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Striking the right balance: Costs and benefits of apprenticeship

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STRIKING THE RIGHT BALANCE: COSTS AND BENEFITS OF APPRENTICESHIP

OECD Education Working Paper No. 153.

By Małgorzata Kuczera, OECD

This working paper has been authorised by Andreas Schleicher, Director of the Directorate for Education and Skills, OECD.

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ABSTRACT

For students, apprenticeships are an attractive form of learning as they simultaneously enhance skills and prepare them for jobs and careers. Typically, public authorities organise and fund off-the-job education and training, while employers take responsibility for the supervision and training of apprentices during their work placements. The involvement of both public authorities and employers in the design and provision of apprenticeships is a key strength, however, the successful involvement of various stakeholders in apprenticeships can be a challenge as it requires the reconciliation of different interests and the careful distribution of costs and benefits from apprenticeships. Well-designed apprenticeship systems are attractive to students, create value for employers, and support economic growth.

This paper contributes to the existing stock of evidence on the costs and benefits of apprenticeships by:

- Presenting a novel analysis of international data on apprenticeships from the Survey of Adult Skills (PIAAC).
- Establishing and discussing in detail links between various elements of apprenticeship design (such as apprentice wage, duration of work placements, apprentice status) and the distribution of the costs and benefits of apprenticeships.

RÉSUMÉ

Pour les élèves, l'apprentissage (formation en alternance) est un moyen intéressant d'acquérir des connaissances puisque ce processus renforce leurs compétences tout en les préparant au marché du travail. En général, les autorités publiques organisent et financent l'éducation et la formation théoriques, tandis que les employeurs se chargent de superviser et de former les apprentis pendant leurs stages en milieu professionnel. La participation à la fois des autorités publiques et des employeurs à la conception et la mise en place des apprentissages est un atout essentiel, mais cette démarche qui associe diverses parties prenantes peut s'avérer difficile car elle exige de concilier différents intérêts et de bien répartir les coûts et les avantages liés à ces formations en alternance. Les systèmes bien conçus de l'apprentissage attirent les étudiants, créent de la valeur pour les employeurs et favorisent la croissance économique.

Le présent document vient enrichir la base de données existante sur les coûts et les avantages des formations en alternance :

- en présentant une analyse inédite des données internationales sur l'apprentissage tirées de l'Enquête sur les compétences des adultes (PIAAC) ;
- en établissant des liens entre, d'une part, divers éléments relatifs à l'organisation des apprentissages (par exemple le salaire des apprentis, la durée des stages en milieu professionnel, le statut d'apprenti) et, d'autre part, la répartition des coûts et des avantages liés à ces formations, et en examinant ces liens de façon détaillée.

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INTRODUCTION

What this paper aims to achieve

This paper aims to advance our understanding of the mechanisms that drive the provision of apprenticeships by exploring selected issues related to the costs and benefits of apprenticeships. It looks at the costs and benefits of apprenticeships from the vantage point of society, the employer and the apprentice.

Apprenticeships are a structured mix of work and training

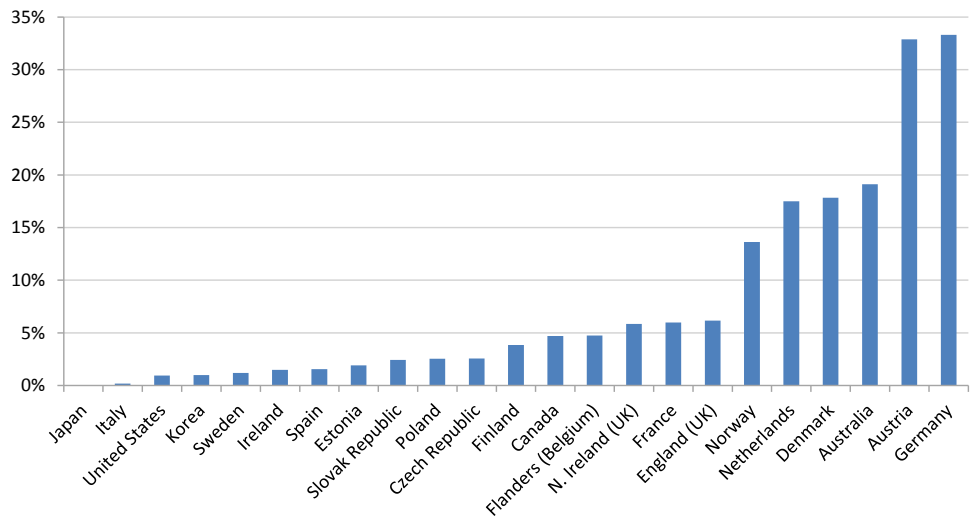
Apprenticeships typically involve a structured mix of: 1) work placements during which apprentices develop new skills and perform productive work; and 2) off-the-job education and training involving no or limited productive work and typically funded and managed primarily by public authorities (e.g. education and training provided in vocational schools, colleges, recognised educational and training providers). Apprenticeships lead to a formal qualification.

There are wide differences across countries in the use of apprenticeships

In some countries, apprenticeships are a well-established route to skilled employment, whereas in other countries, apprenticeships are uncommon, with employers favouring other means of training and upskilling. Figure 1 shows the differences in enrolment in apprenticeship programmes that lead to upper-secondary and short post-secondary qualifications. These large differences across countries reflect differences in national policy choices, as well as cross-national differences in the costs and benefits of apprenticeship training for employers and apprentices, and therefore the incentives for both parties to pursue such training.

Figure 1. There are large differences in the use of apprenticeships

Current apprentices in programmes leading to upper-secondary or shorter post-secondary qualifications as a share of all students enrolled in upper-secondary and shorter post-secondary education (ISCED 3 and ISCED 4C), 16-25 year-olds (2012)



Notes: In Ireland, Italy, Japan, Korea, Spain, Sweden and the United States the estimated share of current apprentices is not significantly different from zero.

For the definition of current apprentices see Box 2.

ISCED: International Standard Classification of Education, www.uis.unesco.org/Education/Documents/isced-2011-en.pdf.

Source: OECD (2016), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.

Vocational education and apprenticeship

In the majority of OECD countries, students can choose between vocational and general programmes at upper-secondary and post-secondary levels. On average, 45% of upper-secondary students enrol in vocational programmes across the OECD (see Figure A1 in Annex A). While many students enrol in vocational programmes, relatively few receive their vocational education in the form of an apprenticeship. For example, in the Czech Republic, Finland and Slovak Republic around 70% of upper-secondary students are enrolled in vocational education and training (VET), however, participation in apprenticeships is low. Countries such as Austria, Australia, Denmark, Germany, the Netherlands and Norway have a large number of VET students enrolled in apprenticeships.

Apprentice contracts have widely different characteristics

Apprenticeship models, defined in law through agreements with employers and sometimes labour representatives, and embedded in custom, differ across countries in terms of duration, time spent on training and productive work, and apprentice status and pay. For example, in countries such as Germany, Norway and Switzerland, apprentice status is defined by a special apprentice contract that is separate from a normal employment contract. Termination of the apprenticeship contract (e.g. because the apprentice drops out from the vocational school) also ends the relationship of the apprentice with the employer. In other places, such as England (United Kingdom), apprentices sign an apprenticeship agreement on top of an ordinary employment contract. Two-thirds of apprentices in England are employed by the employer prior to the apprenticeship agreement (BIS, 2016). Breaking an apprenticeship agreement does not automatically result in a termination of the employment contract.

Wage arrangements for apprentices are very variable

In many countries (e.g. Austria, Denmark, England, Germany, Switzerland), apprentices receive an apprentice wage during the entire period of the apprenticeship, regardless of whether they are in a work placement with the company or in off-the-job education and training with a school (or other educational provider) at any point. The cost of the apprentice wage during the off-the-job period may be borne solely by the employer providing the apprenticeship, or shared more broadly among employers and taxpayers. For example, in Denmark, the cost of the apprentice wage paid to apprentices during the off-job-period in vocational schools is reimbursed to companies providing apprenticeships from the employer levy fund. In Austria, subsidies to companies providing apprenticeships cover part of the cost of the apprentice wage during off-the-job education and training. Individuals enrolled in apprenticeships may also be eligible for financial support, such as the youth allowance for Australian apprentices aged 16-24 years-old (www.australianapprenticeships.gov.au/programs/incentives).

This paper explains why the costs and benefits of apprenticeships are important

The costs and benefits of apprenticeships to employers depend on hours of instruction, the contribution of apprentices to productive work in the company, apprentice wages, the cost of trainers and mentors, and the context in which the apprenticeship is provided, including labour market institutions and level of regulation, and the characteristics of companies in the economy, such as company size.

Repeated surveys of cost-benefit analyses of apprenticeships have been performed in Germany and Switzerland, meaning that the majority of empirical examples provided are from these two countries (see for example Schönfeld et al., 2016). A cost-benefit analysis of apprenticeships has also recently been performed in Austria (Schlögl and Mayerl, 2016). The Bertelsmann Foundation has conducted a study in Spain, although it has a very different approach to the studies already mentioned. It estimates under which conditions employers in Spain would offer apprenticeships (Wolter and Mühlemann, 2015). Cost-effectiveness of apprenticeships is also discussed in the recent report by the European employer's organisation (BusinessEurope, 2016). These reports show that apprenticeships, depending on its design, can benefit employers.

This paper contributes to a broader OECD project on work-based learning

This paper is designed to support the costs and benefits module of a wider OECD project on work-based learning (see Box 1). This module is financed by the European Commission, as a contribution to the European Alliance for Apprenticeship, and Germany. It looks at costs and benefits of apprenticeships from the perspective of the employer, the apprentice and society, places this analysis alongside examples of policy and practice from countries, and identifies key policy messages. The present paper draws on an analysis of the costs and benefits of apprenticeships carried out for the OECD by an external expert (see Mühlemann, 2016). It also draws on the work conducted by the OECD on incentives for apprenticeships, sponsored by Norway. Within the framework of the wider OECD project on work-based learning, the present paper argues that there are some basic principles for the provision of apprenticeships determined by the balance of costs and benefits.

Box 1. Work-based learning in vocational education and training: The broader OECD project

The OECD launched this study in 2015 with the aim of delivering policy messages about how to use work-based learning in vocational education and training (VET) to achieve better economic and social outcomes. It builds on in-depth analytical work on six topics and a series of workshops held in 2016. Six reports will be published:

- Striking the balance: The costs and benefits of apprenticeship
- Incentives for apprenticeship
- Work, train, win: Work-based learning design and management for productivity gains
- Work-based learning for youth at risk: Getting employers on board
- Recognising skills acquired through work-based learning
- Work-based learning and career guidance.

A synthesis report drawing together all six modules will be published in 2017. All reports will be published on the following website as they become available: www.oecd.org/edu/skills-beyond-school/work-based-learning.htm.

Australia, Canada, Germany, Norway, Scotland (United Kingdom), Switzerland, the United Kingdom, the United States and the European Commission have provided voluntary contributions towards the work, either through sponsoring specific modules or contributing to the project as a whole.

How this paper is structured

Section 1 discusses why the costs and benefits of apprenticeships are important, and how this analysis can inform policy. It also discusses the costs and benefits to government and society, illustrated with new evidence from the Survey of Adult Skills (PIAAC). Section 2 introduces the perspective of the employer and the apprentice, and explores how different building blocks of apprenticeships (and their combinations) affect the distribution of costs and benefits for companies and individuals. Section 3 looks at incentives for employers to offer apprenticeships, including financial incentives, such as subsidies and tax breaks, and non-financial incentives, such as adjustments in apprenticeship design. Section 4 discusses the provision of apprenticeships in small companies.

SUMMARY OF POLICY LESSONS

Costs and benefits to government and society

While direct evidence on the impact of apprenticeships raises many methodological difficulties, a number of indicators, particularly on school-to-work transition, suggest that apprenticeships are a powerful means of educating and training many young people. Apprenticeships need to be effectively balanced with more academic forms of education that sustain and develop basic skills, and linked to post-secondary opportunities, including routes to higher education that add to the status of apprenticeships.

1. More comprehensive and rigorous evaluations of the outcomes of apprenticeships are needed to support policy reforms that seek to develop and expand apprenticeship schemes.

2. Comprehensive evaluations need to:

- Be underpinned by a deeper analysis of the costs and benefits of apprenticeships to understand why some companies and sectors provide apprenticeships while others do not.

- Take into account the fact that students opting for apprenticeship programmes often have different characteristics to those pursuing more academic paths.

3. To make apprenticeships attractive to individuals, and to strengthen their labour market outcomes, apprenticeships need to:

- Provide pathways to higher levels of education and training.

- Ensure that all apprentices have, or develop, strong basic skills.

Costs and benefits to employers and individuals

A carefully designed apprenticeship scheme can be a worthwhile investment both for employers and individuals. Employers provide apprenticeships to recruit the most able apprenticeship graduates and invest in their future workforce. Employers also provide apprenticeships as apprentices make a valuable contribution through their productive work. For apprentices, a well-designed apprenticeship ensures a smooth entry to the labour market and provides good preparation for their chosen career.

When designing apprenticeship programmes, governments, social partners and other agencies should ensure that they will deliver adequate net benefits to make them attractive to all parties, including apprentices themselves. They therefore need to:

1. Establish apprentice wages that are low enough to encourage companies to offer apprenticeships, but high enough to attract good quality apprentices. Apprentice wages should take account of:

   – Wages of skilled and unskilled employees.

   – Characteristics of the apprentice population (such as age, relevant work experience).

- Increases in apprentices' productivity over the course of the apprenticeship.

2. Define and apply relevant quality assurance tools to cover both off-the-job and on-the-job education and training to ensure that apprentices develop a full range of generic and occupational skills during the programme.

3. Ensure that the time spent in work placements is sufficient to allow employers to recoup their initial investment in apprentice training, without compromising the attractiveness of apprenticeship to apprentices – work placements that are too long impose an additional opportunity cost on apprentices through foregone earnings.

4. Ensure that apprentices have an opportunity to develop complex skills during work placements, and that employers gradually increase the time apprentices spend carrying out productive skilled tasks.

Financial incentives

Financial incentives for apprenticeships are likely to have modest effects, and will usually involve substantial deadweight. They may also have some unintended effects, such as encouraging the engagement of employers who are more interested in subsidies than in skills development. At the same time, through quality youth apprenticeships, employers may be shouldering the burden of training and guiding young people through to employment. Financial incentives should be carefully monitored and evaluated, as evaluation evidence is relatively thin. There are various types of non-financial incentives. Some of the most promising are capacity building measures that aim to support employers and get the best out of apprentices. These findings lead to following policy recommendations:

1. Financial incentives for employers to take apprentices are likely to yield substantial deadweight losses, i.e. they subsidise apprenticeships that would have been provided anyway. Therefore, such incentives should be used with caution and their impact should be evaluated carefully, including displacement effects. Targeted financial incentives (e.g. by sectors, company characteristics) may reduce deadweight loss but may be more costly to design and implement.

2. Introduce high quality standards for apprenticeships to ensure that incentives do not lead to apprenticeships in low-skilled jobs.

3. When providing financial incentives for apprenticeships, ensure that small employers also receive support with accessing and processing available funding.

4. Cost sharing by employers at the sectoral level can be promoted in specific sectors where: the cost of apprenticeship training is high, the labour market is tight and it is difficult to find skilled employees on the external market, and when employers face a high risk that their fully-trained employees will be poached by other employers.

5. Financial incentives should take into account the wider public policy context, as well as the relative attractiveness of alternative learning pathways (including tertiary education) and the level of public support offered for such pathways.

6. Explore options for enhancing non-financial incentives for employers, including measures that increase the training capacity of employers.

Smaller employers

Evidence shows that small employers often make effective use of apprentices. This may be because small employers also learnt their trade as apprentices and understand and appreciate the apprenticeship route. Circumstances may be different in countries with a weaker overall apprenticeship culture, and where individual small employers may not fully understand how to go about realising the potential benefits. Small employers will often also benefit from supporting and co-ordinating institutions or other intermediary organisations and structures that help small employers in different ways to work together to manage apprentices. Some smaller employers will benefit from targeted training and assistance to develop their capacity to use apprentices.

1. Smaller employers can benefit greatly from apprentices. Governments and social partners can support smaller employers by:

   – Encouraging employers to find ways to share the responsibilities and risks associated with the provision of apprenticeships.

   – Promoting bodies that work with groups of small employers to co-ordinate training.

   – Supporting small employers with the administration and provision of apprenticeships.

2. Special financial incentives for smaller employers to take on apprentices should be used cautiously and carefully evaluated.

1. COSTS AND BENEFITS TO GOVERNMENT AND SOCIETY

Introduction: Why the costs and benefits of apprenticeships are important

The cost-benefit balance needs to make apprenticeships attractive both to employers and apprentices

Apprenticeships rely on the involvement of and contributions from the state, companies and individuals. Typically, apprenticeships involve collaboration between government and employers: public authorities organise and fund off-the-job education and training, while employers take responsibility for apprentices during their work placements. For students, apprenticeships are an attractive form of learning as they simultaneously enhance skills and prepare for jobs and careers. While apprenticeships are usually provided at no direct cost to apprentices, they sometimes involve contributions from individuals.

The involvement of both government and employers in the design and provision of apprenticeships is a key strength, however, it requires the reconciling of different perspectives and interests, and careful distribution of the costs and benefits from apprenticeships so that everyone – apprentices, employers and society at large - wins. An imbalanced distribution of costs and benefits from apprenticeships can lead to too few companies offering apprenticeships, or too few students starting apprenticeship programmes.

Evaluating the costs and benefits of apprenticeships from different points of view can help to guide policy

Governments must prioritise between apprenticeships or other alternative education and training options, and the balance of expenditure between different programmes for school leavers and others using apprenticeships. A comparison of the net benefits of apprenticeships[1] compared to other options can inform this decision.

A good understanding of the costs and benefits of apprenticeships can also provide insights into why companies provide training, which makes apprenticeship policy more effective. For example, without a good understanding of the cost-benefit structure it is very difficult to define an effective method of offering a financial incentive (in the form of a tax break or subsidy) to companies providing apprenticeships. If the incentive is below the net cost incurred by the company, it may only have a small effect or no effect at all, depending on a firm's training motive. If the incentive is above the point that allows companies to break even it will lead to inefficiencies.

The cost-benefit framework is also a tool for companies to allow them to estimate, and therefore recognise, the potential net benefit of apprenticeship training, and to organise work placements in a way that maximises their benefits.

1. Net benefits = benefits less costs.

Costs to government and society

Governments often pay for off-the-job education and training

Governments often contribute to apprenticeships by funding off-the-job education and training in schools or colleges. Off-the-job education in apprenticeship programmes for young people that lead to upper-secondary qualifications are typically fully funded by public authorities and provided at no cost to apprentices. This is consistent with many countries that see upper-secondary education as a fully funded educational minimum.

Off-the-job education for apprentices at post-secondary level, and for older apprentices, sometimes involve fees. For example in England (at least until new arrangements are introduced in 2017), while the government covers the full cost of off-the-job education for 16-18 year-olds, it covers only 50% of the cost for 19-23 year-olds, with the remainder paid by the employer or individual (Learndirect, 2016).

Apprenticeship programmes tend to cost less than alternative school-based options

Teaching vocational skills in school workshops is often expensive because of the high cost of specialised equipment and machinery. The overall public expenditure cost of an apprenticeship programme tends to be lower than the cost of VET provided in schools as apprentices spend most of their time in work placements. In countries such as Austria, Germany, the Netherlands, and Switzerland, the time in schools or external training amounts to around 20-30% of the programme duration (see Table 2). A study comparing public expenditure on upper-secondary education in Switzerland shows that the public cost of the provision of apprenticeships is significantly lower than the cost of entirely school-based vocational programmes (Swiss Coordination Centre for Research in Education, 2011).

Subsidised apprenticeships may still be less expensive than school-based VET

Since apprenticeships require employers to provide work placements, governments sometimes provide financial incentives to employers. Even with subsidies, the cost of apprenticeships to the state can still be below the cost of providing school-based VET. This reflects lower costs of provision of training in companies, and the fact that apprentices add value to the company during work placements (Westergaard and Rasmussen, 1999). This issue will be discussed in more detail in section 3.

Governments can fully or partly bear the costs of institutions and infrastructure that support apprenticeships

In addition to direct funding for apprenticeships, governments can provide “in-kind” contributions. This can include governments overviewing the qualifications that apprenticeships lead to, funding final examinations and assessments, providing training to apprentice instructors in companies, and supporting bodies that involve various stakeholders to steer or advise on apprenticeship policies.

Benefits to government and society

Governments support apprenticeships for many of the same reasons they support other forms of education and training: they provide multiple benefits to individuals and society in the form of higher employment rates and productivity, better health and lower criminality rates. Without public support, the provision of education and training would be inadequate.

The cost-benefit balance should be compared to alternative options

Apprenticeships are offered alongside other educational options, including vocational education and training programmes provided in schools and colleges, as well as academic paths and employer training. Apprenticeships are one of a number of routes leading to employment and preparing for life in society. The justification of government support for apprenticeships is that they should lead to outcomes that are at least as good as those arising from alternative similarly priced routes.

It is hard to compare the outcomes of apprenticeship and academic programmes

While it is possible to look at data on labour market and other outcomes (including basic skills), and to compare the outcomes of those who have gone through apprenticeships and those who have pursued more academic forms of education, these comparisons are not usually very meaningful.[2] The Programme for International Student Assessment (PISA) data show that in most countries where 15-year-olds have gone into academic or vocational alternatives academic tracks, young people in academic paths have on average stronger performance. However, in some countries such as Brazil, Colombia, Costa Rica, the Dominican Republic and Mexico students in these programmes score higher than students in academic programmes (OECD, 2016c). This often reflects the fact that good academic results are required to enter more academic tracks. Against the background of these large selection biases, a comparison of outcomes should be conducted with caution.

Approach adopted in this report

Bearing in mind the limitations explored above, this section describes the outcomes from apprenticeships and compares them with the outcomes from other education and training paths. The performed analysis draws on the Survey of Adult Skills (OECD, 2016a). Box 2 explains how current apprentices and apprenticeship graduates were defined using data from the Survey. This section also discusses how the presented findings can be interpreted. Whenever possible, the descriptive information is completed with evidence from relevant research studies.

2. Some studies (e.g. Brunello and Rocco, 2015) drawing on cross-sectional data analysis try to address this challenge by controlling for individual characteristics such as socio-economic background. However, this does not entirely eliminate the selection bias. Furthermore, there is a risk of cohort bias in studies that evaluate changes in outcomes over time based on an outcome comparison across different age groups at one point in time.

Box 2. Apprentices and apprenticeship graduates in the Survey of Adult Skills (PIAAC)

Current apprentices

Current apprentices are defined as currently studying in upper-secondary education or short post-secondary programmes (at ISCED level 3 longer than 2 years or ISCED 4C) and defining themselves as apprentices or holding an apprentice contract. See Table A1 in Annex A for the distribution of apprentices between upper-secondary and post-secondary levels.

Variables C_Q07 and D_Q09 from the background questionnaire for the Survey of Adult Skills were used to identify the current apprentices (see Box A1 in Annex A for the full text of the questions). As these variables do distinguish between internships and apprenticeships, the apprenticeship has been limited to programmes leading to upper-secondary and short post-secondary programmes only, assuming internships are more common in long post-secondary programmes than at lower levels of education and training.

Apprenticeship graduates

In Austria, Canada and Germany, individuals were classified as apprenticeship graduates if they identified "apprenticeship" as their highest qualification (question B_Q01aAT in Austria, B_Q01aCA6 in Canada, and B_Q01aDE2_REC in Germany in the national background questionnaires for the Survey of Adults Skills).

In Norway, an apprenticeship graduate is a person whose highest qualification is ISCED 3C, 2 years or more (question B_Q01a in the background questionnaire for the Survey of Adult Skills).

In Denmark, an apprenticeship graduate is a person whose highest qualification is at upper-secondary level (ISCED 3, 2 years or more) and the qualification was obtained in one of the following areas of study: social science, business and law; science, mathematics and computing; teacher training and education science; engineering, manufacturing and construction; agriculture and veterinary; health and welfare; and services (questions B_Q01a and B_Q01b in the background questionnaire for the Survey of Adult Skills).

All variables used to define "apprenticeship graduates" are reported in Box A1 in Annex A.

Sources: OECD (2013), "The background questionnaire", in *The Survey of Adult Skills: Reader's Companion*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264204027-5-en; National background questionnaires in *"The Survey of Adult Skills"* (unpublished).

Basic skills and apprenticeships

Education and training systems with apprenticeships and "early" tracking into lower secondary education (such as Germany, Austria and Switzerland) are often compared with more comprehensive systems that do not track at all in school (for example the United States) and those that only divide young people between vocational and academic tracks at upper-secondary level (as in France and Nordic countries). In comprehensive systems, students follow the same core curriculum (with some differences between chosen specialisations or modules) instead of being sorted, often by ability, into paths that lead to different learning objectives. The evidence from some research studies shows that early tracking may have a negative impact on the performance and outcomes of those who end up in vocational tracks that cater to students with a lower ability (e.g. Jakubowski et al., 2010; Bauer and Riphahn, 2006), however, this finding is not universal. The Netherlands, for example, has early tracking but performs very well on equity. Governments that would like to invest in apprenticeships may want to know if they have an adverse effect on the performance of young people, in particular on the performance of those at the bottom of the skills distribution. If young people from the age of 15 and 16 spend most of their time with an employer, and only a small proportion of time in school, there may be concerns regarding their basic skills.

Young people choosing apprenticeships have lower basic skills than those choosing academic paths

In general, individuals selected into or choosing apprenticeship programmes have lower basic skills than those entering academic pathways. For example, in Switzerland, more than 70% of 15-year-olds with middle and low reading skills, and around 40% of high performers (as measured by PISA 2000), enter upper-secondary vocational education (Meyer, 2003), and 90% of those in upper-secondary VET are in apprenticeships (Bertschy, Cattaneo, and Wolter, 2009). An initial gap in achievement between students in apprenticeships and academic paths is likely to persist. According to the Survey of Adult Skills, current apprentices and apprenticeship graduates have weaker basic skills than students and graduates from academic paths. However, since they started their different programmes with these differences, it is unknown if the choice of track exacerbated, left unchanged, or reduced these differences.

Some countries are more effective in providing strong basic skills to apprentices than others

Figure 2 shows numeracy skills of young people enrolled in apprenticeship and other upper-secondary and short post-secondary programmes. The apprentice average performance and the gap in performance between current apprentices and other students vary across countries. These variations reflect differences in the design of the apprenticeship systems, in the overall effectiveness of education and training systems in conveying basic skills to young people, and in characteristics of student populations.

Basic skills of apprentices depend on the level of apprenticeships

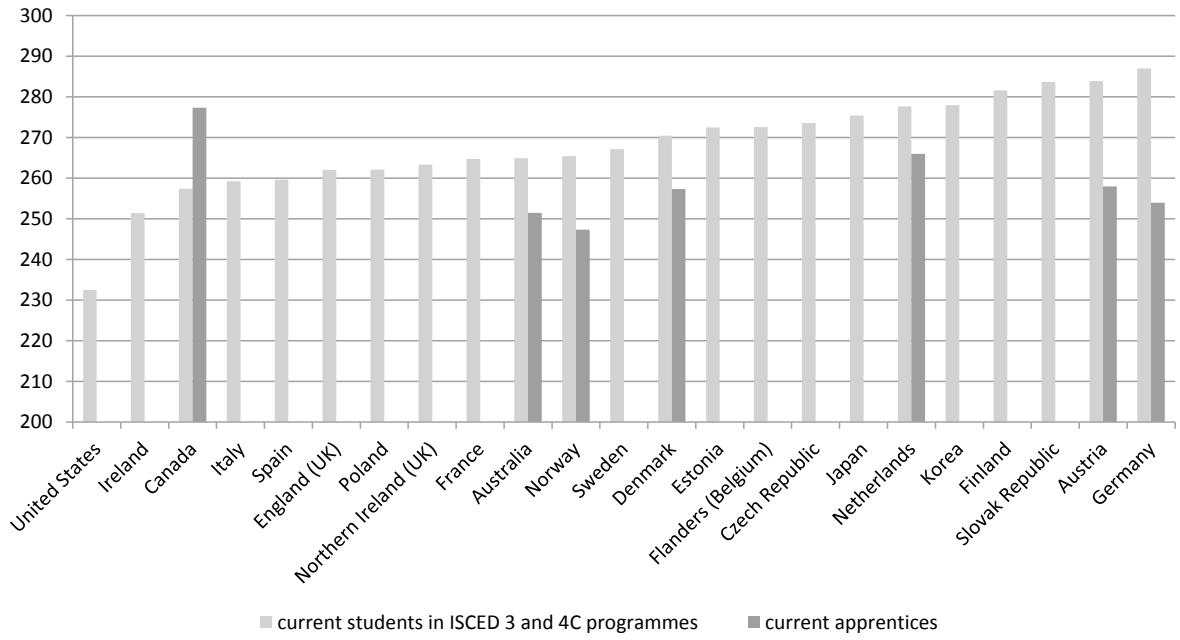
The difference in numeracy skills of apprentices in Canada and elsewhere can be explained by the fact that apprenticeships in Canada are provided at the post-secondary level (ISCED 4C), while in other countries they mainly lead to upper-secondary qualifications (see Table A2 in Annex A). Apprenticeships embedded into higher levels of education and training are therefore associated with stronger basic skills. Strong basic skills are often a pre-requisite for higher level qualifications.

Apprenticeships and the skills distribution

Comparison of the skills distribution, as measured by the score point difference in numeracy performance between the 90th and 10th percentiles, shows that while some countries with strong apprenticeships have a relatively large spread in numeracy among current students in upper-secondary and short post-secondary programmes, others do not (see Figure A2 in Annex A).

Figure 2. How do apprentices perform on basic skills?

Mean numeracy performance of current apprentices and students (other than apprentices) enrolled in ISCED 3 and 4C programmes, 16-25 year-olds



Notes: Apprentice numeracy scores are reported for countries with at least 30 observations. See Figure 1 for the share of apprentices in the student population enrolled in upper-secondary and short post-secondary programmes.

Source: OECD (2016a), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.

Do apprenticeships provide a path to higher levels of education and training?

The attractiveness of apprenticeships partly depends on whether they provide opportunities for upskilling and moving up in education and training. While apprenticeship programmes are primarily designed for labour market entry, in many countries they also provide a route into higher levels of education. The effectiveness of such routes depends on the wage premium associated with higher level qualifications, and on pathways in the system that allow apprenticeship graduates to continue in education and training. For example, in Germany, around 10% of apprenticeship graduates continue to post-secondary level. Apprenticeship graduates represent around 13% of students in all post-secondary programmes, and between 20-40% in post-secondary professional programmes, such as Training at Fachschule, Meister, Berufsakademie, Fachakademie, Bachelor at Fachhochschule (classified at ISCED 5B and 5A level) (OECD, 2016a).

Apprenticeships and the labour market

Apprenticeships facilitate transition to the labour market

In comparison to other educational paths, apprenticeships are distinctive as they equip young people with both generic and job-specific skills by combining learning and work, which facilitates the transition of young people from school to work. There is some evidence that upon graduation, apprentices have better labour market chances in terms of duration of job search, unemployment spells and wages in comparison with those who choose another type of upper-secondary education (Bratberg and Nilsen, 1998; van der Klaauw et al., 2004; European Commission, 2013).

Overall, countries with a high share of young people in apprenticeships have lower rates of disconnected youth and youth experiencing a difficult transition to employment (Quintini and Manfredi, 2009).[3] This is an important finding, as evidence shows that first labour market experiences have lasting consequences, and that unemployment leaves young workers with long-term scars that impose costs both on individuals and society (Bell and Blanchflower, 2011; Nilsen and Reiso, 2011).

Apprenticeship and wages: Evidence from the Survey of Adult Skills

In countries where apprenticeship graduates can be identified (see Box 2 for the definition of apprenticeship graduates), the wage and employment outcomes of apprenticeship graduates are compared with the wage and employment outcomes of those holding different qualifications. This comparison takes into account numeracy skills, age, gender and firm size, and is limited to those who are currently not studying.

Figure 3 shows that in most countries, where apprenticeship data are available, young apprenticeship graduates earn: 1) more than similar adults with education below upper-secondary level; and 2) more than those who graduated from academic upper-secondary education (and have no higher qualifications); but 3) less than those with post-secondary and tertiary education and training. This finding holds even after restricting the post-secondary sample to specific fields of studies, such as general fields of studies, social sciences and humanities, and after allowing for an interaction between the level of education and basic skills (the assumption being that strong basic skills yield a higher wage premium for those with higher levels of education). A comparison of wages of apprenticeship graduates and of graduates from school-based VET was only feasible in Austria, where the difference in earnings between these two groups was not statistically significant.

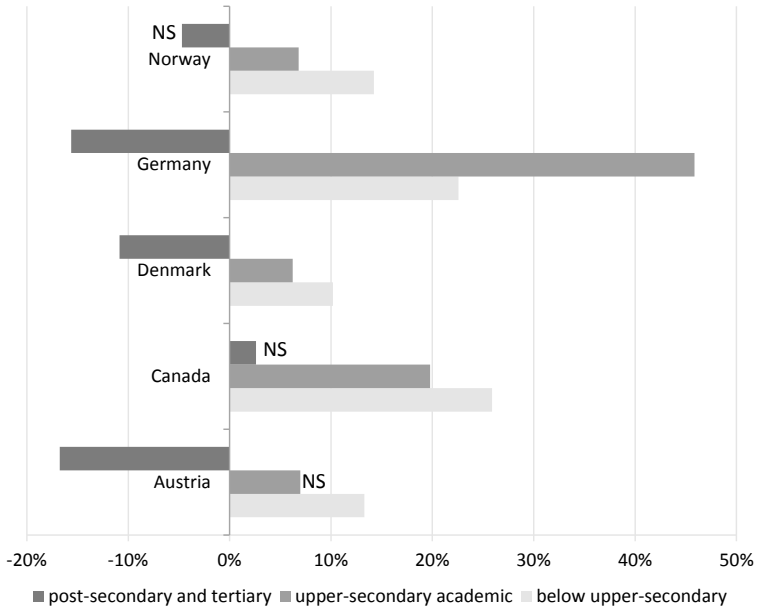
In terms of employment opportunities, apprenticeship graduates (16-35 year-olds) are less likely to be unemployed than those who have not completed upper-secondary education, and have similar chances of being employed as those who graduated from post-secondary programmes (OECD 2016a).

3. This study compares the labour market situation of young people across various countries and at various points of time.

Figure 3. Wage premium of apprenticeship graduates

16-35 year-olds and not in education, by highest qualification level

(Apprenticeship graduates – reference group)



Notes: Coefficients from the ordinary least squares (OLS) regression of log hourly earnings. Coefficients adjusted for numeracy performance, age, gender and firm size. Wage outliers were dropped, namely wages above the 99th percentile and wages below the 1st percentile. Post-secondary and tertiary programmes include programmes at ISCED 4 A and B, ISCED 5 and ISCED 6 level. Upper-secondary academic refer to upper-secondary (ISCED 3 longer than 2 years) and short post-secondary programmes (ISCED 4C) that are not vocational. For definition of apprenticeship graduates see Box 2. 16-25 year-olds with foreign qualifications are excluded. NS: result is not statistically significant (p-value is greater than 0.05).

Source: OECD (2016a), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.

Higher premiums attached to post-secondary and tertiary qualifications may reflect an element of signalling, whereby those with these qualifications find it easier to get good jobs because the qualifications signal better basic skills to employers, rather than because the post-secondary and tertiary programmes have provided productivity enhancing training. However, higher premiums may also reflect job-relevant skills acquired during these programmes, many of which are professional but not assessed in the Survey. They may also reflect other characteristics of the post-secondary graduate population, such as stronger non-cognitive skills and better social networks that are rewarded on the labour market. Also, as argued above, some apprenticeship graduates continue to higher levels of education (e.g. around 10% of apprenticeship graduates in Germany). The benefits to this population from post-secondary and tertiary education and training can therefore be partly attributed to apprenticeships.

Labour market outcomes of apprenticeships over time are less certain

Some research studies argue that while vocational education and training leads, in the short term, to positive outcomes by facilitating labour market entry, this initial advantage disappears in the long term. A study by Hanushek, Woessmann, and Zhang (2011), using data from the International Adult Literacy Survey (administered between 1994 and 1998), argues that graduates from vocational education and training are penalised in the later stages of their careers as they are more likely to lose their jobs after the age of 50 than those from academic pathways. The authors argue that this is because VET graduates lack the strong basic skills necessary to quickly adapt to changing work requirements triggered by technological changes.

Forster, Bol, and van de Werfhorst (2016) performed a similar analysis using data from the Survey of Adult Skills carried out in 2012.They confirm that VET is associated with early career benefits, with the benefits being the largest in countries with strong apprenticeship systems. They also confirm that in some countries, the early career advantage associated with VET turns into a disadvantage later on. However, the negative effect of VET in late career is apparent in countries with no or limited apprenticeships, while in countries with strong apprenticeships (such as Germany, Austria), there is no clear evidence of a negative effect. The two studies have many limitations. They draw conclusions based on an analysis of cross-sectional data, which means that they were unable to separate age, period, and cohort effects that also influence career trajectories. A more fundamental underlying difficulty is that they do not compare two alternative ways of preparing people for the same career. Those with apprenticeships and vocational training may pursue different careers with different career trajectories compared to those pursuing academic routes. They may work with their hands more often, which makes it harder to sustain productivity than those in non-manual work as the body ages and suffers physical injury.

A longitudinal study by Prada (2014) is one of few studies addressing this methodological challenge. It estimated an impact of vocational, cognitive and non-cognitive skills on labour market outcomes and school choices in the United States, and found that individuals with strong vocational skills but low levels of cognitive and non-cognitive ability were better off not going to college,[4] (as measured by wages). The opposite was found for those with strong cognitive skills. It is not clear to what extent the results of this study could apply to other apprenticeship systems, as vocational education and training in the United States is mainly school based. Overall, the evidence on long-term effects of apprenticeships is inconclusive.

Conclusions and policy implications

While direct evidence on the impact of apprenticeships raises many methodological difficulties, a number of indicators, particularly on school-to-work transition, suggest that apprenticeships are a powerful means of educating and training many young people. Apprenticeships need to be effectively balanced with more academic forms of education that sustain and develop basic skills, and linked to post-secondary opportunities, including routes to higher education that add to the status of apprenticeships.

Policy pointers

1. More comprehensive and rigorous evaluations of the outcomes of apprenticeships are needed to support policy reforms that seek to develop and expand apprenticeship schemes.
2. Comprehensive evaluations need to:
   - Be underpinned by a deeper analysis of the costs and benefits of apprenticeships to understand why some companies and sectors provide apprenticeships while others do not.
   - Take into account the fact that students opting for apprenticeship programmes often have different characteristics to those pursuing more academic paths.
3. To make apprenticeships attractive to individuals, and to strengthen their labour market outcomes, apprenticeships need to:
   - Provide pathways to higher levels of education and training.
   - Ensure that all apprentices have, or develop, strong basic skills.

4. In the United States, career and technical programmes are provided mainly in colleges.

2. COSTS AND BENEFITS OF APPRENTICESHIPS TO EMPLOYERS AND INDIVIDUALS

Introduction

This section looks in depth at the costs and benefits of apprenticeships to employers and apprentices. It looks at the different key drivers of costs and benefits, such as wages and apprenticeship length, to explore why the net benefits of apprenticeships are so variable. One implication of this analysis is that the variable offer of apprenticeships by employers is driven by the variation of these costs and benefits. However, costs and benefits are not immutable, they can be altered through changes in the design of the apprenticeship system and the way in which apprenticeships are delivered.

The cost-benefit balance for employers and individuals

Employers will only want to offer apprenticeships if there are net benefits

There is a policy concern that employers are sometimes reluctant to offer apprenticeships. Employers (if well-informed about costs and benefits) will offer apprenticeships if the expected benefits are more than, or at least equal to the expected costs.

- The costs may include:
  - Apprentice pay and other related expenditure (e.g. reimbursement of travel costs, social security benefits).
  - Time and salary of work-based instructor (person designated to teach, guide and supervise the work and training of apprentices).
  - Tools and equipment used by apprentices.
  - Administrative costs.
- The benefits may include:
  - The productive contribution of apprentices to the employer during their period of apprenticeship.
  - Recruitment of the most productive apprentice graduates as valued employees generates benefits after the end of the apprentice period (long-term benefits). These benefits will be discussed in detail below.
  - Employers offering apprenticeships enhance their reputation as they may be seen as contributing to the common good. This may indirectly increase profits if companies seen as socially responsible are more likely to sell their products and services (however these benefits are difficult to measure).

Incentives depend on the cost-benefit balance

Companies that are not able to reap the long-term benefits (for example, because apprentice graduates typically leave shortly after graduating) will not offer apprenticeship training unless they can recoup the costs by the end of apprenticeship period. Companies that retain apprentice graduates, and that therefore realise the long-term benefits, are more likely to make long-term investments in apprentice skills, even if the investment costs exceed the short-term benefits in productivity.

Short-term (productive) benefits + long-term (recruitment) benefits => cost : apprenticeship provided

Short-term benefits + long-term benefits < cost : no apprenticeship provided

The cost-benefit balance depends on multiple factors

The mix of short and long-term benefits, and therefore the mix of incentives for employers to take on apprentices, varies across countries and occupations. In Germany, about 30% of apprenticeships result in positive net benefits by the end of apprenticeship, compared to 71% in Switzerland. However, German companies are also more likely to retain apprentices as skilled workers after the end of the programme, and thus to realise long-term benefits. The retention rate of apprentices at the firm level is 60% in Germany and 35% in Switzerland (Mühlemann, 2016). This shows how net benefits from apprenticeships can actually arise from different sources in different contexts. The next section looks at how the different elements of apprenticeships affect the costs and benefits to employers and individuals.

Individuals compare costs and benefits of apprenticeships with costs and benefits of other options

Individuals, like employers, will only enter an apprenticeship if they can benefit from doing so. However, they will also see their investment in apprenticeships in comparative terms. So as an individual enters an apprenticeship programme, the benefits from the programme should not only be higher than its costs, but the associated returns should be at least as good as the returns a similar individual can expect from alternative paths available. Education and training involves two types of costs to individuals:

- Direct cost, including tuition fees and the cost of study material and examination fees.
- The cost of foregone earnings.

In countries such as Austria, Denmark, Germany, Norway and Switzerland, the direct cost is low, as apprenticeship programmes are free of charge to individuals. This is similar to other options available to young people that lead to comparable qualifications. In Australia, providers of off-the-job training can charge fees in some circumstances. This cost can fall either on individuals or employers. One study estimates that in Australia, employers cover 53% of the direct cost, individuals 19%, with the remaining 28% covered by the state (Dockery, Norris, and Stromback, 1998).

The cost of foregone earnings may be lower for apprentices than students in full-time school education, as apprentices typically receive an apprentice wage. However, individuals also invest in education and training (including apprenticeships), and expect positive returns on their investment through higher wages, better career opportunities and social status. As argued above, labour market outcomes (measured in terms of employment rates and wages) from apprenticeships are typically positive. Individuals are better off completing an apprenticeship than obtaining no upper-secondary education or only completing academic upper-secondary education. One Swiss study estimates that apprenticeship graduates earn, on average, 20% more during their lifetime than someone who did not obtain any further qualification after completing compulsory education (Swiss Coordination Centre for Research in Education, 2011).

Understanding the costs of apprenticeships to employers and individuals

Wages are often the largest part of the costs to employers

Apprentice wages, plus the social benefits that employers contribute for apprentices, represent the largest share of apprenticeship costs. In Switzerland, the average share of labour costs per apprentice in three-year programmes is around 50% of the total costs (approximately CHF 14 383) (Strupler, Wolter, and Moser, 2012). In Germany, an average of 62% (EUR 9 490) of total apprenticeship costs are spent on apprentice wages (Schönfeld et al., 2010). In Austria, the share of labour costs for apprentices ranges between 57% of total costs in the first year and 72% in the third year of the apprenticeship (Schlögl and Mayerl, 2016).

The apprentice wage results from various factors

The apprentice wage often reflects market conditions. For example, when there are many young people looking for apprenticeships, and few apprenticeships are offered by employers, apprentice wages may be low. The apprentice wage also depends on the bargaining power of trade unions and employer associations, and the design of the apprenticeship scheme (Ryan et al., 2013).

Minimum apprentice wages are set differently across countries

In Norway, apprentice wages are determined for each sector through negotiations between trade unions and employers associations at the national level; in Austria and Germany, the apprentice wage is based on collective wage agreements in occupations where collective bargaining exists; and in Switzerland, it is up to individual employers (see Ryan et al., 2013 for a discussion on wage setting in England, Germany and Switzerland). Table 1 provides additional information on wage arrangements across countries and economies.

Table 1. How apprentice wages and social security contributions differ across countries

	Do apprentices receive a wage during on-the-job period?	Do apprentices receive a wage during off-the-job period?	What is the apprentice wage, as compared to the skilled worker's wage?	Who defines the minimum apprentice wage?	Do employers pay social security contributions for an apprentice?
Australia	Yes	No	Information not available	Depending on the programme, the wage is defined by sectors at national and regional level. In some cases it is up to individual companies	Information not available
Austria	Yes	Yes	On average 50% of the skilled worker wage	Sectors at regional level	Yes, but the state covers parts of the insurance costs
Denmark	Yes	Yes	30-70% of the skilled worker wage, depending on the year of the programme	Sectors	No
England (UK)	Yes	Yes	On average 63% of the skilled worker wage (metalworking industry)	Individual company according to the national regulations	No (for apprentices under the age of 25)

Table 1. How apprentice wages and social security contributions differ across countries (*continued*)

	Do apprentices receive a wage during on-the-job period?	Do apprentices receive a wage during off-the-job period?	What is the apprentice wage, as compared to the skilled worker's wage?	Who defines the minimum apprentice wage?	Do employers pay social security contributions for an apprentice?
Germany	Yes	Yes	25-33% of the skilled worker wage, depending on the year of the programme	Sectors at regional level	Yes
Netherlands	Yes	Yes	Missing	Sectors	Yes
Norway	Yes	No	30-80% of the skilled worker wage, depending on the year of the programme	Sectors at national level	Yes
Scotland	Yes	Yes	Information not available	Individual company according to the national regulations	Yes
Sweden	No	No	-	-	-
Switzerland	Yes	Yes	On average 20% of the skilled worker wage, depending on the year of the programme	Individual company but employer/ professional associations provide recommendations on the wage level. As a result, apprentice wage varies by sector	Yes

Note: Apprentice wages can vary largely across sectors and tend to increase over the duration of the apprenticeship programme.

Sources: The OECD International Survey of VET Systems, 2007 – countries' responses (unpublished); Ryan, P. et al. (2013), "Apprentice Pay in Britain, Germany and Switzerland: Institutions, Market Forces and Market Power." *European Journal of Industrial Relations* 19 (3), pp. 201–20, http://dx.doi.org/10.1177/0959680113494155; Schönfeld, G et al. (2016), "Kosten Und Nutzen Der Dualen Ausbildung Aus Sicht Der Betriebe." BIBB. www.bibb.de/veroeffentlichungen/de/publication/show/id/8034; Swiss federal Statistical Office (2016), "What's New? Income from Employment 2015. Gross Income from Employment per Year from Employed Persons according to Economic Activity Status, Group of Occupation, Workweek Percentage and Gender Median in Franc." June 14, www.bfs.admin.ch/bfs/portal/en/index/themen/03/01/new.html.

Apprentice wages tend to increase during the programme

In most cases, apprentice wages gradually increase over the period of an apprenticeship, reflecting a gradual increase in apprentice skills and productivity. For example, in Austria, an apprentice in the metal processing industry earns EUR 550 per month in the first year, EUR 740 in the second year, EUR 1 010 in the third year, and EUR 1 360 in the fourth year (European Commission, 2013). For a young apprentice plasterer (under 21) in Australia, the hourly rate in 2013 was AUD 10 in the first year, just under AUD 12 in the second year, around AUD 16 in year three, and around AUD 19 in their final fourth year (CFMEU Construction, 2010). In the United Kingdom, where many apprentices are incumbent workers, the apprentice minimum wage is the national minimum wage, with the exception of apprentices aged under 19 and apprentices in the first year of their apprenticeship who can be paid below the minimum wage (www.gov.uk/national-minimum-wage-rates). Turning 19 or completing the first year of an apprenticeship may therefore automatically trigger an increase in an apprentice's wage (BIS, 2016).

The wage employers are prepared to pay

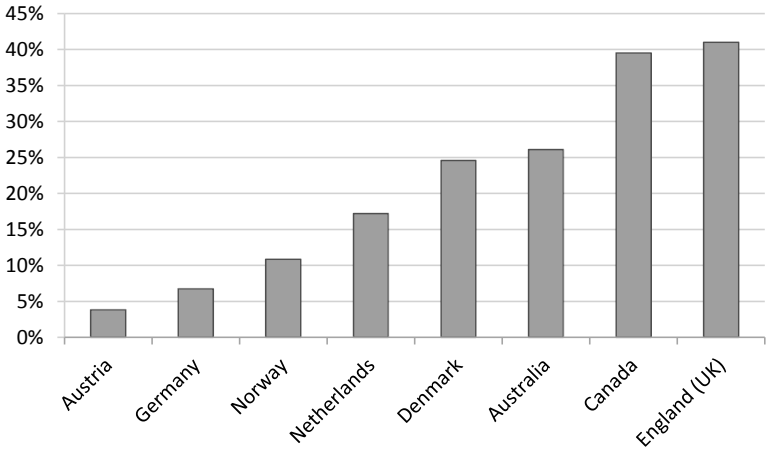
The employer reservation wage (what they are willing to pay) for apprentices will depend on how employers see the costs and benefits of hiring an apprentice. Companies expecting long-term benefits from apprenticeship training may be willing to spend more on apprenticeships as they can recoup their investment later on through recruiting the most able apprentices. These companies may pay higher wages to attract the best candidates to their apprenticeships. Typically, large employers are more likely to realise long-term recruitment benefits. Evidence from Germany shows that large firms are also those who offer higher apprentice wages (Beicht, 2011).

The wage apprentices are prepared to accept

The individual reservation wage (what apprentices are willing to accept) depends on factors including labour market tightness and individual characteristics, such as ability and age (see Figure 5). Younger individuals have a lower reservation wage as they expect to recoup their investment in an apprenticeship over their lifetime. They may also have low short-term costs as many still live with their parents. In countries where apprentices have a status of employees, or are perceived primarily as employees, apprentice wages tend to be higher. In these countries, apprentices are also older than in countries where apprenticeships are clearly separated from employment. For example, in the Netherlands, there are two vocational upper-secondary tracks: "BBL" apprenticeships (Beroeps Begeleidende Leerweg) (with on-the-job time representing nearly 70% of the programme), and "BOL" programmes (Beroeps Opleidende Leerweg), which are not seen as apprenticeships (where on-the-job time represents around 30% of the programme). BBL students tend to be older than BOL students, and on average 71% are incumbent workers, i.e. they have worked with their employer before starting their apprenticeship (Christoffels, Cuppen, and Vrielink, 2016). Some 75% of BBL apprentices earn more than the national minimum wage. Figure 4 shows the share of older apprentices across countries.

Figure 4. How old are apprentices?

Share of 25-year-olds and older among current apprentices



Notes: For the definition of current apprentices in Australia, Austria, Canada, Germany, the Netherlands and Norway, see Box 2, and for the definition of current apprentices in England (United Kingdom) see BIS (2014). According to the national data in the Netherlands, around 40% of apprentices are 23 years-old and older (www.cpb.nl/publicatie/lonen-van-bbl-leerlingen-en-het-wettelijk-minimumjeugdloon). These are individuals studying in apprenticeship programmes called BBL (with on-the-job representing nearly 70% of the programme duration). Individuals in BOL programmes (with on-the-job representing around 30% of the programme duration) are excluded. The difference between the national data and data from the Survey of Adult Skills (PIAAC) can be explained by different definitions used in the two data sources. In the Survey of Adult Skills, current apprentices are those who define themselves as apprentices or as holding an apprenticeship contract. This group can include both BBL and BOL students, with BBL being mainly used by older adults and BOL catering to a much younger population.

Sources: OECD (2016a), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/. Data for England: BIS (2014), *Apprenticeships Evaluation: Learner Survey 2014*, Department for Business Innovation and Skills, UK Government, www.gov.uk/government/publications/apprenticeships-evaluation-learner-survey-2014.

During periods of high youth unemployment, individuals are more likely to accept lower wages. In making educational and training choices, would-be apprentices take into account the proposed apprentice wage, as well as future benefits resulting from the apprenticeship training and qualification, such as higher earnings, better employment and career opportunities and higher status. If the expected benefits are high, potential apprentices are more likely to accept a higher upfront investment in the form of lower wages and higher foregone earnings. Beicht (2011) shows that nearly 70% of German apprentices think their wages are too low (although this may be a view shared by many workers). While the level of apprentice satisfaction is positively associated with wages, it also depends on other factors, such as the size of the company, quality of training and overtime hours.

The cost of instructors/trainers is the second largest cost of apprenticeships to employers

The costs of instructors/trainers cover those who are also employees and external instructors/trainers hired by the employer. In Switzerland, the cost of instructors/trainers amounts to 38% of the total cost for an employer offering an apprenticeship (Strupler, Wolter and Moser, 2012), in Germany it is 23% (Jansen et al., 2016) (the high cost of skilled labour may explain the higher instruction cost in Switzerland). Evidence from Flanders (Belgium) shows that, on average, 2.6 company employees are involved in apprentice training, and that the main apprentice instructors spend around one-third of their working time on the training and supervision of apprentices (De Rick, 2008 in Poulsen and Eberhardt, 2016).

Benefits to employers and apprentices: The mix of skilled and unskilled tasks in work placements

Apprentices may spend time on three types of task (see discussion in Kis, 2016):

- Non-productive activities: i.e. activities with no direct productive value to the firm. This includes time wholly dedicated to learning (e.g. doing exercises and simulations or listening to an instructor's explanations), and other non-productive activities (such as time spent in transport to visit a client). Non-productive activities that involve learning bring indirect benefits through improved skills and higher apprentice productivity.

- Productive skilled activities: i.e. tasks that are normally performed by a skilled worker. This includes both "learning by doing" (often new skilled tasks under close supervision and receiving feedback), and more routine activities that involve less learning (for example a routine skilled task where the skills involved were acquired earlier in the apprenticeship). Productive skilled work involves learning while doing real work, rather than by simulation.

- Productive unskilled activities: this includes tasks that can be done by an unskilled worker (e.g. cleaning a workshop). Performing such tasks does not develop any specific occupational or technical skills, but it may develop soft skills, such as ability to work in a team or time management.

See Table 3 for a country comparison of time spent by apprentices in productive tasks.

Employers seek to maximise benefits through the mix of apprentice tasks

Apprentices, like ordinary workers, typically undertake a mix of tasks ranging from the unskilled to the highly skilled. To simplify and clarify the argument, it can be supposed that there is a binary divide between unskilled and skilled tasks. The benefits to employers arising from the unskilled work of apprentices require little or no training investment. Conversely, realising benefits from the skilled work of apprentices requires significant investment by the company (see Table 2).

Table 2. Costs associated with skilled and unskilled work by apprentices

Costs of apprentices contributing to unskilled work	*Costs of apprentices contributing to skilled work*
Apprentice pay and other related expenditures	Apprentice pay and other related expenditures
Administrative costs	Administrative costs
	Training equipment
	Salary of instructors / trainers

Apprenticeships that develop few skills have little value to apprentices

Employers can allocate apprentices to unskilled tasks from the beginning of their apprenticeship. Some unskilled work can be beneficial to apprentices as it allows them to acquire soft skills, for example, understanding how to successfully complete an assigned task on time and how to become familiar with the

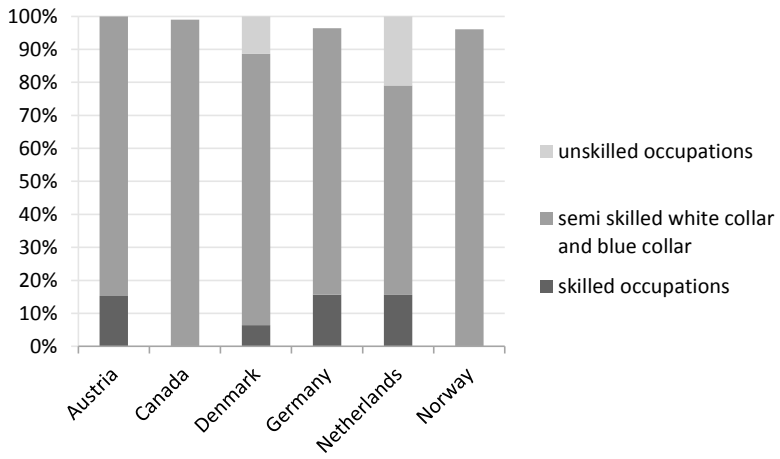
work environment. However, apprentices who undertake only unskilled work learn few new skills, while experiencing foregone earnings (if the apprentice wage is below the unskilled wage). In these circumstances, there may be a high dropout rate from apprenticeship programmes, and students will tend to shun apprenticeships. In the long run, even just a small proportion of low-quality apprenticeships can damage the overall reputation and "brand" of apprenticeships.

Apprenticeships take place mainly in "semi-skilled" jobs

The distribution of apprenticeships across occupations, classified according to the skills required on the job (based on the International Standard Classification of Occupations), provides an indication of the skills apprentices develop during the programmes, assuming that the allocation of apprentices to various tasks reflects the skills used by the company. Most apprenticeships are provided in semi-skilled white and blue-collar jobs (see Figure 5). In some countries, such as Austria and Germany, apprenticeships are also found in highly skilled jobs, and in other countries, some apprenticeships are concentrated in low-skilled jobs.

Figure 5. In what type of occupation are apprentices found?

16-65 year-old current apprentices, 2012



Source: OECD (2016a), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.

Regulations can prevent employers from using apprentices only for unskilled work

In principle, giving unskilled work to low-paid apprentices could be economically attractive to employers. Simulations based on cost-benefit surveys show that a Swiss training firm could increase their net benefits by an average of EUR 22 000 per apprentice over the period of an apprenticeship if the apprentices performed only unskilled tasks (Wolter and Ryan, 2011 in Mühlemann, 2016). However, apprenticeships that rely solely on low skills would be of little value to apprentices. Regulations therefore need to ensure that apprentices have an opportunity to develop a wide range of skills with the training employer, and that they receive instruction and carry out skilled productive work, in addition to unskilled work.

Many countries set standards for the skills apprentices should develop, and on the minimum amounts of training they should receive both on and off-the-job. These requirements are underpinned with robust assessments of training outcomes during the programme and on completion.

In some countries, special bodies help companies to design good quality training and monitor the quality of the workplace component. These bodies can be set up by companies themselves or externally. For example, in Germany, the quality of work placements provided by companies is monitored by external monitoring agencies and works councils. Works councils represent employees at the firm level and control quality within the training firm. They have a right to call for a replacement of training personnel if the training quality is unsatisfactory (see e.g. Kriechel et al., 2014 in Mühlemann, 2016).

Reputation effects can limit the extent of low-quality apprenticeship provision (see Wolter and Ryan, 2011 for a discussion), however, potential apprentices are unlikely to have all the required information before the start of apprenticeship programme to adequately assess the training quality of a particular employer.

Employers have to invest in training to increase apprentice capacity for skilled tasks

Using apprentices in productive skilled tasks requires training. Apprentices need to learn occupation-specific skills, which involves costs in terms of instruction time and equipment. When the wages of skilled workers are high, companies will generally be more willing to make this investment and allocate more apprentice time to productive skilled tasks for which they would otherwise have to pay high wages to a skilled worker. However, higher skilled worker wages also increases the costs of instruction time, since a skilled employee will need to be diverted from productive tasks to spend more time on training and supervising apprentices undertaking skilled tasks. Depending on the amount of training provided by the firm, as well as the time spent by apprentices in skilled work, higher skilled worker wages may either increase or decrease a firm's net training costs, and therefore the demand for apprentices. An increase in skilled worker wages is likely to reduce net apprenticeship costs if required instruction hours are low and the share of skilled work allocated to apprentices is high, which would increase the demand for apprentices (holding other factors constant).

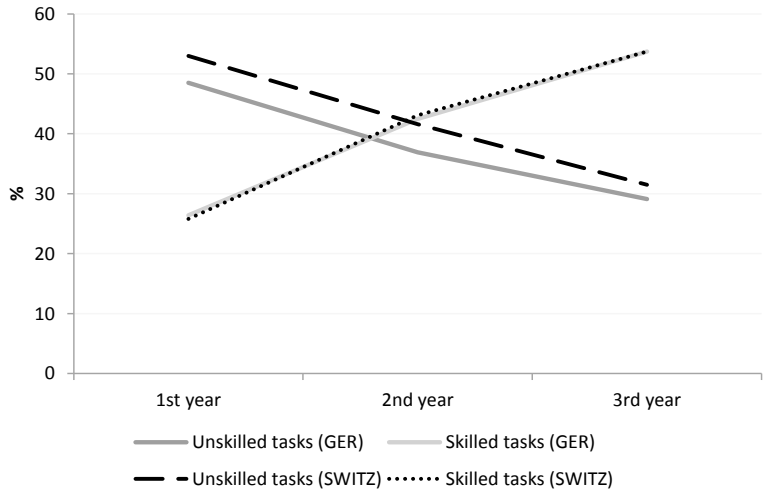
Apprentices usually slowly increase the proportion of skilled tasks in their job mix

Evidence from Germany and Switzerland shows that the amount of skilled work carried out by apprentices increases over time, while the time spent on unskilled tasks falls (see Figure 6). In the final year of an apprenticeship, apprentices in these two countries are more often allocated to productive skilled than unskilled tasks.

While Austrian apprenticeships also follow this pattern, the increase in skilled and decline in unskilled productive tasks is much more modest. As a result, apprentices in the third year of their apprenticeship carry out as much unskilled as skilled work. Overall, apprentices in Austria spend more time on unskilled work than their counterparts in Germany and Switzerland (Schlögl and Mayerl, 2016).

Figure 6. Share of workplace time spent by apprentices in three-year programmes in unskilled and skilled work

(2007 for Germany and 2009 for Switzerland)



Source: Jansen, A. et al. (2015), "Labour Market Deregulation and Apprenticeship Training: A Comparison of German and Swiss Employers", *European Journal of Industrial Relations*, http://dx.doi.org/10.1177/0959680115580687.

Net benefits to employers rise when apprentice wages increase more slowly than apprentice productivity

For apprenticeships to be attractive to employers they have to offer a net benefit over the full period of the apprenticeship. This often means balancing a net investment over the early part of the apprenticeship with net benefits over the latter part. This section assumes that the employer does not realise long-term benefits from apprenticeships. For example, in Switzerland, research estimates that, on average, apprentice productivity reaches around 70% of skilled worker productivity by the last year of the apprenticeship programme, while the apprentice salary during this period amounts to 20-30% of the skilled worker wage (Swiss Coordination Centre for Research in Education, 2011; Swiss federal Statistical Office, 2016). In Germany and Switzerland, as apprentices become more productive over time (because they are getting better in skilled tasks and spend more time in productive skilled work) and their productivity rises faster than their wages, companies obtain substantial net benefits from their apprentices towards the end of their apprenticeships.

In Switzerland and Germany, the productivity of apprentices is low when starting out, as they spend a lot of time in training, and the time left for productive work is allocated mainly to unskilled tasks. At this stage, apprentices are paid above their productivity. However, the situation reverses later on in the programme (the point when the wage and productive lines cross, see Figure 7). Apprentices are more and more productive while being paid below their productivity. From this point on, the net benefits to the employers are positive.

Figure 7. Change in-company net benefits: Productivity rising faster than wages

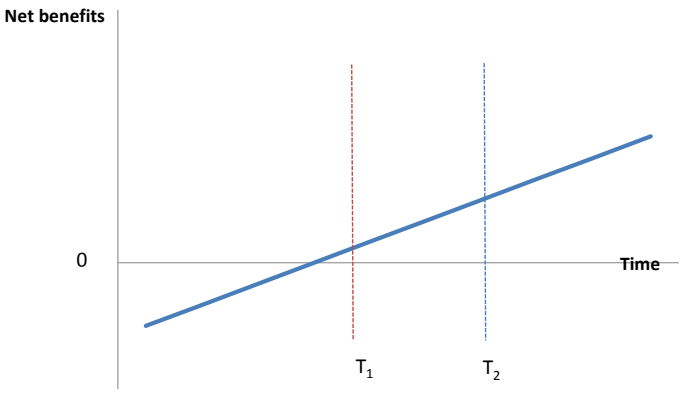
Note: Programme duration is shown on the horizontal axis, and wage and productivity on the vertical.

Employer benefits are linked to the duration of the apprenticeship programme

Figure 8 shows changes in the net benefits for a company that gradually increases the time spent by apprentices on productive skilled tasks, while keeping the wage below the productivity of apprentices. The company incurs large losses at the beginning of the apprenticeship (net benefit is negative), which typically corresponds to investment in training of apprentices, and reaches larger net benefits at the end of the apprenticeship programme.

The company can recoup its investment by the end of the period T2 (the triangle under the horizontal axis is equal to the triangle above the axis). If the duration of the programme is shorter than the period T2 (e.g. the apprenticeship ends in the period T1), the company will not be able to recoup costs by the end of the apprenticeship. This means that unless employers can retain the apprentice and obtain longer term benefits, apprenticeships will not be profitable. Beyond point T2, the firm's net benefits increase, and individual returns diminish. This is because apprentices at that point are nearly as productive as skilled workers, but are being paid an apprentice wage that is less than the value of what they are producing.

Figure 8. Net benefits from apprenticeship over the duration of apprenticeship

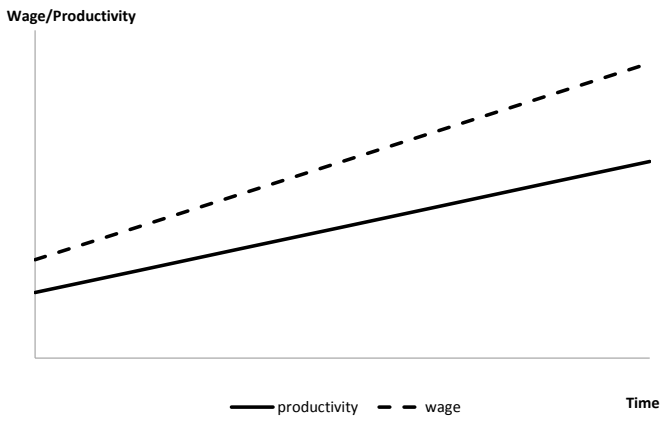


Note: For simplicity the net benefits are presented as a strictly increasing function of time. In reality, they increase up to the point when an apprentice's productivity reaches the productivity of the skilled worker, after which they flatten.

Employer benefits depend on how productivity and wages evolve during apprenticeships

Figure 9 also shows an increase in apprentice productivity and wages over the programme duration. However, the wage and productivity lines do not cross – in fact they diverge - so that employer net benefits remain negative throughout the period of an apprenticeship. This reflects a pattern found (on average) in Austria, where the net costs to an employer of an apprenticeship are higher towards the end of the programme. This is because employer costs increase faster over the period of an apprenticeship than the benefits associated with the productive contribution of apprentices (Schlögl and Mayerl, 2016). This can be explained by a sharp increase in wages of Austrian apprentices in their last year of apprenticeship, combined with a slow increase in their productivity. This may be because Austrian apprentices are more likely to be allocated to unskilled tasks than their counterparts in Germany and Switzerland.

Figure 9. Change in-company net benefits: Productivity growth lagging behind the growth in apprentice wage



Note: Programme duration is shown on the horizontal axis, and wage and productivity on the vertical.

Apprentice productivity depends on various factors

The time needed by apprentices to acquire skills can vary substantially by sector and occupation. While apprentices may require an extended period of training before being able to carry out productive tasks in some occupations, in others, apprentices can be rapidly productive. Training duration also depends on apprentice ability, for example, programmes catering to disadvantaged youth may need adapting to the learning pace of the target population. These differences should be taken into account when evaluating and defining the duration of apprenticeship programmes. Box 3 describes how countries define duration as part of their apprenticeship programmes.

Box 3. How much room is there for variation in apprenticeship duration?

National variations

In some apprenticeship schemes (e.g. United Kingdom, United States), a standard duration is not defined collectively for each occupation at the national or state level, and there is room for some variation in how long an apprenticeship lasts for a given occupation. There is a minimum duration requirement of one year in both countries (12 months in the United Kingdom; 2 000 hours for registered apprenticeships in the United States (www.doleta.gov/oa/apprentices.cfm, www.gov.uk). In various countries, duration is defined through collective agreement for each occupation. For example:

- Germany: Apprenticeships last two, three or three and a half years, depending on the occupation. The majority of occupations involve a three-year programme (www.bibb.de/de/berufeinfo).
- Ireland: Almost all apprenticeships take a minimum of four years to complete, with a minimum three years for only one out of the 27 apprenticeship occupations (www.fas.ie).
- Norway: Most apprenticeships take four years to complete, with four and a half year schemes in some occupations.
- Switzerland: Two-year apprenticeships (covering 53 occupations) lead to a federal VET certificate. Three or four-year apprenticeships (covering over 200 occupations) lead to a federal VET diploma. Those who have completed a two-year apprenticeship may progress to a three or four-year apprenticeship within the same field, entering the second year of the programme (www.berufsberatung.ch/).

Time-based vs. competence-based completion

Apprentices must usually participate in training over a fixed period of time, and can take a qualifying examination at the end of that period. Some countries have introduced competence-based completion (or progression) that allows apprentices to complete their qualification once they have reached the targeted competences, rather than after a fixed period of training.

In Australia, a nominal term is agreed for each apprenticeship or traineeship, but that may be reduced, and apprentices may progress from one stage of an apprenticeship to the next based on their competences rather than time served (www.australianapprenticeships.gov.au/employers).

In the United States, registered apprenticeship programmes range from one to six years, depending on the complexity of the occupation, with the majority of programmes taking four years. Some of the programmes are competency-based or hybrid, others are time-based. In competency-based schemes, apprentices may complete faster or take extra time to develop the required competences, although these schemes still have to comply with certain requirements regarding time spent on each major process. Hybrid apprenticeship programmes combine time-based and competency-based elements (www.doleta.gov/oa/apprentices.cfm).

Source: Kis, V. (2016), "Work, train, win: work-based learning design and management for productivity gains", *OECD Education Working Papers*, No. 135, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlz6rbns1g1-en.

Benefits to employers: The mix of productive and unproductive activity during work placements

Apprentices divide their time in the workplace between productive work and non-productive activities

During a work placement, training can be provided in-company workshops and training centres, or it can be directly integrated into the context of productive work. In Switzerland and Germany, apprentices spend, on average, around 80% of their time in the company on productive tasks; undertaking these tasks, and receiving feedback and guidance, is a key element in skills development. Apprentices spend the other 20% of work placement time on non-productive activities, which may involve some training, simulations, exercises, and other non-productive tasks (Jansen et al., 2015).

Training can be integrated into productive work

While some types of training require separate time with instructors outside productive activities, training can also be fully integrated into productive work. For example, after having received instructions from a trainer/instructor, apprentices may be asked to carry out certain tasks on their own, practicing and repeating these tasks either in a real work setting or in a workshop environment. In a real work setting, apprentices exercise their skills while also producing an output. While the apprentice normally needs more time and more supervision than a skilled worker, their work still contributes to the output of the company.

In a workshop setting, apprentices also improve their skills, but without producing anything of market value. The integration of some elements of training into the production process is, in principle, beneficial from the point of view of companies, and neutral from the point of view of an apprentice, assuming that the apprentice is indifferent to how skills are developed, and that practicing in a workshop or in a workplace leads to similar skills.

Employers can sometimes increase short-term benefits by allocating more apprentice time to productive work

Jansen et al., (2012) show that German firms with apprentices reduced the share of non-productive activities for apprentices in the workplace by half between 2000 and 2007 in order to increase time spent in productive work. This resulted in substantially higher short-term apprenticeship benefits for the firm. The shift from non-productive to productive activities would have had an adverse effect on apprentice training if the additional productive work had less training value than the non-productive activity (including workshop training) that it replaced. The evaluation of the German reforms to improve labour market flexibility tends to indicate this has not happened (Jansen et al., 2012). Neither time with instructors/trainers nor overall spending on apprenticeships decreased over time, and the productivity of apprentices compared to skilled workers did not change. Using apprentices in more productive tasks can, therefore, at least in principle, be beneficial to companies, without having an adverse effect on the accumulation of job-relevant skills in apprentices.

The balance between productive and non-productive work can sometimes reflect seasonal or cyclical patterns of demand, meaning that apprentices can be given more non-productive training during slack periods, when the opportunity cost of their own and their supervisor's time in potentially productive activities is lower.

The scope for apprentices in productive activities depends on occupation

Apprentices in highly technical occupations requiring very expensive and specialised equipment may need more training outside productive work before being able to work with the real work equipment, as a mistake with the equipment could cost the company more than the cost of training through non-productive activities. Similarly, apprentices in occupations in which the health and safety of clients could be jeopardised may require more training outside of the real work context.

Apprenticeships can be promoted by making companies better at training

Independently of occupation and apprentice ability, some companies are better than others at training apprentices. A company that is better at training can expect higher gains as apprentices can be used in productive tasks earlier on. Small companies with limited training capacity may therefore benefit particularly from support measures such as training for trainers or assistance with administrative work (see sections 3 and 4).

Benefits to employers and apprentices: Balancing on and off-the-job components of apprenticeships

The mix and sequencing of off-the-job and work placement elements varies across countries

Apprenticeships combine education and training in vocational schools and colleges with periods in the company, however, the time sequencing of on and off-the-job training varies. In Norway, the majority of apprenticeships last four years, with the first two years spent in a vocational school and the last two with a company. In Germany and Switzerland, apprentices alternate education and training in a vocational school with periods in a company, typically on a weekly basis. One factor is geography: a weekly split between employer and vocational school means that the employer and the school should be relatively close to one another. In some countries where the population is thinly spread, such as Norway, on and off-the-job education and training can be provided over a longer period of time.

In Germany and Switzerland, apprentices in three-year programmes spend roughly a quarter of their apprenticeship time in vocational schools (in Switzerland there is slightly more time off-the-job in four-year programmes). In Austria, where the majority of apprenticeships last three to four years, apprentices spend, on average, 20% of their time in vocational schools, with the remaining time training and working in companies that provide apprenticeships (see Table 3).

Employers weigh up the costs and benefits of apprentices spending time in off-the-job education and training

More time spent in vocational schools can reduce company benefits from apprenticeships by decreasing the time spent by apprentices in the company in productive work[5] and in developing employer-specific skills. However, more time in vocational schools may reduce company costs if apprentices develop job-relevant skills during the off-the-job period that would otherwise need to be provided by the company. For example, in many technical occupations, some of the training cannot be easily integrated into productive work, and therefore requires instruction outside regular work activities. The cost falls on the company if the school does not provide this, although this may be advantageous if the technical training requires a lot of tailoring to the specific company context.

Apprentices also weigh up the costs and benefits of off-the-job training

From the individual's point of view, more off-the-job training is beneficial if it develops a wide range of generic skills. Typically, off-the-job education provided to younger apprentices in their late teens includes some of the same type of education received by their peers in full-time school education and training, and will commonly include attention to numeracy and literacy and other generic skills. For example, in response to poor basic skills among young people in England, the government raised requirements in English and mathematics for all young people (16-years-old and above) in formal education and training, including apprentices, who did not achieve a satisfactory level in these two subjects in their previous education and training (Kuczera et al., 2016). When an apprenticeship programme caters to individuals with learning difficulties, teaching basic skills can be a challenge, as long periods of classroom instruction may discourage less academically oriented students and sometimes trigger dropout.

The balance of on and off-the-job training has to be right for both employer and apprentice

The length and exact organisation of the off-the-job period needs to reflect the skill requirements in specific occupations, and the characteristics of the target student population. This is often determined by a national curriculum, or may be guided at the industry-level, e.g. by employer associations. Individual

5. It is also conditional on cost-benefit structure of apprenticeships.

employers often have less influence on how much time an apprentice spends at the workplace in a given year of training.

Table 3. What is the duration of an apprenticeship and how much work placement does it involve?

	Duration of the programme including off-the-job period and work placement with the company	Time allocation in apprenticeship programmes	Work place time spent in productive and non–productive tasks
Austria	3-4 years	66% - workplace with the company 20% - off-the-job education and training 14% - leave and sick days	83% of the time with the company is spent on productive work
Denmark	3.5-4 years (typically)	Information not available	Information not available
England (UK)	Minimum 12 months, 15 months on average	At least 20% in off-the-job education and training	Information not available
Germany	3-3.5 years (2-year programmes also are available)	54% - workplace with the company 31% - off-the-job education and training 15% - leave and sick days	70% of the time with the company is spent on productive work
Netherlands	2-4 years	72% - workplace with the company including leave and sick days* 24% in-school The remaining 4% can be allocated either to school teaching or practical training	
Norway	Mostly 4 years (Shorter programmes are available for disadvantaged students)	Apprentices spend as much time in school as in a workplace with the company (typically the first two years are spent in school and the last two with the company)	1 year of training 1 year of productive work
Sweden	3 years	Apprentices spend as much time in school as in a workplace with the company	Information not available
Switzerland	3-4 years (2-year programmes also are available)	59% - workplace with the company 27% - off-the-job education and training 14% - leave and sick days **	83% of the time with the company is spent on productive work

Notes: (*) The estimation of time allocation in the Netherlands does not take into account leave and sick days. Assuming apprentices in the Netherlands spend the same amount of time being sick or on leave as their counterparts in Austria and Germany, time allocation to the workplace with the company would be around 58%. (**) Time with the company and in school as a percentage of the total programme duration was estimated based on 2009 data in Jansen et al., 2012, assuming the working year has 250 days and leave and sick days represent 14% of the programme.

Sources: The OECD International Survey of VET Systems, 2007 – countries' responses (unpublished); Ryan, P. et al. (2013), "Apprentice Pay in Britain, Germany and Switzerland: Institutions, Market Forces and Market Power." *European Journal of Industrial Relations,* 19 (3), pp. 201–20, http://dx.doi.org/10.1177/0959680113494155; Schönfeld, G. et al. (2016), "Kosten Und Nutzen Der Dualen Ausbildung Aus Sicht Der Betriebe." BIBB. www.bibb.de/veroeffentlichungen/de/publication/show/id/8034; Swiss federal Statistical Office (2016), "What's New? Income from Employment 2015. Gross Income from Employment per Year from Employed Persons according to Economic Activity Status, Group of Occupation, Workweek Percentage and Gender - Median in France." June 14. www.bfs.admin.ch/bfs/portal/en/index/themen/03/01/new.html; Jansen, A. et al. (2012) "The Effect of Labor Market Regulations on Training Behavior and Quality: The German Labor Market Reform as a Natural Experiment", *Economics of Education Working Paper Series,* 0083, University of Zurich, Institute for Strategy and Business Economics (ISU), https://ideas.repec.org/p/iso/educat/0083.html; Rijksoverheid (2016), Overzicht aantal uren onderwijstijd, www.rijksoverheid.nl/onderwerpen/schooltijden-en-onderwijstijd/inhoud/overzicht-aantal-uren-onderwijstijd (accessed December 2016).

Benefits to employers: Long-term recruitment benefits

Apprenticeships yield benefits to employers through the productive work carried out by apprentices while on the programme, as well as through long-term recruitment benefits realised by employers after the end of the apprenticeship period. This is because employers can readily select reliably productive apprentice graduates, rather than hire employees from the external market. In some occupations and countries, the majority of companies provide apprenticeships with long-term benefits in mind.

Employers that realise long-term benefits are more likely to accept upfront investment in apprentices

Employers that intend to employ former apprentices as skilled workers have stronger incentives to look to the long-term benefits of apprenticeships. They may therefore increase the share of time spent by apprentices in training, as the productivity of former apprentices in skilled tasks depends on the amount of training and exposure to skilled work the person receives during an apprenticeship programme. Large net costs incurred during apprenticeships are therefore balanced by large long-term benefits.

Long-term benefits arise because employers can pay a wage below productivity

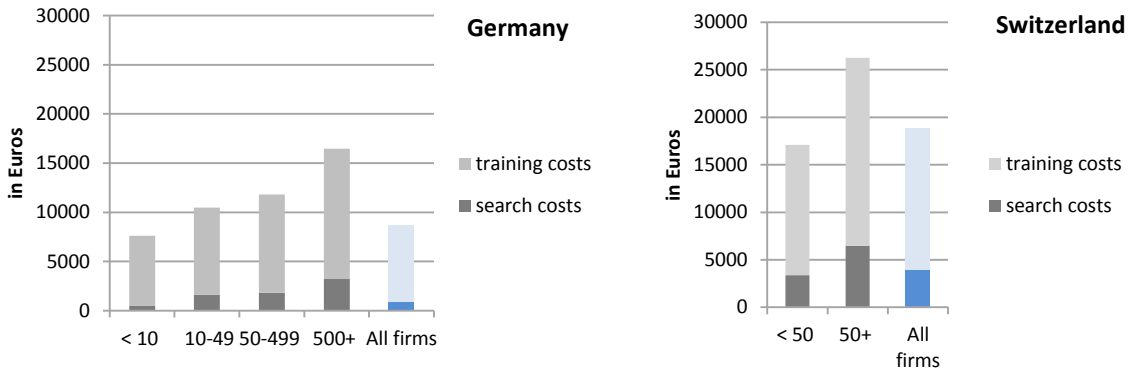
In "perfect" labour markets, fully informed employers can buy exactly the skills they want instantly and without any transaction costs. However, in the real world, employers with privileged knowledge of the productivity of their apprentice graduates can pay a wage below their productivity. Labour markets are imperfect for multiple reasons: when information is "asymmetric" (whereby the actual productivity of employees is not visible to all potential employers); because of labour market institutions that compress wages (rather than allowing them to reflect individual productivity variations); and because the company is the only employer in the specific occupation in the region (monopsony). These market imperfections can yield substantial post-training benefits to employers.

Recruitment of apprentice graduates also creates long-term benefits

Recruitment costs include: expenditure on job advertisements and interview costs; formal and informal training expenditure, including costs of lower productivity of regular employees who instruct new recruits; and the costs associated with the initially low productivity of any new employee during the adaptation period (until the worker reaches full productivity) (see Figure 10). Part of the cost is also the risk of mistaken recruitment, followed by the need to fire recruits. Firing expenditures include: administrative costs; morale effects, including the costs of lower productivity among workers during the notice period; and the costs of unfilled vacancies. Employment protection regulations add to these costs variably, depending on their toughness. Recruiting graduate apprentices who are observed on the job as reliably productive and fully equipped with firm-specific skills avoids both the hiring and the potential firing costs, and on these grounds is often an attractive option. While this can be a significant factor in employer decisions to recruit young apprentices, it is irrelevant to employers who are considering turning an incumbent worker into an apprentice, which constitutes a significant proportion of apprenticeships in a number of countries.

Figure 10. Average hiring costs for a skilled worker in Germany and Switzerland (in EUR), 2012/13

By firm size (horizontal axis)



Note: CHF/EUR exchange rate of 1.10 on 11 September 2015. Hiring cost - average cost to successfully fill a vacancy.

Source: Mühlemann, S. (2016), "The cost and benefits of work-based learning", *OECD Education Working Papers*, No. 143, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlpl4s6g0zv-en.

Apprenticeships can be a powerful and effective means of recruiting productive workers

Apprenticeships save on the training costs of future workers hired externally, and allow employers to better match individuals with responsibilities and tasks on the job. Research has shown that apprenticeship training can help to uncover the true ability and motivation of an individual apprentice, a process that can take several years following external recruitment (Lange, 2007). The employer can also accurately evaluate suitability for specific positions, which reduces information asymmetries between the training firm and the apprentices.

Recruitment costs are greater for companies that rely on highly specialised and technical skills

In specialised sectors, employers commonly need to provide a significant amount of training to workers recruited externally. By retaining graduate apprentices, these companies therefore save significant training costs, since the apprentice graduates already have the required skills.

Savings from recruitment are larger in more rigid labour markets

A comparison of the retention rate of apprenticeship graduates in Germany and Switzerland shows that German companies, which operate in a more rigid labour market than their Swiss counterparts, are more likely to retain graduate apprentices than Swiss firms. German companies are therefore more likely to realise long-term benefits from apprenticeships than Swiss firms.

Firms that offer apprenticeships to their employees realise lower long-term benefits

In some countries, such as Austria, Germany and Switzerland, apprenticeships are designed for young people with no or limited work experience, whereas in Canada and the United Kingdom, apprenticeships can be offered to incumbent workers. In England, on average two-thirds of apprentices were working for the company before entering an apprenticeship. In sectors such as management, health and social care, hospitality and catering and retail, the share of apprentices working for their employers prior to starting their apprenticeship was the highest (80% or more), while in engineering, manufacturing technologies and electro technical fields it was the lowest (around 45%) (BIS, 2014). In countries where apprenticeships

cater mainly to incumbent workers, companies providing apprenticeships are less likely to reap long-term benefits than companies in countries with apprenticeship schemes for young people.

Conclusions and policy implications

A carefully designed apprenticeship scheme can be a worthwhile investment both for employers and individuals. Employers provide apprenticeships to recruit the most able apprenticeship graduates and thus to invest in their future workforce. Employers also provide apprenticeships as apprentices make a valuable contribution through their productive work. For apprentices, a well-designed apprenticeship ensures a smooth entry to the labour market and provides good preparation for their chosen career.

Policy pointers

When designing apprenticeship programmes, governments, social partners and other agencies should ensure that they will deliver adequate net benefits to make them attractive to all parties, including apprentices themselves. They therefore need to:

1. Establish apprentice wages that are low enough to encourage companies to offer apprenticeships, but high enough to attract good quality apprentices. Apprentice wages should take account of:

    - Wages of skilled and unskilled employees.
    - Characteristics of the apprentice population (such as age, relevant work experience).
    - Increases in apprentices' productivity over the course of the apprenticeship.

2. Define and apply relevant quality assurance tools to cover both off-the-job and on-the-job education and training to ensure that apprentices develop a full range of generic and occupational skills during the programme.

3. Ensure that the time spent in work placements is sufficient to allow employers to recoup their initial investment in apprentice training, without compromising the attractiveness of apprenticeship to apprentices – work placements that are too long impose an additional opportunity cost on apprentices through foregone earnings.

4. Ensure that apprentices have an opportunity to develop complex skills during work placements, and that employers gradually increase the time apprentices spend carrying out productive skilled tasks.

3. INCENTIVES FOR EMPLOYERS TO PROVIDE APPRENTICESHIPS

Introduction

Given the evidence that apprenticeships represent a cost-effective way of developing workforce skills and transitioning young people smoothly from school to work, there are good policy reasons for governments to encourage and support the provision of apprenticeships. When apprenticeship offers are limited, the government and social partners may want to promote apprenticeships through a range of incentives. This paper distinguishes between two types of incentive:

- Financial incentives that may include either direct subsidies or tax benefits.
- Non-financial incentives that include measures such as assisting employers in providing apprenticeships, preferential treatment for companies with apprentices in the public procurement process, and image campaigns.

For apprenticeships to be attractive to employers, they need also to be attractive to students: if apprenticeships are attractive to students, then well-qualified young people will compete to be apprentices, and training employers will be able reap the benefits of their abilities. This means that the level of public support for the learning pathways that compete with apprenticeships, such as different forms of post-secondary education, is important. If such pathways receive higher public funding than apprenticeships and are high status, for example when university fees are zero, then young people may avoid apprenticeships because of the more attractive well-funded alternative. Employers may then be reluctant to recruit apprentices, as they will be seen as a group of school leavers with weak school attainment that prevented them from entering other forms of post-secondary education. In short, if the broader educational context provides some very appealing alternatives to apprenticeships, filling apprenticeship places will be harder.

Financial incentives

Financial incentives funded with general public expenditure: Tax breaks and subsidies

The cost of financial incentives for apprenticeships can come out of general public expenditure, and therefore from taxpayers, as: 1) a reduction in the tax base or tax due by companies providing apprenticeships; or 2) a subsidy to firms with apprentices. Some examples include:

- In Austria, tax incentives were abolished in 2008 and replaced by direct subsidies for apprenticeships. The Ministry of Economics and Labour considered the tax incentive scheme failed to target companies that would benefit most from additional support for apprenticeships (CEDEFOP, 2011). Tax incentives have been replaced by a grant based system. The amount of grant received by the employer depends on the year of apprenticeship, with the subsidy decreasing with each year of apprenticeship (in the first year the employer receives an equivalent of three gross apprentice wages per apprentice, in the second year an equivalent of two gross apprentice wages, and in the third year an equivalent of one gross apprentice wage). Extra support is available to employers for the provision of additional training and for the training of instructors, and to employers whose apprentices excel on their final assessment or face learning difficulties. In addition, grants are available for apprenticeships that support the equal access of

men and women to traditionally non-male and non-female professions (Federal Ministry of Science, Research and Economy, 2014).

- In France, all enterprises (including public establishments) employing apprentices for at least one month can benefit from a tax credit. Employers receive EUR 1 600 per apprentice per year or EUR 2 200 for disabled and low qualified apprentices. Small and medium-sized enterprises (SMEs) offering apprenticeships are fully exempted from employer social contributions (CEDEFOP, 2011).
- In the Netherlands, tax deductions were abolished in 2014 and replaced with subsidies (Casey, 2013).

Financial incentives funded by employers

The costs of financial incentives can also fall on employers, with either all employers or some employers contributing, typically through a levy on a percentage of turnover or payroll. Funds from contributions may be used to support training in general and apprenticeships in particular. For example, in Denmark and France, all employers share the costs of apprenticeships. In Austria, Germany and Switzerland, levies are collected by sector; while in England (United Kingdom), only large employers contribute. Further details on incentive schemes are set out in Table 4.

Table 4. Financial incentives to companies providing apprenticeships

	Tax incentives*	Subsidy	Levy scheme
Australia	Tax incentives depend on the qualification the programme leads to	Subsidy in specific cases e.g. person being trained has a disability.	No
Austria	Tax incentives abolished in 2008 and replaced by targeted subsidies	From 2008, targeted subsidies are available per apprentice (the amount depends on the year of apprenticeship) for: additional training, training of instructors, apprentices who excel in final assessment, measures supporting apprentices with learning difficulties, and measures supporting equal access of men and women to apprenticeships.	A levy fund in the construction sector covering all regions and in the electro-metallic industry of one province (Vorarlberg). Negotiated by the Employers and Trade Union.
Belgium – Flanders	Payroll tax deduction	Direct subsidy depending on the number of apprentices and programme duration.	No
Denmark	No	No	All companies (including in the public sector) pay a contribution to the Employer Reimbursement Fund (AER) based on the number of full-time employees. The amount is DKR 492.50/ full-time employee four times a year. Enterprises with apprentices get their expenses for trainees refunded when they are at VET college (i.e. salary, transportation). AER also pays grants to motivate employers who establish extra training places.

Table 4. Financial incentives to companies providing apprenticeships (*continued*)

	Tax incentives*	Subsidy	Levy scheme
England (UK)	No	Contributions from employers who pay the levy are topped up with a 10% contribution from the government. Grants to companies and education and training institutions offering apprenticeships to 16-18 year-olds.	Universal levy set at 0.5% of payroll, applying to the proportion of payroll above GBP 3 million
Germany	No	No	In the building sector. Negotiated by employers and trade unions.
Netherlands	Tax exemptions (abolished in 2014)	Subsidy from 2014 to employers providing apprenticeships of maximum EUR 2 700 per student per year (depending on the duration of the apprenticeship and the number of training companies asking for subsidies).	No
Norway	No	Direct subsidy per apprentice depending on apprentice characteristics (such as age, disability, school performance, migration status, gender, previous education) and sector characteristics.	No
Switzerland	No	No	All companies within a given economic sector are required to contribute to a corresponding vocational and professional education and training (VPET) fund (e.g. to develop training programmes, organise courses and qualifications procedures, promote specific occupations). The Confederation may declare some VPET funds to be of general interest and therefore mandatory for all companies within a given economic sector.

Note: Tax incentives reduce either the tax base or the tax due. They include: 1) tax allowances (deducted from the gross income to arrive at the taxable income); 2) tax exemptions (some particular income is exempted from the tax base); 3) tax credits (sums deducted from the tax due); 4) tax relief (some classes of taxpayers or activities benefit from lower rates); 5) tax deferrals (postponement of tax payments).

Sources: The OECD International Survey of VET Systems, 2007 – countries' responses (unpublished); CEDEFOP (2011), Using Tax Incentives to Promote Education and Training: Cedefop Panorama Series 2009, Cedefop Panorama Series 2009, Dictus Publishing, Saarbrücken, www.cedefop.europa.eu/fr/publications-and-resources/publications/5180; Federal Ministry of Science, Research and Economy (2014), *Apprenticeship: Dual Vocational Education and Training in Austria Modern Training with a Future*, www.bmwfw.gv.at/Berufsausbildung/LehrlingsUndBerufsausbildung/Documents/Die_Lehre_HP_engl.pdf.

Special case: Levies

What are the effects of levies?

Levy schemes normally have distributional effects, which makes some employers winners and others losers. The winners are those who pay little into the levy scheme but take extensive advantage of it, for

example by having numerous apprentices supported by levy funding. The aim of levy schemes is to reward employers that create apprenticeship places and make those who benefit indirectly, such as by poaching employees trained by other companies, contribute to the cost of training. Other effects may be unintended. For example, some industrial sectors make little use of apprentices for good reasons – perhaps the skills involved evolve too rapidly to be formalised in an apprenticeship qualification – but they may still have to invest heavily in skills development and pay into a levy.

Many incentive effects arise from how levy funds are spent, as with incentives funded out of general taxation. However, some effects may arise from how levies are collected. For example, in Singapore, the fact that levies fall only on employers paying low wages may encourage an increase in wages and skills to justify the higher wages, and/or it may raise the unemployment risk of the low-skilled by increasing their cost.

Some effects are not strictly economic. Levy schemes that require employers to be directly involved in managing the training fund and identifying training priorities are commonly intended to give employers a sense of ownership of, and involvement in, training.

Few countries have levy systems specifically designed to support apprenticeships. Three countries with such systems are Denmark, England (United Kingdom) and France (see Box 4).

Box 4. Employer levies to support apprenticeships in Denmark, England and France

Denmark maintains a dual apprenticeship system supported by an employer levy system. All employers, public and private, contribute to the Employers' Reimbursement Fund by a fixed amount for each employee (in 2016, around EUR 370 per year). Levy funds are used primarily to pay apprentice salaries while they are pursuing off-the-job training. Apprentice wages are set at the sector level through collective agreements, and typically reach 40 to 50% of the minimum wage. (This model compares with Ireland, where the government carries this cost and pays an allowance to apprentices during their off-the-job training). Reimbursements are relatively generous and may exceed the wage in some cases. There are bonuses for youth who find a paid apprenticeship without assistance (AUB, 2016; OECD, 2014).

Apprenticeships in **England (United Kingdom)** have been undergoing reform to raise their quality and status. A target of three million apprenticeship starts by 2020 has been set, backed by a new proposal that a minimum of 2.3% of the workforce of large (250+ employees) public sector employers should be apprentices. A new funding arrangement, based on an employer levy, will be introduced in 2017. While the requirement for employers to pay the levy is UK-wide, spending its proceeds involves devolved responsibilities; the apprenticeship funding arrangements described here apply only to England. The levy will be collected at the rate of 0.5% of all payroll over GBP three million, smaller employers will be exempted. Levy-paying employers will be given a digital training account where they can see "their" levy contributions accumulating in a fund that is topped up by a 10% contribution from the government. They can use this account to pay registered providers to provide training (and other bodies to provide assessment) for apprentices in their workforce. Funds entering the account must be used within 24 months (Department of Education, 2016). Employers who cannot call on these funds (either because they are small employers who pay nothing or little into the levy, or because they have exhausted the training account) must pay 10% of the training and assessment costs of their apprentices, with the levy funding the remaining 90% (Department of Education, 2016).

Box 4. Employer levies to support apprenticeships in Denmark, England and France (*continued*)

France maintains a complex mix of incentives to encourage employers to offer apprenticeships. A training levy in the form of an apprenticeship tax is set at 0.5% of the wage bill, plus an additional 0.18% tax contribution to a separate "apprenticeship development" fund. Large employers with 250+ employees provide a further contribution that varies with the percentage of their employees in work-based vocational training (apprenticeships and some other schemes). Most funds from these taxes are funneled through intermediary bodies and the regions to offer employers a tax credit of EUR 1 600 per apprentice, and an allowance of at least EUR 1 000 per apprentice. Employers are largely exempt from social security contributions on their apprentices (a substantial benefit in France). Employers may also opt for some of their contributions to the apprentice tax to go directly to the local training institutions that they designate, including higher education institutions, independently of the apprenticeship training role of these institutions. However, following recent reforms, only around 23% of the apprenticeship tax is now allocated in this ways (Conseil d'Analyse Economique, 2014).

Sources: AUB (2016), Webpage for AUB Employers' Reimbursement System, https://indberet.virk.dk/arbejdsgivernes-uddannelsesbidrag-english/arbejdsgivernes-uddannelsesbidrag-aub (accessed December 2016). Department of Education (2016), Webpage for: Apprenticeship Funding: How it will work (updated 25 October 2016), UK Government, London, www.gov.uk/government/publications/apprenticeship-levy-how-it-will-work/apprenticeship-levy-how-it-will-work (accessed December 2016); Conseil d'Analyse Economique (2014) L'apprentissage au service de l'emploi Les notes du conseil d'analyse économique, no 19, Decembre 2014, www.cae-eco.fr/IMG/pdf/cae-note019-env2.pdf; OECD (2014), *OECD Economic Surveys: Denmark 2013*, OECD Publishing, Paris, http://dx.doi.org/10.1787/eco_surveys-dnk-2013-en.

Who bears the cost of levies?

Levies imply an extra cost for companies that may be absorbed by employers, passed on to customers through higher prices, or shifted on to workers and apprentices through lower wages. If there are many skilled workers willing to work for the company, even at a lower wage, the employer can shift the cost on the workers. If, however, companies struggle to find qualified labour, they may not be able to lower salaries.

How to build employer support for levies?

Employers in an industry sector may see apprenticeships as being in their collective interest, even when individual (often small) employers may be reluctant to invest in apprentices who could leave to work for another employer. In these circumstances, employers may opt to work together to support training through a levy. Employer commitment to sectoral training levies is normally high, and such schemes can be found in Germany, Austria and Switzerland.

Employers have particular incentives to set up a sectoral levy fund when the cost of apprenticeship training is high, the labour market is tight and it is difficult to find skilled employees on the external market, and employers face a high risk that their fully-trained employees will be poached by other employers. Employers tend to be more sceptical of universal levy schemes, often perceived by employers as a tax, and where companies have little control over how the money is used and spent (Müller and Behringer, 2012).

How the money is spent

Subsidies can be earmarked according to various criteria:

- Number of apprentices: A number of countries offer a fixed sum per apprentice to employers that provide apprenticeship places. In Norway, the government provides companies a subsidy per apprentice (with a right to upper-secondary education) of around EUR 14 800[6] for two years of work placement with the company, including one year of productive work and one year of training (Norwegian Directorate for Education and Training, 2016). The grant amount is set at the level slightly below the cost of a one year full-time school education.

- New apprenticeship places: Sometimes subsidies aim to encourage companies to create new apprenticeship positions. In Austria and Australia, there is a subsidy for employers providing new apprenticeship places (Federal Ministry of Science, Research and Economy, 2014). The Australian government offers an AUS 1 500 (EUR 1 000[7]) incentive for an employer who commences an Australian apprentice in a certificate III or IV level qualification (New South Wales Department of Industry, 2016).

- Specific occupation: Some countries promote apprenticeships in specific industries and occupations. In Australia, there is an extra subsidy for employers providing apprenticeships that lead to an occupation from the National Skills Needs List. In Norway, higher grants are allocated to employers in small crafts, such as shoemaker, pottery art and silversmith art, which are "protected" for historic or social reasons.

- Progression through the programme: The subsidy can depend on how successful apprentices are in progressing through and completing the programme. The Australian government provides AUS 2500 (EUR 1 700[8]) for employers whose apprentices successfully complete the apprenticeship programme (New South Wales Department of Industry, 2016).

- Characteristics of the apprentice*:* Financial incentives available to companies can also depend on the characteristics of apprentices. Certain schemes aim to increase the provision of work placements to individuals with particular characteristics, such as age, disability, school performance, migration status, gender, and previous education. In Norway, a company receives a maximum subsidy if the apprentice is entitled to three years of upper-secondary education. Companies offering apprenticeships to a person over 21 years and/or who has already attained a qualification at the upper-secondary level receive a subsidy of around a third of the full subsidy. In addition, the company can apply for an extra subsidy if the person has special needs and is under the age of 25 (Norwegian Directorate for Education and Training, 2016). In Australia, there are a wide range of targeted incentive payments for particular circumstances and groups, including for apprentices in a set of "equity" groups and apprentices in rural areas (Australian Government, Department of Education, 2015).

Choice between a lump sum and an earmarked grant

A lump sum that is offered to employers who decide to take on apprentices but that is independent of apprentice numbers creates financial incentives for companies that have not provided apprenticeships

6. Based on currency NOR/EUR exchange rate, 5 April 2016.

7. Based on currency AUS/EUR exchange rate, 5 April 2016.

8. Based on currency AUS/EUR exchange rate, 5 April 2016.

previously, but does not affect the decision of a firm with apprenticeship arrangements in place to take on an additional apprentice.

A lump sum can be usefully provided to build training capacity (including, for example, investment in trainers/instructors, training equipment, assessment capacity) in a company or a sector. Conversely, a subsidy based on the number of apprentices is more likely to have an impact on a firm's decision to create additional apprenticeship places.

Challenges associated with financial incentives

The effect of direct financial subsidies for apprenticeships is probably modest

There are some theoretical reasons to expect that financial incentives will have modest effects. Work on the costs and benefits of apprenticeships in Switzerland and Germany shows that the net benefits to employers are extremely variable from sector to sector and employer to employer. This means that only a relatively small proportion of employers will increase their provision of apprenticeships in response to financial incentives.

This theoretical perspective is borne out by empirical evidence. Westergaard and Rasmussen (1999) found a significant positive effect of public subsidies in Danish firms, but only in manufacturing, office and retailing. In Austria, subsidies appear to have had a limited impact (Wacker, 2007). In Switzerland (where there are no subsidies of this type), a simulation exercise suggested that subsidies would have an impact on firms not involved in apprenticeships, but would have no effect on the supply of apprenticeship training in firms that train already (Mühlemann, 2016). An evaluation of the Australian scheme shows that the subsidy had only a small impact on the decision of employers to train. This was mainly because the subsidy covered only a small part of the company cost of offering an apprenticeship (Deloitte, 2012). Another Australian study evaluates the impact of the withdrawal of an apprenticeship subsidy to employers (Pfeifer, 2016), showing that it had no effect on employers using apprenticeships as a recruitment tool. However, the withdrawal of the subsidy led to a decline in apprenticeship provision in sectors where employers could not count on the long-term benefits of apprenticeships. These employers were not able to break even by the end of the programme without the subsidy. Mühlemann (2016) argues that the reduction in apprenticeships was particularly strong in the service sector, where the quality of apprenticeship provided was often low (as measured by graduation rates and employment outcomes). The subsidy may therefore have been promoting apprenticeships that were of limited value to individuals.

The overall implication is that financial subsidies will typically involve a significant amount of "deadweight", i.e. apprenticeships that employers would have funded anyway, even in the absence of the relevant incentive. Some element of deadweight is inevitable, usually the objective is to minimise its scale so that incentives increase the number of apprenticeships. A further risk is that financial incentives may succeed in engaging employers who are primarily interested in the subsidy, rather than training the apprentices.

Regulations ensure incentives do not promote apprenticeships in very low-skilled jobs

Where apprenticeship regulations make significant demands on the employer in terms of their capacity to train the apprentice, some employers may lack the relevant capacity to take on apprentices; either because their production processes are highly specialised and do not allow apprentices to develop a range of skills required by the qualifications, or because they lack experienced staff able and willing to guide the learning of apprentices. This bottleneck in capacity means that such employers cannot take on apprentices, at least in the short term. In the longer term, however, they may be encouraged by incentives

to invest in their own training capacity. It is important that regulations of this type exist to avoid incentives encouraging employers to offer apprenticeships without providing the required training.

Companies relying on high-level skills may be indifferent to incentives

Companies relying on highly skilled employees may be unwilling to take on apprentices if the skills required and developed during apprenticeships are defined at a much lower level than those the company requires. For example, if apprenticeship programmes are at a much lower level, companies may be more likely to hire and train university graduates from specific fields rather than offer work placements to apprentices.

Incentives targeted at the support of vulnerable groups may experience deadweight problems

The German experience with training bonuses for companies offering work placements to disadvantaged apprentices (with learning difficulties or from disadvantaged backgrounds) also shows some of the challenges in such schemes. Mühlemann (2016) argues that the design of the scheme is to blame: the bonus for disadvantaged apprentices was too low to allow companies to recoup their investment by the end of the apprenticeship. Companies were therefore offering work placements to individuals they intended to hire after the end of apprenticeship in order to realise long-term benefits. These individuals would have been offered an apprenticeship place even without the subsidy.

Displacement takes place when subsidies increase one type of training at the expense of others

Displacement is often intended, since funding criteria are designed to set priorities. But well-intended measures can sometimes result in unwanted displacement effects. For example, in the Netherlands, a 1998 tax law allowed firms to claim 120% of their training expenditure as a tax deduction for workers under 40, and 140% for those over 40, with the objective of encouraging the training of older workers. However, the effect was that training was redistributed from workers slightly below the age of 40 to those just over 40. The overall volume of training was little changed (Leuven and Oosterbeek, 2004).

Measures to reduce deadweight sometimes focus on additionality

Attempts are sometimes made to avoid deadweight by limiting subsidies to additional apprenticeships. In Austria and Australia there is a subsidy for employers providing new apprenticeship places (Federal Ministry of Science, Research and Economy, 2014). For example, there is an AUD 1 500 (EUR 1 000[9]) incentive for an employer who starts an Australian Apprentice in a certificate III or IV level qualification (New South Wales Department of Industry, Australia, 2016). A tax allowance for training introduced in Flanders (Belgium) was limited to companies that could show they were increasing overall training (Muller and Behringer, 2012). However, additionality tests can be hard to enforce. It may also be seen as unfair if funding does not go to employers with a stable and longstanding commitment to apprenticeships.

Sectoral and national schemes have different attractions

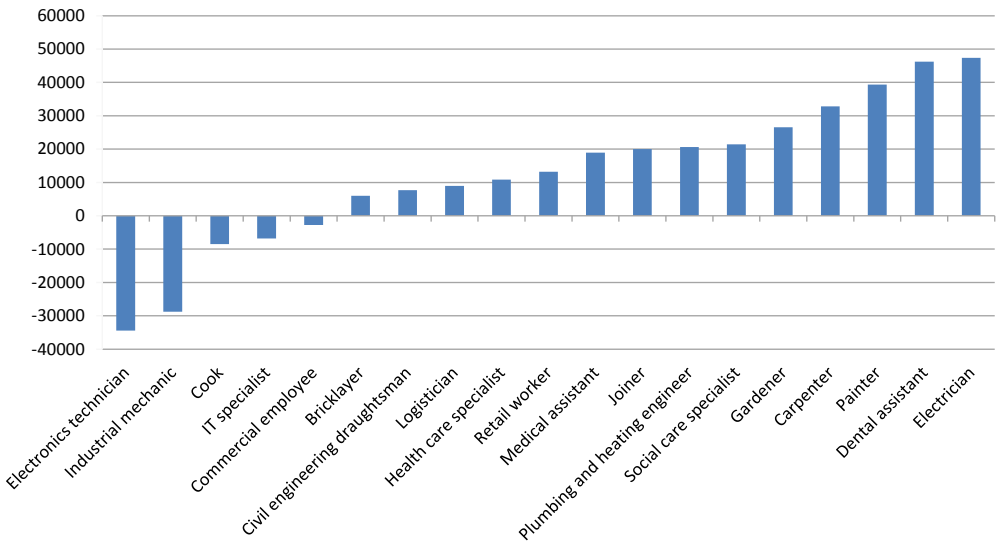
Universal schemes with a simple structure (e.g. with one tax credit or subsidy rate for training companies) are easier to understand and handle by employers. They are also cheaper in terms of administrative costs. However, they do not take into account the large differences in costs and benefits incurred by companies, which can lead to either deadweight effects or the under-provision of apprenticeships.

9. Based on currency AUD/EUR exchange rate, 5 April 2016.

In Germany, the net costs per apprentice (costs less benefits gained during the apprenticeship period) by sectors ranges from EUR 1 200 to 8 000 (Mühlemann, 2016). In Switzerland, this difference is even larger, with many companies making financial gains from apprenticeships by the end of the apprenticeship (see Figure 11). In Austria, employer net benefits are, on average, negative by the end of the apprenticeship, despite the subsidy, although the cost-benefit ratio is positive in some occupations, typically those that are female dominated (e.g. office clerk, hairdresser, pharmacy assistant). Schlögl and Mayerl (2016) argue that government subsidies may contribute to the oversupply of apprenticeships in these occupations. Given large differences in the costs and benefits structure across different firms, a single subsidy level will only encourage more apprenticeships in a relatively small proportion of "marginal" cases, while substantial deadweight is inevitable.

Figure 11. The net benefits of apprenticeships in Switzerland

Net benefits (in EUR) reached by the end of the apprenticeship period. Long-term benefits such as benefits flowing from the recruitment of apprentice graduates are not included



Source: Mühlemann, S. (2016), "The Cost and Benefits of Work-based Learning", *OECD Education Working Papers*, No. 143, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlpl4s6g0zv-en.

Large employers are better at accessing financial support

Large employers tend to benefit disproportionately from financial incentives (Müller and Behringer, 2012). For employers to benefit from the subsidy they need to be informed about the scheme, e.g. on the existence of the measures, the criteria of eligibility, and procedures of application. Access to accurate and timely information may be easier for larger employers that often have training departments and staff dedicated to training issues. The provision of apprenticeships and the use of subsidies also involve costs. The cost of these procedures may be less significant for bigger enterprises, relative to their overall training costs. Small enterprises may lack the capacity to determine training needs, plan accordingly and file applications for cost reimbursement or grants. It is therefore important to assist small companies with access to and the processing of available funding in parallel to providing financial incentives for apprenticeships. Some of these measures are discussed in section 4.

Non-financial incentives for employers

Non-financial incentives take three main forms:

- Capacity building and support measures designed to help employers make better use of apprentices.
- Regulatory measures that require employers to take apprentices (or penalise them if they do not).
- Image enhancement measures designed to attract employers and students to the apprenticeship brand.

Capacity building and support measures

The design of apprenticeship systems must balance the needs of companies and apprentices

Apprenticeship design needs to build in features that will make the institution attractive to employers, but without losing sight of the fact that an apprenticeship system needs to attract good students. As argued in the previous section, the attractiveness of apprenticeships to employers and individuals depends on the duration of apprenticeship programmes, how the duration is articulated with apprentice wages and productivity, and on the content and organisation of the work placement (see section 2).

Apprenticeships can be promoted by making companies better at training

Some employers may not feel able to train apprentices, and some are better than others at conducting on-the-job training. Training capacity depends on the quality of trainers, training methods and training equipment, and is typically less well developed in small companies that do not have dedicated training arrangements. Small companies may therefore particularly benefit from measures designed to enhance training capacity, such as training for trainers or assistance with administrative work.

The capacity to train and develop apprentices is very similar to general management capacity. All workers are partially rather than fully skilled, particularly in the context of innovation, where everyone is trying out new approaches and tasks. In this context, the job of managers is to guide and support staff and ensure that key tasks are performed, while at the same time developing the skills of staff through feedback of different types. This is a very challenging task, and similar to that of someone supervising apprentices. The implication is that measures that develop employer capacity to manage apprentices will also assist their capacity to manage other staff.

Governments can enhance the training capacity of firms through a wide range of tools that include the provision of training for apprentice instructors; offering support materials to firms to help them develop their training skills; and facilitating networking among employers to share knowledge and experience on how best to support, develop and make use of apprentices. For example, the Norwegian Directorate for Education offers free resources for apprentice instructors on their website, including short movies showing how instruction can be carried in practice (Directorate for Education and Training, Norway, 2011).

In some countries, special bodies facilitate the provision of apprenticeships

In some countries, special bodies undertake a range of tasks on behalf of companies providing apprenticeships, such as taking care of the administrative duties involved in apprenticeship training, employing apprentices and hiring them out to host employers, matching employers to students looking for workplace training, undertaking training, and managing apprenticeship administration. They can be run and managed by employers themselves or by a third party. They have particular relevance for smaller

employers that cannot efficiently manage all of these functions internally. They are discussed more fully in section 4.

Regulatory measures

The simplest type of regulatory measure is a workforce requirement. For example, in England, a new proposal is that larger (250+ employees) public sector providers should have at least 2.3% of their workforce as apprentices. Some measures may be linked to public procurement. Companies providing apprenticeships may sometimes receive preferential treatment in the award of public contracts. Strupler and Wolter (2014) evaluated this policy in Switzerland, and found that the policy increased apprenticeship provision among small firms with fewer than 50 employees, and among firms in sectors where public procurement represents a large share of the business. The policy had little effect on training quality (measured with instruction time).

While this measure looks promising given its relatively low cost and the positive impact on provision, there are also some potential drawbacks: 1) some highly specialised firms have niche skilled jobs that will not correspond to any widely recognised apprentice qualification, and they may be discriminated against in a public procurement process; 2) there may be discrimination against small firms (compared to large firms) when a limited pool of qualified applicants for apprenticeships are scooped up by the larger firms; and 3) such a policy may lead to too many apprenticeships in certain industries or occupations (such as construction) where public procurement is widespread (Leiser and Wolter, 2014 in Mühlemann, 2016). Preferential treatment to companies with apprenticeships in public procurement contracts may also be against World Trade Organisation guidelines (Mühlemann, 2016).

The Norwegian government has introduced new rules for apprenticeship requirements in public procurement. For contracts worth a minimum of NOK 1.5 million, the government must buy goods and services from companies that are an approved apprenticeship provider. These regulations will mainly apply to the building, construction and ICT sectors. These stricter rules are part of the follow-up to the new Social Contract to ensure that every VET student in search of an apprenticeship shall find one. Lack of apprenticeship places is a serious challenge in Norway: in 2015, 9 000 would-be apprentices could not find an apprenticeship place.

Image enhancement measures

Companies that offer apprenticeships can enhance their reputation as companies investing in people. This may indirectly increase profits if companies seen as socially responsible are more likely to sell their products and services. In a recent campaign in Norway, training companies can brand themselves with a label for “approved learning enterprises”. The purpose of this initiative is to encourage more enterprises to join the apprenticeship scheme. If consumers make it clear that they prefer to buy goods and services from approved learning enterprises, firms that offer apprenticeships will have a competitive advantage. The government has launched a public relations campaign to encourage people to look for the brand, with advertisements in a national newspaper and on online marketplaces, as well as a Facebook page. While such branding initiatives may be promising, evidence of their effectiveness is scarce, and good quality evaluations remain to be undertaken.

Conclusions and policy implications

Based on the evidence presented in this paper, financial incentives for apprenticeships are likely to have modest effects, and will usually involve substantial deadweight. There are also risks of unintended effects, such as encouraging the engagement of employers who are more interested in subsidies than skills development. At the same time, through quality youth apprenticeships, employers may be shouldering the

burden of training and guiding young people through to employment, a task that in other contexts would fall to government and the public purse. In recognition of this role, Norwegian employers, for example, receive a sum for each apprenticeship that is nearly as high as what it would cost for the apprentice to complete their school education without an apprenticeship. In this area there are issues of burden-sharing between government and employers that go beyond the narrow issue of incentives and their effectiveness. One clear implication is that financial incentives should be carefully monitored and evaluated, as evaluation evidence is relatively thin.

There are various types of non-financial incentives. Some of the most promising are capacity building measures that aim to support employers and get the best out of apprentices. The cost-benefit balance of apprenticeships is not always fixed in stone: better apprentice supervisors and trainers could make apprenticeships profitable for an employer. Support institutions can help individual employers successfully work with apprentices. Very often, the apprenticeship "culture" that is often referred to as the dual system in countries is in fact a set of management capacities within employer organisations that allow them to make effective use of apprentices. Management capacity can be learnt, and this resonates with a long-term aim of many countries to build apprenticeship capacity.

Policy pointers

1. Financial incentives for employers to take apprentices are likely to yield substantial deadweight losses, i.e. they subsidise apprenticeships that would have been provided anyway. Therefore, such incentives should be used with caution and their impact should be evaluated carefully, including displacement effects. Targeted financial incentives (e.g. by sectors, company characteristics) may reduce deadweight loss but may be more costly to design and implement.

2. Introduce high quality standards for apprenticeships to ensure that incentives do not lead to apprenticeships in low-skilled jobs.

3. When providing financial incentives for apprenticeships, ensure that small employers also receive support with accessing and processing available funding.

4. Cost sharing by employers at the sectoral level can be promoted in specific sectors where: the cost of apprenticeship training is high, the labour market is tight and it is difficult to find skilled employees on the external market, and when employers face a high risk that their fully-trained employees will be poached by other employers.

5. Financial incentives should take into account the wider public policy context, as well as the relative attractiveness of alternative learning pathways (including tertiary education) and the level of public support offered for such pathways.

6. Explore options for enhancing non-financial incentives for employers, including measures that increase the training capacity of employers.

4. APPRENTICESHIPS AND SMALLER EMPLOYERS

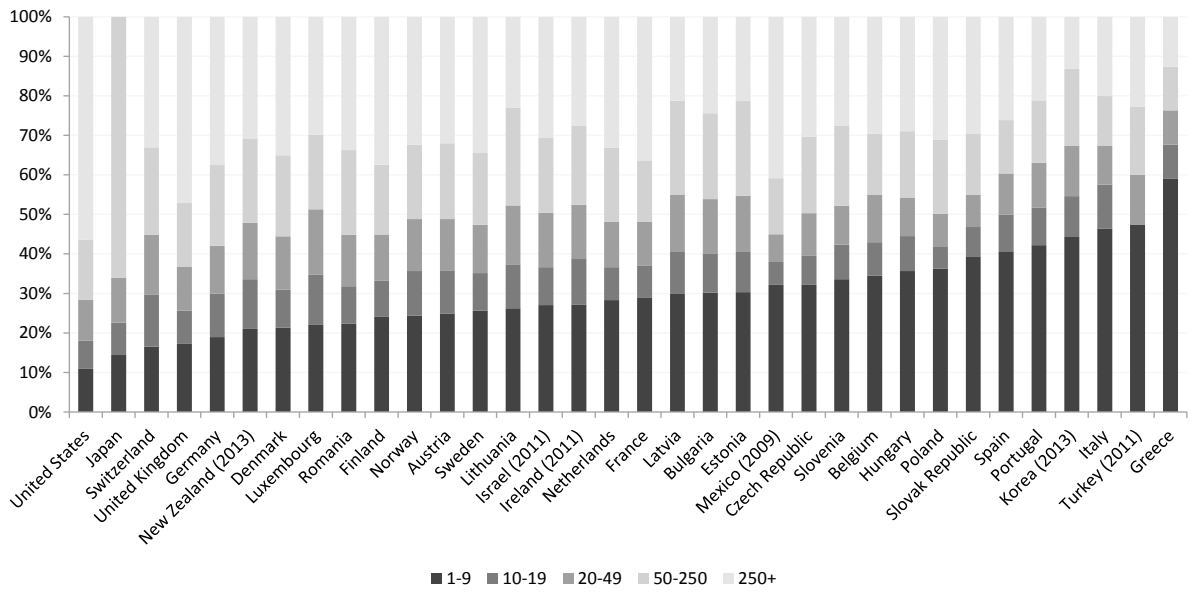
Introduction

Many countries are concerned that smaller employers may be reluctant to offer apprenticeships. It has been argued that funds from training levies are often exploited by larger employers (Johanson, 2009; Dar and Whitehead, 2003; CEDEFOP, 2011; Müller and Behringer, 2012), and that smaller employers may perceive few benefits from training if trained employees are "poached" by larger employers with better career prospects; they may also lack the capacity to plan and determine training needs. However, there is evidence to suggest that smaller employers actually make significant use of apprentices.

Many economies rely on micro and small companies

In southern European countries and Korea, 40% or more of all employees work for micro companies that employ fewer than 10 people (see Figure 12). These micro companies represent between 70% and 95% of all companies across OECD countries (OECD, 2015). In the majority of countries, small companies with fewer than 50 employees account for at least 40% of total employment. On average in OECD countries, 40% of value added is created by small enterprises (with fewer than 50 employees), with the relative share of small firms in total value added ranging from 23% in Mexico to more than 60% in Luxembourg. The contribution of small companies to the economy varies across sectors, but they are the backbone of the services sector in nearly all countries. In contrast, large firms provide a substantive contribution to value added in manufacturing (OECD, 2016).

Figure 12. Persons employed, by company size (2012 or latest available year)



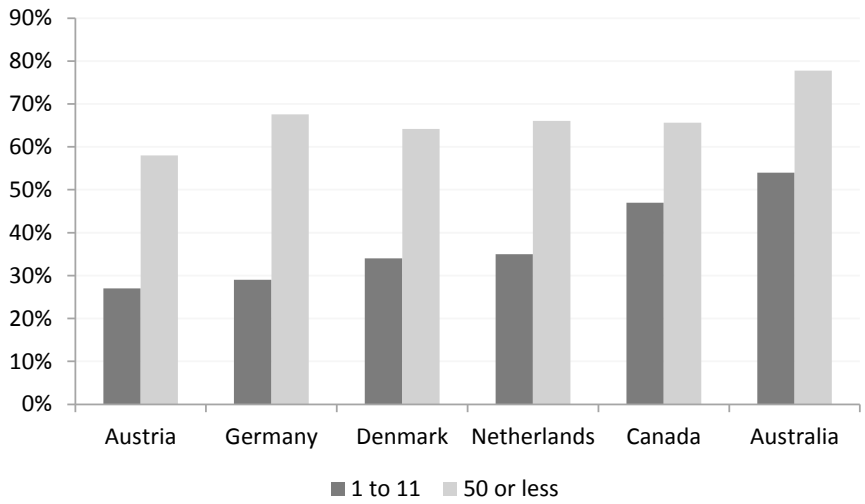
Source: OECD (2015), *Entrepreneurship at a Glance 2015,* Table 2.2, OECD Publishing, Paris, http://dx.doi.org/10.1787/entrepreneur_aag-2015-en.

Small companies are a major provider of apprenticeships

Small companies provide a large share of apprenticeships. In countries for which data are available, more than half of all apprentices work in companies with 50 employees or fewer (see Figure 13). Many small companies therefore find apprenticeships beneficial, either because the design of the apprenticeship system works well for them, or because of special incentives or support mechanisms that encourage the provision of apprenticeships among small employers. Small and very small employers, including family firms, may find that apprenticeships are an effective way of recruiting and training up key individuals in a context where personal connections and loyalties may play an important role that cannot be reproduced through ordinary recruitment channels.

Figure 13. A large share of apprentices (16-65 year-olds) work in small and micro companies

2012, companies with 1 to 11 employees, and with 50 employees or less



Source: OECD (2016a), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.

Small companies are over-represented in some sectors

Apprenticeships are more common in sectors and occupations with a long tradition of training and where employers (and often unions) are well represented and organised. Companies from these sectors/occupations therefore have access to training know-how and institutional support that is not available to companies from other sectors and occupations. For example, in the majority of countries with apprenticeship training, there are many apprentices in manufacturing, construction and engineering. However, there are also many differences, for example, in Norway and Canada, apprenticeships in sectors such as business and administration are less common than in Austria and Germany (OECD, 2016a). Differences between sectors in apprenticeship provision can also be attributed to varying work and production methods (some occupations require higher level skills than others). These sectoral differences impact on apprenticeships by firm size, as some sectors (e.g. food preparation and restaurants) involve many small employers, while others (such as aerospace) are dominated by large employers.

Barriers to apprenticeships in small employers

Establishing apprenticeships in small companies is more challenging

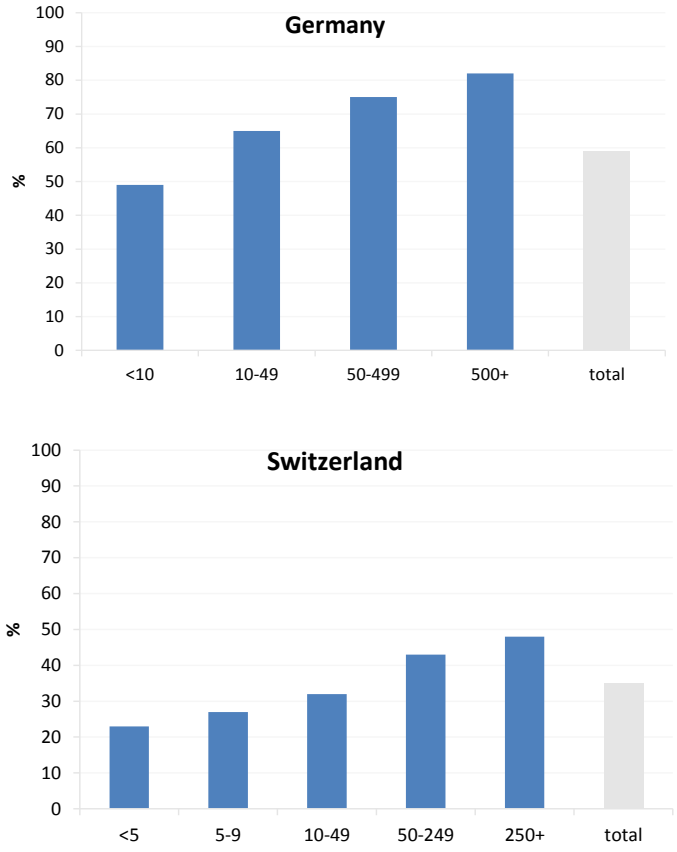
While small firms are a major provider of apprenticeships, they are less likely to provide apprenticeships than large employers. In Switzerland, around 25% of companies with fewer than 10 employees provide apprenticeships; compared to 80 % of large firms employing 100 people or more (Mühlemann, 2016). This statistic provides no indication of whether the ratio of apprentices to ordinary employees is greater or smaller in larger firms. There are a number of ways in which small companies may find the provision of apprenticeships more challenging.

Small companies are less likely to recruit apprentice graduates

Large companies are more likely to realise long-term benefits from apprenticeships by retaining the most able graduate apprentices than small employers. Evidence from Germany and Switzerland shows that retention rates of apprentices increase with firm size (see Figure 14). Higher retention rates among larger employers may reflect graduate preferences, as big companies are often seen as more attractive to work for in terms of salary, benefits packages and long-term career opportunities.

Figure 14. Company retention rates of apprentices

By company size



Sources: Jansen, A. et al. (2015), "Labour Market Deregulation and Apprenticeship Training: A Comparison of German and Swiss Employers", *European Journal of Industrial Relations*, http://dx.doi.org/10.1177/0959680115580687; Strupler and Wolter (2012) in Mühlemann, S. (2016), "The Cost and Benefits of Work-based Learning", *OECD Education Working Papers*, No. 143, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlpl4s6g0zv-en.

Small companies are less likely to attract the best apprentices

There is some evidence (Germany and the Netherlands) that apprentices with stronger basic skills are more likely to be found in big firms (see Table A2 in Annex A). This may be because higher ability students choose apprenticeships in larger firms, or that large employers are more effective in developing skills in apprentices, or both. Evidence shows that large firms invest more in training and in the development of general skills than small companies, which tend to provide more company specific training (European Commission, 2013). Patterns of self-selection of starting apprentices are also relevant: if would-be apprentices with strong skills prefer larger employers with good career opportunities, smaller employers may decide to opt out altogether from apprentice recruitment.

Small companies may find the provision of apprenticeships expensive and disruptive

Small companies are less able to benefit from the economies of scale that can reduce the unit cost of apprenticeship training. Such economies are realised when, for example, a trained instructor provides training to a few apprentices at the same time, or when the company bears the fixed cost of administrative and other requirements associated with apprenticeships. Small companies may also be unable to train for the full range of skills required by a particular apprenticeship qualification.

Incentives and support for small employers to offer apprenticeships

Incentives for small employers to offer apprenticeships

One of the main potential market failures for small companies providing apprenticeships is that they are more likely to have their fully-trained apprentices poached by another employer. As a result, they may not provide apprenticeships unless they can recoup their training investment by the end of the apprenticeship through the additional productivity of the partly trained apprentice, without taking into account the long-term benefits of retaining a skilled worker. Governments can help to tackle this issue through financial incentives targeted at small firms, or by supporting mechanisms that allow smaller employers to work together to gain economies of scale in apprenticeship provision.

Shared responsibility for the provision of apprenticeships

Some small companies are not able to comply with all the requirements for the on-the-job part of an apprenticeship (e.g. in terms of skills that apprentices should develop and trainers' qualifications). To support employers that on their own would not be able to provide apprenticeships, many countries have arrangements that allow employers to share responsibility for apprenticeships. For example, in Denmark, small companies can jointly provide part or a whole apprenticeship (Poulsen and Eberhardt, 2016). In Germany, "apprenticeship sharing" includes the following models (Poulsen and Eberhardt, 2016):

- Lead enterprise with partner enterprise model: the lead enterprise bears the overall responsibility for training, but parts of the training are conducted in various partner enterprises.
- "Training to order" model: some periods of training take place outside the regular enterprise, perhaps in a nearby large enterprise with a training workshop, on the basis of an order and against reimbursement of costs.
- "Training consortium" model: several small enterprises work together and take on apprentices.
- "Training association" model: the individual enterprises establish an organisation for the purpose of the training that takes over the organisational tasks (contracts, etc.), while the master enterprises offer the training. The organs of the association are the general meeting and the honorary committee. A statute regulates the rights and obligations of the members.

In Austria, companies that cannot fulfil certain standards (for instance because they are too small or too specialised to provide their apprentices with the required training) may form training alliances (*Ausbildungsverbünde*) to share apprentices. Alliances of training firms are supervised at the state level by the Apprenticeship Offices (*Lehrlingsstellen*) appointed by Economic Chambers. Economic Chambers help to find partners for firms willing to create new training alliances. Lachmayr and Dornmayr (2008) show that training alliances help to improve the quality of apprenticeship provision. In 2008, at least 5 000 training firms, or 15 000 apprentices, were organised in training alliances (estimation in Lachmayr and Dornmayr, 2008 based on Hoeckel, 2010).

Shared responsibility for apprenticeships among commercial partners

In specific occupations in England, such as those related to engineering and technology, large companies may provide part of the apprenticeship training to apprentices recruited by small companies in their supply chains. By providing part of the training on behalf of the small companies, large employers ensure that they receive better quality products and services from their suppliers, and prevent skills shortages in their supply chains (Lewis, 2014). Without this partnership and the "outsourcing" of part of their apprenticeships, many small companies would not be able to provide apprenticeships, as they often lack the training infrastructure. Apprenticeships provided jointly with a large and well-known company also raises the status of provided apprenticeships, and allows small firms to attract better candidates (Lewis, 2014).

Measures to improve training capacity among small companies

Small companies may therefore particularly benefit from measures to improve training efficiency, such as training for trainers and assistance with administrative work. This can include a range of tools. For example, in Austria, qualified trainers from vocational schools can work with small companies and support them in the provision of apprenticeship training (CEDEFOP, 2015).

In some countries, external bodies help companies with different aspects of apprenticeship provision (see Box 5). While they are not designed specifically to serve small employers, they can facilitate the provision of apprenticeships in small firms.

Box 5. External bodies involved in apprenticeship training

Australia: Group training organisations (GTOs) are not-for-profit organisations supported by public authorities, with some charges to host employers. GTOs employ apprentices and hire them out to host employers, sometimes focusing on a particular industry or region. Their tasks include: selecting apprentices adapted to the needs of employers; arranging and monitoring training both on- and-off-the job; taking care of administrative duties; and ensuring that apprentices receive a broad range of training experience, sometimes by rotating them to different firms.

For research papers on GTOs see: www.ncver.edu.au/publications/bytheme.html.

Norway: Apprenticeship Training Agencies (ATA) (*opplæringskontor*) are owned by companies and aim to establish new apprenticeship places, supervise companies with apprentices, train staff involved in the instruction of apprentices and organise the administrative tasks related to being a training company. Many ATAs organise the theoretical part of apprentices' training. While county authorities must approve each individual company with apprentices, ATAs often sign the apprenticeship contracts on behalf of enterprises providing apprenticeship, thereby becoming accountable for completion of the apprenticeship and its results. About 70-80% of companies with apprentices are associated with ATAs. These bodies are funded through the state grant. Typically, companies pay half of the amount received from the state for apprenticeship training to ATAs. The prices of ATA services are set in an agreement between ATAs and the member companies.

A recent research report (Høst et al., 2014) found that the ATAs often carried out the county authorities' tasks and worked actively in assuring the quality of the apprenticeship training. ATAs have the formal status of training enterprises, however they operate somewhere between the county authorities and the individual company with apprentices, making their legal status unclear. Research show that the institutional support given by the ATAs is important for the apprenticeship scheme to work (Høst, Skålholt and Nyen, 2012).

Switzerland: Autonomous training centres provide basic practical training to apprentices on behalf of companies. Training can be of varying duration, and typically precedes training in a company. It aims to facilitate the transition to training in companies by providing apprentices with theoretical and practical knowledge relevant to the occupation. It ends with a theoretical examination. Training in the training centres does not replace education and training provided by vocational schools. In addition to the provision of training, some training centres also take responsibility for the recruitment of apprentices for companies. The centres are non-profit organisations, with their expenses covered by the member companies. Member company fees vary depending on the occupation. Companies outsource part of the training to training centres rather than providing it themselves, as it is more effective and less risky.

- Training centres reach economies of scale by increasing the number of apprentices while maintaining the cost.
- As training is the principal activity of training centres, they have greater capacity to focus on the quality of training than individual companies. Some companies, and in particular SMEs, do not have the capacity to deliver good quality apprenticeship training on their own. Apprenticeship training typically takes two years and represents a long-term commitment for companies.
- By outsourcing training to training companies, which take the entire responsibility for apprentices during this period, companies also outsource part of the risk. The risk can be related to changing business environment, economic shocks and other factors.

Based on an empirical evaluation, the model of training centres is a viable alternative to part of in-company training.

Sources: The OECD International Survey of VET Systems, 2007 – Norway (unpublished); personal e-mail exchange with Norway; Walther B., J.Schweri and S.Wolter (2015), "Shall I train your apprentice? An Empirical Investigation of Outsourcing of Apprenticeship Training in Switzerland", *Education+Training*, Vol. 47 Iss4/5 pp. 251-269; Høst, H., A. Skålholt, A. and A. Nyen, (2012). Om potensialet for å få bedriftene til å ta inn flere lærlinger: En kartlegging av norske bedrifters vurdering av lærlingordningen. ISSN: 1894-8200. Nordisk institutt for studier av innovasjon, forskning og utdanning. Sider: 94; Høst, H. (2014). Kvalitet i fag og yrkesopplæringen. Arena for kvalitet – Opplæringskonferanse, Utdanningsdirektoratet.

Conclusions and policy implications

The evidence shows that small employers often make effective use of apprentices. This may be because small employers themselves learned their trade as apprentices and understand and appreciate the apprenticeship route. Circumstances may be different in countries with a weaker overall apprenticeship culture, and where individual small employers may not fully understand how to realise the potential benefits. Small employers will often benefit from supporting and co-ordinating institutions or other intermediary organisations and structures that help small employers to work together to manage apprentices. Some smaller employers will benefit from targeted training and assistance to develop their capacity to use apprentices.

Policy pointers

1. Smaller employers can benefit greatly from apprentices. Governments and social partners can support smaller employers by:

    - Encouraging employers to find ways to share the responsibilities and risks associated with the provision of apprenticeships.

    - Promoting bodies that work with groups of small employers to co-ordinate training.

    - Supporting small employers with the administration and provision of apprenticeships.

2. Special financial incentives for smaller employers to take on apprentices should be used cautiously and carefully evaluated.

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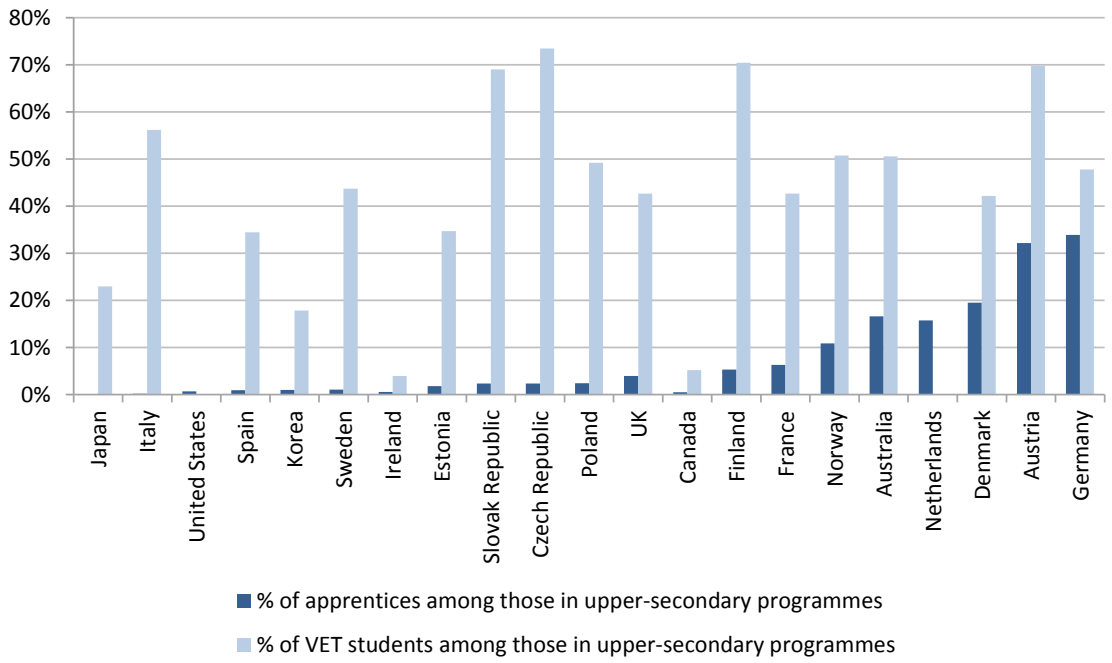
ANNEX A

Figure A1. Share of upper-secondary students participating in VET and apprenticeships

Age cohorts: 15-64 year-olds for data on VET, and 16-65 year-olds for data on apprenticeships



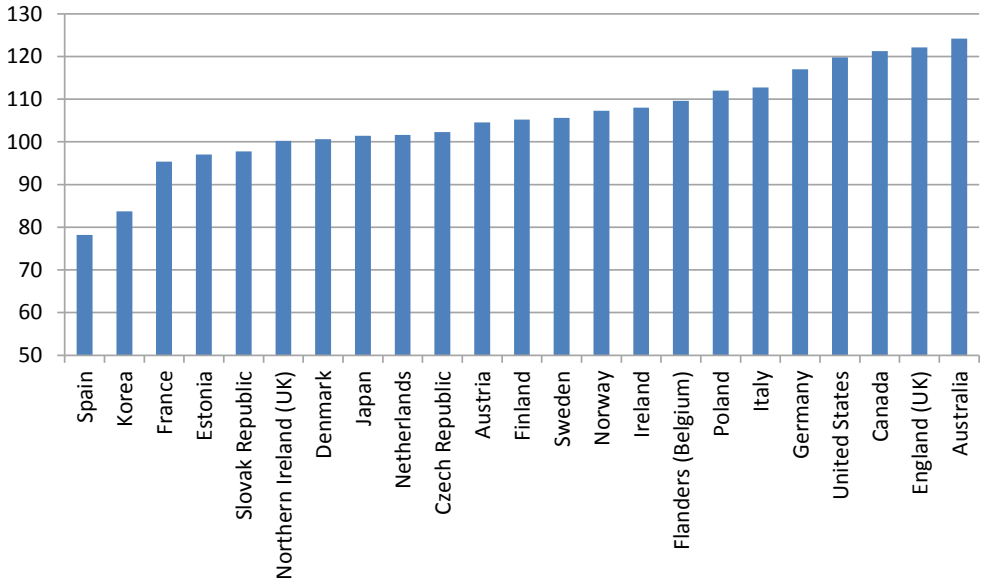
Note: Data on VET enrolment in the United States and the Netherlands are missing. Data on apprenticeship in the United Kingdom refer to apprenticeship participation in England and Northern Ireland only.

In Italy, Japan, Korea, Spain, Sweden and the United States, the estimated share of current apprentices is not significantly different from zero.

Sources: OECD (2016b), *Entrepreneurship at a Glance 2016*, Table C1.3a, OECD Publishing, Paris, http://dx.doi.org/10.1787/entrepreneur_aag-2016-en; OECD (2016), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.

Figure A2. Distribution of numeracy skills among those enrolled in upper-secondary and short post-secondary programmes

Difference between the 90th and 10th percentiles (in score points), 16-25 year-olds



Source: OECD (2016), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.

Table A1. Distribution of current apprentices (16-65 year-olds) by level of education and training, in %

	Upper-secondary	Short post-secondary	Number of observations
Australia*	83	17	58
Austria	100	0	87
Canada	8	92	63
Denmark	97	0	95
Germany	100	0	116
Netherlands	100	0	75
Norway*	79	21	51

Note: * Results for Australia and Norway should be interpreted cautiously due to the sample size.

Source: OECD (2016a), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.

Box A1. Variables used to identify current apprentices and apprenticeship graduates

International background questionnaire

C_Q07

Please look at this card and tell me which ONE of the statements best describes your current situation. If more than one statement applies to you, please indicate the statement that best describes how you see yourself.

1 Full-time employed (self-employed, employee)

2 Part-time employed (self-employed, employee)

3 Unemployed

4 Pupil, student

5 Apprentice, internship

6 In retirement or early retirement

7 Permanently disabled

8 In compulsory military or community service

9 Fulfilling domestic tasks or looking after children/family

10 Other

DK

D_Q09

What kind of employment contract do you have? Is that … *[Only salaried employee]*

1 An indefinite contract (go to D_Q10)

2 A fixed term contract (go to D_Q10)

3 A temporary employment agency contract (go to D_Q10)

4 An apprenticeship or other training scheme (go to D_Q10)

5 No contract (go to D_Q10)

6 Other

Box A1. Variables used to identify current apprentices and apprenticeship graduates (*continued*)

BQ_01a

Which of the qualifications on this card is the highest you have obtained?

1 No formal qualification or below ISCED 1 (Go to B_Q02a)

2 ISCED 1 (Go to B_Q01c1)

3 ISCED 2 (Go to B_Q01c1)

4 ISCED 3C shorter than 2 years (Go to B_Q01b)

5 ISCED 3C 2 years or more (Go to B_Q01b)

6 ISCED 3A-B (Go to B_Q01b)

7 ISCED 3 (without distinction A-B-C, 2y+) (Go to B_Q01b)

8 ISCED 4C (Go to B_Q01b)

9 ISCED 4A-B (Go to B_Q01b)

10 ISCED 4 (without distinction A-B-C) (Go to B_Q01b)

11 ISCED 5B (Go to B_Q01b)

12 ISCED 5A, bachelor degree (Go to B_Q01b)

13 ISCED 5A, master degree (Go to B_Q01b)

14 ISCED 6 (Go to B_Q01b)

15 Foreign qualification

B_Q01b

What was the area of study, emphasis or major for your highest level of qualification? If there was more than one, please choose the one you consider most important.

1 General programmes

2 Teacher training and education science

3 Humanities, languages and arts

4 Social sciences, business and law

5 Science, mathematics and computing

6 Engineering, manufacturing and construction

7 Agriculture and veterinary

8 Health and welfare

9 Services

Box A1. Variables used to identify current apprentices and apprenticeship graduates (*continued*)

National background questionnaire - Austria

B_Q01aAT

Which of the qualifications on this card is the highest you have obtained?

1 = "No compulsory school"

10 = "Post-secondary courses"

11 = "Post-secondary colleges"

12 = "University courses"

13 = "University-Bachelor"

14 = "University-Master"

15 = "Post-graduate courses"

16 = "Doctoral Programme"

17 = "Foreign qualification"

2 = "Compulsory school"

3 = "Apprenticeship"

4 = "Vocational School (< 2 Years)"

5 = "Vocational School (2 Years and longer)"

6 = "Nursing"

7 = "Master craftsman's certificate"

8 = "Academic Secondary School"

9 = "Vocational college"

.V = "Valid skip"

.D = "Don't know"

.R = "Refused"

.N = "Not stated or inferred"

National background questionnaire - Germany

B_Q01aDE2_REC

Which of the qualifications on this card is the highest you have obtained?

1 = "No professional qualification (yet)"

10 = "Doctorate"

11 = "Foreign professional qualification"

12 = "Another professional qualification"

Box A1. Variables used to identify current apprentices and apprenticeship graduates (*continued*)

2 = "Apprenticeship (Lehre)"
3 = "Basic vocational training (beruflich-schulische Ausbildung)"
4 = "Training at Fachschule, Meister"
5 = "Berufsakademie, Fachakademie"
6 = "Bachelor at Fachhochschule"
7 = "Master/Diplom at Fachhochschule"
8 = "Bachelor at university"
9 = "Master/Diplom at university"
.V = "Valid skip"
.D = "Don't know"
.R = "Refused"
.N = "Not stated or inferred"

National background questionnaire - Canada

B_Q01aca6

Which of the qualifications on this card is the highest you have obtained?

1 = "No formal education"
10 = "Bachelor's degree"
11 = "University certificate above the bachelor's"
12 = "First professional degree (medical, veterinary medicine, den"
13 = "Master's"
14 = "Ph.D."
15 = "Education not definable by level"
2 = "Less than high school diploma"
3 = "High school diploma or equivalent"
4 = "Trade/vocational certificate (includes an attestation of voc"
5 = "Apprenticeship certificate"
6 = "CEGEP diploma or certificate"
7 = "Non-university certificate or diploma from a college, school"
8 = "University transfer program"
9 = "University certificate or diploma below bachelor's degree"
.V = "Valid skip"
.D = "Don't know"
.R = "Refused"
.N = "Not stated or inferred"

Sources: OECD (2013), "The background questionnaire", in *The Survey of Adult Skills: Reader's Companion*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264204027-5-en; National background questionnaires in *"The Survey of Adult Skills"* (unpublished).

Table A2. Firm size and literacy skills

Reference group is firms employing more than 50 people. Variable “firms 50” is firms with 50 or fewer employees

Country	Parameter	Estimate_m	SE	prob_T
Austria	Intercept	256.0622	7.05279	0
Canada	Intercept	287.6763	10.98371	0
Denmark	Intercept	269.1184	7.507157	0
Germany	Intercept	279.6391	6.286906	0
Netherlands	Intercept	288.4626	6.366924	0
Norway	Intercept	244.4325	10.09737	0
Austria	firms50	-4.88844	8.564001	0.569747
Canada	firms50	-21.6098	14.59736	0.142747
Denmark	firms50	-10.7112	8.521074	0.212448
Germany	firms50	-15.9068	8.968389	0.079975
Netherlands	firms50	-14.1289	7.643442	0.068272
Norway	firms50	10.81464	12.2796	0.381152

Note: Number of observations: Austria – 102, Canada – 145, Denmark – 152, Germany – 169, the Netherlands – 169, Norway – 38.

Source: OECD (2016a), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis/.