# Economic Value of Education Seminar 2 – Answers

### Exercise 1

Using the compound interest table on the spreadsheet:

1. What would £100 be worth in 5 years’ time at an interest rate of 5%?  
   £127.63
2. What would £100 be worth in 10 years’ time at an interest rate of 8%?  
   £215.89
3. An investment advisor offers a guaranteed return of 6% over 5 years for investing in a bond with an upfront fee of £50, regardless of amount invested.
4. Is it worth investing £100 in this bond, compared to keeping the £100 under your bed?  
   No, because it would only produce £133.82-£50.00 = £83.82 after five years.

### Exercise 2

Use the present value table where each column shows the present value of £100 received in *t* years’ time (each row is a year) for the interest rates from 1% to 12%.

1. What is the present value of £100 received in 5 years’ time when r=5% (or 0.05)?  
   £78.35
2. What is the present value of £100 received in 5 years’ time when r=1% (or 0.01)?  
   £95.15
3. What is the present value of £100 received in 10 years’ time when r=10% (or 0.10)?  
   £38.55
4. Given that the rate of discount is 10%, would you rather have £35.05 in 10 years’ time or £30 in 13 years’ time?  
   This is present values of £13.51 versus £8.69, but don’t need to do this calculation because the latter gives you less money after a longer time period so is clearly worse.

### Exercise 3

* Is it worth investing in the house when it costs £120,000 or is the bond the better investment?  
  Step 1: what is the present value of the sum of net income plus the sale value of the house? (You will find this on the spreadsheet – take a look at the formulae to make sure you understand them.)  
  £114,864
* Step 2: what is the net present value of the house investment if it costs £120,000? In other words what is the difference between the present value of the cash flows from the house and what it costs to buy now?  
  -£5,136
* Step 3 (decision): does investing in the house give you a better financial return than investing your money in a bond which earns 10% pa?  
  Bond is the better return

1. Is it worth investing in the house when it costs £100,000 or is the bond the better investment?  
   At £100,000 the house is the better return
2. Complete the criterion for an efficient investment decision:  
   A person will increase his/her wealth (and hence welfare or utility) if s/he purchases an asset (i.e. invests) for which the **net present value is greater than ZERO .**

### Exercise 4

Compare the internal rates of return of the two house purchase options to the respective net present values of the expected future net income stream.

1. Delete less or greater as appropriate:
2. When the house costs £120,000 to buy, the NPV is less/~~greater~~ than 0 and the IRR is less/~~greater~~ than the rate of discount.
3. When the house costs £100,000 to buy, the NPV is ~~less~~/greater than 0 and the IRR is ~~less~~/greater than the rate of discount.
4. When is the IRR criterion for an efficient investment? Complete this statement:  
   A person will increase their wealth (hence welfare or utility) if they purchase an asset for which the internal rate of return exceeds the \_\_**discount rate**\_\_\_\_\_\_\_.

### Exercise 5

In the table below indicate which are private or social opportunity costs, and which are private or social returns (benefits).

|  |  |  |
| --- | --- | --- |
| Type of cost or return | Private cost or return | Social cost or social return |
| Educational institutions’ marginal cost of providing education |  | Social cost |
| Tuition fees paid by individuals | Private cost |  |
| Costs of food, clothing, rent etc. of individual while in education | X | X |
| Maintenance grant | Private return |  |
| All out of pocket expenses on education paid by individuals for books, travel, ICT, etc. | Private cost | Social cost |
| Post-tax earnings foregone by individual due to enrolment in schooling, courses etc. | Private cost | Social cost (with taxes) |
| Taxes foregone by individual due to not working due to being educated |  | Social cost (see above) |
| (Additional) Pre-tax earnings of the individual (after graduation) |  | Social return |
| (Additional) Post-tax earnings of the individual (after graduation) | Private return |  |
| Tax revenue from spending done by individual(NB Could be private cost if the spending is done on education)…. | X | X |
| Higher pension due to employer and personal pension schemes | Private return |  |

### Exercise 6

1. What is included in:  
   (a) Chris’s net private returns?  
   Foregone post-tax earnings, tuition fee paid, Post-tax earnings, Post-tax pension payments  
   (b) net social returns?  
   Foregone pre-tax earnings, cost of education provision, pre-tax earnings
2. Why is Chris’s social rate of return to education less than his/her private rate?  
   Society incurs high costs of education provision in the form of costs of provision and foregone pre-tax earnings and although society eventually benefits from large pre-tax earnings, these cash flows are long way in the future so do not have a high present value.
3. Will the investment in Chris’s lifetime education, given the IRR, be socially efficient?  
   Yes, provided society cannot find an alternative investment that generates a greater return than 13%.
4. What has not been included in these calculations of Chris’s social rate of return to education?  
   Other social benefits, for example health and crime benefits of education.

### Exercise 7

1. Why is the rate of return to upper secondary education compared to lower secondary education higher than the rate of return to tertiary education compared to upper secondary when people with tertiary education generally earn more than people with only upper secondary education?  
   The return to tertiary education tends to be lower because there are quite high opportunity costs of studying in the form of higher foregone earnings. The actual costs of annual provision are also often high.
2. Is investment in (i) tertiary education; (ii) upper secondary socially ~~in~~efficient if the opportunity cost of capital is:  
   (a) 20%? Upper secondary is (just about), tertiary isn’t  
   (b) 10%? Upper secondary is, tertiary isn’t  
   (c) 6%? Both upper secondary and tertiary are social efficient at this required rate of return.
3. How do the following changes in assumptions affect the six IRRs (change them one at a time only)?  
   The initial IRRs are:  
   29.0%; 13.2%; 9.7%; 7.0%; 25.6%; 20.0%
4. a reduction in the tax rate to 25%?  
   29.1%; 13.2%;10.0%; 7.0%; 25.6%; 20.0%  
   (b) an increase in the annual cost of university provision by £2,500 per annum?  
   29.0%; 12.9%; 9.7%; 6.4%; 25.6%; 20.0%

NOTE: ONLY reduces social rates of return – as the person is not required to pay back more. Hence its just an increase in the social cost of going to university (social opportunity cost increases – not what the individual pays).  
(c) tuition fee repayments in the form of a graduate tax of 4% until the age of 45?  
28.4%; 13.2%; 8.3%; 7.0%; 25.6%; 20.0%  
(d) an increase in graduate earnings by 5% for each year of employment?  
29.9%; 13.5%; 12.1%; 8.6%; 25.6%; 20.0%