

## Appendix F

### **THE “VALUE” OF EDUCATION.**

It is frequently suggested that education should be run like a business in order to minimize costs and maximize efficiency. If this is a reasonable suggestion, then it should also be reasonable to evaluate the “value” of education, at least to the individual, using business methods and techniques, specifically the net present value [NPV] or discounted cash flow [DCF] procedure. The details of this procedure can be found in most accounting business accounting texts. Briefly, what the procedure does is to calculate the present value of future expenditures or receipts, and to base financial decisions on the net present value of these expenditures or receipts, thus eliminating the complicating effect of the “time value” of money. An example will make this procedure clearer. Assume that you have won the lottery and are presented with the choice of one million dollars now, or one hundred thousand dollars a year for ten years. Most people would opt for immediate payment, The problem is more complex however if the option is between one million dollars now or the following options:

Year	Option #1	Option #2	Option #3
1	\$100,000	\$100,000	\$130,477
2	\$100,000	\$104,000	\$126,677
3	\$100,000	\$108,160	\$122,987
4	\$100,000	\$112,486	\$119,405
5	\$100,000	\$116,986	\$115,927
6	\$100,000	\$121,665	\$112,551
7	\$100,000	\$126,532	\$109,273
8	\$100,000	\$131,593	\$106,090
9	\$100,000	\$133,857	\$103,000
10	\$100,000	\$113,000	\$100,000
Total	1,000,000\$	\$1,200,611	\$1,146,388

The tendency for most people would be to select option 2, as this apparently provides the greatest total return, however this neglects the time value of the money. Because the larger payments of option 2 are far in the future, they are worth less immediately. While any discount rate can be chosen, a current typical rate is 5%. In effect this asks how much would one have to invest at the present time at 5% compound return to receive a given sum in the future. For example, what is the current or net present value of \$1.05 to be received in one year if an annual interest rate of 5% is assumed. The answer of course is \$1.00.

If the above values are discounted at 5% the following result is obtained.

Year	NPV 1\$ @ 5%	NPV Option #1	NPV Option #2	NPV Option #3
1	1.00\$	\$100,000	\$100,000	\$130,477
2	0.95\$	\$95,238	\$99,048	\$120,645
3	0.91\$	\$90,703	\$98,104	\$111,553
4	0.86\$	\$86,384	\$97,170	\$103,147
5	0.82\$	\$82,270	\$96,245	\$95,374
6	0.78\$	\$78,353	\$95,328	\$88,187
7	0.75\$	\$74,622	\$94,420	\$81,541
8	0.71\$	\$71,068	\$93,521	\$75,396
9	0.68\$	\$67,684	\$90,600	\$69,714
10	0.64\$	\$64,461	\$72,841	\$64,461
Total		\$810,782	\$937,276	\$940,495

It can therefore be seen that when the time value of money is considered, what at first appears to be the best choice may not be optimal. Because we have the projected median income for various educational attainment levels (Chapter 4), and good estimates of the required investment of time and money, it is possible to perform a “business” or NPV/DCF analysis of education for the individual.

Please note the following simplifying assumptions which uniformly result in the best possible case for additional “education” beyond high school.

- I. Income is considered to be uniform throughout the working life. In actuality, higher income is skewed to the later years where the discount is higher and the NPV less. While not documented, it seems plausible that the higher the level of educational attainment, the more the peak earning years are skewed into the future.
- II. Both the increase in total tax rates with time and the affect of progressive tax rates are ignored.
- III. Opportunity costs are implicitly included because of the lower or no income shown for the post-secondary learners.
- IV. Carrying costs of (interest on) student loans are ignored, only cumulative cash-flow is considered.
- V. High school graduation at 18 and a 50 year working life are assumed.
- VI. Values are in constant value inflation adjusted 1996 Dollars.
- VII. A working year of 2080 hours is assumed.
- VIII. The median hourly wage rates are projected using the linear trend line equations previously calculated from last known (1996) values. From Chapter 4 these are:
  - A. High school - \$10.60 per hour base less \$0.0773 per year
  - B. Post-secondary - \$11.92 per hour base less \$0.0626 per year
  - C. Baccalaureate - \$17.25 per hour constant
- IX. Three attainment levels are evaluated, high school, post secondary, and baccalaureate at three different discount rates 5% (Chart 1 - NPVED), 7% (Chart 2 - NPVED), and 9% (Chart 3 - NPVED).
- X. VoTech charges of \$1,000 per year for two years are assumed.
- XI. Full time employment while attending VoTech is assumed.
- XII. Net college costs of \$12,500 per year for four years are assumed.
- XIII. Part-time employment while attending college with minimal income is assumed.
- XIV. Yield from alternative investment of either college tuition (\$50,000) or VoTech fees (\$2,000) is not considered.

## **RESULTS:**

Examination of the following charts indicates the following:

- I. Using commonly accepted criteria for investment analysis, it is clear that if college education was proposed as a business investment, it and its advocate would be ridiculed. Normal business practice requires “break-even” in one year or less without tax affect, and “break-even” in two years or less with tax effect, if a capital investment is to be even considered. Under the best case condition of 5% DCF, “break-even” of college does not

occur until about 5.8 years into the project, and a net gain over the alternative of high school only does not occur until about 18 years into the project. Net gain over post-secondary [VoTech] education does not occur until 22 years into the project.

- II. If the somewhat higher but more realistic discount rate of 9% is used, net gain over high school education only does not occur until 30 years into the project and the post-secondary (VoTech) alternative is never exceeded, indicating an internal rate of return [IRR] of about 8% which is very low for a business investment.
- III. Ignoring any “quality-of-life” issues, if the only criteria is maximum economic income / return to the typical individual, it appears that the optimum strategy would be high school graduation, enlistment in the armed forces, and investment of the college costs in a good mutual fund.

# Cummulative DCF (Earnings) @ 5% High School, Post-Secondary and Baccalaureate

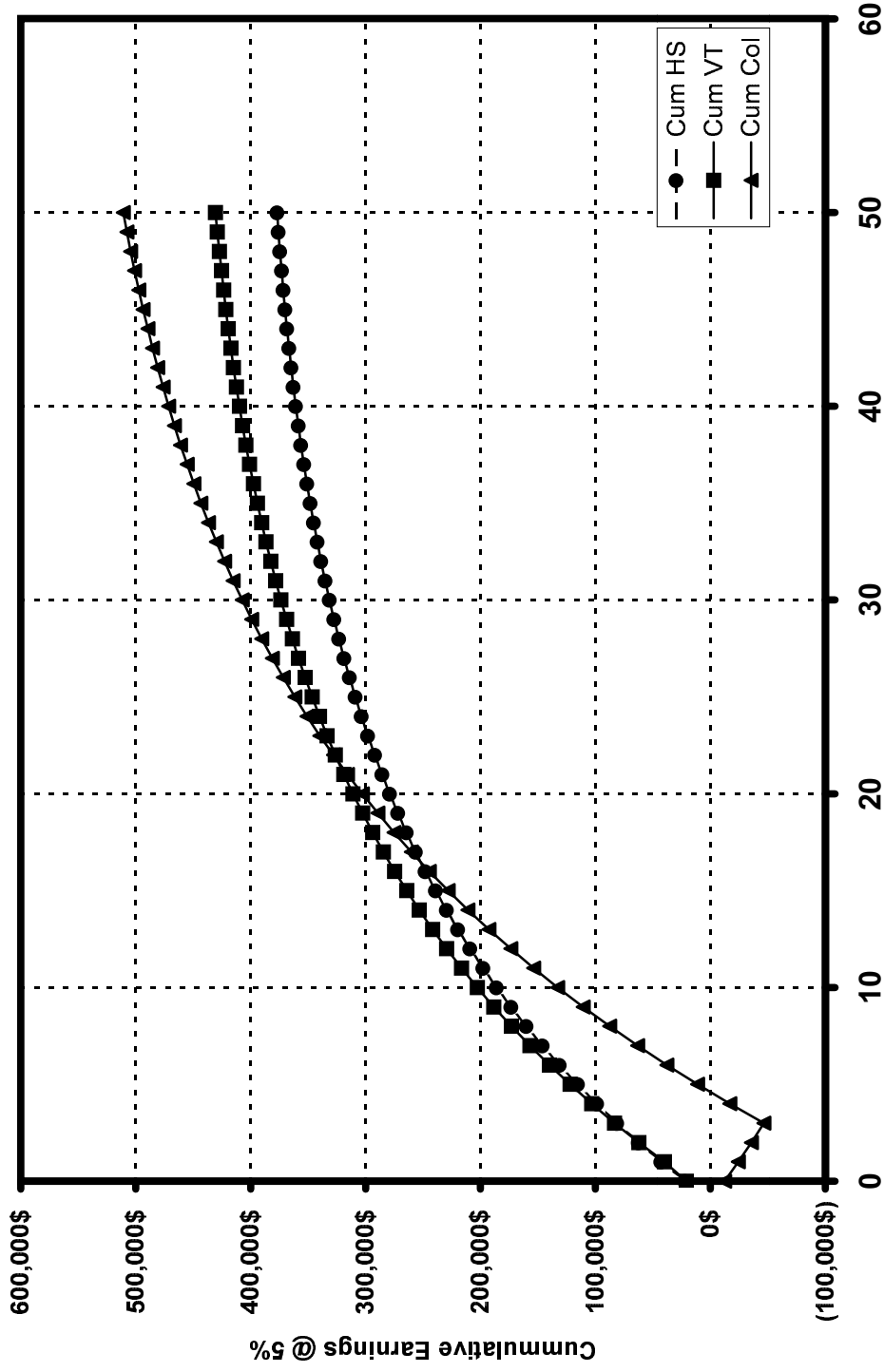


Chart 1 -Npved

Cumulative DCF (Earnings) @ 7%

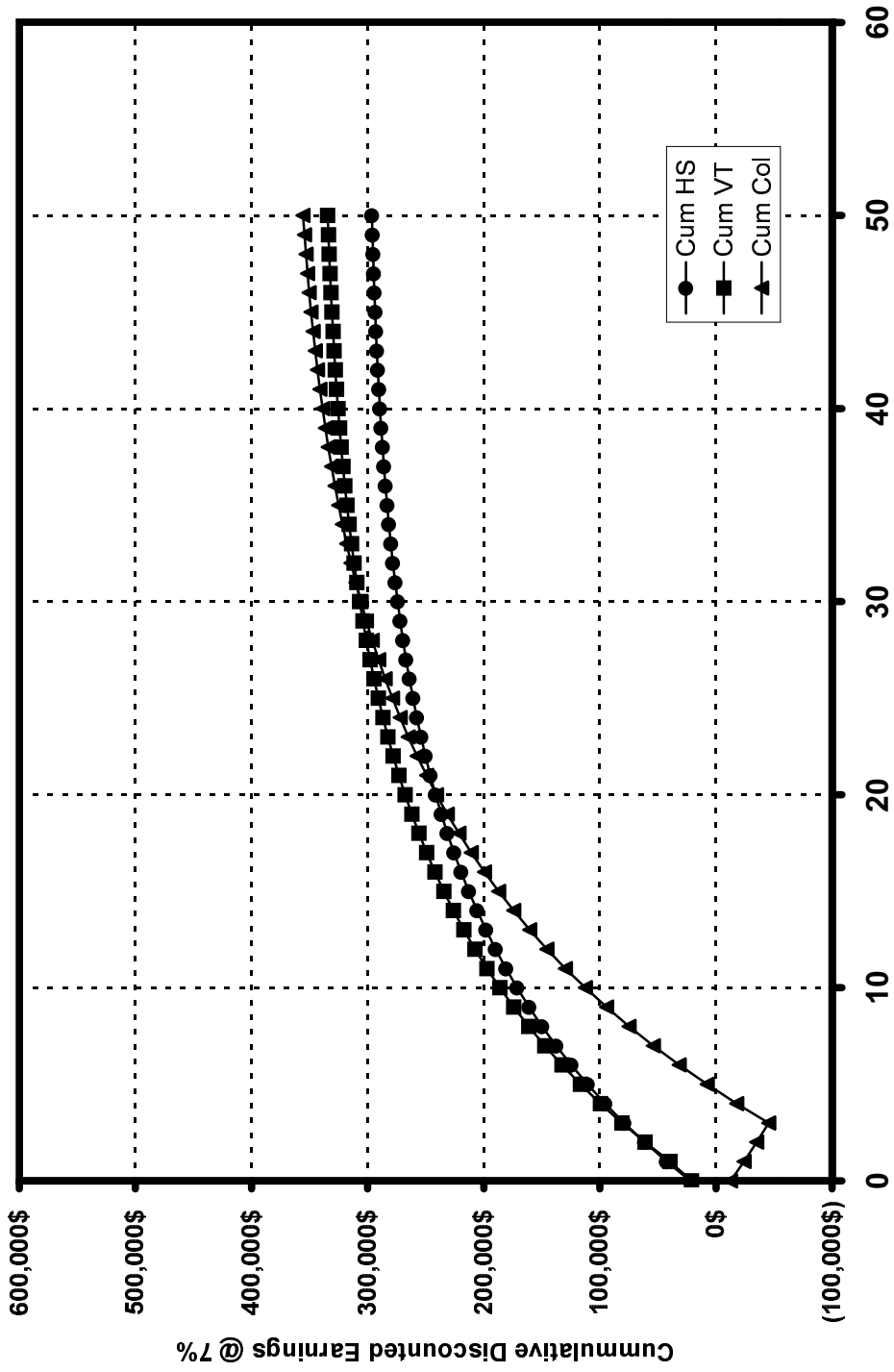


Chart 2 - Npved

### Cumulative DCF (Earnings) @ 9% High School, Post-Secondary, and Baccalaureate

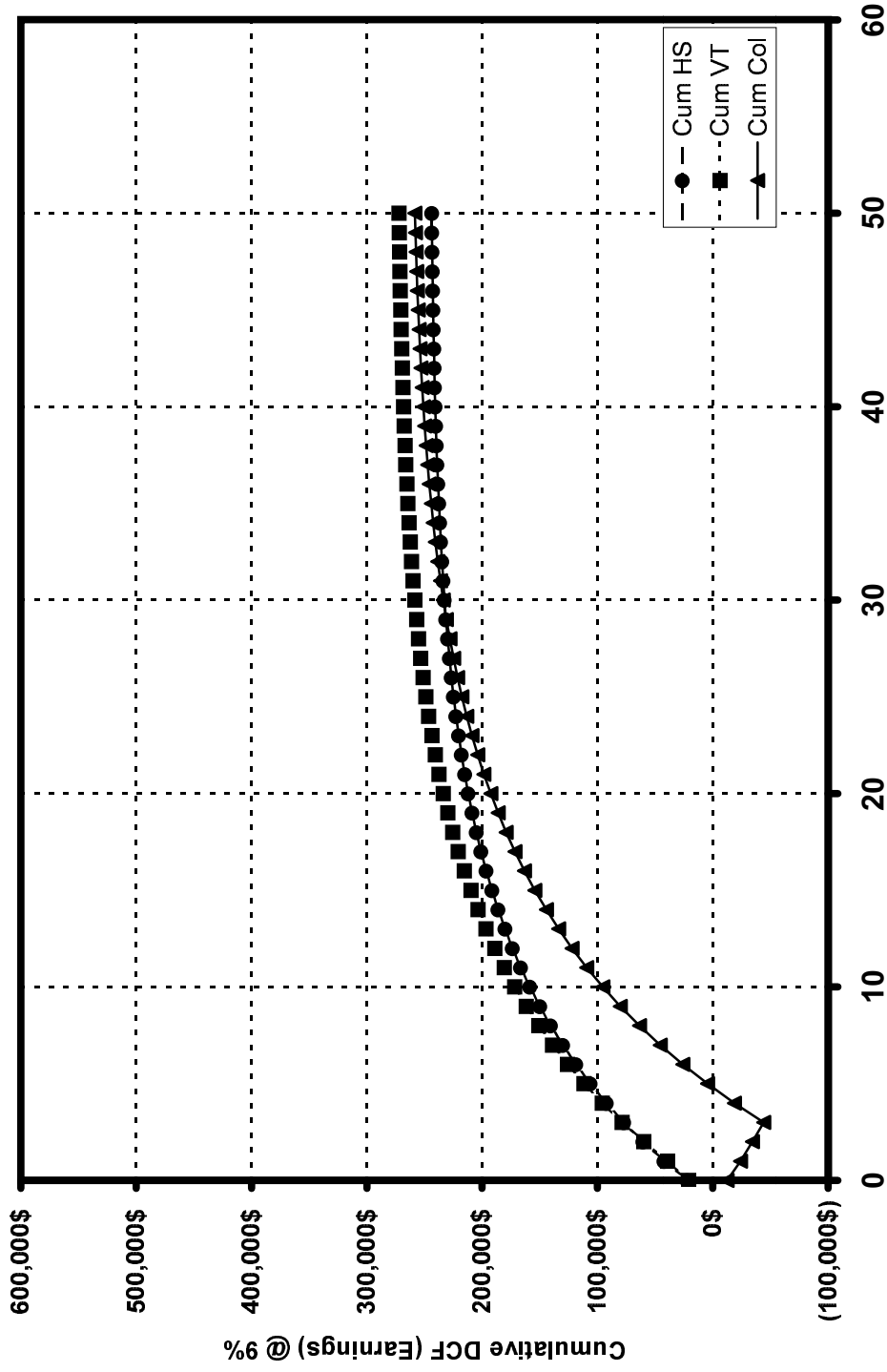


Chart 3 - Npved