expanding apprenticeship. Pharmacy and

laboratory technician positions can provide rewarding careers in the context of work experience and courses on biology and health.

Expanding slots in existing apprentice occupations

Canada should undertake research to determine the availability of apprenticeships in a wide array of occupations and the extent to which employers use apprenticeships in occupations that are apprenticed either in Canada or in other countries. It will be important to identify both the barriers to growth and the steps that are likely to be most effective in stimulating an expansion of apprenticeship. Among the regulatory barriers that should be examined in detail are the requirements for specific ratios of journeymen to apprentice. This is a contentious issue but one that deserves objective analysis.

Funding, outreach, and accounting

In the United States, government funding for apprenticeship is starved, especially in comparison to the vast sums devoted to college and university education. While Canada spends far more on apprenticeship than does the United States, public funding per apprentice probably falls well behind outlays per university or community college student. Governments should commission a study to compare the level of public support for young people who enroll in conventional post-secondary programs as opposed to programs that involve extensive work-based learning.

Developing a robust website should be a high priority. Although the existing Canadian sites are far better than most U.S. sites, they are far inferior to the U.K. apprenticeship website (apprenticeships.org.uk). A modest investment would improve the quality and accessibility of information. In addition to raising the Internet presence of Canadian apprenticeship, governments and business groups should consider the advantages of establishing a peer-to-peer network for those with an interest or stake in apprenticeship. Such a network would allow sponsors to reach out to other sponsors, apprentices to reach out to other apprentices, and workforce professionals to interact with sponsors, apprentices, and one another.

Finally, Canada should undertake research on accounting rules for human capital. As previously noted, companies generally claim the cost of training as an operating expense, an approach that fails to recognize the long-term value of investing in human capital. If financial accounting treated an investment in human capital like any other capital investment, most of any year's spending would appear on the balance sheet as

an asset. This change in the treatment of human capital would likely encourage firms to increase their investments in training – including apprenticeship training.

The payoffs

Implementing these and other recommendations for expanding Canada's apprenticeship system would yield significant payoffs. Fewer Canadian youth would be unemployed or in jobs ill-suited to their interests and capabilities. Canadian firms would find it easier to recruit workers with the skills they need, and would experience lower rates of workforce turnover. Canadians would be more likely to find careers that are personally and professionally rewarding and that offer significant wage growth over time. More Canadian firms would achieve the sorts of productivity gains that are common in countries with robust apprenticeship systems. Firms that sometimes find themselves needing to reduce the skill level required for a job to accommodate the available labour supply – a process known as de-skilling – could instead focus on enhancing job quality with the knowledge that skilled workers would be available to undertake a broad array of advanced.

From a societal perspective, expanded apprenticeship training would reduce income inequality by equipping workers to earn higher wages. Taxpayers would benefit as well, as employers shoulder an increased share of the costs of education and training.

The benefits that would accrue to workers, firms and society would take time to materialize. But the right mix of public policy and private initiative today could generate rapid momentum toward a more broadly based apprenticeship system that increases the welfare of Canadians.

References

Acemoglu, Daron and Jorn-Steffen Pischke. 1999. "Beyond Becker: Training in Imperfect Markets." *The Economic Journal.* 109: 453. 112-142.

Bassi, Laurie and Daniel McMurrer, 2006. "Employers' Perspectives on Human Capital Development and Management," Submitted to OECD, Feb. 2006.

Bauernschuster, Stefan, Oliver Falck, and Stephan Heblich. 2009. "Training and Innovation." *Journal of Human Capital.* Vol. 3, no. 4. 323-353

Becker, Gary. 1980. *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education.* Chicago: University of Chicago Press.

Beicht, Ursula and Joachim Ulrich. 2005. "Costs and benefits of in-company vocational training." BWP Special Edition. 2005. http://www.bibb.de/dokumente/pdf/a1_bwp_specialedition_beicht.pdf

Boothby, Daniel and Torben Drewes. 2010. "Returns to Apprenticeship in Canada." Canadian Labour Market and Skills Researcher Network. Working Paper no. 70. http://www.clsrn.econ.ubc.ca/workingpapers/CLSRN%20Working%20Paper%20no.%2070%20-%20Boothby%20and%20Drewes.pdf

Canadian Apprenticeship Forum. 2006. Apprenticeship--Building a Skilled Workforce for a Strong Bottom Line. http://www.caffca.org/files/access/Return_On_Training_Investment-Employers_report.pdf

Canadian Apprenticeship Forum. 2013. "Apprenticeship Analysis: Youth Perceptions of Careers in the Skilled Trades." http://caf-fca.org/document.php?id=134 Ottawa, Ontario.

Clark, Damon and René Fahr. 2001. "The Promise of Workplace Training for Non-College-Bound Youth: Theory and Evidence from German Apprenticeship." IZA Discussion Paper No. 378. Bonn, Germany: IZA. http://www.iza.org/en/webcontent/publications/papers/viewAbstract?dp_id=378

Conway, Maureen, Amy Blair, Steven Conway, and Linda Dworak-Munoz. 2007. *Sectoral Strategies for Low-Income Workers: Lessons from the Field*. Washington, DC: Aspen Institute. http://institute.usworker.coop/sites/default/files/resources/003%202007_Conway%20et%20al_Sectoral%20Strategies%20for%20Low-Income%20Workers%20-%20Lessons%20from%20the%20Field.pdf

Fersterer, Josef, Jorn-Steffen Pischke, and Rudolf Winter-Ebmer. 2008. "Returns to Apprenticeship Training in Austria: Evidence from Failed Firms." *Scandinavian Journal of Economics.* 110(4). 733-753.

Fuller, Alison and Lorna Unwin. 2006. "Expansive and restrictive learning environments." In Evans, Karen, Hodkinson, Phil, Rainbird, Helen and Unwin, Lorna (eds.) *Improving Workplace Learning.* London: Routledge.

Galarneau, Diane, René Morissette and Jeannine Usalca. 2013. "What Has Changed for Young People in Canada?" *Insights on Canadian society.* Statistics Canada.

Geel, Regula and Uschi Backes-Gellner. 2009. "Occupational Mobility Within and Between Skill Clusters: An Empirical Analysis Based on the Skill-Weights Approach." Working Paper No. 47. Swiss Leading House on Economics of Education, Firm Behavior and Training Policies. Zurich: Swiss Federal Office for Professional Education and Technology. http://ideas.repec.org/p/iso/educat/0047.html

Geel, Regula, Johannes Mure and Uschi Backes-Gellner. 2011. "Specificity of occupational training and occupational mobility: an empirical study based on Lazear's skill-weights approach." *Education Economics*, 19:5, 519-535

Göggel, Kathrin and Thomas Zwick. 2012. "Heterogeneous Wage Effects of Apprenticeship Training." *Scandinavian Journal of Economics.* 114:3. 756-779.

Gunderson, Morley, and Harry Krashinsky. 2012. "Returns to Apprenticeship: Analysis based on the 2006 Census." CLSRN Working Paper 99. Vancouver: Canadian Labour Market and Skills Researcher Network. April.

Hanushek, Eric, Ludger Woessman, and Lei Zhang. 2011. "General Education, Vocational Education and Labor-Market Outcomes Over the Life-Cycle." NBER Working Paper 17504. Cambridge, MA: National Bureau of Economic Research.

Hasluck, C. and Hogarth, T. 2010. "The Net Benefits to Employers' Investments in Apprenticeships: Case Study evidence from the UK." *Canadian Apprenticeship Journal*, 2.

Hargreaves, Rodger. 2013. "Youth Apprenticeship Programming in BC: Is it Providing Relevant Education to High School Students?" *Canadian Apprenticeship Forum*. Volume 8.

Hoeckel, Kathrin and Robert Schwartz. 2009. *A Learning for Jobs Review of Germany*. Paris: OECD.

Hoeckel, Kathrin, Simon Field and W. Norton Grubb. 2009. *A Learning for Jobs Review of Switzerland*. Paris: OECD.

Hollenbeck, Kevin. 2008. "State Use of Workforce System Net Impact Estimates and Rates of Return." Presented at the Association for Public Policy Analysis and Management (APPAM) Conference, Los Angeles, California. http://research.upjohn.org/confpapers/1

Kamphuis, Pascal, Arie C. Glebbeek and Harm van Lieshout. 2010. "Do sectoral training funds Stimulate training?" *International Journal of Training & Development.* Vol. 14 (4) pp. 273-290.

Miller, Linda. "Canada" and "England" in '*Possible futures for the Indian Apprenticeships system project*. Interim Report to the World Bank. 2013. Edited by Erika Smith and Ros Brennan Kemmis. University of Ballarat, Australia.

Lazear, Edward. 2009. "Firm-specific human capital: A skill-weights approach." *Journal of Political Economy.* 117: 914–40.

Lerman, Robert, Lauren Eyster, and Kate Chambers. 2009. "The Benefits and Challenges of Registered Apprenticeship: The Sponsors' Perspective." Washington, DC: U.S. Department of Labor, Employment and Training Administration. http://www.urban.org/UploadedPDF/411907_registered_apprenticeship.pdf

Mohrenweiser, Jens and Thomas Zwick. 2009. "Why Do Firms Train Apprentices? The Net Cost Puzzle Reconsidered" Labour Economics. 16. 631-637.

Muehlemann, Samuel, Harald Pfeifer, Gunter Walden, Felix Wenzelmann, and Stefan Wolter. 2010. "The financing of apprenticeship training in the light of labor market regulations. *Labour Economics*, 17(5), 799-809.

Nicholson, Claudia. 2013. "Attracting Young People to Careers in the Trades: Results from the Future to Discover Project." *Canadian Apprenticeship Forum.* Vol. 8.

OECD. 2010. *Learning for Jobs.* Paris: Organization for Economic Development and Cooperation.

OECD. 2009. *Off to a Good Start: Jobs for Youth.* Paris: Organization for Economic Development and Cooperation.

Rauner, Felix, Lars Heinemann, Dorothea Piening, and Rainer Bishoff. 2010. "Costs, Benefits, and Quality of Apprenticeships: A Regional Case Study." In *Rediscovering Apprenticeship: Research Findings from the International Network on Innovative Apprenticeship*. Edited by Felix Rauner and Erica Smith. London: Springer Science + Business Media.

Reed, Deborah, Albert Yung-Hsu Liu, Rebecca Kleinman, Annalisa Mastri. Davin Reed, Samina Sattar, and Jessica Ziegler. 2012. "An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States." Washington, DC: Office of Apprenticeship, U.S. Department of Labor. http://wdr.doleta.gov/research/FullText_Documents/ETAOP_2012_10.pdf

Ryan, Paul. 2001. "The School-to-Work Transition: A Cross National Perspective." *Journal of Economic Literature.* March. 34-92.

Smith, Erika. 2013. "Occupational Identity in Australian Traineeships: An Initial Exploration." *Technical and Vocational Education and Training: Issues, Concerns and Prospects.* 18. 131-41.

Steedman, Hilary. 1993. "The Economics of Youth Training in Germany." *The Economic Journal*, Vol. 103, No. 420: 1279-1291.

Wagner, Karin. 1999. "The German Apprenticeship Program Under Strain." In Pepper D. Culpepper and David Finegold (eds). *The German skills machine: sustaining comparative advantage in a global economy.* United States: Berghahn Books, 1999.

Wolter, Stefan C. and Paul Ryan. 2011. "Apprenticeship." In Eric A. Hanushek, Stephen Machin, And Ludger Woessmann (eds.). *Economics of Education, Vol. 3, Handbooks in Economics*. The Netherlands: North-Holland, 2011, pp. 521-576.

To be added to our mailing list or for additional information, please visit
www.ceocouncil.ca

To download a copy of this report, please visit
www.ceocouncil.ca/skills