A06: DeFi Yield Calculator

Optimize Your DeFi Portfolio

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Assignment Overview

Learning Objectives

- Evaluate risk-return trade-offs across DeFi strategies
- Calculate impermanent loss for liquidity pool positions
- Model portfolio performance under multiple price scenarios
- Justify investment decisions with quantitative reasoning

Assignment Details

- Time: 60 minutes
- Format: In-class activity
- Difficulty: Hard
- Points: 50

Your Scenario

You have $10,000 USDC to allocate across 5 DeFi strategies. Maximize risk-adjusted returns.

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digital-ai-finance.github.io/crypto-economics/assignments/A06_defi_calculator/instructions.html

The Five DeFi Strategies

Strategy Table

Strategy	APR	Risk Level
ETH/USDC Liquidity Pool	30%	High (impermanent loss)
USDC Lending on Aave	8%	Low
ETH Staking	4%	Medium
New Protocol Yield Farm	100%	Very High
Hold USDC (no yield)	0%	None

Key Insight

Higher APR always comes with higher risk. The 100% yield farm could lose everything. The 0% USDC hold is the only strategy with zero downside.

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Tasks 1–2: Allocate & Calculate IL

20 min

Task 1: Portfolio Allocation

1. Decide how much of your $10,000 to put in each strategy
2. Allocations must sum to $10,000
3. Record on your portfolio worksheet
4. Consider diversification vs. concentration

Task 2: Impermanent Loss

1. For your ETH/USDC LP allocation, calculate IL
2. Use the IL calculation guide provided
3. IL depends on price change ratio

IL Formula (Simplified)

- $\text{IL} = 2\sqrt{r}/(1 + r) - 1$
- where r = new price / old price
- At $r = 2$ (price doubles): IL $\approx$ 5.7%
- At $r = 0.5$ (price halves): IL $\approx$ 5.7%

Warning

IL is *in addition to* any price exposure. A 30% APR LP can still lose money if IL exceeds the yield.

Three Price Scenarios

1. **Bull case**: ETH price increases 50%
2. **Stable case**: ETH price unchanged
3. **Bear case**: ETH price decreases 50%

Scenario Impact

The LP yield is 30% APR, but if ETH drops 50%, your IL is ∼5.7% *plus* you hold 50% ETH that lost value. The "high yield" may not compensate.

For Each Scenario, Calculate

1. Return from each strategy
2. IL impact on LP positions
3. Total portfolio value after 1 year
4. Compare scenarios side by side

Materials

- Portfolio worksheet
- Return calculator
- IL calculation guide

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Tasks 4–5: Justify & Present

20 min

Task 4: Written Justification

1. Write 2–3 paragraphs explaining your strategy
2. Address: Why this allocation? What risks are you taking?
3. Reference your scenario modeling results
4. Would you change your allocation with more information?

Task 5: Presentation

- 2-minute summary of your strategy
- Key metric: expected return in each scenario
- Biggest risk you identified

Grading Breakdown

- Portfolio allocation: 10 pts
- IL calculations: 10 pts
- Scenario modeling: 10 pts
- Written justification: 10 pts
- Presentation: 10 pts

Deliverables

- Completed portfolio worksheet
- Completed return calculator
- Written justification (2–3 paragraphs)
- 2-minute oral presentation

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Impermanent Loss

- Occurs in AMM liquidity pools
- Loss relative to simply holding the assets
- "Impermanent" because it reverses if prices return
- Becomes "permanent" when you withdraw at different prices

Yield Sources

- Trading fees (LP positions)
- Lending interest (supply/borrow markets)
- Staking rewards (protocol inflation)
- Liquidity mining (token incentives)

Risk Spectrum

- Stablecoins: smart contract risk only
- Lending: smart contract + utilization risk
- Staking: slashing + lock-up risk
- LP: IL + smart contract + price risk
- Yield farming: all of the above + rug pull risk

DeFi Rule of Thumb

"If you can't explain where the yield comes from, you *are* the yield."

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Tips for a Strong Portfolio

Strategy Tips

- Diversify: don't put everything in one strategy
- The "safe" allocation (USDC hold) is a legitimate choice
- Consider correlation: ETH staking + ETH LP = double ETH exposure
- Factor in smart contract risk for newer protocols

Calculation Tips

- Use the return calculator to check your math
- IL is symmetric: 2x and 0.5x give the same IL
- Don't forget to subtract IL from LP returns
- Compare total portfolio value, not just APR

Common Mistake

Students often compare APR directly without accounting for IL and price exposure. A 30% APR LP can underperform 8% lending in a bear market.

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Get Started

Assignment Page

digital-ai-finance.github.io/crypto-economics/assignments/A06_defi_calculator/instructions.html

All Assignments

digital-ai-finance.github.io/crypto-economics/assignments/index.html

Open your worksheet and start allocating your $10,000!

You have 60 minutes to allocate, calculate, model, justify, and present.