

## **The Economics of Vocational Education and Training**

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### **X.1 Introduction**

1. The dominant paradigm in the economics of education is Human Capital Theory, which suggests that education and training are investments that make individuals genuinely more productive. Individuals who are more productive will, according to this theory, also have higher earnings and be more employable. The private economic return to investing in education or training, i.e. the gain to the individual, can therefore be measured by the net gain in lifetime earnings accruing as a result of their investment in education or training.
2. Policy-makers around the world tend to accept unquestioningly the premise that investment in education and training is a good thing, with most committed to investment in human capital, including Vocational Education and Training (VET), as a means of securing higher economic growth and national prosperity as well as achieving equity goals (see Wößmann, (2008)). However, some economists have argued that individuals who are more able and productive also tend to invest in more education (Spence, 1973; Arrow, 1973). In other words, education does not necessarily make you more productive it simply acts as an expensive sorting device, to enable employers to identify more able individuals. Wolf (2002) claims that the policy emphasis on education and skills as the main driver of economic growth overstates the importance of human capital investments and that a major function of education is as a sorting device and to

some extent a social discriminator. In making policy about education and training it is clearly important to understand these potential economic returns to education and training to the individual, firms and the wider economy. However we must also recognize that separating out the genuine impact of education on productivity and earnings from its role as a sorting device is very difficult.

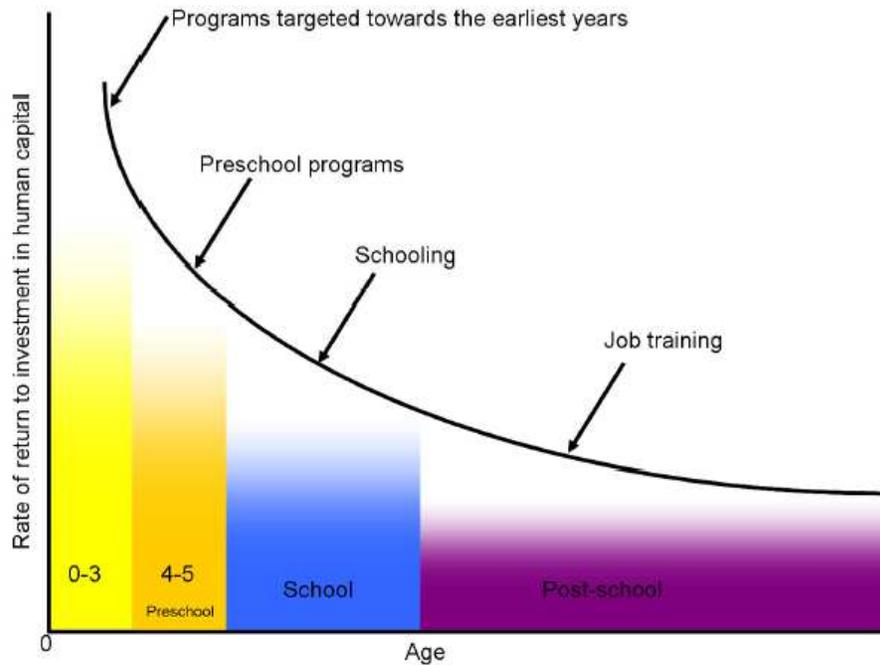
3. Understanding the economic value of education and training, as measured by gains in wages, is important but not in itself enough to inform policy about the optimal type of education and training system. As recent papers such as Carneiro and Heckman (2003), Cunha and Heckman (2009) and Carneiro (2009) argue, it is also crucial that we understand the technology of skill formation over the life cycle. For effective policy formation we need to know how different types of people can effectively acquire skills at different stages of the life cycle as well as the economic returns to those skills once acquired. This is particularly important in the area of Vocational Education and Training, since international evidence suggests that the economic returns to some VET is low.
  
4. Finally, even if one accepts that education and training genuinely does enhance individuals' productivity in the labour market, it is not clear that focusing on earnings is enough. Firstly it is not clear that wages always accurately reflect individuals' productivity levels, as suggested by economic theory. This is clearly not the case in the public sector, as the wages of nurses and teachers for example are state determined (although influenced by prevailing private sector wages). Of course education is also far more than an economic investment and yields a myriad of non-economic benefits for the individual. These benefits may be in the form of reduced crime, better parenting skills, and/or better health outcomes. Non economic benefits from education are not considered in conventional rates of return analyses. But looking at these potential wider benefits of education and training is also crucial for sound policy development – particularly in the area of VET.

5. In section X.2 of this Chapter we look at the economic literature on how skills are formed and the implications this has for VET policy. In section X.3 we look at the international evidence on the returns to VET. In section X.4 we conclude.

## **X.2 The technology of skill formation and its implication for VET**

6. The system of vocational education and training and enrollment rates in VET differs markedly by country. This has already been documented in other Chapters in this book.
7. But how effective is VET in raising the skill levels of individuals, how does this vary by country and what are the implications for policy? We argue that in order to look at this question properly from an economic perspective, VET has to be seen as part of a whole life cycle process of skill formation which starts in the womb and ends in the grave.
8. The extent to which VET and other education and training raises individuals' skill levels can be measured by estimating the economic return to such qualifications and skills. The work on skills formation shows that these economic returns to skills investment are largest in early childhood and decline over the lifecycle. From an analysis of both theory and evidence, Carneiro and Heckman (2003) present the following figure arguing that, at the current levels of investment, rates of returns to investment in human capital are declining over the life-cycle (this version of the figure is taken from Heckman, 2008).

Figure 1: Returns to Investment in Human Capital Over the Life Cycle



Source: Heckman (2008)

9. Numerous studies suggest that there should be strong investments in early childhood, both because the sensitive periods for acquiring several capabilities occur early in life, but also because successful learning early in life is the foundation for successful learning later in life (Carneiro and Heckman (2003), Cunha and Heckman (2009) and Carneiro (2009), Meghir and Palme, (2005)).
10. However, this literature also argues, that it is not enough to just invest in skill formation (both cognitive and non-cognitive) in early life. These investments also need to be followed up by further investment in skills, or there is a strong risk that individuals' will not fulfill their potential. This is particularly so for individuals from poorer socio-economic backgrounds who not only tend to start with lower levels of investment but then also have access to poorer quality schools and thus experience less subsequent investment.
11. The stock of human capital available to a young adult as he or she enters the labor market and beyond is therefore a function of the history of skill investments that

took place up to that moment. This function is much more complex than the just the sum of all the investments up to that point, because the timing of investments over the life course is not irrelevant for the final result. One key point emerging from this literature is that if the degree of complementarity between early and late investments is very strong then it may be very costly or impossible to remediate the lack of early investments.

12. Secondly this body of literature looks at the plasticity of learning (i.e. the ease with which a person's skills can change and develop) and the critical periods for learning. There is increasing evidence that there are sensitive periods of learning, which imply that if the proper investment is not done at the right time (during the sensitive period) then learning opportunities may be permanently lost. This literature suggests it is very hard to build on cognitive skills if they have not been acquired in the first 10 or so years of life. On the other hand, the same evidence base suggests there is much more scope for enhancing non-cognitive skills into adulthood. So there are critical periods of learning. If you miss them you do not get another chance.
13. These two issues have strong implications for the effectiveness of VET provision. Different VET systems will provide a different mix of cognitive and non cognitive skills and VET specialization will occur at different ages in different countries (some countries select children into VET at an early age). In general the extent to which VET provision can build on prior investments will be critical to the economic value of VET. Any policy initiative in the VET area needs to take this into account this dynamic complementarity of skill investment as well as the plasticity of skill acquisition.
14. A competing model would say that investments in skill are substitutes over time, and therefore their timing is irrelevant, so all that matters is the sum of all investments one receives during one's life. If that were the case then education and training could take place at any point over the life course and still prove

effective in boosting the skills and earnings of individuals, even those who left initial education with very little in the way of skill. Our reading of the evidence is that this is not the case and that later investments that are not built on strong initial investments are likely to prove ineffective. Certainly firms believe this to be so. It is also well known that more educated workers are more likely to be selected for (or select themselves for) company training, suggesting that firm investments in VET are targeted at individuals with higher levels of initial human capital (Blundell, Dearden and Meghir (1996) for the UK and Carneiro and Heckman (2003) for the US).

15. This dynamic complementarity not only means that the returns to later investment in skill are highest for those with strong early investments, but it also means that the returns to early investments in skill will increase with follow-up investments later in life. This is discussed more in the next section – but is important to bear in mind when looking at the rates of return to VET.

16. Dynamic complementarity is also a potential explanation as to why borrowing constraints in late adolescence play such only a small role in college attendance relative to such factors as family background and ability (Carneiro and Heckman, 2002), and why, as we will see in the next section, the returns to basic skills programs, i.e. programmes that attempt to improve individuals literacy and numeracy skills (see Torgeson et al. (2004) for a summary) and public job training programs are generally so low across the world, as we now show (e.g., Lalonde (1995), Cohn and Addison, (1998), Heckman, Lalonde and Smith (1999), Carneiro and Heckman, (2003) and Dearden, McGranahan and Sianesi (2004), Abramovsky et al. 2005).

### **X.3 International Evidence on the returns to VET**

17. The wage returns to general education have consistently been found to be strong and significant worldwide. It is widely agreed that the economic return from an

extra year of formal full-time education is around 8 to 10 per cent or even higher for some individuals (see for example the review by Card (1999)).

18. In studies that look at the returns to qualifications rather than years of education, again most studies find significant economic returns. However it does matter what type of qualification you acquire. In many countries, the wage returns to academic qualifications are significantly higher than the returns to vocational qualifications, government training programs and adult basic skills training (see for example Blundell, Dearden and Sianesi (2005), Dearden *et al.*, 2002; Dickerson 2005, Carneiro and Heckman (2003)).
19. What are the returns to VET? Why are the returns to some forms of VET so much lower than those for general education? Why do policy makers and governments around the world still invest significant amounts of money in government sponsored VET programs when the returns are not high?
20. To address these questions, we start by looking at the international evidence on the returns to basic skills programs, vocational education, government training initiatives and work-based training and then discuss the rationale for large state sponsored VET programs.

### **Basic Skills Training**

21. The value of cognitive skills in the labour market is high in most labour markets and some studies suggest there has been an increase in the return to cognitive skill over time, particularly in the US and the UK (see Tyler (2004a) for an overview; Howell and Wolff (1991); Murnane *et al.* (1995); Murnane *et al.* (2000); Bowles *et al.* (2001)). The value of *basic skills* is also high in some countries, although the evidence base is more limited (see Grinyer (2005) for a summary). In countries such as the US, Northern Ireland and the UK, the rate of return to basic literacy and numeracy is substantial (Denny *et al.* (2003), McIntosh and Vignoles (2001),

Bynner et al. (2001), De Coulon et al. (2007) and Tyler (2004a)). However, the returns to basic literacy and numeracy are not high in all countries. In particular countries where the supply of basic skills is relatively large compared to demand, e.g. Germany, the rate of return to such skills is much lower (Denny et al. (2003)).

22. Although basic skills have high value in the labour market it is not the case that the returns to basic skills programmes are substantial. Again the evidence base is somewhat limited. A recent international survey by Torgeson et al. (2004) suggests firstly that there is limited robust evidence on the impact of basic skills training. Secondly, those basic skill interventions that were robustly evaluated (e.g. by Random Control Trial) did not show systematically positive effects. Other UK evidence is consistent with this view: a study using rich cohort data to determine the economic return to basic skills courses and improvements in basic skill in adulthood found limited effects, for example (Dearden et. al. 2001). Given that most interventions tend to be small scale and in adulthood, this is perhaps unsurprising. As we discussed in the previous section, later human capital investments need to build on prior investments in the early years, particularly for cognitive skill development. Thus trying to train illiterate adults is going to be challenging.

23. This evidence on the effectiveness of basic skills training, or lack thereof, contrasts sharply with the evidence on early interventions that have been found to be successful in improving cognitive skills and basic literacy and numeracy. For example, in the UK context, the *Sure Start* pre-school intervention and a primary school intervention called *The Literacy Hour* have been found to be effective in improving children's cognitive and non-cognitive skills ((NESS (2008) and Machin and McNally (2004)). In the US pre-school interventions, such as *The Perry Pre-school* random trial which provided 2 years of pre-school support for poor black children in the US, have had a significant positive impact on children's skills (Nores et. al (2005)) and Heckman et. al. (2008)). Thus it is certainly not

the case that one cannot improve individuals' literacy skills, rather that interventions late in adulthood are more difficult.

### **Vocational Education at End of Compulsory Schooling**

24. The vocational options available to students at the end of post compulsory schooling varies hugely across different countries. Some countries specialize in VET options early in middle secondary school (e.g. Germany), whilst others essentially force students to follow a largely academic curriculum until much later (e.g. the US). Some countries have been shifting the balance over time, introducing vocational qualifications in secondary schooling that have notional parity with their academic equivalencies (e.g. the UK). Just as the provision of vocational education varies hugely by country, so too does the economic value of VET. Again, differences in the value of vocational training are linked to the dynamic complementarity argument and the extent to which efficiency and equity considerations are complements, substitutes or unrelated.
  
25. In countries where there are well developed vocational education systems in schools and well established apprenticeships systems – returns to vocational education are high (e.g. Steedman 1993, Acemoglu 2001, Acemoglu and Pischke 1999) (or indeed where there is a competitive market for apprentices (e.g Heckman (2000))). This is not however, universally the case. In Australia, for example, the returns to VET are positive but vary by qualification level and mode of study (Ryan, 2002).
  
26. In countries where there is a less developed vocational system the proliferation of vocational qualifications both in the schooling system and beyond has weakened the signal of what the vocational education is providing and returns are less (Wößmann (2008); Machin and Vignoles (2005)). This is exemplified by the UK experience where vocational specialization generally occurs at the end of

compulsory schooling<sup>1</sup>. Since the 1970s in the UK there has been a proliferation of vocational qualifications and a dramatic shift away from apprenticeships<sup>2</sup>. Many newer vocational qualifications (National Vocational Qualifications) have little economic value. Jenkins, Greenwood and Vignoles (2007) found, in line with much previous research (Dearden et al. 2004), negative average wage returns to these low level vocational qualifications and specifically NVQ Level 2<sup>3</sup>. Similarly, in the US context, the returns to academic education are higher (see Kane and Rouse (1995), Card (1999)). The returns to community college, which tends to be vocationally oriented, are still positive (Kane and Rouse (1995)). However, for those who drop out of high school prior to graduation, the route to obtaining later higher school certification (GED) has been found to have only limited economic returns, and in some cases negative returns (Heckman, Hsee and Rubinstein (2000); Murnane and Willett (2004); Tyler (2004b)).

27. Thus the institutional arrangements for VET provision in the secondary schooling phase and beyond heavily determine the likely outcomes for students who do not proceed down the academic route.

### **Government Sponsored Adult Training**

28. Public sector job training programs attempt to provide skills to a population of very low skilled adults have almost universally been unsuccessful but despite this such programs remain on lots of countries agenda – largely because of equity considerations. Again this comes back to the dynamic complementarities argument. Such job programs are largely targeted at low skilled unemployed individuals, and these people accumulated little human capital earlier in their life and therefore they lack strong foundations on which public training can then build

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<sup>1</sup> This is changing somewhat with the introduction of vocationally oriented curricula at 14.

<sup>2</sup> The current UK government has tried to reinvigorate the apprenticeship system with some success.

<sup>3</sup> NVQ2 is supposedly equivalent to the age 16 qualifications acquired in England, namely General Certificates of Secondary Education or GCSEs.

- on. As a result, they are not able to learn much from the training that is offered to them.
29. A job program entitled “Train to Gain” in the UK is classic example of this problem. This program provides subsidised work related training for low skilled workers with the subsidy going to firms to encourage them to train. It was introduced on a pilot basis and was fully evaluated in 2003 and 2004. The evaluation suggested only small insignificant effects from the programme on the incidence of training being undertaken by firms (Abramovsky et al. (2005)). Furthermore, they found that the majority of firms undertaking this training would have done so in the absence of the program i.e. the deadweight loss was considerable. Additionally, the training provided in this program at best lead to qualifications which have been found to have extremely low or even nil wage returns. Specifically, the training was designed to lead to lower level and newer vocational qualifications that have little labour market value ( Dearden *et al.* (2004b;); Dickerson (2005), McIntosh (2004)). Thus it this particular program had the twin challenge of being aimed at adults and also being designed to lead to qualifications that historically have had low labour market value.
30. Public training programs are not however, ineffective purely because they are largely targeted at adults. Youth training programs, aimed at unemployed young adults, have been similarly ineffective (e.g. see Fougere (2000) for an analysis of French youth training and Friedlander et al. 1997). Again this may be partially due the modest amount of training being provided and its low quality. However, it is also the case that such programs are aimed at young adults who lack a good human capital base. They tend to have nil or few qualifications and low levels of cognitive skill. Building on such a weak foundation is undoubtedly more difficult.

### **Employer provided Work-related training**

31. There is clear evidence that work related training, provided by or at least purchased by firms, yields strong positive economic returns across a range of

different countries (Almeida and Carneiro (2009), Bassanini et. al. (2005), Blundell et al. (1999); Groot (1999); Leuven, (2005);). This stands in contrast to the evidence on public training programs which have been found to be generally ineffective (Wößmann, (2008)). There is also a large body of evidence that convincingly shows that more educated workers receive higher levels of on and off the job firm provided training. Furthermore, firms train those who earn the highest returns to VET (Vignoles et. al. (2004)). Thus once again we see that there are dynamic complementarities in the VET system and as discussed earlier, firms are more likely to invest in individuals who already have higher levels of skill.

### **Wider Benefits of VET**

32. Perhaps focusing on just economic returns missing an important part of story (Wößmann, 2008). VET could improve the non-cognitive skills of low-skilled adults which will in turn impact on the early cognitive and non-cognitive skills of their children and as a consequence their lifetime skill acquisition. Alternatively it might be that training that is not typically valued or supported by government (e.g. that doesn't provide qualifications or is directly work-related) may affect non-cognitive skills of adults that will in turn have an impact on the cognitive and non-cognitive skills of their children which may have long term benefits that are typically not evaluated or measured. These potential intergenerational benefits of VET are much more difficult to measure and have not as yet been proven to be important. In fact some evidence from Australia suggest that whilst degree and higher level VET qualifications were associated with better health outcomes, lower level VET qualifications were not (Stanwick et al. 2006). Only time, and proper long term evaluations of such qualifications and programs, will tell.

### **X.4 Implications and Conclusions**

33. The Economics of VET is complicated and more research, more inventive policy development and more rigorous evaluation of VET policies needed worldwide. It

is important that these studies not only focus on the economic returns to VET but on the whole process of skill formation. It is clear that policy needs to ensure that lots of investments in skills occurs in early life – but this is too late for a lot of adults with low levels of skills. A lot of current solutions to adults’ skills problems are clearly not working and more rigorous testing and evaluation of more innovative policies is what is needed – and these need to take into account the fact that skills beget skills. Furthermore, given the evidence that cognitive skills are potentially less malleable later in life, it may be that adult interventions need to pay closer attention to the development of individuals’ non-cognitive skill. Focusing on possible intergenerational transmissions of skills may also be important.

34. The arguments put forth in the this Chapter suggest that there should be strong investments in early childhood, both because the sensitive periods for acquiring several capabilities occur early in life, but also because successful learning early in life is the foundation for successful learning later in life. These investments also need to be followed up, or there is a strong risk that they will not fulfill their potential. But this does not address the skills deficit for the current generation of adults in a number of countries in the world. As argued by Wößmann (2008), when policy makers are making decisions about government educational programs, they not only consider economic efficiency (high returns) but also equity (equality of opportunity). He argues that for some educational investments, particularly early investments, efficiency and equity considerations are strong complements – what is good from an efficiency point of view also is good from an equity point of view. However, for other educational investments, in particular some VET programs, government policy making often involves a trade-off between efficiency and equity arguments. This creates a further complexity in the economics of VET.
35. Fixing the problem of unskilled unqualified adults is certainly hard and costly and at the moment in a lot of countries the solutions being adopted are based on an act

of faith rather than sound evidence. We argue that effective, or at least informed, policy involves understanding more fully the nature of dynamic complementarities in the acquisition of skills over the life cycle and a better understanding of the differential sensitive periods in the accumulation of cognitive and non-cognitive skills. This is a promising research agenda in which people are starting to make inroads (see Cunha, Heckman and Schennach (2008)) and this area of research is highly likely to guide education policy, including VET policy in years to come. A more explicit understanding of the trade off, or otherwise, between efficiency and equity considerations in government policy making is also needed. Current research tells us that adult learning builds on learning in adolescence: whilst equity considerations may dictate that we need to invest in adults now, only by balancing this with good quality early investment will we improve outcomes in the future.

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