

Methods involved in estimating returns for apprentices, firms and society at large

Workshop 'Costs and benefits of apprenticeship'
European Centre for the Development of Vocational
Training (Cedefop)

Stefan Speckesser
Thessaloniki, 24 November 2014

Overview of presentation

- Scope of cost-benefit analyses
- Estimating impacts
- Costs and benefit analysis
- Valuation
- Results
 - Apprentices
 - Firms
 - Society
- Discussion

Scope of cost-benefit analyses

- Estimate (social) net benefit of a programme (monetary values)
 - Not a 'method' as such, but valuation of impacts
 - Impacts can be obtained by different methodological designs (experimental, non-experimental, econometric, qualitative)
- Valuation of costs and benefits
 - Observed market values (prices, wages)
 - Estimated monetary values (willingness to pay, surveys)
 - Potentially socially weighted if related to distributional objectives
- Comparing cost-benefit analyses of different programmes to
 - Identify programme maximising positive net benefits to society (in monetary terms)
 - Provide evidence for policy decision making as the programme generating the highest net benefit to society should be chosen

Estimating impacts: Theory

- Theoretical mechanism
 - Human Capital theory: Principles outlined by Becker (1964) and Mincer (1974), who relate education ('Human capital investment') to subsequent earnings increases ('return to investment')
 - Screening/signalling approaches
- Magnitude of impacts needs to be estimated, e.g.
 - Experimental designs (random assignment)
 - Non-experimental designs (econometric models)
- Example: Estimating the returns to apprenticeships in the UK

Estimating impacts: Methods

- Example: Estimating the 'Returns to apprenticeships' in the UK
 - Annual Population Survey (APS) variable on 'recognised apprenticeships' and counterfactual
 - Estimation of 'Returns to apprenticeships' (incremental return of full achievement of apprenticeships can be compared to counterfactual)
- Making sure achievement/non-achievement of apprenticeship is only characteristic in which people (16-65 years old) differ in APS:
 - Exclude people with Higher Education
 - Remove observations of extreme values (below the first percentile or above the 99th percentile) as outliers distort mean impact estimations
 - Controlling for a number of variables (work experience, gender, ethnicity, region, sector, size of firm and all other qualifications held)
- Estimation of returns of apprenticeships to earnings and employment

Estimating impacts: Wage returns

- Level 2 (as opposed to Level 1) qualifications are associated with a wage premium of 6.7 per cent
- Apprenticeship adds additional 8 per cent compared to people with Level 2 qualifications and no apprenticeship
- Compared to individuals whose highest qualification is Level 1, people with achieved level 2 apprenticeships earn 14.7 per cent more
- Level 3 qualifications have greater impact (15 per cent), while the additional effect of an apprenticeship is 8.1 per cent (yielding 23.1 per cent combined)

Estimating impacts: Wage returns

Table 1 Earnings returns of apprenticeship completion and standard errors (in parentheses) Level 2 and Level 3

Level 2	0.067*** (0.009)	Level 2 and Recognised Apprenticeship	0.080*** (0.009)
Level 3	0.155*** (0.009)	Level 3 and Recognised Apprenticeship	0.081*** (0.010)

*** *Statistically significant at 1% significance level*

Source: Annual Population Survey. Own estimations

Estimating impacts: Employment

- Relative to Level 1 qualifications, employment probability increases by 4.4 percentage points when holding Level 2 qualifications
- Additionally, having completed an apprenticeship increases this probability by another 3.4 percentage points (7.8 percentage points combined)
- Achieving Level 3 (as opposed to Level 1) increases employment probability by 8.1 percentage points. In addition, an achieved apprenticeship at this level increases it by another 2.6 points (10.7 percentage points combined)

Estimating impacts: Employment

Table 2 Employment returns of apprenticeship completion and standard errors (in parentheses) Level 2 and Level 3

Level 2	0.044*** (0.000)	Level 2 and Recognised Apprenticeship	0.034*** (0.000)
Level 3	0.081*** (0.000)	Level 3 and Recognised Apprenticeship	0.026*** (0.000)

*** Statistically significant at 1% significance level

Source: Annual Population Survey. Own estimations

Estimating impacts: Others

- Findings are positive, but also differ (probably more recent?) from other studies, for example
 - McIntosh (2004): 5-7 per cent at either level
 - McIntosh (2007): 16 per cent wage increase of Level 2 and 18 per cent wage increase of Level 3 Apprenticeship (relative to next lower qualification level)
 - London Economics (2011): Level 2 Apprenticeships 12 per cent and Level 3 Apprenticeships 22 per cent (relative to next lower)
 - National Audit Office (2012): 11 per cent wage premium for Level 2 Apprenticeships, and 18 per cent for Level 3 apprenticeships (relative to next lower)
- But what is the individual, employer and social net benefit, i.e. once the costs for acquiring the qualification/ undertaking the apprenticeships are accounted for?

Costs and benefit analysis: Outline

- Costs and benefits
 - Relevant during the apprenticeship (present values) and subsequently (future values)
 - Affect stakeholders differently at different time points
- Outline of most important costs and benefits for principal stakeholders
 - Apprentices
 - Employers
 - Society
 - Government ('Public budgets')

Costs and benefits: Employers

- During apprenticeships (e.g. Hogarth 2012/Pfeiffer et al. 2009)
 - Costs
 - Staff costs for apprentices and supervisors (wages, employer National Insurance Contributions [NIC], discretionary payments, pension)
 - Other costs (set up costs, materials/consumables, administrative and recruitment costs, training workshops in house, course fees if not paid for by the government)
 - Benefits
 - Productive contribution ('apprentice product')
 - Reduced recruitment costs for skilled workforce
 - Saving of downtime due to lack of skilled staff, better public image due to offering opportunities to young people, improved attractiveness for talent because of apprenticeships, further firm-effects, intra-firm diffusions of skills)
- Post-apprenticeship benefits
 - 'Return to investment' for employers: Crucial to understand why employers engage in apprenticeships
 - Very likely transitory

Costs and benefits: Employers

- Transitory nature of employers' benefits:
 - Recent papers for the UK (McIntosh 2007, Hogarth 2012, Pfeiffer et al. 2009) evidence of substantial net costs of apprenticeships for employers
 - Apprentice product not sufficient to recover employers costs of apprenticeships
 - Employers would have to recoup some of the rent from the investment into skills by paying post-apprenticeship employees below their marginal revenue product ('rent sharing')
 - Dearden, Reed and Van Reenen (2005): Returns from skills investment to sectors (in addition to individuals)
- Existence of permanent return to employers at odds with microeconomic theory (and rationale for state intervention):
 - Wages and marginal productivities of workers align in the longer term
 - Workers paid below their true level of productivity would find alternative employment in the longer term and leave the firm

Costs and benefits: Apprentices

- In-apprenticeship costs and benefits
 - ‘Opportunity costs’ (lower wages relative to the wage in regular employment or loss of out of work benefits if applicable)
 - Direct costs (learning materials, travel costs, child-care costs, etc.)
 - Loss of leisure time because of learning activity (exceeding weekly working times), effort to learn and achieve outcomes, increased pressure/anxiety, expectations, etc.
 - Benefits: Apprentices wage, complementary public in-work benefits (e.g. Working Tax Credits), increased happiness and satisfaction because of working for its own sake
- Post-apprenticeship benefits
 - Wages returns and increased employment probabilities
 - Non-monetised benefits (happiness/satisfaction, improved long-term wealth, health and family circumstances, impacts on communities)

Costs and benefits: Society

- Social costs and benefits: Aggregated individual costs and benefits plus further benefits from macroeconomic growth
- Tangible benefits: Wages (total remuneration) represent value contribution of workers (standard microeconomic theory)
- Intangibles to be added to aggregations of individual benefits:
 - Further benefits (diffusion/aggregate growth) disregarded
 - Economic growth
- However:
 - Few empirical studies estimate the size of these effects
 - Dearden et al (2005) and London Economics (2012) estimated positive impacts on sectors and firms; unclear magnitude)

Costs and benefits: Public budget

- Costs during apprenticeships
 - Funding of FE Colleges
 - Reduced tax/NIC compared to counterfactual working at lower qualification during apprenticeship)
 - Increased Working Tax Credit and other in-work benefits for people starting apprenticeships out of a status claiming benefit
- Post-apprenticeship benefits: Derived from positive social benefits
 - Increased tax incomes and reduction of out-of-work benefits
 - Further intangibles (reduction in health spending, crime, poverty): No systematic information about the magnitude of most effects
- Net benefits: If apprenticeships are cost-effective, then subtracting the initial investment from the present values of all relevant future outcomes should result in a non-negative amount for the public budgets

Valuation

- Market prices
 - Apprentices' wages (Apprentice Pay Survey)
 - Wages of people involved in supervision (Labour Force Survey LFS)
 - Average benefits and pension contributions (Official publications)
 - Observed wages of employment in low-skills employment
- Institutional data
 - Duration of apprenticeships
 - Guided Learning Hours (non-contributory time/time for supervision)
 - Spending of public budgets on Apprenticeships
- Observed characteristics of apprentices
 - Achievement rate
- Discount factors
 - Increased lifetime earnings and employment accrue in the long term
 - To derive Present Value Net Benefits (NPV), Present Value costs have to be subtracted from future earnings (discounted to Present Values)

Valuation

- Valuation is based on
 - Market prices, obtained from *Labour Force Survey* (LFS) or other survey (*Apprentice Pay Survey*) data
 - Apprentices' wages
 - Wages of people involved in supervision
 - Average benefits and pension contributions
 - Observed wages of employment in low-skills employment
 - Institutional data
 - Duration of apprenticeships by framework
 - Guided Learning Hours (non-contributory time/time for supervision)
 - Spending of public budgets on Apprenticeships
 - Observed characteristics of apprentices
 - Achievement rate
 - Discount factors
 - Increased lifetime earnings and employment accrue in the long term
 - To derive Present Value Net Benefits (NPV), Present Value costs have to be subtracted from future earnings (discounted to Present Values)

Valuation

Table 4 Apprentice costs and benefits

	L2	L3
Benefits (in apprenticeship, in present values)		
Apprentice remuneration	£12,982	£19,072
Non-financial benefits/wellbeing	+	+
Social status	+	+
Costs (in apprenticeship, in present values)		
Remuneration in alternative non-apprenticeship employment of same duration	£20,376	£29,934
Costs for FE	£0	£0
Learning materials	+	+
Effort/loss of leisure	+	+
Net benefit in apprenticeship (present values)	-£7,394	-£10,862
Benefits post-apprenticeship		
Increased life time earnings if achieved successfully (PV)	£131,571	£200,883
X Achievement rate	75%	79%
= Expected value of increased life time earnings(PV)	£99,073	£157,894
Further long-term non-financial benefits	+	+
Net benefit in present value at onset of apprenticeship	£91,679	£147,032

Source: APS data and own estimations on the returns to apprenticeships, achievement rates, own calculations

Valuation

Table 3 Costs and benefits for employers

	L2	L3
Costs of apprenticeship		
Apprentices' remuneration costs	£12,982	£19,072
Supervision/admin costs	£7,131	£10,600
Benefits during apprenticeship		
Apprentice product	£11,869	£18,894
Public image	+	+
Social status	+	+
Net benefit of apprenticeship	-£8,244	-£10,777
Benefits following the end of the apprenticeship	+	+
Savings in recruitment/induction costs	+	+
Temporary employer rent	> £8,244	> £10,777
Firm level effects	+	+
Effects along supply chain etc.	+	+
Employer benefits		
Total benefits and NPV net benefit	+	+

Source: Framework data, LFS data, apprentice starts in England, 2011/12

Valuation

Table 5 Social cost-benefit analysis

	L2	L3
In-apprenticeship		
Costs		
Value contribution of counterfactual non-apprenticeships employment	£20,376	£29,934
Public FE funding	£2,500	£3,300
Benefit		
Apprentice product	£11,869	£18,894
Social net benefit in apprenticeship	-£11,007	-£14,340
Post-apprenticeship		
EV of increased in output valued as life time remuneration increase in (in present values)	£99,073	£157,894
Firm level profitability	+	+
Positive externalities	+	+
Economic growth at aggregate levels	+	+
Social net benefit post-apprenticeship	>£99,073	>£157,894
NPV net benefit	> £88,066	> £143,554

Source: APS data and own estimations on the returns to apprenticeships, achievement rates, Hogarth et al. (2012) and own calculations

Discussion

- Apprenticeships
 - Substantial investment by employers/individuals/society
 - High positive net social benefits (in PV) in the long-term
- True benefits underrepresented
 1. Longer term/aggregate effects of apprenticeships not included in micro econometric analysis
 2. Higher work incomes (relative to the counterfactual) cause additional returns to public budgets from indirect taxation as consumption increases
 3. Further budget impacts (reduced crime/healthcare spending) have not been included
- Further analysis would have to address
 - CBA of apprenticeships at firm level data (i.e. using sectors variation or firm level data)
 - Impact of apprenticeships on growth