Private Credit Fund - FX Hedging Strategies

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Executive Summary

Problem

Fund faces currency mismatch. Contribution in USD but returns are in EUR.

Performance becomes a function of underlying asset and currency movements.

Solution

Static Forward Hedging for risk averse appetite.

Dynamic Hedging Strategy for risk neutral with potential upside capture.

Limitations

Interest rate simplification.
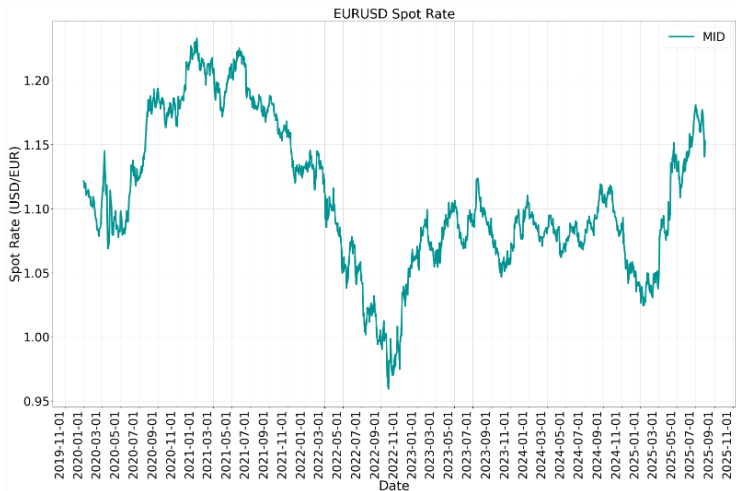
Transaction costs omitted.

Market Analysis I

Figure: Currency Spot Rate

Key Dates: 2020 - COVID, 2022 - War Crisis

Market Analysis II

Regime	Freq	Spot Return	Volatility	Risk Reversal	Put Skew
High Vol (Panic)	25%	+2.2%	10.3%	-134%	86%
Normal Vol	50%	+2.3%	7.0%	-59%	77%
Low Vol (Calm)	25%	-3.7%	5.2%	-31%	77%

Risk Reversal: Difference between put and call volatility. -100% = puts twice expensive as calls (fear).
Uses 1 Year time-lag data.

Panic Mode

Volatility Spikes to 2 × calm periods.
Markets paying significant premium for EUR protection (-134% RR).

Calm

Low volatility but steady erosion of returns.

Downside protection is disproportionately more expensive.

Methodology

Model

Heston Stochastic Volatility (calibrated to historical data provided).

Simulation

Monte-Carlo with 10,000 paths

Assumptions

- Static interest rates can be used to infer forward rates.
- Euler scheme for option price calculation is sufficient.
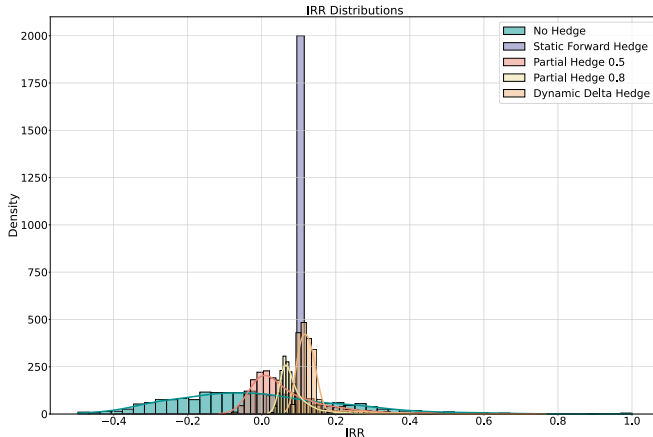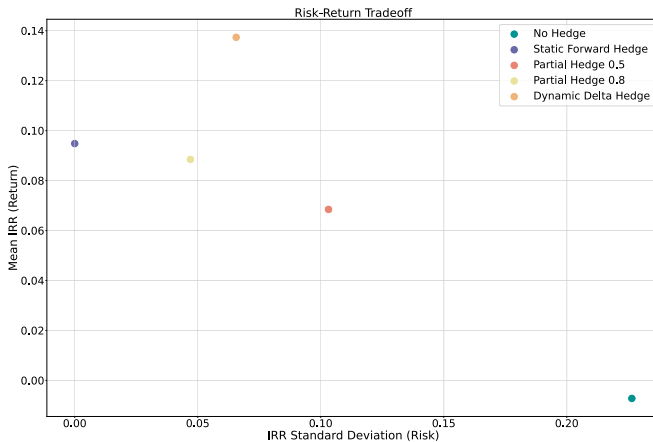- Computational costs can be negated.

Figure: IRR distribution for hedging strategies

Figure: Mean Risk-Return Trade-off for hedging strategies

Figure: Multiples on Invested Capital for hedging strategies

Figure: CVaR for hedging strategies

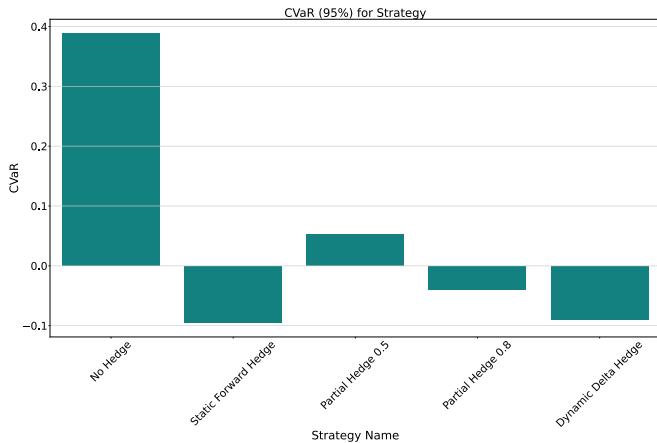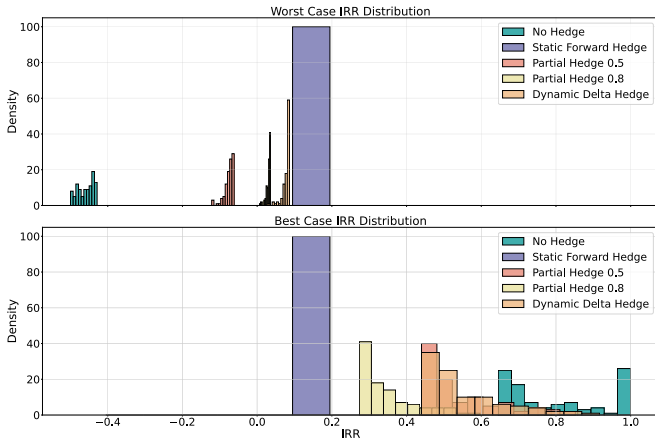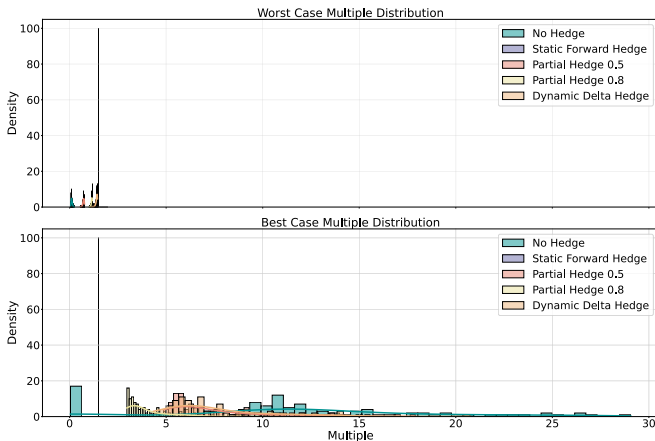Figure: IRR distribution for hedging strategies for extreme scenarios.

Figure: Multiples on Invested Capital for hedging strategies for extreme scenarios.

Cost-Benefit Analysis

Strategy	IRR Preservation	Risk Reduction	VaR Reduction	Weighted Value
No Hedge	0	0	0	0
Static Forward Hedge	-0.10	1.00	1.29	0.72
Partial Hedge 0.5	-0.08	0.54	0.88	0.45
Partial Hedge 0.8	-0.10	0.79	1.14	0.61
Dynamic Delta Hedge	-0.14	0.71	1.29	0.61

Table: Weighted Cost-Benefit Analysis for the hedging strategies

Weighted Value = equal weighting for each of the metrics.

Recommendations

Static Forward Hedging:

- ✓ Premium cost minimised.
- ✓ Eliminates FX risk.
- ✗ No upside participation.
- ✗ Inflexible as cash flow changes.

Dynamic Hedging:

- ✓ Upside movement participation.
- ✗ Transaction costs from rebalancing.
- ✗ Lags during large quick delta moves.
- ✗ Sudden volatility spikes may negatively impact option prices.

Limitations and Drawbacks

- Back testing not covered. Max drawdown, Sharpe ratio and tracking error missing as metrics.
- Transaction Costs not taken into account.
- Interest rate not modeled as a stochastic function.
- Partial Hedging numbers assigned arbitrarily.
- Unaware of client risk appetite, accounting needs or cost constraints.

Next Steps

- Implement back-testing framework.
- Model interest rate as a stochastic function (e.g. Heston + SABR)
- Different weighting schemes depending on client needs.
- Modeling should be aware of regimes.
- Liquidity conscious decision-making and metrics (e.g. Liquidity VaR).