

Buy vs. Rent a Home: Report

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Prediction : Depends on various factors
Data taken from Google

Observation: Typically, if the duration of stay exceeds 5+ years, purchasing a home is generally preferable based on historical data, assuming normal economic conditions for particular city.

S.N	Parameter Name	Value	Assumption/Source
1	Initial Home Purchase Price	₹8,000,000	99acres
2	Down Payment Percentage	25%	Standard Loan Terms
3	Down Payment Amount	₹2,000,000	Standard Loan Terms
4	Loan Amount	₹5,500,000	Standard Loan Terms
5	Interest Rate	9.00%	SBI Home Loan
6	Loan Term	25 years	HDFC Home Loan
7	Buying Closing Cost	6% of Property	Real Estate Market Trends
8	Property Tax	0.50%	BBMP Property Tax
9	Home Insurance	₹10,000	ICICI Lombard
10	House Owner Association (HOA) Fee	₹20,000	Anecdotal
11	Maintenance Cost	2% of Property	propex.ai
12	Home Value Appreciation Rate	12% annually	Knight Frank India Report
13	Selling/Closing Cost & Associated Costs	2% of Sale Price	Real Estate Market Trends
14	Discount Rate	5%	Google Data

15 Years of Stay

6 years

Assumed

1.2 Parameters for Renting a Home

Parameter	Value	Source
Monthly Rental Cost	₹30,000	housing.com
Yearly Rental Cost	₹360,000	housing.com
Rental Cost Increase	8% annually	financeoutlookindia.com
Renter's Insurance	₹5,000	Anecdotal
Maintenance Fee	₹20,000	propex.ai
Maintenance Fee Increase	10% annually	Anecdotal
Security Deposit	₹90,000	housing.com
Upfront Cost	₹145,000	nobroker.in

2. Method and Formula Used (Excel)

2.1 Loan Repayment Calculation (Buying Option)

- **EMI Calculation:**

Formula: `=PMT(interest_rate, loan_term, -loan_amount)`

Calculates the fixed monthly payment required to repay the loan over its term. Negative loan amount indicates an outgoing cash flow.

- **Future Value of EMI After 6 Years:**

Formula: `=FV(interest_rate, years_of_stay * 12, -EMI, 0)`

Determines the total value if EMI payments were invested at the given interest rate.

- **Remaining Principal After 6 Years:**

Formula: `=FV(interest_rate/12, (loan_term * 12) - (years_of_stay * 12), EMI, loan_amount)`

Provides the remaining outstanding loan balance after 6 years.

2.2 Property Value Appreciation

- **Formula:** `=FV(property_appreciation_rate, years_of_stay, 0, -purchase_price)`
 - Estimates the future value of the home after 6 years considering an annual appreciation rate.
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2.3 Costs and Expenses (Buying Option)

Cost Type	Formula	Concept
Property Tax	<code>=FV(discount_rate, years_of_stay, 0, -annual_tax)</code>	Accounts for annual property taxes adjusted for inflation.
Home Insurance	<code>=FV(discount_rate, years_of_stay, 0, -annual_insurance)</code>	Accumulates annual home insurance costs.
Maintenance Cost	<code>=FV(discount_rate, years_of_stay, 0, -annual_maintenance)</code>	Projects maintenance expenses over the period.
HOA Fee	<code>=FV(discount_rate, years_of_stay, 0, -annual_HOA_fee)</code>	Calculates cumulative HOA fees.
Selling Costs	<code>=property_value * selling_cost_percentage</code>	Reflects transaction costs incurred while selling.

2.4 Rental Expenses Calculation

Cost Component	Formula	Concept
Annual Rent Cost	<code>=FV(rental_increase_rate, years_of_stay, -annual_rent)</code>	Projects the cumulative rent over the stay period.
Maintenance Fee	<code>=FV(maintenance_fee_increase, years_of_stay, -annual_fee)</code>	Accumulates maintenance costs over time.
Renter's Insurance	<code>=annual_insurance * years_of_stay</code>	Sums fixed yearly insurance costs.
Upfront & Security Deposit	<code>=upfront_cost + security_deposit</code>	Combines initial expenses and refundable deposits.

3. Final Cost and Profit Calculation

3.1 Buying Option Analysis

Cost Category	Formula/Concept
Down Payment	<code>=purchase_price * down_payment_percentage</code>
Total EMI Paid Over 6 Years	<code>=EMI * 12 * years_of_stay</code>
Remaining Principal	<code>=FV(interest_rate/12, (loan_term * 12) - (years_of_stay * 12), EMI, loan_amount)</code>
Property Tax (6 years)	<code>=FV(discount_rate, years_of_stay, 0, -annual_tax)</code>
Home Insurance (6 years)	<code>=FV(discount_rate, years_of_stay, 0, -annual_insurance)</code>

Maintenance & HOA (6 years)	<code>=FV(discount_rate, years_of_stay, 0, -annual_maintenance) + =FV(discount_rate, years_of_stay, 0, -annual_HOA_fee)</code>
Selling Costs	<code>=property_value * selling_cost_percentage</code>
Total Cost at End of 6 Years	Sum of all above costs

3.2 Selling Proceeds & Net Profit (Buying Option)

Calculation	Formula/Concept
Selling Price of House	<code>=FV(property_appreciation_rate, years_of_stay, 0, -purchase_price)</code>
Net Selling Price (after costs)	<code>=selling_price - (selling_price * selling_cost_percentage)</code>
Net Profit	<code>=net_selling_price - total_cost</code>

3.3 Renting

Cost Category	Formula/Concept
Total Rent Paid Over 6 Years	<code>=FV(rental_increase_rate, years_of_stay, -annual_rent)</code>
Maintenance & Insurance	<code>=FV(maintenance_fee_increase, years_of_stay, -annual_fee) + (annual_insurance * years_of_stay)</code>
Upfront & Security Deposit	<code>=upfront_cost + security_deposit</code>
Total Rental Cost	Sum of all above components

4. Conclusion

- Net Present Value (NPV) of Buying: $\text{=NPV}(\text{discount_rate}, -\text{total_costs_buying}, \text{net_selling_price})$
 - Net Present Value (NPV) of Renting: $\text{=NPV}(\text{discount_rate}, -\text{total_rental_cost})$
 - Extra Profit from Buying: $\text{=NPV_buying} - \text{NPV_renting}$
 - **Final Recommendation:**
 - If $\text{NPV}(\text{BUYING}) > \text{NPV}(\text{RENTING})$, **Buying** is more profitable, else go for Renting.
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5. Summary of above formula that we have used :

Calculation	Excel Formula
EMI Calculation	$\text{=PMT}(\text{interest_rate}/12, \text{loan_term}*12, -\text{loan_amount})$
Property Value Appreciation	$\text{=FV}(\text{appreciation_rate}, \text{years_of_stay}, 0, -\text{purchase_price})$
Future Value of EMI Payments	$\text{=FV}(\text{interest_rate}/12, \text{years_of_stay}*12, -\text{EMI}, 0)$
Property Tax & Insurance FV	$\text{=FV}(\text{discount_rate}, \text{years_of_stay}, 0, -\text{annual_cost})$
Selling Costs	$\text{=selling_price} * \text{selling_cost_percentage}$
Net Profit	$\text{=selling_price} - \text{total_costs}$

Investment Decision: Report

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Final Prediction:Depends on various factor

Data Source: Data taken from Google (with sources mentioned below)

Observation:If investing in property for more than 10 years, it is generally a favorable decision based on historical data, provided that property appreciation exceeds 7%, interest rates remain below 9%, and the discount rate is approximately 9-10%

Parameter	Value (Assumption)	Source
Property Location	Bangalore	MagicBricks
Plot Size (sq. ft.)	1,000	NoBroker
Purchase Price (Rupees)	₹10,000,000	99acres
Down Payment (25%)	₹2,500,000	Assumed (Standard Loan Terms)
Loan Amount (75%)	₹7,500,000	Assumed (Standard Loan Terms)
Interest Rate	8.50% (Annual)	SBI Home Loan
Loan Tenure (in years)	30	HDFC Home Loan

Property Appreciation Rate	6.00%	Knight Frank India Report
Annual Property Tax	1.00%	BBMP Property Tax
Annual Property Tax Amount	₹100,000	Assumed constant
Insurance Costs (Annual)	₹20,000	ICICI Lombard
Selling Costs	1.00% of property value	Real Estate Market Trends
Discount Rate for Land	10%	Ideally 10–20%
Holding Time of Land (years)	10	Assumed

2. Methods and Formula used:

The investment decision was formulated through a systematic analysis involving loan repayment calculations, property value appreciation, and consideration of associated costs and expenses. Below is a detailed breakdown of the methods and Excel formulas applied in my excel sheet for implementing above financial model :

2.1. Loan Repayment Calculation:

The loan repayment was calculated using the standard **EMI (Equated Monthly Installment)** formula, utilizing the **PMT** function in Excel and projecting all EMI at the future value so that we can compare at the end of 10yr . This calculation helps in determining the monthly payment necessary to service the loan over its 30-year tenure but we are paying at the end of Holding time of land remaining amount of principal.

EMI Formula in Excel:

`=PMT(Interest_Rate, Loan_Tenure, -Loan_Amount)`

- **Interest_Rate:**

- **Loan_Tenure:** 30 yr
- **Loan_Amount:** The principal amount borrowed (₹7,500,000).
- **Negative sign (-):** shows outgoing payments.

Principal Remaining After 10 Years:

Since the property is to be sold after 10 years (120 months), it is important to determine the remaining loan balance(i.e. **Remaining principal amount, for the time being ignore early payment fee**) at that point so that we can pay the remaining principal amount at the end of 10 yr. This is calculated using the **FV (Future Value)** function in Excel.

Formula Used:

`=FV(Interest_Rate, Loan_Tenure - Holding_Time_of_Land, EMI, -Loan_Amount)`

- **FV:** Provides the outstanding principal after 10 years.
- **Holding_Time_of_Land:** 10 yr, hence `(Loan_Tenure - 10)`
- **EMI:** Derived from the previous PMT calculation.

This calculation helps identify how much of the loan will still be outstanding and thus needs to be repaid upon selling the property.

2.2. Property Value Appreciation:

Property appreciation follows a compound interest model, assuming a consistent annual appreciation rate of 7%. The **FV function** was again employed to find the property value at the end of the 10-year holding time.

Formula Used:

`=FV(Appreciation_Rate, Holding_Time_of_Land, 0, -Purchase_Price)`

- **Appreciation_Rate:** Annual appreciation rate (6%).
- **Holding_Time_of_Land:** Duration of holding (10 years).
- **Purchase_Price:** Initial property value (₹10,000,000).

This result helps us to get the selling price of the property after 10 years.

2.3. Costs and Expenses:

2.3.1. Property Tax and Insurance:

- **Annual Property Tax:** assumed constant over 10 years and take it to the future value for final comparison .
- **Annual Insurance Cost:** ₹20,000 annually and take it to the future value for final comparison .

Both were calculated at their future values over the holding period(i.e. 10yr) using the **FV function**:

Formula Used:

=FV(0, Holding_Time_of_Land, -Annual_Cost)

This was applied separately for property tax and insurance to estimate total amounts paid over the decade.

2.3.2. Selling Costs:

Upon selling the property, associated costs include agent commissions and transaction fees, assumed at **0.5%** of the property's appreciated value.

Formula Used:

=Appreciated_Property_Value * Selling_Cost_Percentage

3. Final Cost and Profit Calculation:

3.1. Total Cost at the End of 10 Years:

The total cost includes:

- Down payment.
- EMI payments made over 10 years.
- Remaining loan principal after 10 years.
- Cumulative property tax.
- Cumulative insurance costs.
- Selling costs incurred at the end of the holding period.

Formula in Excel:

=Down_Payment + (cumulative future value of EMI) + Remaining_Principal + Property_Tax_Total + Insurance_Total + Selling_Cost

3.2. Net Profit Calculation:

The net profit is by subtracting the total cost from the appreciated property value at the end of 10 years.

Formula Used:

Net_Profit=Appreciated_Property_Value - Total_Cost

Decision : If Net_Profit is greater than zero then we should invest in property else do not invest .

4. Conclusion:

If the investment yields a **positive net profit**, making it a financially positive decision for investing if Appreciation rate is greater than 6.5%. The property's appreciation over 10 years outweighs the combined loan repayment obligations, tax, insurance, and selling expenses. Therefore, **we should invest** in this property for this case but it may vary with different values of appreciation rate ,interest rate ,discount rate etc.