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Exploring Cost Analysis A Case Study Illustrating How Different Assumptions Influence Evaluative Conclusions

Nadini Persaud & Cristian Gugiu

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Purpose

A life earnings study to determine the value of the ABC A'Level (**US College equivalent**) qualification, relative to other qualifications, namely O'Levels (**US High School equivalent**) and B.Sc.

Study refined to public sector only.

Background on Education System

Based on British education system. Exams set and marked in UK. During the past 20 years almost all O'Levels have been replaced by Caribbean (CXC) equivalent.

A'Levels still widely used. A few Caribbean equivalents currently being piloted by CXC.

Critical Competitors of ABC

- Technical College (main competitor)
- Labor Market
- University of the West Indies
- Police Force
- Nursing Profession
- Private individuals who offer tutoring in A'Levels

Assumptions/Caveats for Interpretation

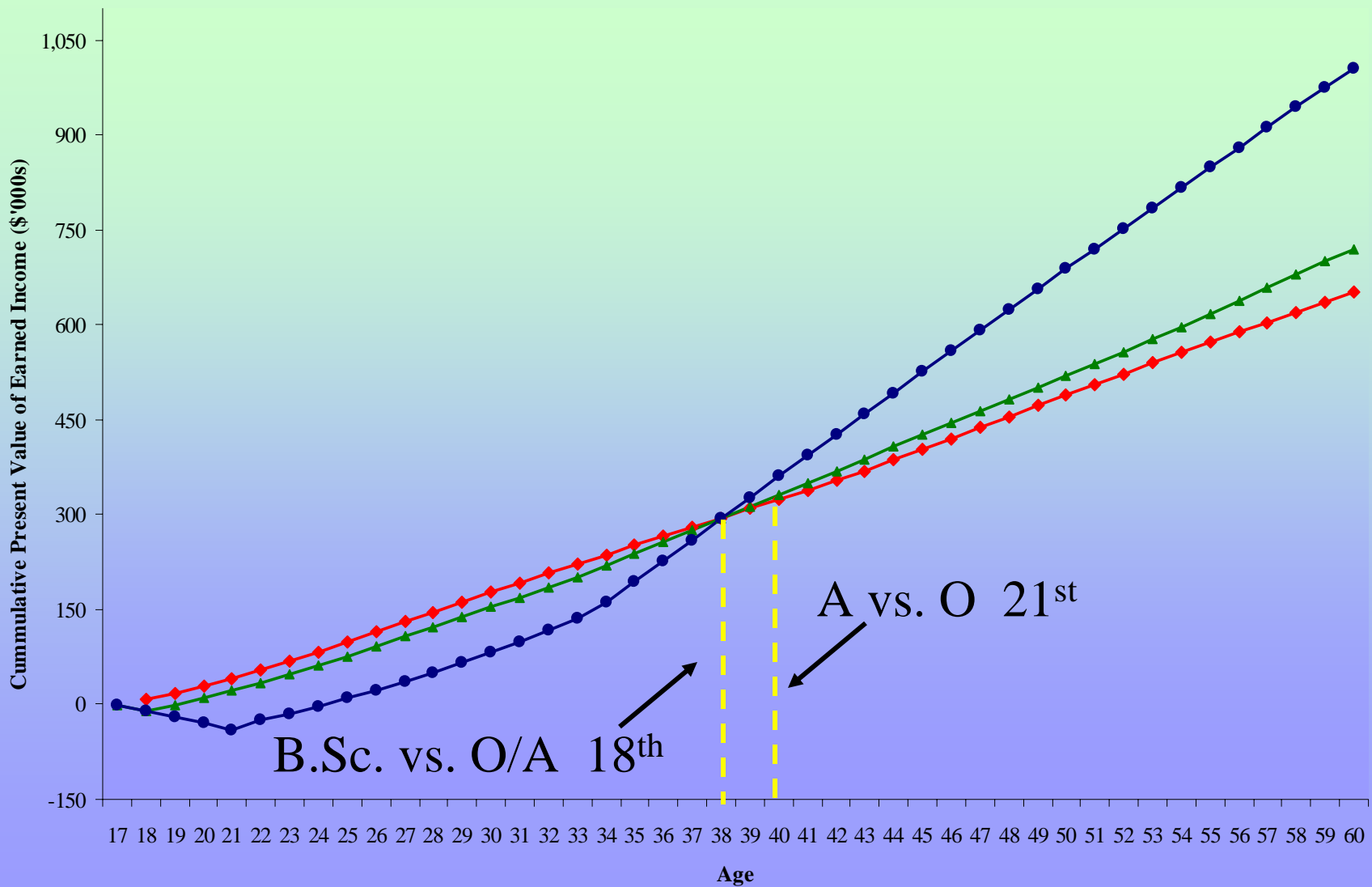
- Schooling precedes work
- Qualifications considered (O'Level, A' Level, B.Sc)
- Commencement of employment
- Time to complete studies
- Retirement age
- Promotion
- Salary increments
- Costs

Assumptions etc. (continued)

- Opportunity costs
- Inflation rate
- Discount rate
- Student loans
- Income tax deductions
- Pay as you earn deductions (SS)
- Allowances
- Intangible benefits
- Unemployment

Career Advancement in Public Sector With Different Levels of Qualifications

| | O'Levels | A'Levels | B.Sc 4 Yrs | B.Sc 3 Yrs |
|----------------------------------|-----------|-----------|------------|------------|
| Employment Age | 18 | 19 | 21 | 22 |
| Retirement Age | 60 | 60 | 60 | 60 |
| Years Spent in Each Grade | | | | |
| 7X (Probation) | 2 | 2 | | |
| G3 | 20 | 10 | | |
| G4 | 21 | 10 | | |
| G5 | | 10 | | |
| G6 | | 10 | | |
| G7 | | | 4 | 4 |
| G8 | | | 5 | 5 |
| G9 | | | 6 | 6 |
| G10 | | | 7 | 7 |
| G11 | | | 8 | 8 |
| G12 | | | 10 | 9 |
| Employment Years | 43 | 42 | 40 | 39 |



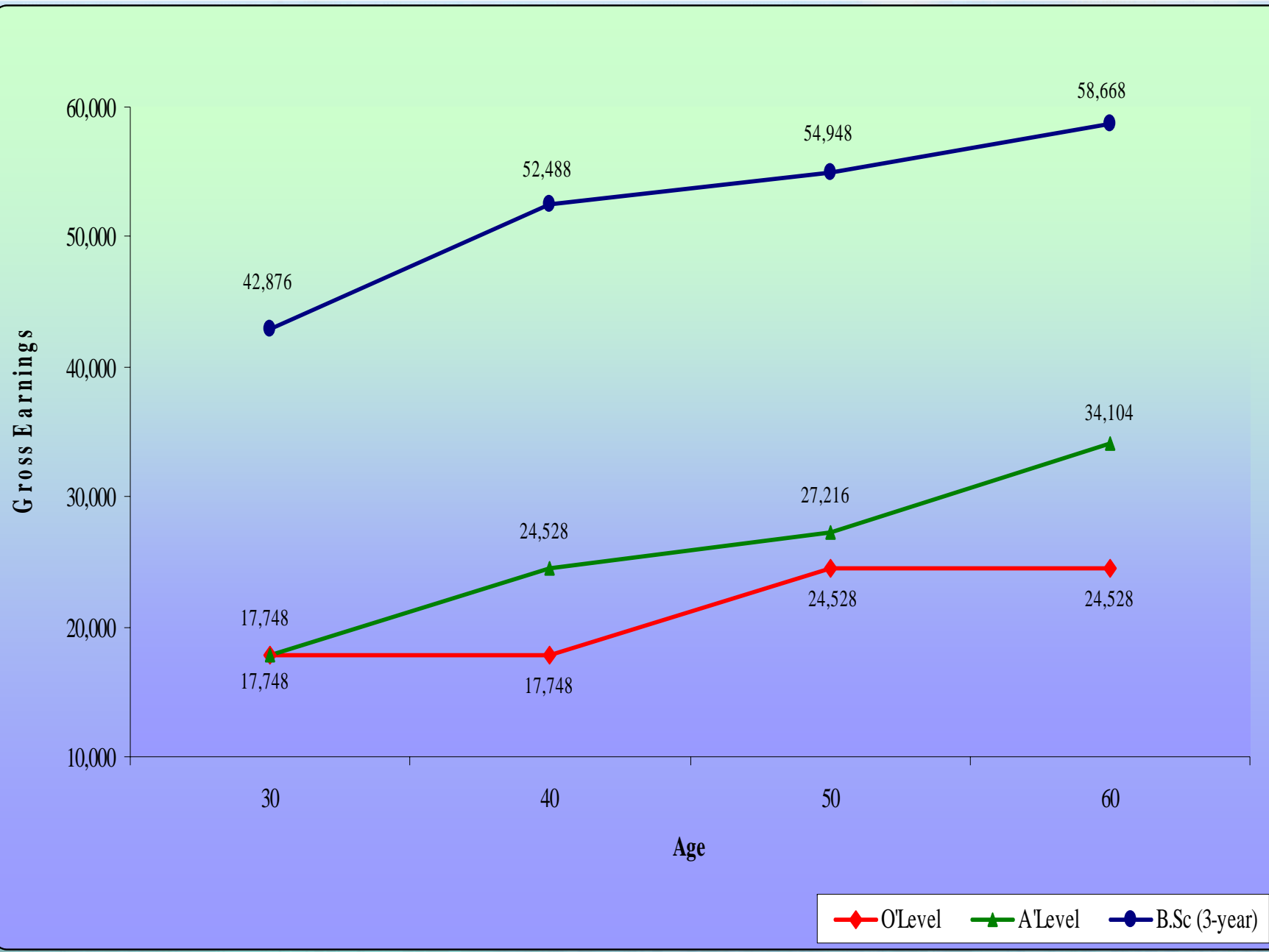
◆ Scenario 1: O'Level
 ▲ Scenario 2: A'Level
 ● Scenario 3: B.Sc. (3 Year Programme)

Net Present Value

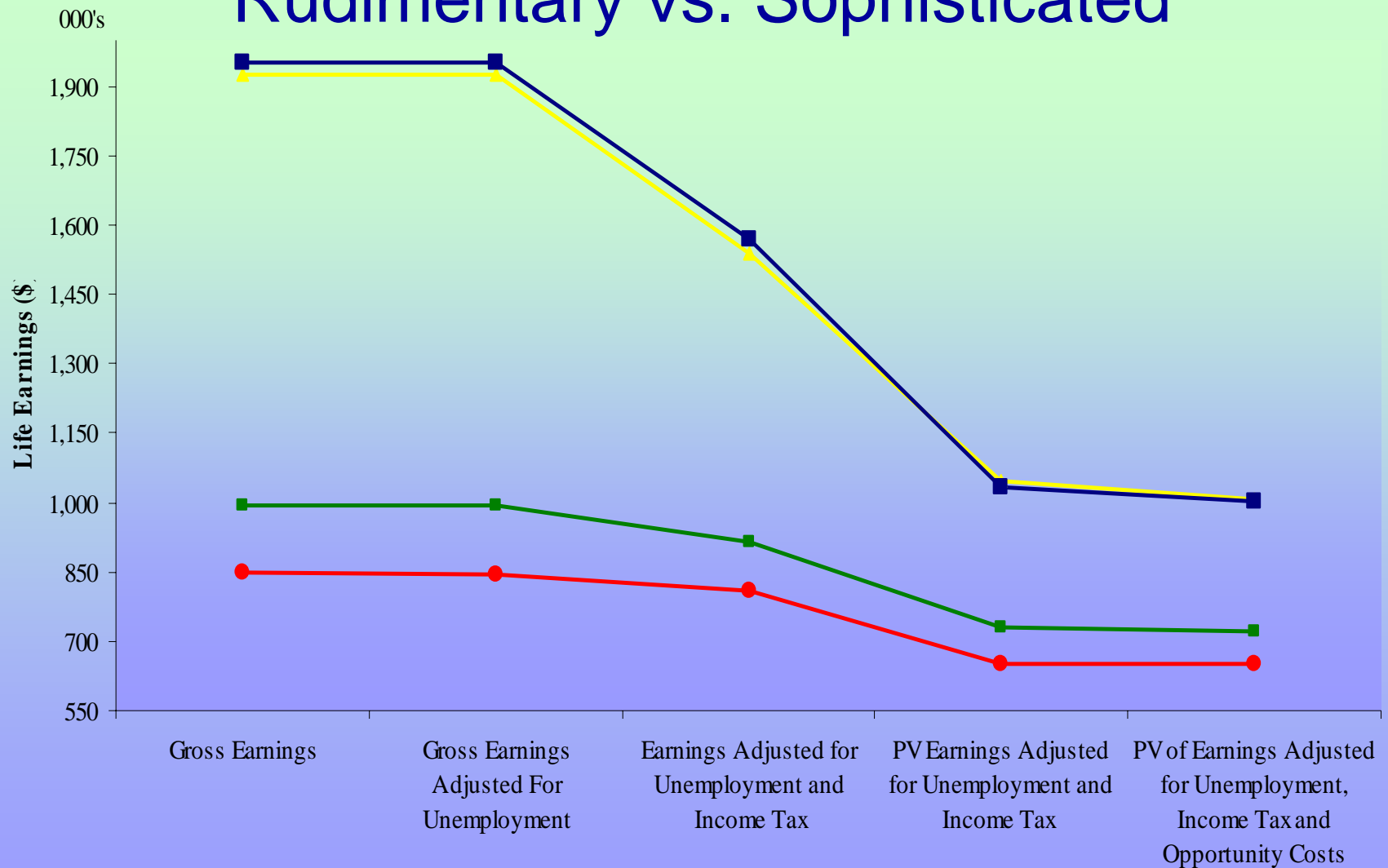
| | \$ | Rank |
|-------------|-----------|------|
| O'Levels | 650,935 | 4th |
| A'Levels | 719,324 | 3rd |
| B.Sc 3 Year | 1,005,146 | 1st |
| B.Sc 4 Year | 1,004,157 | 2nd |

PV Difference in Life Earnings

| | \$ | % |
|---------------------------------|---------|-------|
| A'Level vs O'Level | 68,388 | 10.51 |
| B.Sc (3 year) vs. O'Level | 354,211 | 54.42 |
| B.Sc (3 year) vs. A'Level | 285,823 | 39.73 |
| B.Sc (3 year) vs. B.Sc (4 year) | 989 | 0.10 |



Rudimentary vs. Sophisticated



Assumptions

—●— O'Level —■— A'Level —▲— B.Sc (3-year) —■— B.Sc (4-year)

Rudimentary vs. Sophisticated (cont.)

| | O'Level | A'Level | B.Sc 3yr |
|--|----------------|----------------|------------------|
| Gross Earnings | 850,536 | 993,276 | 1,923,744 |
| Gross Earnings Adjusted For Unemployment | 843,852 | 991,756 | 1,923,111 |
| Earnings Adjusted for Unemployment and Income Tax | 808,219 | 914,818 | 1,540,412 |
| PV Earnings Adjusted for Unemployment and Income Tax | 650,935 | 729,363 | 1,046,641 |
| PV of Earnings Adjusted for Unemployment, Income Tax and Opportunity Costs | 650,935 | 719,324 | 1,005,146 |

Major Problem with Sophisticated Analyses

Policymakers/staff/stakeholders rarely have enough training in economic analyses to perform cost studies. Many cannot appreciate the value of such studies because they simply do not understand the concept of discounting. Very difficult concept for most to understand unless trained as an economist/accountant.

Sensitivity Analyses

- A procedure to determine the sensitivity of the outcomes of an alternative to changes in its parameters.
- How would different promotion assumptions or different discount rates affect overall conclusion?

Sensitivity Analyses: Start Salary

- Recall that in our analyses, both A'Level and O'Level graduates commenced employment in Grade 3 at the same salary, but A'Level graduates were promoted twice as fast as O'Level graduates.
- What happens if we change our assumption for the start salary for these two groups?
- What start salary would an A' Level graduate need to earn 20% more than an O'Level graduate.
- WB: Every year of additional education should earn 10% more in income.

Sensitivity Analyses: Start Salary

- ❑ Keeping promotion rate constant, we performed a sensitivity analysis to determine the start salary an A'Level graduate would need to earn 20% above an O'Level graduate.
- ❑ Analysis revealed that they would need to commence employment at the maximum salary in Grade 3 to earn 18.02% (\$17,748).
- ❑ If they commence employment in Grade 4, rather than Grade 3, they would exceed the WB projection of 20%.
- ❑ A'Level vs. O'Level \$ 68,388 10.51%
- A'Level vs. O'Level \$117,292 18.02%

Sensitivity Analyses: Discount Rate

Real Interest Rate .88%

| | \$ | % |
|----------------------------|---------|-------|
| A'Level vs. O'Level | 68,388 | 10.51 |
| B.Sc (3 years) vs. O'Level | 354,211 | 54.42 |
| B.Sc (3 years) vs. A'Level | 285,823 | 39.73 |

Real Interest Rate 4.00%

| | | |
|----------------------------|---------|-------|
| A'Level vs. O'Level | 15,985 | 4.78 |
| B.Sc (3 years) vs. O'Level | 100,061 | 29.91 |
| B.Sc (3 years) vs. A'Level | 84,075 | 23.99 |

Real Interest Rate 7.00%

| | | |
|----------------------------|--------|-------|
| A'Level vs. O'Level | -2,609 | -1.29 |
| B.Sc (3 years) vs. O'Level | 9,447 | 4.69 |
| B.Sc (3 years) vs. A'Level | 12,057 | 6.06 |

Sensitivity Analyses: Discount Rate

[REA 11.xls](#)



Data Constraints

- ❑ Prevented us from conducting some types of analyses e.g. did not make sense to calculate ROI since we did not have education costs for O'Levels.
- ❑ When faced with data constraints: Use assumptions, but justify by reference to literature/interviews. Very important to perform sensitivity analyses to ensure robustness.

Costing Intangibles/Externalities

- ❑ Did not assign costs to intangibles. Work required to quantify was not worth the effort.
- ❑ However, even though intangibles were not quantified, they were discussed in the narrative and it was noted that if they were included in the computations, conclusions may have been different.

Costing Intangibles/Externalities

Private Returns

- Develop leadership skills
- Develop awareness/appreciation of health and cultural issues
- Builds self-esteem
- Develop time and stress management skills

Costing Intangibles/Externalities

Societal Returns

- ❑ O'Level graduates are only 17. Some may be too immature to commence serious employment. High costs to society w.r.t drinking, gambling, unprotected sexual activity, drug use and crime.
- ❑ Better health, lower medical costs.
- ❑ More stable family environments, lower costs for domestic violence, physical and mental abuse programs and facilities.

Major Discoveries

- ❑ No difference between a 3-year vs. 4-year program of UWI studies.
- ❑ Current public sector salary structure does not provide much incentive to pursue A'Level studies.
- ❑ Although college cost is minimal (<\$6,000), many may still not be able to attend college because this cost is approximately 4 times the poverty rate.

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