Is gold investment decision of the Indian Investors being impacted by hyperbolic discounting bias during the pandemic period?

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Introduction

Gold has a universal appeal and is worshiped in all climates, without a single temple, and in all classes, without a single hypocrite. The reason may be that it's the only metal that combines lustrous beauty, rareness, virtual indestructibility and is reliable in value forever. No other commodity enjoys as much universal marketability as gold. The various options available for investment in gold are physical purchases of gold in the form of bars, biscuits, coins, and Jewellery and financial instruments based on gold. In Indian culture, gold is more than precious metal, and is truly embedded in the belief system. Gold is an inseparable part of Indian society over centuries and millennia and has fused well into an Indian psyche.

Gold is not only a reliable, long-term strategic asset for investment, but also an investment option which is becoming increasingly important in the present lockdown period. Gold is a distinct complement to stocks, bonds and broad portfolios. Gold is wealth store and a hedge against systemic risk, currency depreciation, and inflation. Gold has historically improved risk-adjusted returns for portfolios, delivered positive returns, and provided liquidity in times of market stress.

Need of the Study

The hyperbolic discounting dimensions of investment decision in gold investment funds does not appear in the existing literature and no study has been conducted with focus on gold investment funds to understand the impact of time inconsistency on the investment decision in gold investment instrument. This study is exploring the impact of behavioral factors on investment decision in gold investment funds during the pandemic situation. Hence, this study

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has the relevance in terms of analyzing and determining the hyperbolic investor behavior for investment in gold investment funds.

The study assists in following:

- Understanding the impact of hyperbolic discounting on investment decision in the gold investment fund.
- Understanding the impact of behavioral factors on investment decision in gold investment fund - the study is able to throw light on the rational as well as irrational behavior patterns of investors that impact investment decision in gold investment fund.
- Understanding the impact of behavior biases on the investor preference for the gold investment fund.
- Understanding the behavioral aspect of the gold investment needs.
- Understanding the changing pattern of demand for investment in gold investment funds during the pandemic for deciphering the hyperbolic investment behavior of gold investors during this pandemic situation.

Objective of the Study

- To study the impact of hyperbolic discounting on gold investors during COVID-19 pandemic.
- To explore the impact of temporal discounting on the demand of domestic gold.
- To understand the different propensity of investors towards gold due to pandemic changes.
- To understand the investment behavior and gold investment patterns of hyperbolic gold investors and patterns of use of gold as an asset class.

Hypothesis of the study

H^1 The hyperbolic discount bias has an impact on the gold investors.

H^0 The hyperbolic discount bias has no an impact on the gold investors.

Research Problem

Hyperbolic discount function generates dynamically conflicting expectations, suggesting an opportunity for gold buyers to constrain their own potential choices. This paper analyses the

decision of the gold investor, who is motivated by hyperbolic discounting and has access to incomplete engagement processes.

According to the World Gold Council report of 24 September 2020, the domestic price of gold decreased by 4.4 per cent month on a monthly basis, but remained 31.1 per cent higher year to date at the month end. Economic indicators sent conflicting signals during August 2020, indicating that the Indian economy is unlikely to see a fast rebound. Retail gold demand diminished as buyers waited on the sidelines after a sharp reversal of domestic gold prices in the light of rising COVID-19 events. Investors looked at and waited for secure investment assets and good year-to-date return results combined with market correction as a purchasing opportunity. This may have helped the flow of investment in the ETF gold. Complete Indian gold holdings in ETFs hit 25.7 t at the end of August 2020 with a net inflow of 1.8 t during the month.

The emerging pattern wherein it appears that the gold investors want to invest in gold ETF during the pandemic as they prefer investing in gold ETF rather than visiting the retail shop and purchase the physical gold due to COVID 19. However, at the same time it is also emerging that such investment decision pattern is not consistent as seen from the the Gold ETF inflow data over last few months. This behavioral pattern of gold investors appears to be indicative of hyperbolic discounting function. .

Gold investors have a self-control attribute. Strotz (1956) was the first economist to formalize the principle of commitment and to explain that commitment processes could theoretically be a significant determinant of economic outcomes. Precious metal gold is a good example of how to decode the firm's loyalty philosophy, since gold is a class of commodities that offers a store of illiquid value, such as investing and instant security incentives to the gold holder, and aims to deliver significant benefits in the long run.

World Gold Council statistics shows mixed trends of demand for gold by Indian investors during the pandemic era, and the behavioral change of gold investors to new gold formats necessitated an investigation of investment decision of hyperbolic gold investors.

Literature Review

The World Gold Council data showed that India's demand for gold drove from 213,2 tons over the corresponding 2020 quarter to 63,7 tons in the April-June quarter of this year. The demand for jewelry decreased in the second half of 2020 by 74 per cent. During the April-July quarter, gold investors purchased less gold jewelry because the shops closed down. WGC data have shown that the total supply decreased by 91 per cent in April and June 2020 to 26 tons in the quarter 2020, compared to 287,9 tons in the same period last year. During the second quarter of the calendar the total supply decreased to 26 tons in April to June 2020.[4] In an environment of fear and confusion, where weddings were either postponed or turned out to be uncharacteristically quiet and private, demand for jewellery plummeted by 74 per cent. Investment demand did relatively better, as high net worth individuals (HNIs) and investors were drawn by gold's safe haven qualities and perhaps some price increase anticipation.[5] In the first seven months of the year 2020, net inflow in the gold exchange traded fund or ETF category reached Rs 4,452 crore, as reported by the Association of Mutual Funds in India. At the end of July 2020, the assets under management (AUM) of gold ETFs increased by 19 percent to Rs 12,941 crore, from Rs 10,857 crore.[6] Clearly, as gold exchange traded funds (ETFs) rose after being inactive for several years, the ease of purchasing online played an important role in consumer behaviour during lockdown. Digital gold has also seen considerable activity, even though volumes in the overall market scenario are still marginal.[7]

It is interesting to perceive the interconnection between the volatility in gold demand during the pandemic and hyperbolic discounting function, therefore the study of economic literature on hyperbolic discounting is necessary.

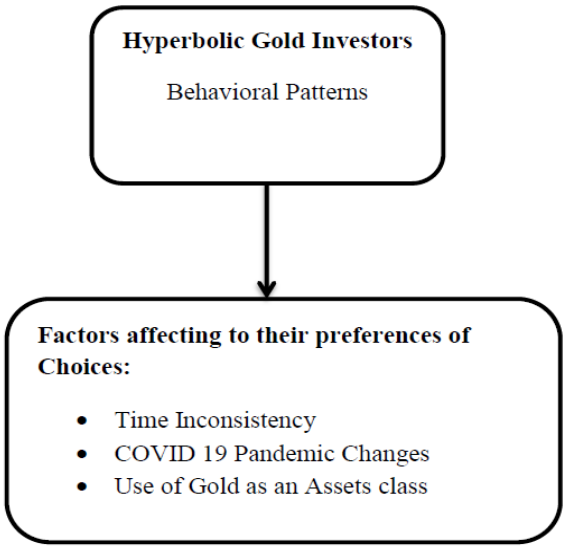
The use of non-constant time discounting can be considered in this paper. The conventional discounted utility model was introduced by Samuelson (1937), who noted that the assumption of a constant discount rate was “in the nature of an hypothesis, subject to refutation by the observable facts”. Empirical evidence has gradually been collected to cast doubt upon the hypothesis of constant discounting, and the literature on hyperbolic discounting has emerged. Hyperbolic discounting refers to the application of time-declining discount rates to trade-off

[4] World gold council report 2020
[5] World Gold Council, research report, Gold retail insight, 2020
[6] Association of Mutual Fund in india, Assets under management disclosure data, December2020.
[7] World gold council, research report, “The relevance of gold as strategic assets- Indian edition” February 2020

between present and future consumption. A particularly commonly used model is the quasi-hyperbolic specification, which in discrete time has discount factors {1, $\beta\delta$,$\beta\delta$2, $\beta\delta$3} (see e.g. Laibson 1997). These preferences can generate time-inconsistent plans (Strotz 1956), and potentially provide an explanation for procrastination, addiction, inadequate saving and various other commonly observed but otherwise perplexing human behaviours (Akerlof 1991). In some cases, plausible evolutionary reasons for these phenomena have been identified (Dasgupta and Maskin 2005). The hyperbolic discouting approach does capture the psychological phenomenon where the present bias is given the special treatment. It assumes the maximisation of utility function with a specific structure and as such misses the core of psychological decision making process since the hyperbolic discounting approach goes much further and it assigning the special role to present bias (Rubinstein 2003).

This paper focusses on the nexus between hyperbolic discounting and gold investors behviour changes in COVID pandemic period. The data analysis section develops the model of beta delta model to understand the gold investors preferences and the intertemporal choices of gold investors.

Theoretical Framework



Relevance of the Study

As lockdown constraint steadily eased, as stated by the WGC, the market for gold began to increase with the onset of rising gold prices beginning on 27 July 2020. Demand momentum was backed by a sharp rally in local gold prices, which increased by 6 per cent between 27 July and 10 August 2020. During this time, the domestic market traded at an average premium of US$ 3 / oz. In accordance with the foreign price of gold, the domestic price of gold dropped by ~Rs3,000/10 gm – down 5.3 per cent between 10 August and 12 August 2020. However, when Gold buyers began postponing further sales, the price plunged back into discount. The weak retail demand continued during the month and the discount in the local market rose to US$ 30 / oz by the end of August 2020. The market inflow into Indian gold ETF was helped by the need for safe havens and high gold returns of about 31.1 per cent.

It appears that investors have invested heavily in gold ETF because they wanted to invest in gold during the festive season such as Akshytritiya and Onam but were unable to purchase physical gold due to the COVID 19 condition and hence they invested in gold ETF. This is, can be seen from spike in gold ETF investments between July and September 2020.

The pattern indicates that various formats of gold instruments received mixed reactions from buyers during the pandemic. Investors' priorities may be driven by increased prospects for liquidity and the reduction of implied prospects for engagement. These shifts in priorities for gold investors represent the trends of gold investing by pandemic hit investors.

Historically, the government has constantly struggled to attract investors to invest in the gold monetization schemes. Some of the schemes have received satisfactory response, but many are still failing to attract investor’s attention. For example, one of the schemes, Gold Monetization Scheme, has good potential but at the same time has several shortcomings including the shortcoming of scheme is supported by very few commercial banks. The scheme has not received the expected response from Indian investors except during the period of demonetization (December 2016), when around 200 tonnes of gold came to Reserve Bank India’s stock (reserves) post demonetization. Gold is also a major import item. It contributes negatively to Balance of Trade for India. Over last few years, government has also taken several policy measures to restrict import of Gold including infamous 80:20 scheme (2012-13) under which there was an export obligation of 20% on the importers of gold. The 80:20

schemes resulted in sharp price differential in domestic and international gold prices and also encouraged gold trafficking. The scheme was eased out in November 2014.

This study based on above observations has following objectives:

- To understand the propensity of investors towards alternative gold instruments.
- To study the hyperbolic gold investors' inconsistent gold investment preferences
- To study the innovations in gold investment alternatives increases the commitment opportunities of the gold investors towards the investing in different innovating gold options like Gold bond, Gold ETF etc.

Research Methodology and Research Design

The research has been undertaken to study the impact of hyperbolic discounting bias impacting the gold purchase and investment decisions in Mumbai region during COVID 19 pandemic. The study incorporates both the data primary as well as secondary data. The sample design is based on convenience sampling method. The sample of proposed study is non-probability sampling.

Data Collection

Primary Data: Primary data is collected from investors (the respondents) with the help of a well-structured questionnaire and personal interview. Around 230 questionnaires were distributed, and 201 responses were found valid for the study.

Secondary Data: The study extracted the secondary data from the various sources which includes research journals, books, thesis reports, certain published sources by National and Global Government organization such as Security Exchange Board of India, Association of Mutual Fund in India and World Gold Council.

Data Analysis

The following table represent the data has been collected from the respondents during the survey.

Count of Ranking	**Column Labels**		
Row Labels	**GOLD-ETF**	**Physical-Gold**	**Grand Total**
1st Rank	**40**	**97**	**137**
COVID	19	46	65
NORMAL	21	51	72
2nd Rank	**97**	**106**	**203**
COVID	43	48	91
NORMAL	54	58	112
3rd Rank	**121**	**98**	**219**
COVID	67	51	118
NORMAL	54	47	101
4th Rank	**73**	**55**	**128**
COVID	42	30	72
NORMAL	31	25	56
5th Rank	**29**	**13**	**42**
COVID	10	7	17
NORMAL	19	6	25
6th Rank	**20**	**14**	**34**
COVID	9	10	19
NORMAL	11	4	15
7th Rank	**18**	**10**	**28**
COVID	9	5	14
NORMAL	9	5	14
Grand Total	**398**	**393**	**791**

The study has considered the quasi-hyperbolic discount function to understand the impulsivity of the gold investors towards choices between the Gold ETF and Physical Gold.

Time inconsistency complicates the modeling of the decision maker since assumptions of gold purchase preference are added to the decision maker analysis during two situations i.e. during COVID pandemic.

'*t*' is decision maker uses the utility function '*u*' to evaluate the stream of preference of gold purchase from (*t*) period onwards. This imples 'time inconsistency' because here we have taken the two time period one is normal economic situation and another one is, economic situation during during COVID pandemic. Since, $'\delta'$ the marginal rate of substitution between '*t*' and '*t* + 1' from the point of view of two time situations is replaced by $\beta\delta$ at *t.* Following is the beta delta function formula which we have applied on the collected data:

$$\boldsymbol{U^{\circ}(u) = u_0 + \beta\delta u_1}$$

Where, $U^0(u)$ = Utility of gold investors invest in Gold ETF or physical Gold.

$\beta =$ 0.5 (less than 1) represent Present biased preference of gold investors.

$\delta =$ 0.67 ($1/3$ weight given to the future value) represent the discount factor which captures the time preference of gold investors to understand the patience and impatience level.

The above beta delta model has been applied on data collecetd for this research study. The respondents were asked to rank seven investment alternatives viz; Real estate, Mutual funds, Debt instruments, Equity, Insurance, Physical Gold and Gold ETF. The study collected above responses for two situations – a. Normal economy and b. Economy impacted by COVID-19. These two situations represents the time inconsistency.

Following are the in detail (rank wise) representation of the implementation of hyperbolic discount function (beta delta model) to understand the impact of hyperbolic discounting bias on gold investors behavior towards Gold ETF and Physical Gold during pandemic and non pandemic period.

Count of 1st Rank

	Gold ETF	Physical Gold
Economy impacted by Covid Situation	19	46
Normal economy situation	21	51

The data applied in beta delta model to understand the utility of gold investors invest in Gold ETF or Physical Gold.

$$U°(u) = u_0 + \beta\delta u_1$$

$$u_0(Covid) = 19 + 0.5 \times 0.67 \times 46 = 34.41$$

$$u_0(Non\ covid) = 21 + 0.5 \times 0.67 \times 51 = \mathbf{38.085}$$

Count of 2nd Rank

	Gold ETF	Physical Gold
Economy impacted by Covid Situation	43	48
Normal economy situation	54	58

The data applied in beta delta model to understand the utility of gold investors invest in Gold ETF or Physical Gold.

$$U°(u) = u_0 + \beta\delta u_1$$

$$u_0(Covid) = 43 + 0.5 \times 0.67 \times 48 = 59.08$$

$$u_0(Non\ covid) = 54 + 0.5 \times 0.67 \times 58 = \mathbf{73.43}$$

Count of 3rd Rank

	Gold ETF	Physical Gold
Economy impacted by Covid Situation	67	51
Normal economy situation	54	47

The data applied in beta delta model to understand the utility of gold investors invest in Gold ETF or Physical Gold.

$$U°(u) = u_0 + \beta\delta u_1$$

$u_0(Covid) = 67 + 0.5 \times 0.67 \times 51 = \mathbf{84.085}$

$u_0(Non\ covid) = 54 + 0.5 \times 0.67 \times 47 = 69.745$

Count of 4th Rank

	Gold ETF	Physical Gold
Economy impacted by Covid Situation	42	30
Normal economy situation	31	25

The data applied in beta delta model to understand the utility of gold investors invest in Gold ETF or Physical Gold.

$$U°(u) = u_0 + \beta\delta u_1$$

$u_0(Covid) = 42 + 0.5 \times 0.67 \times 30 = \mathbf{52.05}$

$u_0(Non\ covid) = 31 + 0.5 \times 0.67 \times 25 = 39.375$

Count of 5th Rank

	Gold ETF	Physical Gold
Economy impacted by Covid Situation	10	7
Normal economy situation	19	6

The data applied in beta delta model to understand the utility of gold investors invest in Gold ETF or Physical Gold.

$$U°(u) = u_0 + \beta\delta u_1$$

$u_0(Covid) = 10 + 0.5 \times 0.67 \times 7 = 12.345$

$u_0(Non\ covid) = 19 + 0.5 \times 0.67 \times 6 = \mathbf{21.01}$

Count of 6th Rank

	Gold ETF	Physical Gold

Economy impacted by Covid Situation	9	11
Normal economy situation	11	4

The data applied in beta delta model to understand the utility of gold investors invest in Gold ETF or Physical Gold.

$$U°(u) = u_0 + \beta\delta u_1$$

$$u_0(Covid) = 9 + 0.5 \times 0.67 \times 10 = \mathbf{12.35}$$

$$u_0(Non\ covid) = 11 + 0.5 \times 0.67 \times 4 = \mathbf{12.34}$$

Count of 7th Rank

	Gold ETF	Physical Gold
Economy impacted by Covid Situation	9	5
Normal economy situation	9	5

The data applied in beta delta model to understand the utility of gold investors invest in Gold ETF or Physical Gold.

$$U°(u) = u_0 + \beta\delta u_1$$

$$u_0(Covid) = 9 + 0.5 \times 0.67 \times 5 = \mathbf{10.675}$$

$$u_0(Non\ covid) = 9 + 0.5 \times 0.67 \times 5 = \mathbf{10.675}$$

The gold investors have given the preference to the physical gold during the normal economic situation (as considering count of 1st 2nd and 5th ranks the higher value of beta delta model) due to impulsivity towards in intertemporal choice. The gold investors were patient and preferred the physical gold. Here, gold investors are liable to have the delayed gratification. By contrast, the respondents also give preference to Gold ETF as liquid assets (considering the 3rd and 4th rank the higher value of beta delta model). Because of the time inconsitecny, gold investors belive that the things in the Normal economic situation do not give much gratification from and in the view of COVID pandemic situation, it appears that they preferred the immediate gratification therefore hyperbolic gold investors increase the tendency of sooner rewards. The last finding of the count of 6th and 7th rank respondents indicates that they are

impulsive towards both the situations i.e. during pandemic and during normal economy situation therefore the intertemporal choices could not be defined clearly.

Conclusion

The study is concluded that the hyperbolic discounting bias has impact on gold investment behavior during the COVID – 19 pandemic and the normal economic situation. The authors find out that the respodents react spontaneously while making the intertemporal choices and they are considering the Gold ETF as the liquid assets during the COVID situation and physical gold as the illiquid assets. The present bias has been tested positively on data hence the study accepted the alternate hypothesis and rejected the null hypothesis. The paper has the authentic study to understand the changing pattern of demand for physical gold and gold ETF during the pandemic. Henceforth, there is gold investment needs but it has impact of temporal discounting, so we can consider that the gold investors are influenced by the present bias and hyperbolic discounting bias has impacted the preference choices of gold investors.

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