Methodology

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November 11, 2025

1 Objective

This document compares two financial strategies over the mortgage horizon:

1. buying a house and paying mortgage-related cash flows (homeowner), and
2. renting and investing the difference in cash flows (renter).

It answers the question: "What happens to my money if, instead of buying a house, I rent and invest?" The comparison evaluates final net worth at time T for each strategy, accounting for house price growth, rent inflation, mortgage payments, down payment, and the renter's investment returns. For the rest of the paper we call **Bob the homeowner and Alice the renter**.

2 Inputs

- H_0, the value of the house at the time of purchase
- D, the mortgage down payment (Typically 20%)
- r_H, the inflation of the house
- C_t^{Bob}, the cash flow paid by Bob at time t. this can be principal payment, interest, etc...
- C_t^{Alice}, the rent paid by Alice at time t
- r_R, the inflation Alice rent
- r_I, the return on investment for Alice
- T, the expiry of the mortgage

3 Methodology

3.1 Bob - The Homeowner

Bob networth at maturity is simply the price of his house at the end of the mortgage:

$$V_{Bob}(T) = H_0 \cdot (1 + r_H)^T$$

Before maturity, Bob networth is the value of his house minus the outstanding balance.

$$V_{Bob}(t) = H_0 \cdot (1 + r_H)^t - \underbrace{P_t^{Bob}}_{\text{remaining principal balance}}$$

3.2 Alice - The Renter

For a fair comparison, we assume spends exactly what Bob would pay for his mortgage related cash flows.

At time 0, Alice has only her down payment D as initial investment:

$$V_{Alice}(0) = D$$

At each time step, Alice networth is updated based on her cash flows and investment returns. There are two cases to consider:

- If for a given month, Bob cash flow is higher than Alice rent, Alice pays her rent and invests the remaining cash at a rate r_I.
- If for a given month, Alice rent is higher than Bob cash flow, Alice sells from her investments to make for the rent payments

$$V_{Alice}(t+1) = V_{Alice}(t) \cdot (1 + r_I)^{\frac{1}{12}} + \left(C_{t+1}^{Bob} - C_{t+1}^{Alice} \right)$$

Because we assume the rent of Alice increase at a rate r_R:

$$V_{Alice}(t+1) = V_{Alice}(t) \cdot (1 + r_I)^{\frac{1}{12}} + \left(C_{t+1}^{Bob} - C_{0}^{Alice} \cdot (1 + r_R)^{t+1} \right)$$