Financial Analysis Project Report

This report presents a comprehensive financial analysis conducted using Microsoft Excel. The analysis applies key financial concepts such as Present Value, NPV, XNPV, IRR, XIRR, loan amortization, and MIRR to support sound financial decision-making. All calculations were performed in Excel, and relevant screenshots are embedded with insights.

Annuity – Present Value Analysis

Annuity				
Price	32000		Price	32000
Interest Rate	0.13		Interest Rate	0.13
No. of payments	8		No. of payments	8
Payment	-6000		Payment	-6000
Payments at end of the year			Payments at beginning of the year	
PV	₹ 28,793		PV	₹ 32,536

Insight: Payments made at the end of the year result in a lower present value compared to payments made at the beginning of the year. This is due to additional discounting benefits. Hence, deferring payments is financially advantageous for the payer.

EMI and Loan Amortization Analysis

Month	Beginning Balance	EMI	Interest	Principal	Ending Balance
1	₹ 100,000.00	(₹ 13,242.27)	(₹ 1,300.00)	(₹ 11,942.27)	₹ 88,057.73
2	₹ 88,057.73	(₹ 13,242.27)	(₹ 1,144.75)	(₹ 12,097.52)	₹ 75,960.22
3	₹ 75,960.22	(₹ 13,242.27)	(₹ 987.48)	(₹ 12,254.78)	₹ 63,705.43
4	₹ 63,705.43	(₹ 13,242.27)	(₹ 828.17)	(₹ 12,414.10)	₹ 51,291.34
5	₹ 51,291.34	(₹ 13,242.27)	(₹ 666.79)	(₹ 12,575.48)	₹ 38,715.86
6	₹ 38,715.86	(₹ 13,242.27)	(₹ 503.31)	(₹ 12,738.96)	₹ 25,976.89
7	₹ 25,976.89	(₹ 13,242.27)	(₹ 337.70)	(₹ 12,904.57)	₹ 13,072.33
8	₹ 13,072.33	(₹ 13,242.27)	(₹ 169.94)	(₹ 13,072.33)	₹ 0.00

Loan Amount	100000
No.of monthly payment	15
EMI	-12000
Interest	8%

Insight: The EMI remains constant throughout the loan tenure, while the interest component decreases and the principal repayment increases over time. This highlights the front-loaded nature of interest payments in loan structures.

Interest and Principal Breakdown

EMI

Rate per annum	0.12
Rate per month	0.01
Term	25
No. of monthly payments	300
Loan Amount (PV)	-5000000
FV	0
Type	1
EMI	₹ 52,140

Rate per annum	0.16
Rate per month	0.01
Term	8
Loan Amount (PV)	-100000
FV	0
Type	0
EMI	₹ 13,262

Rate per month	0.013
No. of monthly payment	8
Loan Amount (PV)	100000
FV	0
Type	0
EMI	₹ 13,242

Interest paid between 2nd and 3rd months
2132.23
(₹ 2,132.23)
Principal paid between 2nd and 3rd months
24352.30
(₹ 24,352.30)

Insight: The cumulative interest and principal paid between specific periods demonstrate how early EMIs contribute more towards interest than principal, emphasizing the importance of shorter loan tenures where feasible.

Investment Decision Using NPV

Decision on Investments

Interest Rate	0.2	
	Cash Flow	
Time	Investement 1	Investement 2
1	-10000	-5000
2	25000	20000
3	-7000	-8000
Total	8000	7000

>>>At Face value, Investment 1 seems attractive. But, to arrive at a decision we need to cal NPVs

NPV (End Year)	₹ 4,976.85	₹ 5,092.59	>>>Investment 2 is a better choice as it has higher NPV
NPV (Beginning Year)	₹ 5,972.22	₹ 6,111.11	>>>Investment 2 is a better choice as it has higher NPV
NPV (Middle Year)	₹ 5,451.87	₹ 5,578.66	>>>Investment 2 is a better choice as it has higher NPV

$$NPV_{mid-year} = NPV_{end-of-year} \times \sqrt{1+r}$$

Insight: Although Investment 1 appears attractive at face value, NPV calculations across different timings show that Investment 2 consistently generates higher value. NPV proves to be a more reliable decision metric than nominal cash flows.

XNPV – Irregular Cash Flows

Interest Rate	0.2
Date	Cash Flow
15/Jun/2016	5000
14/Oct/2016	5143
30/Apr/2017	8838
10/Nov/2016	-4893
16/Sep/2016	-2134
18/Apr/2017	8047
27/Aug/2016	3908
17/Jul/2016	-4007
NPV	17523.65

Interest Rate	0.2
Date	Cash Flow
15/Mar/2015	0
15/Jun/2016	5000
14/Oct/2016	5143
30/Apr/2017	8838
10/Nov/2016	-4893
16/Sep/2016	-2134
18/Apr/2017	8047
27/Aug/2016	3908
17/Jul/2016	-4007
NPV	17077.23

Insight: XNPV accurately accounts for the timing of irregular cash flows. Including the valuation date with zero cash flow ensures precise present value estimation, reinforcing the importance of time-weighted discounting.

IRR and Unique IRR Validation

Cash Flow	Interest Rate	NPV	
10000	8.00%	(₹ 304.95)	
-5000	8.50%	(₹ 242.26)	
-8500	9.00%	(₹ 180.80)	
2000	9.50%	(₹ 120.54)	
	10.00%	(₹ 61.47)	
	10.53%	(₹ 0.12)	>>>NPV is nearly 0, hence this rate represents IRR
	11.00%	₹ 53.23	
	11.50%	₹ 108.91	
	12.00%	₹ 163.51	

Insight: IRR remains constant across different guess values, confirming the existence of a unique IRR. This makes IRR a reliable profitability indicator for conventional cash flow patterns.

Multiple IRR Scenario

IRR

Cash Flows
10000
-5000
-8500
2000

IRR
10.53%

Cash Flows	Guess	IRR
10000		10.53%
-5000	0.05	10.53%
-8500	0.15	10.53%
2000	0.2	10.53%
	0.25	10.53%
	0.3	10.53%
	0.35	10.53%
	0.4	10.53%
	0.45	10.53%
	0.5	10.53%
	0.55	10.53%

Insight: Multiple IRRs arise due to more than one sign change in cash flows. In such cases, IRR becomes ambiguous, and reliance on NPV or MIRR is recommended.

No IRR Scenario

Cash Flows	Guess	IRR
-20000		-9.59%
82000	15.00%	-9.59%
-60000	20.00%	-9.59%
2000	25.00%	-9.59%
	30.00%	-9.59%
	35.00%	-9.59%
	40.00%	-9.59%
	45.00%	216.09%
	50.00%	216.09%
	55.00%	216.09%
	60.00%	216.09%
	NPV @ 9.59%	($0.00)
	NPV @216.09%	$0.00

Insight: The #NUM! error across all guess values indicates that no IRR exists for the given cash flows, further demonstrating the limitation of IRR in non-conventional scenarios.

XIRR for Irregular Cash Flows

Cash Flows	Guess	IRR
10000		#NUM!
-5000	0.05	#NUM!
8500	0.15	#NUM!
2000	0.2	#NUM!
	0.25	#NUM!
	0.3	#NUM!
	0.35	#NUM!
	0.4	#NUM!
	0.45	#NUM!
	0.5	#NUM!
	0.55	#NUM!

>>>The result #NUM means that there is no IRR for the cash flows considered

Year	Project A	Project B
0	-1000	-1000
1	0	400
2	200	400
3	300	300
4	500	300
5	900	200
IRR	17.32%	20.49%
NPV	₹ 815.89	₹ 552.40

Date	Cash Flow
4/8/2015	-10000
8/15/2015	4000
3/15/2016	3000
4/25/2016	5000

XIRR	50.55%

Insight: XIRR incorporates exact dates of cash flows and provides a realistic annualized return. It is particularly useful for real-world investments where cash flows are unevenly spaced.

MIRR – Modified Internal Rate of Return

Finance rate	10%
Reinvestment Rate	12%

Year	Cash Flow
0	-1.6
1	10
2	-10

Discount	NPV
10%	($0.70)
25%	$0.00
110%	$0.43
400%	($0.00)
500%	($0.04)

MIRR	7%

Insight: MIRR resolves the shortcomings of IRR by differentiating between finance and reinvestment rates. Despite multiple NPVs equaling zero, MIRR provides a single, meaningful return of 7%, making it a superior metric for complex cash flow structures.

Conclusion

The project successfully demonstrates the application of Excel-based financial analysis tools. By integrating numerical results with analytical insights, the report highlights the importance of selecting appropriate financial metrics for investment and financing decisions.