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EDU/EDPC/CERI(2008)3

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

18-Apr-2008

English - Or. English

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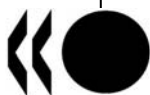
COSTS AND BENEFITS IN VOCATIONAL EDUCATION AND TRAINING

Declassified

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JT03244472

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COSTS AND BENEFITS IN VOCATIONAL EDUCATION AND TRAINING

Tentative conclusion

The evidence gathered in this VET cost benefit literature review leads to the following preliminary conclusions that will be used to inform subsequent research.

1. *An aggregate cost-benefit analysis or general conclusions applicable to all OECD countries are hardly feasible for substantive and methodological reasons*
 - VET systems, their definition and forms of provision vary substantially across countries.
 - Lack of standardized approach to data collection limits comparability; missing evidence.

2. *Understanding the determinants of VET costs and benefits is as important as knowing the costs and benefits themselves*
 - Determinants include: Labour market regulations, influence of trade unions, nature of demand for skills, industry sector or occupation, types of VET provision, general versus specific training.
 - Example: salaries of Swiss trainees are higher than those of their German counterparts but only Swiss firms reap net benefits; reason: unlike Germany, the flexible labour market in Switzerland does not inhibit turnover, therefore Swiss firms have to make sure trainees are productive.

3. *Various direct and indirect costs to different stakeholders have to be taken into account*

	School based VET	Workplace training
Individual	Student fees Charges for material/equipment	Accept lower wages Opportunity costs (forgone earnings as unskilled worker)
Employer	Paid time off for staff/trainees Financial support for staff/trainees	Pay wages (and labour costs) higher than productivity Mistakes by inexperienced trainees, wasted resources and time of experienced workers In-house training courses (material, special clothing, teacher salary, administration)
State	Funding of education institutions Scholarships, vouchers, grants and loans	Subsidies to training firms Financial concessions to employers (tax allowances)

4. *An assessment of VET (as investment) should consider both short- and long-term benefits*

- While costs are typically expected up front, benefits might arise at different points in time.
- Benefits may be difficult to quantify and hard to disentangle from other variables affecting performance and productivity.

	Individual*	Employer	Society
Short-term benefits	Employment chances Earning levels Work satisfaction Drop out less likely from vocational than general courses (US data)	Higher productivity from well trained workforce Saved costs from recruiting external skilled workers (incl. time for integration and risk of hiring a person not known to the company)	Saved expenses for social benefits (unemployment as consequence of failed transition from education to work)
Long-term benefits	Flexibility and mobility Lifelong learning (more likely to receive training and upgrade skills later in life)	Supply benefits (e.g. image improvement) Less turnover (no need for re-training of new workers)	Externalities from productivity gain due to better education Increase in tax income from higher earnings

*VET students' abilities differ systematically from academic students – what is the right counterfactual?

5. *The question 'Is it worthwhile to invest in VET?' remains open at this stage*

- VET is costly compared to general education.
- However: blue-collar workers (i.e. VET graduates) are still needed in today's economies.

→ *A more suitable question could be: How can the provision of VET be made most cost-effective? This general question translates into concrete guiding questions for further analytical work on VET and country visits such as:*

- Who should pay for VET?
- Where and how should VET be provided?
- Can context variables determining the cost-benefit relationship be influenced?

Introduction

1. This paper has been prepared as part of the analytical phase of the OECD policy review on vocational education and training (VET). Its purpose is to identify the different costs and benefits involved in the provision of initial VET¹ and the difficulties involved in assessing them from a comparative point of view. At this stage the paper is provisional and makes no claims to present exhaustive information on a subject of such broad scope. During the course of the VET policy review, it will be updated and evidence from other elements of the project, in particular the international questionnaire incorporated. Countries are invited to provide feedback and contribute additional research and data to the evidence base.

2. The paper draws from different approaches to the analysis of VET costs and benefits using evidence from OECD countries. It underlines the importance of examining the background factors which determine the cost-benefit relationship and discusses some methodological limitations. The remainder of the paper is divided into two parts. The first deals with VET *costs* and their distribution between different stakeholders. The second sets out the different types of *benefits* and their determinants and sheds light on the evidence regarding both the employer and individual returns to VET.

Context affects VET costs and benefits

3. The definition and provision of VET varies substantially across OECD countries. VET systems range from highly regulated structures in the dual system countries to situations like in the UK, where vocational education is highly fragmented and apprenticeships do not have a legally defined identity (Steedman, 2001). Costs and benefits of alternative forms of provision differ accordingly. As a consequence, it is difficult to carry out an aggregate cost-benefit assessment or to come up with general conclusions valid for all OECD countries.

4. VET systems are embedded in national economic structures which add to their heterogeneity. Flexibility or rigidity of the labour market has an impact on employee turnover and on employers' capacity to protect themselves against free-riding and poaching. Regulations such as minimum wages as well as the impact of unions and involvement of employers are crucial in shaping the wage structure and hence training costs and benefits. In the standard theoretical model of human capital with perfect labour markets, workers capture all the returns to their general human capital and employers have no incentive to pay for general training. However, when labour market frictions compress wages (increasing the wages of less skilled workers), firms may invest in the general skills of their employees. The reason according to Acemoglu and Pischke (1998) is that labour market imperfections restrict mobility of workers. This implies that trained workers do not get paid their full marginal product when they change jobs and general skills are turned into de facto specific skills. As a consequence, they argue, regulated labour markets in Europe and Japan generate more firm sponsored general training than for instance the US.

5. Other factors adding to the complexity of cost-benefit analysis include the nature of vocational education and training (in vocational schools or work-based) and the specific occupation or industry. Characteristics of the students, their age and level of prior schooling (Bernier, 2006) the time it takes them to complete a VET programme and to find an apprenticeship place (Steedman, 2001) are also relevant.

Methodological limitations

6. The comparative study of VET costs and benefits is further complicated by the fact that there is no standardized approach to VET data collection across OECD countries (Kath, 1998; Moy and

¹ Adult learning and training has been excluded to focus the present study and because it has recently been dealt with in the OECD study Promoting Adult Learning, OECD, 2005.

McDonald, 2000). Data sources differ substantially and are often incomplete or do not allow for a distinction between vocational and general studies or for a disaggregated study of different client groups. As a consequence, most studies used in this paper are based on national data sources and serve as case studies or examples rather than being necessarily representative for all OECD countries.

7. Billett (1998) observes that while governments seek evidence to prove that expenditure of public funds is producing demonstrable benefits, the interest of employers in assessing the impact of training on productivity is limited. Many employers cannot provide data because they do not have separate cost accounting for their training system (Beicht et al., 2004). This means that the data necessary to assess benefits from VET are often missing.

8. A further methodological difficulty is that while costs and immediate benefits including earnings and employment chances for students upon graduation from a VET programme are relatively straightforward to measure, medium and long-term benefits such as mobility or the capacity to upgrade skills later in life are more difficult to quantify (Winkelmann, 2002). Outcome measures also tend to have an economic focus, neglecting community and personal outcomes that are less clearly measurable.

9. Overall, it is difficult to show a causal relation between training and changes in sales volume, productivity and other profit measures of firms because there are many factors besides training, that can influence them (Lankard Brown, 2001; Moy and McDonald, 2000). The same holds for the correlation between initial training and benefits accruing to the individual later in life as it is difficult to isolate the effect of VET from other variables that might have an impact on performance.

Costs associated with vocational education and training

Defining the costs of VET

10. VET costs can be divided into direct costs including apprentice wages, salaries for training personnel, teaching material, equipment, building infrastructure etc. and indirect costs such as tax expenditures or subsidies but also opportunity costs (forgone earnings as unskilled workers) and drop out costs.

11. Compared to general or academic education, the costs of VET are substantial, in particular for those occupations that require heavy equipment and sophisticated infrastructure. In Germany, the dual VET system overall costs EUR 10 800 per year per person (excluding apprentices salaries), much more than the EUR 4 500 per student in tertiary VET (*Fachhochschulen*) and the EUR 5 500 in tertiary academic education (universities; this number excludes research expenses) (Konsortium Bildungsberichterstattung, 2006: 22). As a consequence, German firms which take on apprentices have to bear net costs (Beicht et al., 2004).

Who pays for VET?

12. Some scholars and policy makers argue that VET careers are not relevant any more. However, evidence shows that the demand for blue collar workers, i.e. VET graduates is high and salaries are on the rise (Meer, 2007). Because of the high private rate of return to apprenticeship, the question has been raised whether future adjustments should be borne by apprentices themselves. At the same time, the social rate of return² to apprentices is sometimes substantial (estimated 12.8% for male apprentices in Australia),

² Training raises output; return to society is the present value of this increment in output over the person's working life.

supporting the case for policy measures to increase the level of apprenticeship training (Dockery et al. 1998). Whether or not employer financial engagement should be made mandatory is questionable should be based on careful weighting of resulting costs and benefits.

13. It is difficult, even in data rich countries like Australia, to find comprehensive evidence on expenditure on training or the exact distribution of training expenditure by individuals, employers and government (Ball, 2005). In particular, there is limited information about employer expenses and gaps in data from private VET providers. The table below indicates the various types of costs of alternative forms of provision borne by different stakeholders in Australia.

Table 1. VET costs borne by different stakeholders (example Australia)

	School and higher education	TAFE and private VET	On-the-job-training
Individual	Fees plus student time	Fees plus students time	Accept lower wages
State	Costs of education institutions, scholarships	Costs of education institutions, scholarships	As an employer
Employer	Limited support for staff doing degrees – fees and time off	Support for staff doing formal courses – fees and paid time off	Pay wages higher than productivity; time of experienced workers; mistakes and wasted resources, in-house training courses

Source: Richardson, S. (2005), New estimates of the employers' contributions to training.

14. In many countries, co-financing arrangements allow costs to be shared between the state, the employers and individuals. Such cost sharing arrangements differ across countries and might vary over time according to economic context variables with more state subsidies during recession for instance in form of a premium for firms that manage to maintain or increase their apprenticeship places during an economic downturn.

15. Billett (1998) points to a potential dilemma in VET funding arising from stakeholders' diverging aims and interests. A national policy goal is to increase quality of VET. Individuals might prefer to acquire general, transferable skills allowing them to move between occupations. By contrast, enterprises' training expenditure typically focuses on the skills and knowledge that are relevant to their particular needs. So what is best nationally, building a skilful and adaptable workforce, and what individuals strive for may be different from the narrower interest of enterprises.

Forms of government intervention

16. Failure in training markets may result from credit constraints and other capital market imperfections deterring potential trainees. Government intervention may be necessary to correct for these failures and can take place in regulatory or financial terms.

17. The state can regulate VET systems variously ranging from laissez-faire approaches and systems with high employer commitment, to regulations establishing sectoral training funds or imposing levy schemes (Smith and Billett, 2005). On the financial side, Kath (1998) distinguishes between three main types of public funding systems: the liberal system where the companies essentially have the liberty of establishing the quantity and quality of initial and continuing vocational training themselves and where the State only prescribes levels of graduated qualification standards without, however, regulating the paths to be followed for certification (e.g. UK) the neo-cooperative model where employers' associations and trade

unions actively steer the process of financial organization and where the State confines itself to putting a legal stamp on group consensus (e.g. Denmark) and the interventionist model where the State, as leading actor, assumes the role of designing the system in collaboration with the social partners (e.g. France).

18. In general, systems that are predominantly school based are overwhelmingly public-funded (Ball, 2005). In dual system countries, by contrast, apprenticeships are handled like a form of public-private partnerships within a well-established co-funding structure: the state bears the cost of the education that takes place in schools while employers finance workplace training.

19. Countries differ in the degree, destination (employer or individual students) and form (direct or indirect) of Government funding of VET. In Germany, there are by tradition no direct financial transfers of public money to firms with respect to apprenticeship. However, in recent years the Federal Government has increasingly financed apprenticeship places for unemployed young people in problem regions (for exact cost calculation see Berger, 2003).

20. Indirect measures like government funded employer incentives to provide training exist in several OECD countries. France has statutory training levies and an apprenticeship tax from which employers are exempted when they train apprentices. However, evidence on the effectiveness of such measures is mixed. Mühlemann et al. (2005) report that net costs to firms depending on degree of government intervention have a significant impact on the initial decision to offer some rather than no apprenticeships but once the firm has decided to train, they do not affect the demand for apprentices. He concludes that the provision of subsidies to firms that already train apprentices should be avoided from as they do not boost the demand for apprentices.

Employer engagement in VET

21. The German Federal Institute for Vocational Training (*Bundesinstitut für Berufsbildung, BIBB*) has developed a model to assess costs to employers which can be divided into three categories: personnel costs of apprentices (salaries and social benefits), remunerations for the training personnel and various other costs including the teaching material, protective and specialist clothing, administrative costs to manage the training including fees to the Chambers of Industry, Commerce and Trade, the body responsible for oversight and monitoring of apprenticeship in firms (Rauner, 2007).

22. The actual level of employer engagement in VET depends on a number of variables. Hasluck (2004) argues that in the UK example, costs are not the main factor deterring employers from engaging in apprenticeship training. The barriers include lack of awareness of the programme, concerns about relevance of specific qualification frameworks, lack of interest in work-related training among young people and the quality of applicants for apprenticeship training.

23. Large and medium size enterprises tend to spend more on training than small firms and training expenses are also skewed by industry sector. Comparing UK industries, Hogarth and Hasluck (2003) reveal wide differences. These are explained by the amount of off-the-job training as opposed to the extent to which job is meant to be learned by doing (i.e. training involves productive activities), apprentice wage levels and employment status of apprentices and related entitlement to services which increase social charges to employers.

24. A frequent caveat of studies assessing employer financial engagement is that they do not clearly distinguish between initial VET (the focus of the present paper) and continuous training for employees. However, although most of the available evidence on initial VET refers only to apprenticeships, efforts have been made to provide a more complete picture. Smith and Billett's (2005) typology includes the following options: enterprises have no legal obligation for training (Canada, United States, United

Kingdom, Netherlands, Sweden); employers voluntarily take significant responsibility for financing training (Germany, Switzerland, and Japan); employers and unions set up training development funds under collective industrial agreements (Belgium, Denmark, and Netherlands); the government offers tax exemptions to enterprises which train their workers (Belgium, Chile, Germany, South Korea); governments introduce compulsory financing of training by employers (Denmark, France, Ireland, South Korea).

25. Broadly speaking, there are two policy options to increase employer engagement: either by creating incentives to encourage voluntary involvement or by compelling employers through imposition levies or licensing arrangements (Smith and Billett, 2005). Both approaches however have their caveats. Subsidies, as discussed in the previous section, are only effective in encouraging firms to start training but not to increase the demand for apprentices in firms that already train Mühlemann et al. (2005).

26. Compelling measures have been criticised as well. The Council of the German Economy for Vocational Education (*Kuratorium der Deutschen Wirtschaft für Berufsbildung*) lists 10 arguments against general training contributions. According to them, it leads to: less apprenticeship places, employers decreasing willingness to train, cost increase for business, more bureaucracy, stronger influence by state and trade unions on employers' decisions, loss of quality and competitiveness for German business and loss of training places and of jobs.

27. Despite these concerns and employers' reluctance, some countries have introduced policies requiring mandatory contributions and set up collective employer funds. In Denmark for instance, the AER (*Arbejdsgivernes Elevrefusion*) was introduced in 1977 to provide incentives for firms to engage in the provision of apprenticeship places (Grollmann et al., 2003). In case of a shortage of apprenticeship places, the number can be increased by financial support from the fund. Moreover, the apprentice's wages while attending off-the-job training in college are 90% refunded by grants from the collective employers' fund. The fund has provided some remedy to the problem of underprovision of apprenticeship places in Denmark.

Individual student contributions

28. Beicht and Walden (2005) observe a trend across many countries towards more contributions by individual students to the funding of VET even though current student contributions are already considerably higher than those made by university students. The level of contributions varies between occupations, across and even within OECD countries. Student financial contributions to VET programmes can take various forms including fees for study at a vocational school, charges for material and resources necessary for their education and forgone earnings and leisure.

29. In Australia costs to students are highly variable: there are differences in concession rates, in hours of course delivery and individual institutes impose additional fees and charges for resources and material. Watson (2005) provides a detailed analysis of the public and non-public fees and charges for material and resources to students in different Australian states and territories. She finds that the material and resource component increased the real costs to students of a VET course by between 50% and 100%.

30. The form of payment (by instalments, availability of student loans etc.) affects the student capacity to pay the course fees. Demand-side obstacles such as labour market imperfections, capital market imperfections or (income) inequalities can lead to underinvestment in education and training and may have to be remedied by public sector involvement. Demand-side financing involves money following students, i.e. funds are given to individuals or institutions on the basis of expressed demand. Direct demand-side funding mechanisms, which transfer cash to individual trainees, include grants to individuals and guaranteed loans for education/training. Indirect demand-side funding mechanisms include funding

training providers on the basis of the number of trainees recruited and/or time spent in training on the basis of an open enrolment policy (West et al., 2000).

31. The introduction of demand-side financing mechanisms into public sector provision has been explicitly linked to the introduction of market principles into education and training systems and the deregulation of training supply. Both types of mechanism aim to increase choice by fostering competition on the supply side and to stimulate demand by empowering the individual to make their own training choices. A further demand-side funding mechanism combines the two approaches: a voucher scheme. A voucher transfers purchasing power without actually transferring money, as funds are paid to the training provider. Earmarked funds are allocated to individuals so that they use to purchase training while the training providers receives unit funding for trainees on submission of the voucher (West et al., 2000). Other incentive and support mechanisms include: individual learning accounts and paid educational leave (Keating, 2005).

32. The Youth Credit scheme in England and Wales in the 1990s (West et al. 2000) and training vouchers in Germany (Kath, 1998) are examples of mechanisms to stimulate demand and encourage individual investment in VET. However, according to West et al. (2000) there are potential downsides attached to voucher funding mechanisms: deadweight loss, i.e. enterprise or household expenditure on education and training being substituted by public sector funds, is likely to be an issue where training is not guaranteed to be fully publicly funded anyways. This implies that additional public spending is only replacing private expenses instead of increasing the resources available to VET. Other caveats are the administrative costs that are higher compared to funding mechanisms that are not demand-led.

Benefits associated with vocational education and training

Defining the benefits of VET

33. Benefits can take various forms and arise at different points in time, during or (much) after the course or training. Individuals enjoy benefits from improved earnings, employment chances, mobility, capacity for lifelong learning, measures of working conditions and job satisfaction. Employers' benefits arise mainly from apprentices' productivity increases. The state yields net benefits both in terms of social rents (both individual and public costs plus positive externalities from increased productivity due to better education) and in fiscal terms (education expenses versus increase in tax income from higher earnings from better educated individuals) (Wolter and Weber, 2005).

34. Some benefits such as greater general openness and ability to learn and upgrade skills later in life are not easily quantifiable. One alternative way to assess benefits beyond an economic analysis of the material labour market benefits is to survey satisfaction both of employers and of individuals. Beicht and Walden (2005) have carried out a survey to assess subjective current and future benefits for further VET. This include issues like: personal development, improvements in efficiency on the job, networking, improved perspective for better or more interesting employment, chances to move up the career ladder, better earnings etc.

Determinants of VET benefits

35. The individual returns from VET depend on the individual students, their abilities and family background. Students in VET systems differ systematically from those in general programmes so that labour market outcomes cannot be directly compared. Meer (2007) argues that students with practical abilities are better off with a VET degree than academically oriented individuals and vice versa. Moreover, whether or not certain VET qualifications and related skills reap benefits depends on the nature of the demand for skills in the labour market. Looking at skills in isolation from context variables can lead to

misinterpretations or over-evaluations as “upskilling a workforce without a corresponding improvement in the equipment they use or the markets they service will rarely achieve more than a marginal improvement in overall productivity, and little more in profit for the business” (Davis, 2007: 7).

36. Another determinant of VET benefits is the orientation (general versus occupation specific) of the programme. Using data from the US Employer Opportunity Pilot Project (EOPP) survey and the National Longitudinal Survey of Youth (NLSY), Loewenstein and Spletzer (1999) assess the degree of specificity and generality of employer-provided training. They analyse how direct measures of specific and general training affect wage growth and mobility. In spite of the emphasis that labour economists have placed on specific training they find that employers in the EOPP and workers in the NLSY indicate that most of the skills obtained through employer provided training are useful quite generally. Although companies might be leery of providing general training for fear of poaching, it seems to have a greater effect on productivity than has specific training. Barrett and O’Connell (2001) used data from enterprises in Ireland and find that although statistically significant positive outcomes in productivity growth were realised for general and all sorts of training, this was not true for specific training. However, Lankard Brown (2001) argues that to be successful, training must be targeted toward a business need, in partnership with the employers.

37. The benefits of VET also depend on how it is provided (Gospel and Foreman, 2002). Single-employer training, if it can integrate training into the broader human resource planning and the objective of staff retention, can be an advantage because actual employers should be best placed to assess training needs and outcomes. At the same, time individual firms may not train for fear of poaching and especially medium or small firms may lack in-house capacity. Colleges provide wide access and national coverage but they can be somewhat remote from the changing needs of employers, and their teaching and equipment can be out of date, especially in high technology sectors. Private providers (especially for-profit companies) have of necessity to be flexible and responsive to market demands. However, quality varies and they may have limited employer links and be reluctant to train in more expensive areas. Multi-employer training reduces administrative costs. At the same time it stays close to employers. Theoretically, group provision can overcome some of the poaching and market failure problems. Multi-employer provision may ensure training in broad skills of a potentially transferable kind which makes it more attractive for young people.

38. Finally, looking at the employer point of view, whether or not a firm can recoup their investments in human capital is heavily dependent on several environmental variables such as turnover or staff mobility which in turn depend on the flexibility of labour market regulation.

Employer perspective

39. The benefits accruing to employers can be measured in different ways. They arise from: returns from productive performance of trainees, (saved) costs of recruiting external skilled workers, (saved) outage costs when skilled workers are in short supply, performance differences between company trained and external skilled workers, supply benefit (e.g. image improvement). Employers reap benefits by saving costs they would incur if they had to hire new employees, including the recruitment process, integration of new employees and the risk of hiring a person that is not known to the company from previous experience.

40. Fluctuation or mobility i.e. whether the employer can keep the apprentice as an employee after the training is accomplished determines how much benefits an employer can reap from training apprentices. But these are not the only context variables determining net VET benefits to employers. Wößmann (2004) argues that in Germany in the past years costs of apprenticeships have increased: from 1988 to 1995 average apprentice salaries rose by 54% (for trade salaries it rose by 66%) while wages in general rose only by 30%. At the same time, the number of days that an apprentice actually spends in the

work place and in productive activity has diminished from 134 to 124 between 1991 and 2000. Another trend that decreases benefits to employers in Germany is the shortening of the apprenticeship years because apprentices only become productive and contribute to the firm's benefits after their third year of training (Rauner 2007).

41. The picture is different in Switzerland, another dual system country, where the value of apprentices output outweighs the costs even though the salaries of Swiss apprentices are much higher than in Germany (Schweri et al., 2003). According to Rauner (2007) in Swiss firms apprentices provide substantial productive work while in Germany the curriculum includes many hours of not immediately productive activities. Hence, Swiss firms do not depend on a regulated labour market and low workforce mobility to make training worthwhile (Wolter et al., 2006).

42. An explanation for such variation in productivity has been put forward by Wolter (2005) who argues that firms which operate in a flexible Swiss labour market have to make sure that apprentices are productive because they cannot be sure to keep their apprentices as employees once the apprenticeship period is over. He however stresses that even though labour market regulations determine employee mobility and hence firms' willingness to invest in their training, these aggregate results cover a heterogeneous picture in the two countries pointing to the fact that despite a common legislative and economic framework, firms have scope to render training productive.

Individual returns to VET

43. In discussing the labour market benefits (employment and earnings) of VET students it is important to bear in mind that in many OECD countries, students enrolling in VET tend to be the lowest attainers at the end of compulsory education. Hence an evaluation of the returns to vocational education includes a certain ability bias and is linked to a process of self-selection. It is important to find the right counterfactual in comparing labour market outcomes. Studies often compare VET student outcomes with those of young adults who completed compulsory education without obtaining any higher level of qualification. Results of such studies are mixed.

44. Studies typically show that individuals with VET qualifications receive higher wages than those without post-school qualifications, especially early school leavers though there are some exceptions (UK data) showing little labour market value of certain VET qualifications. Evidence on employment is equally mixed. Across a range of labour market outcomes, these studies also support the view that the benefits of VET participation are more pronounced in comparison with early school leavers than with those who complete school without undertaking further study. Where they do compare outcomes for males and females, they also tend to find that the benefits of participation for males are more substantial than those for females. As a general result, a work based component of VET studies seems to have an advantage over purely school based VET. Other research suggests that VET graduates are more likely to receive formal training than those with no post-school qualifications.

45. Education investment by individual students entails risks of two types: non-completion, meaning that costs of education already spent cannot be compensated by later benefits; or a situation where a completed education does not reap the expected benefits (Wolter and Weber, 2005). However, Pereira and Martins (2002) demonstrate in an international comparative study of sixteen OECD countries that the higher the variation in earnings, i.e. the higher the risk, the greater the returns to education.

Table 2. Benefits to individual students if vocational education and training

Author (Year)	Data, Country	Results
Bishop/Mañe (2005)	High school student reports and transcripts US	Students who take a certain percentage of vocational subjects go on to earn higher wages and work more compared to purely academic students. There are both short and medium term returns to career-technical education and payoffs increased over time. The share of upper-secondary students in Career-Tech programmes has a statistically significant positive association with rates of graduation from upper secondary school and the proportion of 15-19 year olds in school or college; i.e. drop-out is less likely in vocational than in academic tracks.
Bonnal (2002)	Survey (19 months transition from school to first job) France	Apprentices (especially men) perform better in the labour market than students from VET schools. Positive effect mainly arise from better performance at very beginning of the period when apprentices are hired (immediately or within two months) by the firm on which they performed their internship. The effect is even stronger when corrected for negative selection bias associated with choice of apprenticeship.
Euwals & Winkelmann (2002)	Register data Germany	Apprentices who stay with their training firms after receiving their diploma have higher wages and stay in their first job longer than apprentices who leave the training firms.
Hofer/Lietz (2004)	Social Insurance data Austria	In terms of long-term unemployment and employment stability high school graduates do better than ex-apprentices and unskilled rank lowest with differences between unskilled and ex-apprentices being more pronounced than between ex-apprentices and high school graduates. Relatively weaker effect for women. Monthly median earnings: slightly higher for secondary school education than for ex-apprentices and unskilled 20% less than ex-apprentices. High-school graduates earn less than ex-apprentices (maybe due to different labour market experiences); female ex-apprentice workers have only a minor earning advantage over unskilled.
Jenkins et al. (2007)	Labour Force Survey England	Negative average returns to National Vocational Qualification level 2, no evidence for an average return to NVQ3 qualifications. However, there are other VET qualifications (BTEC, City & Guilds) that generate substantial wage premia. Level 3 vocational qualifications are associated with a higher probability of employment. There is less evidence of any association at level 2.
Karmel/Nguyen (2006)	Student Outcomes Survey Australia	Compares students that have only partially completed VET certificate and VET graduates, finds positive association between the highest (VET) education level and employment. Compares students that have only partially completed VET certificate and VET graduates, find positive association between the highest (VET) education level and wages.

Table 2. Benefits to individual students if vocational education and training (continued)

Author (Year)	Data, Country	Results
McIntosh (2004)	Labour Force Survey UK	Vocational qualifications at all levels can improve the employment chances of unqualified school leavers, even when panel data are used to control for unobserved individual heterogeneity and to ensure that the qualification is acquired before employment is attained. However, few unqualified school leavers seem to be following this vocational route to qualifications.
McIntosh (2007)	Labour Force Survey UK	Apprenticeships (compared to other vocational qualifications) significantly positively related to probability of being employed. Wage returns have increased over time, especially for Modern Apprenticeships although these results might be driven by selection and related ability bias.
Meer (2007)	National Education Longitudinal Survey United States	Evidence for a comparative advantage in track selection: those that self-selected into a VET track are not likely to earn more had they chose differently, and vice versa those on the academic track are better off on that track.
Neuman et al. (2002)	Various national data Israel	Look at disaggregated data: returns to VET for people from important minorities (recent immigrants, Sephardic Jews, and Israeli Arabs) and disadvantaged groups (females); efficacy of VET in raising wages for these groups is very mixed, differing from group to group. Argument for use of sub-national data.
Ryan (2002a)	Survey of Education and Training (longitudinal) Australia	Individuals who complete VET qualifications generally receive higher wages than similar individuals who do not complete VET qualifications. This benefit continues throughout their career. The wage effects vary by VET qualification level and are higher for males who complete VET qualifications than females. Returns to VET depend critically on the work/study combination used by individuals to undertake their courses. The qualifications are highest for those who work full-time and study part-time while undertaking their course.
Ryan (2002b)	Survey of Education and Training (longitudinal) Australia	Full-time employment outcomes are significantly higher for VET graduates relative to students without post-school qualification immediately after entering the labour market. These differences tend to narrow, as the outcomes of the comparison groups improve. VET graduates appear less likely to be studying at any point in time or to have recently undertaken a training course than university graduates. Actual fields in which VET graduates complete their qualifications also have an impact on outcomes.

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