# Things to know for the second test

## AAEC 3316 –

What is risk, what is uncertainty, what is Bernoulli's principle, what is utility, what is a utility function, what is the Expected Utility Theorem, what are the three possible types of risk preference that could be displayed by decision-makers, what is certainty equivalence, how to calculate certainty equivalence, what is risk premium, need to know the equation of risk premium in terms of certainty equivalence and expected value, need to know how to graph risk premium in the utility and risky prospect space, need to know the five assumptions/axioms needed to fulfill the Expected Utility Theorem, definition of risk aversion coefficient, relevance of the "relative" risk aversion coefficient, what is meant by DARA, CARA, and IARA, be able to list possible sources of risk, be able to list possible approaches decision-makers might follow to address risk and uncertainty related issues, be familiarized with the FOUR key findings of Sandmo, given the discussion regarding diversification versus specialization which of the two makes more sense to you.

Need to go over handout #16 (based on Dillon's book) carefully because you need to be familiar with the FOC of utility of profit maximization with time and time preference under risk and uncertainty considerations (LOOK AT the BIG picture here, do not get bogged down in details, carefully read the discussion/interpretation written up in this handout ..

Finally, need to make sure to go over handout #12 (based on Robinson and Barry's book) regarding E- V Frontier Analysis (Expected Value Variance Frontier Analysis).

# OPTIMAL INPUT USE

A * STATIC - NO TIME - NO RISK & UNCERTAINTY $VMP_{x_i} = P_i$

B * DYNAMIC - W/TIME - NO TIME PREFERENCE - NO RISK AND UNCERTAINTY

$$VMP_{x_i} = P_i + \pi^* \left(\frac{\partial t}{\partial x_i}\right)$$

C * DYNAMIC - W/TIME - W/TIME PREFERENCE - NO RISK AND UNCERTAINTY

$$VMP_{x_i} = P_i + \pi^* \left(\frac{\partial t}{\partial x_i}\right) \left[\frac{t\,(1+r)^t \rho}{(1+r)^t - 1}\right]$$

D * DYNAMIC - NO TIME - NO TIME PREFERENCE - W/RISK AND UNCERTAINTY

$$E(P_y)\left[\frac{\partial E(y)}{\partial x_1}\right] = P_i + (RSU_{EV})\left[\left\{E(P_y)^2 + V(P_y)\right\} \cdot \frac{\partial V(y)}{\partial x_1} + 2V(P_y)E(y)\left(\frac{\partial E(y)}{\partial x_1}\right)\right]$$

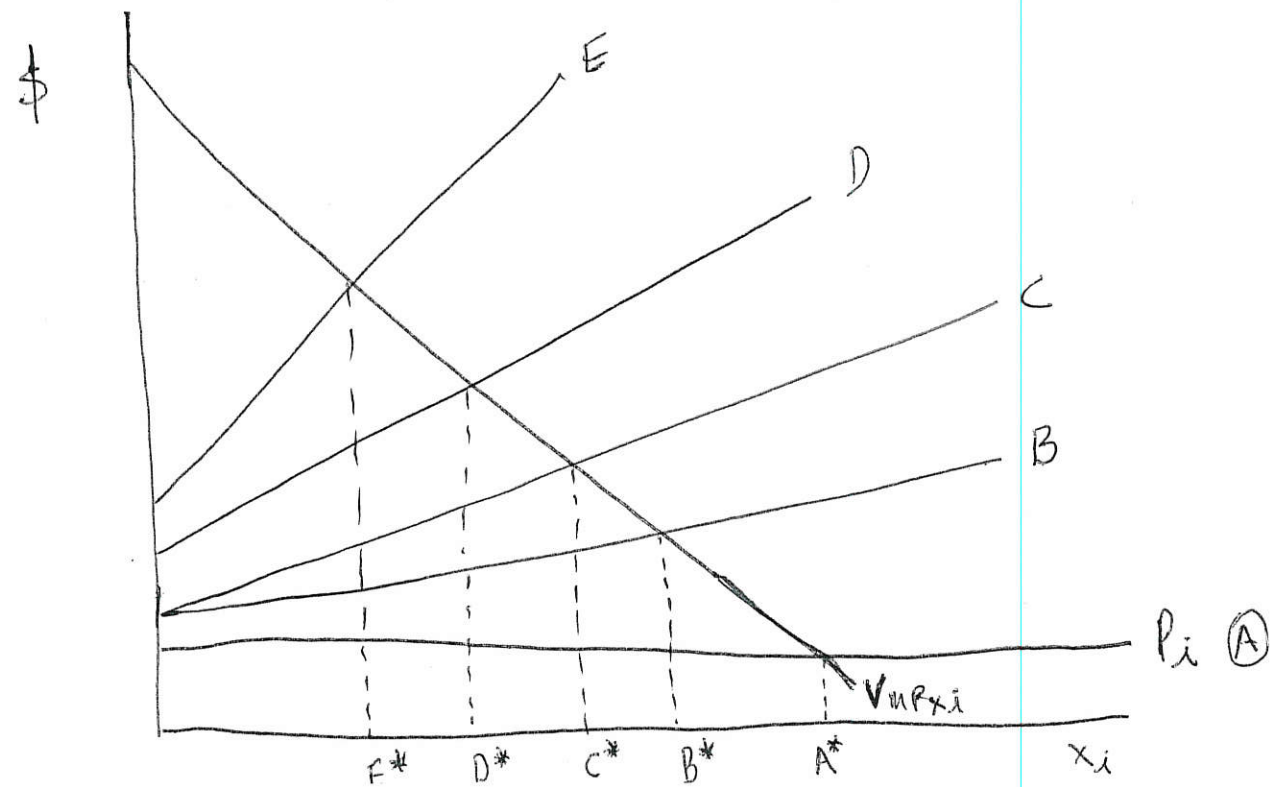
WHERE: $E(P_y)\left[\frac{\partial E(y)}{\partial x_1}\right]$ = EXPECTED VALUE OF $VMP_{x_i}$ ; $\frac{\partial E(y)}{\partial x_i}$ = EXPECTED VALUE OF $MPP_{x_i}$

$RSU_{EV} = \frac{\partial E(\pi)}{\partial V(\pi)}$ slope of an iso-utility curve in the E-V space

E * DYNAMIC – W/TIME – W/TIME PREFENCE – W/RISK AND UNCERTAINTY

$$E(P_y)\left[\frac{\partial E(y)}{\partial x_1}\right] = P_i\,(1+r)^t + \left(\sum_{i=1}^{n} P_i x_i + F\right)\rho\,(1+r)^t\left(\frac{\partial t}{\partial x_i}\right) + E\left(\pi^{**}\right)(1+r)^t\left(\frac{\partial t}{\partial x_i}\right) +$$

$$RSU_{EV}\left\{2\,V(P_y)\,y\left(\frac{\partial y}{\partial x_i}\right)\right\}\left\{\frac{\rho}{(1+r)^t-1}\right\}\left\{\frac{1-\rho\,y\,(1+r)^t\left[\frac{\partial t}{\partial x_i}\right]}{(1+r)^t-1}\right\}$$



a) REGARDING THE OPTIMAL LENGHT OF TIME FOR THE PRODUCTION PROCESS TO GO FOR:

* W/TIME – NO TIME PREFERENCES – NO RISK AND UNCERTAINTY

$$\pi^{*} = \frac{\pi}{t}$$

OPTIMAL LENGTH OF TIME WHEN MARGINAL PROFIT PER UNIT OF TIME (LHS) EQUALS AVERAGE PROFIT PER UNIT OF TIME (RHS).

* W/TIME – W/ TIME PREFENCE – NO RISK AND UNCERTAINTY

$$\pi^{**} = \frac{(\partial\pi/\partial t)}{(1+r)^{t}}$$

OPTIMAL LENGTH OF TIME WHEN THE FLOW OF PROFIT PER UNIT OF TIME (LHS) EQUALS THE PRESENT VALUE OF PROFIT PER UNIT OF TIME

* W/ TIME – W/ TIME PREFERENCE – W/ RISK AND UNCERTAINTY

$$\frac{\partial E(\pi)/\partial t}{(1+r)^{t}} = E(\pi^{**}) + RSU_{EV}\left(\frac{\rho}{(1+r)^{t}-1}\right)\left\{\frac{\frac{\partial V(\pi)}{\partial t}(1+r)^{-t} - 2V(\pi)\rho}{(1+r)^{t}-1}\right\}$$

OPTIMAL LENGHT OF TIME WHEN THE PRESENT VALUE OF THE EXPECTED VALUE OF PROFIT PER UNIT OF TIME EQUALS THE EXPECTED VALUE OF THE FLOW OF PROFIT NET OF THE IMPACTS OF THE VARIANCE OF PROFIT PER UNIT OF TIME