The Gold Activation Project

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Gold: A Primer

A History of Gold

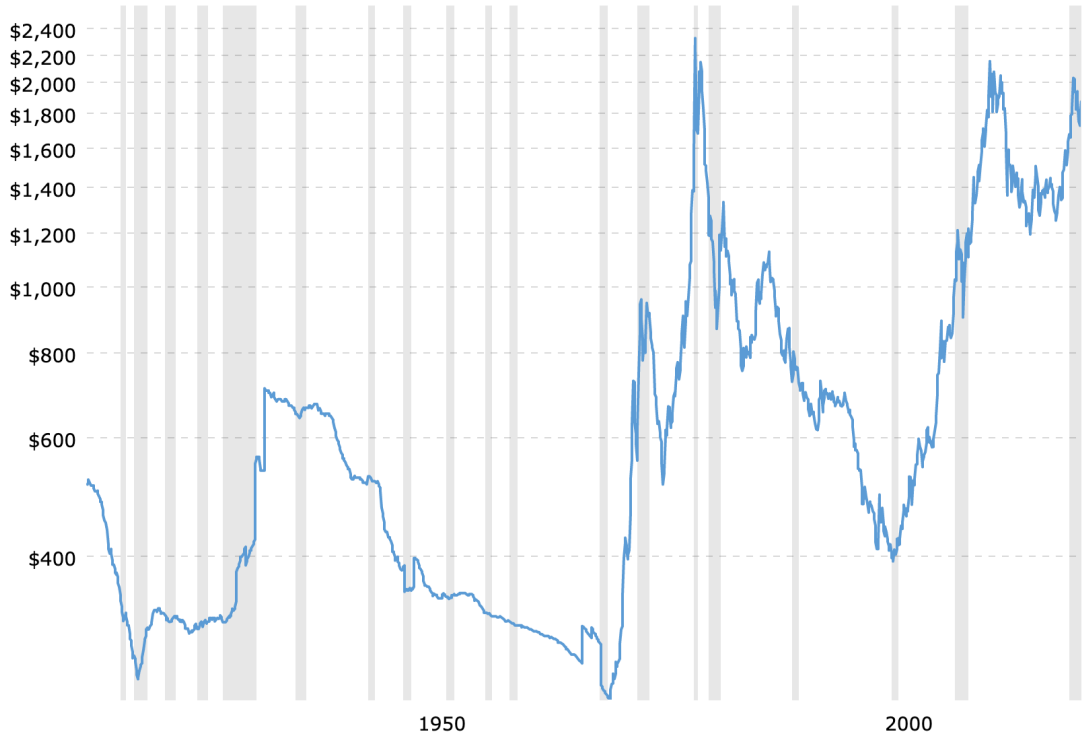
For thousands of years, human civilisations have been fascinated by gold. People were drawn to it for its natural beauty and rarity. However, it also has several properties that make it incredibly useful: it naturally does not tarnish or oxidize, and is very malleable. For these reasons, civilisations have been using gold as a currency since at least 1500BC.

It also used to be the basis of the gold standard in the 19th and early 20th century, where a country's paper currency was directly linked to a fixed amount of gold, though this was eventually abandoned by countries in favour of fiat money.

Nowadays it is often used as a store of value, since it is scarce, does not degrade, and is often uncorrelated with the stock market, but a store of value is not a productive asset.

Figure 1 below shows the inflation adjusted prices of gold over the past 100 years, with recessions in grey. From the graph, we see that gold prices often spike during recessions, as people search for a safe asset to put money into.

Gold is the asset of choice because the global supply of gold is small and stable: at about 170,000 tons, all gold ever mined would fit inside a 20m cube. Again, this is due to the natural scarcity of gold. Global supply only grows about 1-2% a year. This comes from mining and is relatively stable since gold exploration and setting up mines is too slow to respond to economic shocks or price changes.



The Indian Problem

A Cultural View

In India, gold is not just a precious metal but a religion. Indians' insatiable appetite for gold spans millennia and is of great sentimental importance. It is an integral part of many India traditions, ceremonies, festivals and, fortunately or unfortunately, it also reflects on personal status in a very status-conscious society. In low-income households, gold is also a way of transferring wealth from generation to generation.

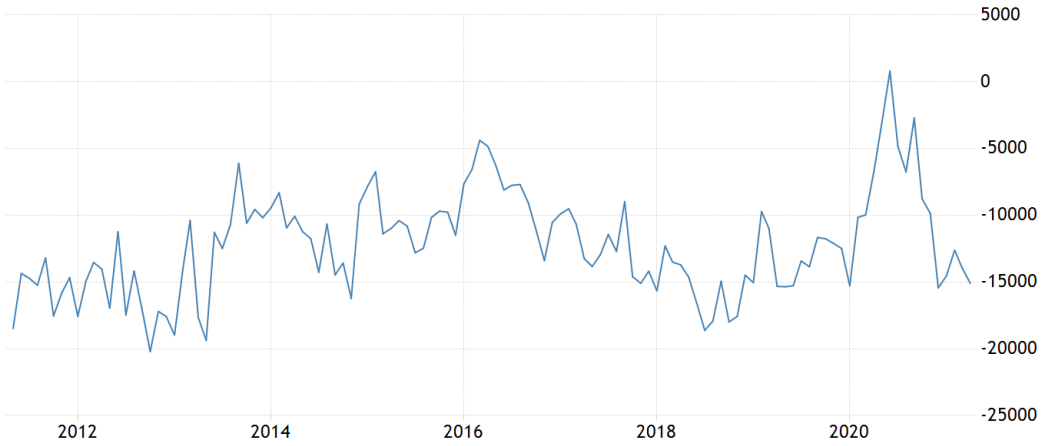
In rural areas, "Stridhan" is a practice that continues to this day. "Stri" means lady and "dhan" means gold/money. It was a practice originally introduces to protect married women from financial difficulties since they usually did not engage in any work outside of the home. This is in addition to the "dowry" which is paid to the husband (also mostly in gold). Since ancient times, there is even an unofficial law, which is still followed today, that states a bride must be covered from head to toe in gold jewelry. It would not be surprising find weddings in India where the total value of gold is equal to the GDP of a small nation!

When the World Gold Council (WGC) came out with the estimate that Indian households hold around 25000 tons of gold, they also estimated that out of these ~25000 tons, ~4000 tons of gold are with Hindu temples. The temple you see above, the "Tirupati" temple in Southern India, is considered the richest in the world in terms of donations and owned wealth. Out of the 300 tons "Tirupati" owns, only ~4.5 tons have been deposited with banks, thus contributing to the economy.

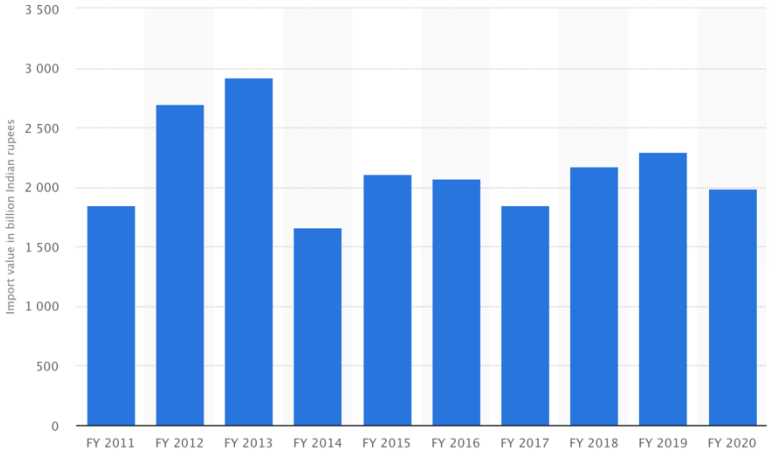
This cultural viewpoint that we start off with in this report might seem irrelevant, but as humans we are creatures of habit and if we've been following tradition for a couple of millennia there is a good chance that we will continue to follow such traditions for the next couple of millennia as well.

An Economic View

Let's begin by looking at India's trade deficit over the last decade:



We observe that India's trade deficit in goods has averaged around US$12-15BN. Now let's compare that with India's gold imports over the last decade:



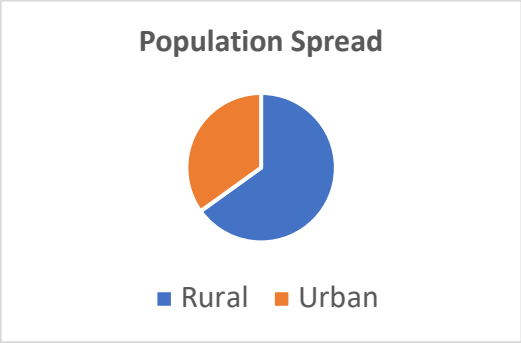
India's gold imports have averaged around US$25BN, with US$28BN of imports in 2019. It is easily observable that **the trade deficits have been, thanks in no small part, to this Indian gold craze** – driving the nation deeper and deeper into debt. India is one of the world's largest importers of gold in the world. However, most of the gold goes to rural areas and low-income households that end up (literally) stuffing it under a mattress and this gold ends up not contributing to the economy at all. The government initially tried to reduce imports using fiscal measures like tariff increases but even that has not been able to put a dent in the buttress that is India's gold craze. While cutting the amount of gold imports and turning that deficit into a surplus might be more effective, getting all the imported (and idle) gold back into the economy is the more viable option.

5 years ago, the government launched a Gold Monetisation Scheme (GMS) with the sole objective of turning this idle stockpile of gold (almost 25000 tons) into a productive asset by providing interest on gold deposits at banks (earlier, people had to pay to store gold at a bank). However, this scheme has only garnered ~20 tons of gold. Apart from the paltry interest being offered, there is no other real incentive for people to be part of this scheme and part with their gold, and that is the problem this project intends to tackle.

An Educational Solution

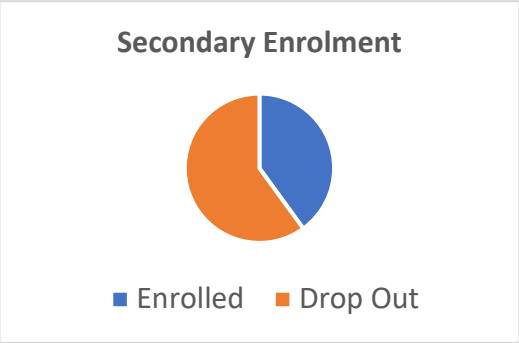
Background

Majority of the Indian population lives in rural areas. The demographic distribution is as can be seen in the pie chart – 65% (900 MM) rural Vs 35% (483 MM) urban. This 65%, however, only account for around 45% of India's Net Domestic Product (GDP after accounting for depreciation).



The average Indian household allocates around 11% of it's household income in gold (mostly jewelry). This is an average, with low-income households allocating more and high-income households allocating less of their income in gold. The average investment in gold per month in rural India is around INR 233.

Now let's consider the current education scenario in India. There are several issues with the Indian education system, but our focus will be on the 2 main issues that can, at least to some extent, be solved with a steady stream of income:



- Many households in rural India do not have access to a steady source of income and hence education is not a priority
- Schooling infrastructure is extremely poor – there is a constant lack of teachers due to poor pay, lack of equipment, obsolete equipment etc.

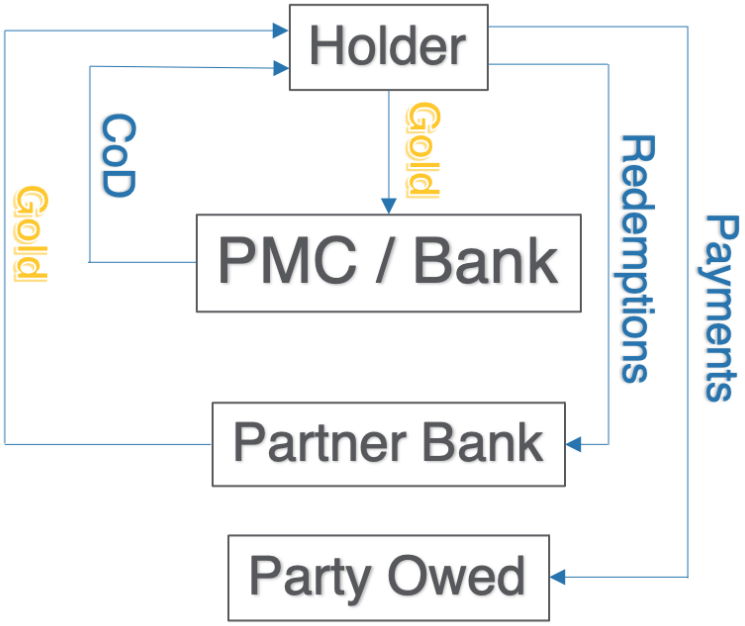
Most low-income households send their kids to Government schools which offer free education up to the 8th grade. Secondary enrolment (9th grade and up), as can be seen in the pie chart, drops drastically due to the fact that this is not free anymore.

In rural India, about 70% of households still depend majorly on agriculture for sustenance, of which around 80% of households are engaged in small scale farming. Even the reason for higher children count per household can be traced back to this problem, in the sense that having more hands working on the field is often thought to increase farm output and hence income.

The vacant premises of a private primary school in Badaun, Uttar Pradesh (Photo: Sayantan Bera/Mint)

The onset of the COVID pandemic has forced children in rural India back to their homes putting their education on an indefinite hiatus. One might argue that the advent of remote education has deemed classroom teaching unnecessary, but what people don't realize is that remote learning requires access to electronic devices and textbooks that are pretty expensive for a rural farming household that can barely afford to feed themselves. Most problems, at the root level, can always be traced back to money, or lack of it.

Proposed Solution



The parent or the gold owner would deposit their gold with the school in exchange for their child getting "free-of-cost" education – they would not be required to make any further periodic payment to the school. For the solution to be viable, we need to first consider a kind of support solution – Tradeable Gold Certificates:

- A big reason that people hold gold is because it acts as a sort of emergency fund that can be easily liquidated in times of need – for example, maybe there is an unforeseen medical expense or a debt to be paid off
- If a certificate of deposit is issued to a gold depositor, these certificates themselves can be traded and used as currency – harkening back to pre-Dodd Frank era days

Now, getting into the main solution, schools can partner with a Portfolio Management Company (PMC) or a Bank. This can be implemented in one of three ways:

- PMC: A specialized asset management company that holds gold deposits for schools and uses gold-backed leverage as capital to invest on the school's behalf thus earning the school a periodic and steady source which can be used to develop infrastructure, pay teachers, procure new equipment etc.
- Bank: An alternative way to implement the same solution would be to engineer a tie up between various banks and the school where we can define a minimum amount of gold that needs to be deposited with the bank that qualifies the child to attend school "free-of-cost"
- PMC + Bank: The solution could also be implemented as a partnership between a PMC and a bank such that the PMC takes the gold deposits and issues certificates of deposits to the gold owners that can be redeemed for gold at any of the partner banks thus giving it currency-like status, as discussed before

How would the numbers work?

Now, let's take a look at the numbers. It would be wise to keep in mind that there are quite a few assumptions made to arrive at the figures below, some of which are indeed heroic, but in the field of finance and economics, without assumptions we have nothing.

- Target Demographic: We will consider rural India which account for ~ 900 million people
- Total Gold under Consideration: Around 2/3 (or 68%) of the demand for gold comes from rural India, so it would be a fair to assume that gold holdings are also similarly distributed. Latest estimates of total household gold holdings in India are around 25,000 tons, so building off of that:

$$Rural\ Gold\ Holdings = 25{,}000{,}000\ Kg * \frac{2}{3} = 16{,}666{,}667\ Kg$$

$$Rural\ Gold\ Holdings\ Per\ Capita\ (on\ average) = \frac{16{,}666{,}667}{900{,}000{,}000} = 18.5\ grams$$

- Let's consider the wealthier subset of the above target demographic under the pretense that it might be easier to incentivize this group to part with their gold and assume that we're dealing with average per capita gold holdings of 25 grams and with the current Indian gold price of INR50,000 this amounts to a monetary value of:

$$Value\ of\ 25\ grams\ (in\ INR) = \sim INR\ 125{,}000\ (US\$1{,}800)$$

- Over the past decade asset management companies in India have returned around 10-11% on average annually

$$Potential\ Annual\ Return\ (at\ 10-11\%) = INR\ 12{,}500-13{,}750\ (US\$180-196)$$

- Since our solution has an educational bent, let's bring that into play. We saw above that government schools offer free education until the 8th grade so we will only consider students 9th grade and up. Assuming ~40 students per class and 1 class per grade for 4 grades (9,10,11 & 12) gives us a total student population / no. of households as ~160. Now, earlier we made the assumption that we will be targeting the wealthier of the rural demographic, so quantifying that, and to be conservative, let's assume that only the top 50% of students / households (80 students / households) will be willing to participate in the program. So, with the additional assumptions of ~30,000 schools per state (for 28 states and 8 Union Territories):

$$Potential\ Gold\ Capture\ per\ State = 30{,}000 *\ 80 * 25\ grams = 60{,}000\ Kg$$

$$Equivalent\ value\ in\ INR = 60{,}000 * 5{,}000{,}000 = INR\ 300\ Billion\ (\sim US\$4\ Billion)$$

$$Potential\ Value\ Capture\ Nationwide = \sim 2{,}000{,}000\ Kg = \sim INR\ 11\ Trillion$$

- As we can see above there is definitely a lot of potential economic value to be captured, more specifically around **INR 11 Trillion or US$ 160 Billion!**

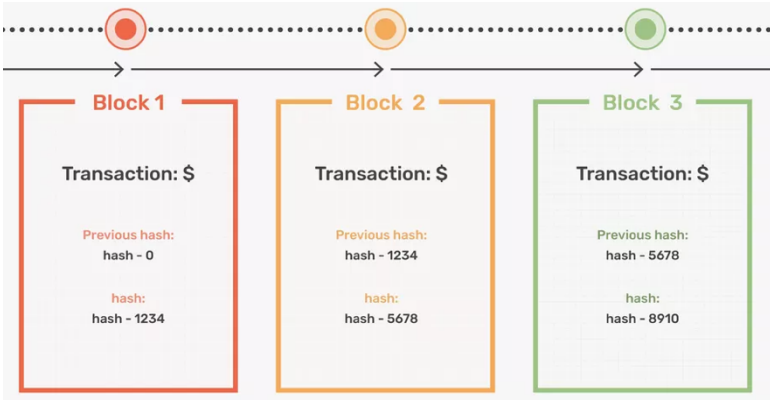
A Blockchain-Integrated Solution

Primer on Blockchain

Going along with the afore-mentioned tradable certificate, it is crucial to design a ledger system to prevent fraudulent attempts. Blockchain is the perfect data structure to serve the purpose of fraud prevention and effortless tracking.

Known as the backbone of major cryptocurrencies such as Bitcoin and Ethereum, blockchain is a data structure that holds information with inherent encryption. The elementary structure within a blockchain is a "block": a unit that can hold data. Each block contains essential and non-essential information. Essential information includes metadata, and the hash-value of the non-essential data. A hash is a complex algorithm that takes any given input and turns it into a predefined length of random integer. Due to the nature of hashing, it is infeasible to reverse the algorithm, thus protecting the integrity of the input value. By simply checking the hash value, one can ensure that the input has not been tampered with. The non-essential data is what stores the main information: an ID number, a transaction, etc.

In addition to the information, each block also holds a pointer to the next block, thereby linking the blocks into a chain of blocks, hence the name "blockchain". The figure below is a simplified version of a blockchain.



Blockchain Solution: Identifying

With the application of blockchain, we could record every piece of gold traded in by assigning them a unique identifier. With pieces large enough such as gold bars, we could simply imprint the id onto the pieces themselves since gold is a malleable metal. With smaller pieces such as jewelries and nuggets, we could print the ids onto their tradable certificates. To prevent misconduct, we could use the hash values of the original sequences as the unique identifier. For instance, if a piece of gold being traded in has the original sequence of "India000123", using a popular hashing algorithm SHA256, we find the hash value to be "6584321977cd96f9c7fee94cf4d3d8d5e89f53cce18a151bcdd8728b14e04a0e", a seemingly random sequence that provides an extra layer of protection. After this piece of gold is traded, the receiver simply has to check the hash value by inputting "India000123" into the SHA256

algorithm for a match to verify the integrity of the gold. Additional information such as the shape, weight, or design of the gold piece could also easily be embedded into the hash value.

Blockchain Solution: Trading

As a decentralized ledger, blockchain records transactions in each of its blocks. Therefore, the transaction history of a piece of gold is recorded and can be verifies step by step from its initial registration to its current owner. Due to the decentralization feature, it would be extremely costly to forge a transaction history by forking the chains (one has to control more than half of the computers in the network). Therefore, as it is implemented in many of the art auctions and transactions, gold trading could be recorded with ease and security using blockchains.

Blockchain Solution: Limitation and Outlook

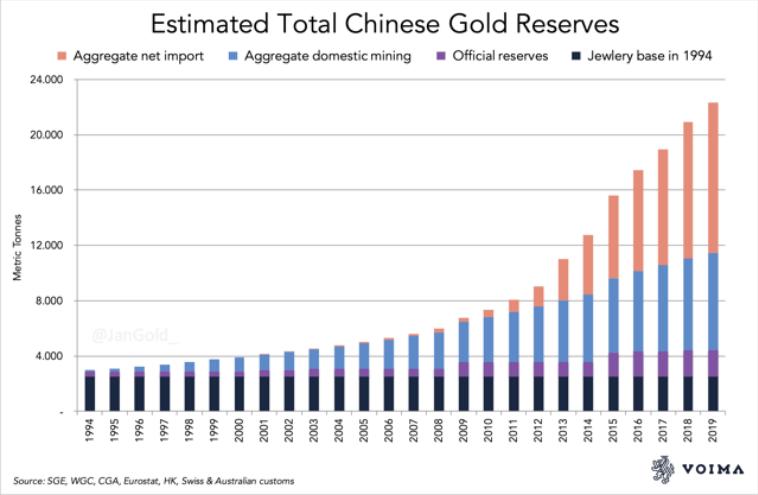
It is worth noting that the initial cost of implementing the blockchain system and training expertise could be relatively high. However, with the system in place, maintenance and operation is less costly. Another feature of using a blockchain-based ledger is that it is easily scalable. Banks and gold traders in India could expand the blockchain network with minimal effort once the system is established, which justifies the high upfront cost.

International Expansion

Gold Hoarding in China and Russia

Research has shown that gold hoarding is not a problem unique to India. China, for instance, has seen increased amount of imports of gold. China has been purchasing more than 100 tons of gold every year since 2009 and will likely own 5000 tons in its stockpile. Russia is no stranger to the problem either. Just in the first half of 2019, Russia has bought about 96 tons of gold.

Gold hoarding seems to be a global problem, especially in the Asian region and Russia. Culturally, many countries in the region share the common belief that gold holds sentimental values and that its intrinsic value is stable especially during times of economic turmoil. We see that China's gold import spiked after the 2008 Great Financial Crisis, showing the worry and uncertainty among the Chinese citizens of the global economy following its impact. As an ancient Chinese saying goes, invest in antiques when the time is peaceful, and invest in gold when it is not. The saying typically refers to war and natural disaster in history, but people seem to have adapted it to economic turmoil in our current times.



As the infrastructure in China, Russia, and other countries are mostly on-par with that in India, implementing tradable certificates and blockchains should be feasible. As for our educational solution, we can cater that towards the different cultural and civil situations in each country and customize our proposal accordingly.

Challenges & Further Research

- From some initial due diligence, there don't seem to be any programs of the sort we have proposed which means that that we will have a first mover advantage
    - But this also means that we will have to take the initiative when it comes to law-making by tackling a labyrinth of bureaucratic red tape
    - The advantage is that since we will be the ones designing the legal framework, we can make it work to our advantage
- Since our business model involves procuring gold from "low-income" households, we might be subject to extra regulations in terms of the kind of investments we might be allowed to make as a Portfolio Management Company
- A barrier to entry will be the financial literacy levels of the target demographic. Since a large part of them are farming households, it might be a challenge to convince them to deposit gold and send their children to school which will give them significant returns over making them work on the field and increase farm output
- There is scope for a lot of further research to be done in the exact numbers and value that can be generated with this project, the regulatory aspects and a pilot run in one of the villages to see the response of our target demographic to such initiatives

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