

**T4DC**  
**HW Economics (please submit individually)**

**Due October 31, 2006, by start of class**

1) [50 points] You are an entrepreneur setting up a kiosk for rural ICT needs. You have two designs and business models to choose from (A and B), which have net cash flows as below (assume this includes any salary costs of the kiosk operator):

Year	Project A	Project B
0	-15,000	-18,000
1	1,000	7,000
2	3,000	6,000
3	4,000	5,000
4	5,500	3,000
5	7,000	1,000

Assume these are net cash flows, and inflation is not an issue (i.e., nominal numbers are fine). Also assume risks are equivalent, and mitigated through insurance and other means. The license is only given for 5 years, so assume that is the life of the project, with no residual value.

Project A is a kiosk that expects increasing cash flows as users adopt this technology/service. *The growth is not due to inflation.* Project B is one where the kiosk can provide voice only, but focuses on long-distance, which has high margins today. However, as the government is rationalizing long-distance tariffs, the earnings from this decline over time.

Which is the better project? Does it appear worthwhile? Does your answer change if you have a soft loan available at 5%?

MAX ½ Page text, single-spaced (excluding tables/figures/calculations – You must show your work/assumptions.)

2) [20 points] Considering Prahalad's BOP model, brainstorm a need (latent demand) in developing communities that is currently either not being met or is of the wrong scale/size/cost, where you propose a new technology or technology based solution. E.g., the lifestraw is a personal level and affordable water filter. Very briefly describe the need, the idea you have (even preliminary) and any other salient information such as business ideas, stakeholder incentives, etc.

MAX 300 words

3) [30 points] A group of miners has banded together to form a cooperative to increase their bargaining power with the markets. They aim to use ICT to help discover the price of gold in the market, while previously they had to sell their production at a price set by a middleman trader. Gold prices are rather volatile, and are at \$18/gm (gram) today. They have the ability to store gold production for a brief period, so aim to learn more about

price variations on a monthly basis. This country suffers from high inflation, so the *monthly* cost of capital is 5% (all numbers are nominal here).

They have \$100,000 to invest in a new mine, and they expect to produce 2.2 kg of gold in the first month, and 3 kg in the second month. However, the price is expected to be either \$19/gm (50% chance) or 25\$/gm (50% chance). This variance is based on whether certain foreign sale transactions are allowed by the government, for which they require ICT to learn the state of the market. What is the expected value for the mine investment? Assume the ICT systems are already available (at no extra cost). Should they invest in the mine?

Max ½ page, single-spaced, *excluding* tables/charts/calculations.

## Some comments and points on Techno-Economics

(Given class time was limited in class, I wanted to mention a few things that we didn't cover, or skimmed through quickly).

### 1) Measuring cash flows

The cash flows shown in the example are rather tricky to determine in practice. While upfront cash flows are often known in reasonable detail, cash inflows, especially out in to the future are often really tricky to know, especially with certainty.

What was shown was the combined NET cash flow, adding up the inflows and outflows in a given year (or respective time period). It is important we know what the net cash flows are, as people often just think about gross earnings. One publication made the mistake, when evaluating the benefits of a firewall and security investments, stated that an airline might have a one day downtime due to an Internet attack, and thus would lose out on selling a thousand seats during the day of downtime, and @\$1,000/seat, this means a million dollars of losses. Multiplied by the 1% chance of such an attack estimated, this meant they should be willing to invest 1% of one million (or \$10,000) into a firewall and security system. WRONG. They don't make a profit of \$1,000 per seat. Those are gross sales, and they pay most of that to the airlines.

### 2) Inflation

Nominal money and real money are linked by inflation. The \$290 for a model T car 75 years ago is the nominal value (face value). In today's money, it is worth a lot more. When comparing that to a car today, we can either convert the 1930 money into today's money (inflate it accordingly) or take today's money and deflate it to then.

It doesn't matter, as long as we're consistent. Similarly, discount rates can be real (post inflation) or nominal (face value). Nominal rates are just real plus inflation. Nominal is easier to determine in the market, but it embeds in it inflation rates. In the long run, the thought is that real earnings are more stable (while nominal returns can vary, especially as inflation varies).

### 3) Opportunity costs and alternatives

It is always important to consider what else we could do with our money, instead of investing it. Of course, one has to be careful about apples to apples comparison. A 3% bank deposit is lower return than a 5% bond by a company, which is lower than the long-run stock market average of 8 or 9+%. But the latter are riskier.

So what is the appropriate discount rate for a child mortality project in Mali? Societal projects often garner "soft loans" (which are below market rates). Sometimes governments use tax revenues to fund such projects, so there is no real "market." Sometimes governments themselves issue or undertake debt for their projects, but even

then the rates are often lower than corporate. Even many multi-lateral agencies, such as the World Bank, issue soft loans, sometimes at 5% nominal rate.

#### 4) Excel

Excel can do many financial calculations, such as NPV, and calculating the IRR. Play around with the functions (and see the help files). PMT is also a useful function. But, you must be careful in how excel does its calculations, e.g., what it considers the initial time period, whether payments are made at the beginning or end of a time period, etc.

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