Managing FX Exposure for €4.5 Million Receivable – Technical Specification

Created by: Francesca Murphy
Updated by: Francesca Murphy
Date Created: October 30, 2025
Date Updated: November 7, 2025
Version: 1.0
LLM Used: GBT-5

Role: Treasury Analyst
Audience: Chief Financial Officer
Purpose: Provide a professional, quantitative specification outlining the analytical structure for evaluating FX hedging alternatives for a one-year EUR-dominated receivable.

---

1. Problem Statement

Our company expects to receive €4,500,000 from a European customer in 12 months, creating exposure to changes in the EUR/USD exchange rate. The current spot rate is 1.1619 USD/EUR and the one-year forward rate is 1.0875 USD/EUR, implying euro depreciation. At this rate, the firm's expected dollar proceeds falls from approximately $5.23 million today to $4.89 million, estimating $340,000 potential loss solely from changes in the exchange rate.

This specification outlines the analytical framework for quantifying and comparing three different hedging strategies including a forward contract, a money-market hedge, and an option hedge to protect USD value while maintaining flexibility in a volatile market.

- **Exposure type:** Receivable (Long EUR / Short USD)
- **Foreign currency amount:** €4,500,000 ; Horizon is one year
- **Objective:** Protect USD value while preserving upside opportunities
- **Decision context:** Corporate Treasury or CFO review

2. Inputs (Known Variables)

This will become the foundation for your spreadsheet and future AI prompts.

Variable	Description	Unit	Example	Source

FC_AMT	Foreign-currency receivable	EUR	4,500,000	Company data
S_0	Current EURUSD spot rate	USD/EUR	1.1619	Yahoo Finance 2025
F_0	1-year EURUSD forward rate	USD/EUR	1.0875	Provided
r_USD	USD 1-year interest rate	% annual	3.66%	FRED Treasury Yield
r_EUR	EUR 1-year interest rate	% annual	3.31%	Euribor Rates 2025
t	Time to maturity	Years	1.0	Derived
K_put	EUR Put strike	USD/EUR	1.0875	Analyst choice
K_call	EUR Call strike	USD/EUR	1.0875	Analyst choice
Premium_put	Put premium	USD per contract	0.015	Scenario
Premium_call	Call premium	USD per contract	0.018	Scenario

3. Assumptions & Constraints

1. Interest rates are simple annual yields on a 360-day basis.
2. Forward rate follows interest-rate parity – $F_0 = S_0 \times \frac{1+r_{USD}}{1+r_{EUR}}$.
3. Option premium is paid upfront in USD.
4. Transaction costs of 0.05% apply equally to all hedges.

5. Exchange rates are quoted as USD per EUR.
6. No taxation, credit, or liquidity frictions.
7. Options are European-style and exercised only at maturity.
8. Results are expressed in USD proceeds at the 1-year horizon.

4. Calculation Flow

Step 1 – Quantify FX risk if no hedge is implemented to establish the base risk profile.

- Project possible EUR/USD spot rates at maturity under multiple scenarios (±10% current spot and forward rates).
    - $USD_{unhedged} = A_{EUR} \times S_T$

Step 2 – Recreate a forward hedge with the objective to lock in the fixed USD value today.

- Apply the current one year forward rate to determine the fixed USD proceeds if a forward contract is used. This confirms if the quoted forward is fairly priced given current interest differentials
    - $USD_{fwd} = A_{EUR} \times F_{1\,yr} - c_t$.

Step 3 – Construct a synthetic forward (money market hedge) using borrowing and investing. Borrow the value of the receivable in euros today, convert them to USD immediately at the current spot rate, and invest the USD proceeds for one year at the USD interest rate. At maturity, use the receivable to replay the euro loan principle and interest. The resulting USD amount will closely match the forward hedge outcome.

Step 4 – Construct an option hedge to protect against euro depreciation while preserving the potential upside if it strengthens. Model the purchase of a premium and a EUR put option giving the right to sell euros at a fixed strike. Exercise the put if the euro weakens below the strike and let it expire if it strengthens. When exercised, multiply the euro amount by the strike rate and subtract the option premium. After letting the option expire, find the dollar proceeds by multiplying the euro amount by the market exchange rate and subtract the option premium.

Step 5 – Combine all hedge results and the unhedged case into a single table to compare metrics. Key decision metrics to highlight include: Expected USD proceeds, downside protection (minimum outcome), volatility reduction (standard deviation), and the hedge cost or opportunity loss. Visually present the results in a line chart showing USD proceeds compared to EUR/USD rate at maturity.

Step 6 – Evaluate which hedge best aligns with corporate risk policy. Low risk tolerance likely aligns with a forward hedge, while a moderate tolerance likely aligns with money market hedge and a desire to preserve upside calls for an option hedge. Quantify the cost of certainty, or the difference between forward and expected spot. Prepare findings for presentation to the CFO and for quantitative modeling in Stage 3.

5. Outputs

These become your spreadsheet outputs, AI prompt targets, and Stage 5 discussion points.

Output	Description	Format	Purpose
USD_forward	USD proceeds from forward hedge	Numeric	Certainty benchmark
USD_mm	USD proceeds from money market hedge	Numeric	Cross-check against forward
USD_put	USD proceeds from EUR put hedge	Table	Sensitivity & protection
USD_call	USD proceeds from EUR call hedge	Table	Optional upside case
Chart_1	Hedge outcomes vs. S_T	Line chart	Visual comparison
Summary	Written conclusion	1–2 paragraph text block	Executive-ready takeaway

Outputs should read like a professional financial dashboard — clear, repeatable, and decision-focused.

6. Sensitivity Plan

In the spread sheet, create a column labeled “EUR/USD Spot at Maturity (S_t)”. Start the first cell at 0.95 × S_0 (5% euro depreciation from today’s spot).
Vary the spot by increasing the rate in increments of 0.01 until you reach 1.05 × S_0 (5% euro appreciation from today’s spot).
Using additional columns, apply the correct formula to calculate USD proceeds for each hedge at each value.
Add totals and highlight summary metrics (min, max, mean, standard deviation across each hedge)
Visualize the results issuing a line chart. The X-axis will be labeled “EUR/USD rate at maturity (S_t)" and the Y-axis will be labeled “USD proceeds”. Plot one line for each hedge type and color coordinate them. Label the chart “FX Hedge Performance – USD Receipts vs. EUR/USD Exchange Rate at Maturity”.

7. Limitations & Next Steps

Limitations include issues with market assumptions, credit, liquidity, etc.

- Volatility and option pricing dynamics are not modeled, only fixed premiums were used.
- Assumes interest-rate parity holds, there is no forward-point basis risk.
- Only a flat 0.05% transaction fee is applied, ignoring bid-ask spreads.
- This does not consider hedge accounting rules or deferred tax effects.
- Counterparty and funding risks are excluded.

The next phase will involve building an Excel model implementing all formulas with named variables from this specification. Each hedge's result will also be validated through cross-checking against the theoretical forward parity rate.