AMIS 894
Assignment 2

1. Straight-line amortization and BLU estimation of the mean. A firm repeatedly invests period-by-period in productive assets. The investment cost is uncertain and independent period-to-period with a constant but unknown expected value and constant variance. The firm accounts for these productive assets by capitalizing and amortizing their cost over three periods. To the extent possible, the firm wishes the accounting accruals to convey information about the unknown mean of investment cost.

Required:

a. Identify the optimal (BLU estimator) period one (first period of asset usage), period two, and period three amortization rates for the productive assets.

b. What is the optimal usage of the data for estimating the mean of investment cost if a four-period history is available? How can third period amortization be combined with fourth period investment to identify this BLU estimate? How do things change when a five-period history is available?

2. Fibonacci amortization and BLU estimation of the mean. A firm repeatedly invests period-by-period in productive assets. The investment cost is uncertain and independent period-to-period with unknown expected value and constant variance σ^2. Further, the mean is subject to stochastic shocks; the shocks are random with mean zero and variance also equal to σ^2. The firm accounts for these productive assets by capitalizing and amortizing their cost over three periods. To the extent possible, the firm wishes the accounting accruals to convey information about the unknown mean of investment cost.

Required:

a. Identify the optimal (BLU estimator) period one (first period of asset usage), period two, and period three amortization rates for the productive assets.

b. What is the optimal usage of the data for estimating the mean of investment cost if a four-period history is available? How can third period amortization be combined with fourth period investment to identify this BLU estimate? How do things change when a five-period history is available?

c. When an arbitrarily long period of history accumulates what is the optimal rate applied to the most recent investment cost?

3. Decelerated amortization and BLU estimation of the mean. A firm organizes around a dynamic productive technology. Each period the firm invests in new technology. The cost of this technology is uncertain and independent period-to-period with a constant but unknown expected value and variance that is increasing at a rate of 1.03^2 per period. The firm intends to capitalize this investment cost and amortize it over three periods but would like the aggregation in accruals to mirror statistical aggregation when possible. That is, the firm intends to devise amortization rates for the three-period life of the assets that yield the BLU (best linear unbiased) estimator for the unknown mean of investment cost.

Required:

a. Identify the optimal (BLU estimator) period one (first period of asset usage), period two, and period three amortization rates for the productive assets.

b. What is the optimal usage of the data for estimating the mean of investment cost if a four-period history is available? How can third period amortization be combined with fourth period investment to identify this BLU estimate? How do things change when a five-period history is available?

c. Suppose results for the first four periods are as follows. The firm organizes (at time 0) by raising $15 of capital ($5 borrowed and $10 from stock issued to the owners). Operating cash flows are very stable at $13 per period. The debt level remains constant by equal borrowing and repayments (for simplicity assume a zero percent interest rate). There are no other transactions (stock issues, repurchases, or dividend declarations or payments) with the owners during the first four periods. The investment cost is $11.64, $11.90, $8.15, and $8.87 for the first four periods (chronologically from the first to the fourth period).

   Prepare financial statements (balance sheets, income statements, and cash flow statements) for the first four periods of the firm's operations. Return to part b and identify the quantities employed in your four-period (BLU) estimate of the mean from your financial statements.