

The potential return from three forms of investment by means of mathematical formulas and graphs

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Abstract - This research paper summarizes the "The potential return from three forms of investment by means of mathematical formulas and graphs." The data has been taken from 2016 to 2022. For this we have used different mathematical formulas, analyzed it graphically and structured it in the form of a research paper.

Key Words: Return, Investment, Gold, Fixed Deposit, Asian Paints, Stock

1. INTRODUCTION

In today's tumultuous world, if man has one common goal, it is to make pecuniary gains. Now there are two chief ways to go about that in the modern world. The first one is to work for yourself and earn an income and the other one entails investing your assets so that they appreciate over time. There are several investment vehicles that one can look into. Some of them include bonds, stocks, mutual funds, real estate, precious metals, fixed deposits, small business, or a combination of all of the above. The purpose of my research statement is to acquaint you with the potential benefits and mercenary returns from three of the aforementioned investments which are- gold, fixed deposits and stock of the multi-national company Asian Paints. This paper would help you decide which investment is for you after weighing all the pros and cons.

1.1 Gold

It is hard to say when our love affair with the yellow metal began but archeological evidence suggests that gold was first discovered in Egypt in 3000 B.C. Afterwards, plenty of empires began using gold coins for transactive purposes but this could not last too long in the 20th century. Although, almost every industrialized country stopped dealing in gold coins, it remained a highly sought-after product due to its rarity and reputation. Decades later, gold is now more than just a currency, it is a long term investment. Gold is seen as a diversifying element to your portfolio which aids in reducing the risks associated with investments and providing a safe haven to the investors. With the world's undivided attention on stock markets, IPO's and technology startups, it's not hard to notice why gold was overlooked. It is not flashy, it never becomes the flavor of the month as it continues to sit and gain value quietly. Therefore, for investors looking to protect their wealth in times of political and economic turmoil and wishing to build their wealth over the long term can rest assured make their investments in gold.

1.2 Fixed Deposits

Fixed deposits (FD) are financial instruments which are offered by banks and some non-banking financial companies. It is an investment plan where one can deposit their lump sum money for a fixed tenure and earn a pre-defined rate of interest on it. Almost all the market-led investments bear great potential risk but fixed deposits on the other hand are more secure and reliable as they are not subjected to changes that occur due to the market volatility. More than 75% of the Indian population is constituted of middle-income group. People of this group have a very meagre amount which is left to invest after meeting all their liabilities. This is why most of them have an inclination towards risk-free investments like fixed deposits. There are two types of interest given by banks which is simple interest and compound interest. Simple interest is basically the interest computed on the original principal amount whereas compound interest is interest on interest. It is calculated on the principal as well as previous period's interest. We have taken the FD rates of the State Bank Of India (SBI) which was founded in 1806 in Calcutta. SBI represents a sterling legacy of more than 200 years. It is India's largest and oldest commercial bank which enjoys the faith of millions of customers across the social spectrum.

1.3 Asian Paints

Asian Paints is a leading Indian Multi-National Paint And Coating Manufacturing Company which was set up in 1942. The current managing director and chief operating officer of the company is Amit Syngle . The company is present in the Home Improvement, Decor, Health and Hygiene segment among many other segments. The company has a group turnover of RS.289 billion and a desirable reputation in the corporate world. Stock of Asian Paints has a book value of Rs.144 but it is currently

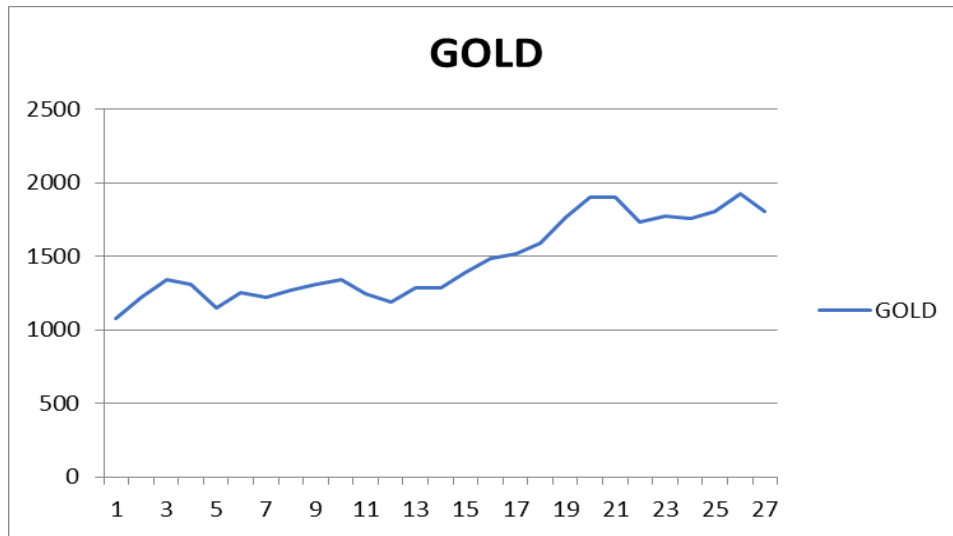
trading at the price of Rs.3428(as on 15th August,2022). Asian Paints has been maintaining a healthy dividend payout ratio and is expected to give phenomenal returns to the investors.

2. WHY I CHOSE THIS TOPIC?

I have a very keen interest in the field of finance and economics which is why I had noticed that the economy has been shook due to challenging events recently, starting from Covid19 to the Russia-Ukraine War. The prices of commodities are skyrocketing, followed by unemployment and regression which cause me to pick this topic because investment is the key to solving all these problems. It helps in wealth generation and provides security for the future in case we are faced with such drastic circumstances in the future. It even helps beat inflation.

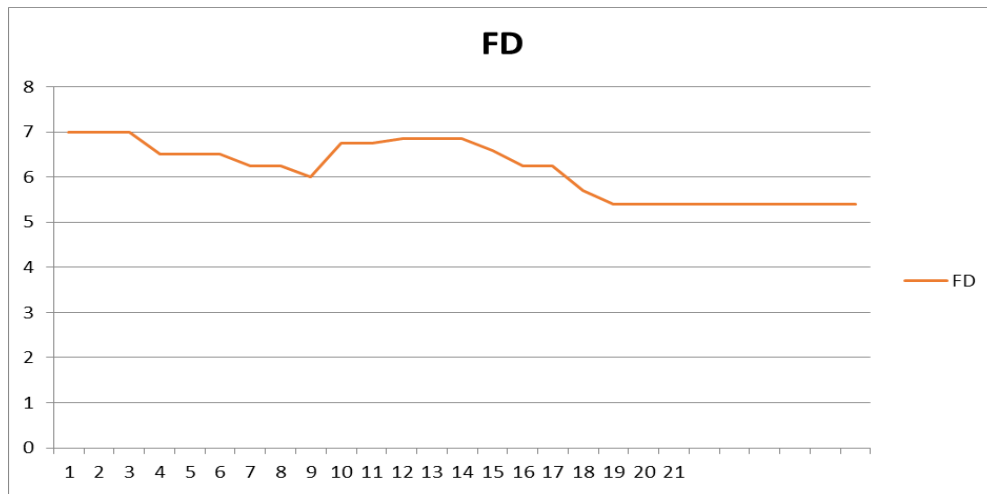
PRICE OF GOLD (PER OUNCE) IN DOLLAR

Month	Sr No.	GOLD
Jan-16	1	1074
Apr-16	2	1223
Jul-16	3	1342
Oct-16	4	1312
Jan-17	5	1150
Apr-17	6	1255
Jul-17	7	1223
Oct-17	8	1271
Jan-18	9	1307
Apr-18	10	1342
Jul-18	11	1242
Oct-18	12	1189
Jan-19	13	1286
Apr-19	14	1287
Jul-19	15	1386
Oct-19	16	1482
Jan-20	17	1518
Apr-20	18	1592
Jul-20	19	1768
Oct-20	20	1904
Jan-21	21	1898
Apr-21	22	1730
Jul-21	23	1776
Oct-21	24	1761
Jan-22	25	1804
Apr-22	26	1925
Jul-22	27	1809



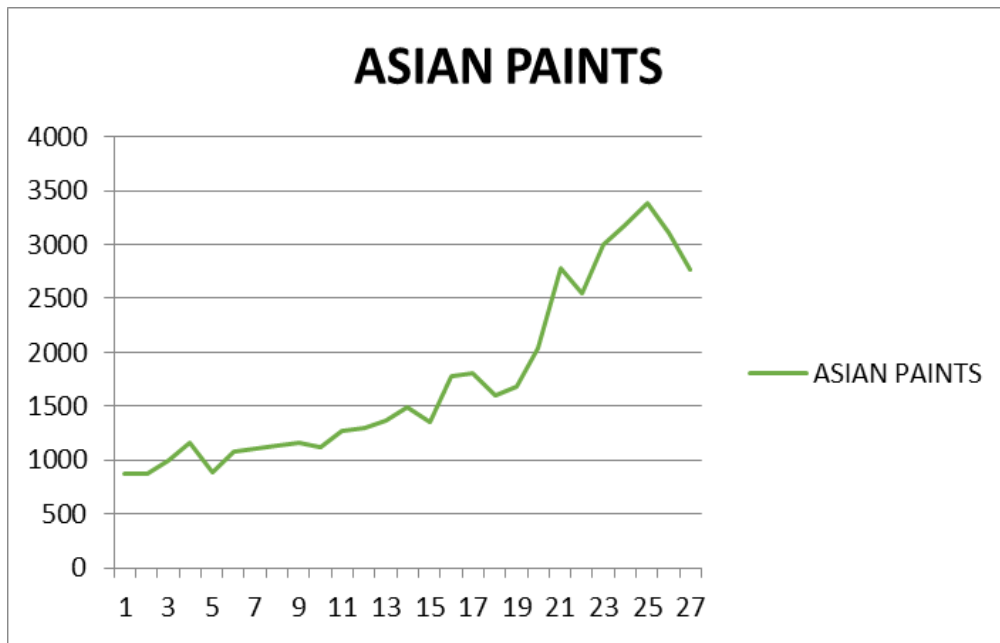
FD RATES

Month	Sr No.	FD
Jan-16	1	7
Apr-16	2	7
Jul-16	3	7
Oct-16	4	6.5
Jan-17	5	6.5
Apr-17	6	6.5
Jul-17	7	6.25
Oct-17	8	6.25
Jan-18	9	6
Apr-18	10	6.75
Jul-18	11	6.75
Oct-18	12	6.85
Jan-19	13	6.85
Apr-19	14	6.85
Jul-19	15	6.6
Oct-19	16	6.25
Jan-20	17	6.25
Apr-20	18	5.7
Jul-20	19	5.4
Oct-20	20	5.4
Jan-21	21	5.4
Apr-21	22	5.4
Jul-21	23	5.4
Oct-21	24	5.4
Jan-22	25	5.4
Apr-22	26	5.4
Jul-22	27	5.4



SHARE PRICE OF ASIAN PAINTS

Month	Sr No.	ASIAN PAINTS
Jan-16	1	878.75
Apr-16	2	870
Jul-16	3	1002.5
Oct-16	4	1160.7
Jan-17	5	891.05
Apr-17	6	1073.5
Jul-17	7	1102.95
Oct-17	8	1131.7
Jan-18	9	1158.5
Apr-18	10	1120.4
Jul-18	11	1264.45
Oct-18	12	1293.3
Jan-19	13	1366
Apr-19	14	1492.7
Jul-19	15	1358.15
Oct-19	16	1776.3
Jan-20	17	1812.25
Apr-20	18	1604.15
Jul-20	19	1686.75
Oct-20	20	2040.45
Jan-21	21	775.75
Apr-21	22	2551.75
Jul-21	23	3003.9
Oct-21	24	3177.85
Jan-22	25	3382.95
Apr-22	26	3114.15
Jul-22	27	2773.15



3. CALCULATIONS

MATHEMATICAL CALCULATIONS OF RETURN

1. GOLD

I plotted the points on x-axis as 1, 2, 3, ..., considering x=1 means January, 2016, x=2 means April, 2016, similarly, x=27 means July, 2022.

I plotted the price of gold on y-axis and fitted quadratic equation for the gold prices.

Considering $y = ax^2 + bx + c$ — (1) where a, b, c have to be calculated. For calculating any quadratic equation, we need at least 3 points.

x=2, y=1223 $a \times 2^2 + b \times 2 + c = 1223$

x=10, y=1342 $a \times 10^2 + b \times 10 + c = 1342$

x=22, y=1730 $a \times 22^2 + b \times 22 + c = 1730$

Simplify & solving above 3 equations

$4a + 2b + c = 1223$ — (2)

$100a + 10b + c = 1342$ — (3)

$484a + 22b + c = 1730$ — (4)

(3) - (2)

$96a + 8b = 119$

$\div 8$

$12a + b = 14.875$ — (5)

(4) - (3)

$384a + 12b = 388$

$32a + b = 32.33$ — (6)

(6) - (5)

$20a = 17.458$

$a = 0.8729$

Putting in (5), we get $b = 4.4$

Putting in (2), we get $c = 1210.7$

$a = 0.8729, b = 4.4, c = 1210.7$

Rounding off

$= 1211$

$a = 0.87, b = 4.4, c = 1211$

$y = 0.87x^2 + 4.4x + 1211$
(gold) (x = time value)

verified by x=26

we get $y = 1913$ by equation & $y = 1925$ (actual)

so, error is very less

\therefore we consider the equation

$y = 0.87x^2 + 4.4x + 1211$

as our correct, most appropriate equation

Our investment in ₹ is ₹500,000
 Roughly taking \$1 = ₹80
 ₹500,000 = \$6250

If 1 ounce cost + 1809 in July, 2022
 ∴ weight purchased in \$1 = $\frac{1}{1809}$ ounces
 ∴ weight purchased in \$6250 = 3.4549
 = 3.455 ounces

After 3 years (12 quarters),
 Adding n = 27 + 4 + 4 + 4
 = 39

$y = .87 \times 39 \times 39 + 4.4 \times 39 + 1211$
 = 2765.87 = gold rate after 3 years
 (July, 2025)

Expected cost of 1 ounce of gold in July, 2025
 = ₹2765.87

Price of our ₹5 lakh = 2765.87 × 3.455
 = 9556.08

converting into rupee,
 consider \$1 = ₹80
 our 5 lakh becomes ₹764486.50

In case dollar appreciates and after 3 years,
 suppose \$1 = ₹85,
 then,
 our 5 lakh becomes ₹12266.8

2. FIXED DEPOSITS

$$A = P \left(1 + \frac{R}{100} \right)^T$$

As SBI gives compound interest on quarterly basis.

T = 3 years = 3 × 4 quarters

R = 5.5% p.a. = $\frac{5.5}{4}$ % per quarter

$$A = 500000 \left(1 + \frac{5.5}{400} \right)^{12}$$

$$= 500000 (1 + 0.1375)^{12}$$

$$= ₹589034.06$$

$$= ₹589034$$

Appreciation = 589034 - 500000
 = ₹89034

3. ASIAN PAINTS

$$y = ab^x$$

To calculate a, b
 take any 2 points

7, 1103
 23, 3004

$$1103 = ab^7 \quad \text{--- (1)}$$

$$3004 = ab^{23} \quad \text{--- (2)}$$

$$\frac{(2)}{(1)} \div (1) \quad b^6 = \frac{3004}{1103}$$

$$b = 1.06$$

$$a(1.06)^7 = 1103$$

$$a = 733$$

∴ our equation is $y = 733(1.06)^x$

$$y = 733(1.06)^{39}$$

$$= 7112.67$$

$$= ₹7113$$

∴ Expected cost of 1 share in July, 2025 = ₹7113

Investment of ₹500,000 in July, 2021
 cost of 1 share = ₹2773.1
 ∴ in 5 lakhs we get = $\frac{500000}{2773.1}$
 = 180.3
 = 180 shares

4. EXPLANATION

For analyzing the data of gold, FD rates and stock of Asian Paints, we have drawn graphs manually and on excel. The slope of gold graph is increasing and is close to the right arm of the parabola. So, taking any 3 points randomly we have calculated value of a, b, c in quadratic. The graph of FD is falling and then almost is consistent from January, 2020 till date. We did not require graphs for this calculation since we used the formula for CI, on quarterly basis, which SBI is following for FD interest. Graph of Asian Paints shows exponential growth (increasing) so we have taken $y=ab^x$ and calculated a, b using two points, verified by two more points. Due to very large calculations I have rounded off some values up to 2 decimal places so ignoring some margin of error, these calculations give an idea of appreciation.

5. CONCLUSIONS

From the research paper it is evident that all the three modes of investments are providing very promising returns but the best graph is that of the stock of Asian Paints. The share of this particular company promises very glowing returns but it is subject to variety of market risks such as inflation, pandemic and many more. On the other hand, gold and fixed deposits provide you with a more guaranteed yet nominal return of investment. Therefore, in my opinion, diversification of your investment portfolio would be extremely beneficial as it would spread your money in various investments, thereby minimizing the risk. Henceforth it would be advisable to invest in gold, FDR and stock of Asian paints in the ratio 2:1:2 or 1:1:3 as someone rightly said "Do not put all the eggs in one basket."

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BIOGRAPHIES

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