

Savings in gold by low-income households in rural India: An empirical study¹

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Abstract

Investment in gold by Indian households is motivated by social, economic, and cultural factors. One in ten households buys gold annually or at higher frequencies, and most commonly in the form of jewellery followed by coins or bars. Gold or gold backed products are widely used to mobilize savings, hedge against inflation, serve as collateral for borrowing loans as well as an instrument for liquidity management by households. Despite households' preference for this asset, the market for gold-based savings products for low-income households remain unexplored to a large extent. In this study we examine the adoption and use of an innovative gold-based micro-savings product among rural households in six states of India, in partnership with Dvara Smart Gold, a formal financial service provider. We also examine the use of this product in the event of shocks like covid-19 and planned occasions like annual festivals. Further, we use logistic regression model to identify the factors influencing the demand for this unique savings product. Overall, we find households' investment in gold-based micro-savings product to be systematic and consistent, even during impactful unplanned events.

Keywords: Gold-based savings, digital gold, household finance, financial inclusion, covid-19 lockdown, systematic savings

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1. Introduction

In India, gold is considered a symbol of social status, financial security and cultural legacy. As a financial instrument, investments in gold or gold-backed products are driven by the various functions they perform. For instance, gold performs the dual role of savings as well as collateral for credit that can help households mitigate risks, smoothen consumption as well as raise funds to fulfil important goals such as marriage, education and capital for business. In the last decade, the purchasing value of gold in India has increased sharply by 96% while the total value of gold purchased has risen by a moderate 35%.⁴ This indicates that the demand for gold by Indian households is moderately inelastic.⁵ The strong preference for gold is also reflected in Indian households' wealth allocation towards this asset. As per the CMIE-CPHS⁶ 2019 data, there is a near universal demand for gold as 99% of households own some form of gold. In terms of share of total wealth, an average Indian household holds 84% of their total wealth in physical assets, 11% in gold bullion and the remaining 5% in financial assets (Report of the Household Finance Committee, 2017). In the case of southern states, households allocate an even higher proportion of their wealth to gold.⁷

While the increased and consistent popularity of gold as a reliable source of saving, investment and credit has allowed the Indian financial sector to channelize gold's multi-functionality into unique products, gaps remain. On the one hand, the market for gold loans is still dominated by informal gold loan financiers consisting of pawnbrokers and moneylenders, which account for 65% of the market share (KPMG Report, 2020).⁸ On the other hand, gold-based savings products have received a lukewarm reception due to their poor design, in particular for the fault of bearing features that are unsuitable for the low-income segment. Given the huge amounts of gold held by Indian households and the lack of suitable gold-based products, there is scope for the Indian financial sector to innovate gold-based financial instruments that perform key financial functions for households, such as those of consumption smoothing and managing

⁴ Figures calculated based on data from the World Gold Council after adjusting with relevant sales tax, customs duty rates and average making charge rates.

⁵ Price elasticity of demand has been calculated by dividing percentage change in total value purchased divided by percentage change in purchasing value of gold per tonne.

⁶ CMIE-CPHS refers to the Centre for Monitoring Indian Economy's Consumer Pyramid Household Survey. For details, see [here](#).

⁷ Among the southern states, Tamil Nadu households own the highest share of gold bullion (28%), followed by Andhra Pradesh (22%) and Karnataka (16%).

⁸ Return of gold financier's in India's organised lending market, KPMG Report, 2020

risks. In particular, the need for gold-based savings product among low-income households (LIHs) is even more critical, since these households often accumulate gold as their primary form of saving (Goedecke et al., 2018).

Given this context, we examine in this paper, firstly, the adoption and use of an innovative gold-based micro-savings product targeted towards rural households in six states.⁹ Secondly, we examine whether the use of this product changes during times of unanticipated events such as covid-19 and anticipated events such as Akshaya Tritiya.¹⁰ Finally, we also aim to understand the factors influencing the demand for this product by examining the characteristics of households that are most likely to take up this product. This allows us to understand the segments of consumers for whom this product is most suitable.

We conduct this study in partnership with Dvara SmartGold (DSG), a formal financial service provider offering a unique gold-based micro-savings product catered specifically to LIHs. A DSG customer is required to make monthly deposits towards the product with an option to make additional deposits if they so choose. In the event of a missed payment, the customer is permitted to make up for the missed investment in the next month. Customers have an option to invest a minimum of ₹250¹¹ or multiples of the same amount. The invested amount is converted into equivalent bullions of digital gold and then transferred to the account of the customer. At the end of the tenure, customers can redeem their accumulated investments either in the form of jewellery, coins, bars or avail loans against their gold balance.¹² The administrative data from DSG allows us to examine consumer behaviour pertaining to their adoption of and persistency in a saving instrument of this form. Using a combination of primary and secondary datasets, and research methods involving both descriptive analysis and logistic regression modelling, we study households' investment behaviour in gold-based savings products and the impact of events, both anticipated and not, on these investments.

We expect that low-income households will be encouraged to adopt this product due to its smaller investment ticket size and inbuilt flexibility in the event of missed payments. We find

⁹ Tamil Nadu, Karnataka, Odisha, Chhattisgarh, Uttarakhand and Jharkhand

¹⁰ Akshaya Tritiya is an annual one-day festival celebrated in India. It is considered to be an auspicious day to invest in high value items like gold.

¹¹ The minimum amount was raised to Rs. 500 in mid-2020 as the customers were comfortable with saving that much.

¹² The features of gold-based micro-savings product is presented in the appendix.

that households were consistent with their investments even after the covid-19 lockdown ended, thus highlighting the importance of a well-designed gold-based micro-savings product that encourages investors to save in a systematic and disciplined manner, without it being onerous for them. In addition, we also identify the determinants of demand for a gold-based micro-savings product through a logistic regression model. We find that the key determinants of demand for this product are the extent of household surplus, amount of jewellery owned, size of family and the number of female dependents in the family. Lastly, we validate our analytical findings through a short survey of a limited number of customers investing in this product.

To the best of our knowledge, this is the first empirical paper that uses administrative data to study investment patterns in a gold-based micro-savings product in India. The paper allows us to understand the suitability of this product among low-income households by providing evidence on the relevance and usability of innovative products such as these. The study also serves as a use-case to understand the factors influencing the take-up of a micro-savings product that can encourage systematic savings among low-income households in rural areas.

The rest of the paper is organised as follows. In section 2 we set the context for the study and briefly discuss the limitations of the retail gold market in India. In section 3, we discuss the research objectives and our specific areas of research. In section 4, we describe the data, discuss the methodology for each research question, and present the results of our analysis. Finally, in section 5, we conclude by highlighting key takeaways from the paper from a policy perspective.

2. Context Setting: The Indian Gold Financial Market

2.1 Market for gold loans in India

The gold loan market in India can be categorised into organised and unorganised markets. The organised category accounts for approximately 35% of the total gold-loan market share. Regulators, to formalize the large unorganised sector, have allowed new-age formal players like non-banking financial institutions and small finance banks to offer gold loans. In terms of product design, gold loans are offered for different tenors with varying rates of interest, diverse repayment plans and quick processing time for disbursements. Some of the factors that pose a challenge for the organised gold loan sector are gold price volatility, high cost and risk involved in the safekeeping of gold items, as well as strong competition from the unorganised sector.

Gold plays the role of a strategic asset in times of emergencies as it aids in capital preservation and provides quick liquidity. Studies report that households across the income spectrum avail of formal gold loans to tide over medical emergencies, financial crisis or to mitigate any other shock. Similar behaviour was also observed during the covid-19 crisis, wherein households, farmers and small businesses availed of gold loans from formal institutions (World Gold Council Report, 2020). In fact, to ease the economic impact of the covid-19 pandemic on households, entrepreneurs and small businesses, the Reserve Bank of India increased the loan to value (LTV) ratio for loans against gold ornaments and jewellery for non-agricultural purposes from 75 percent to 90 percent in 2020. This allowed borrowers to receive more credit against the same quantity of gold than was previously possible, and thus tide over their temporary liquidity mismatches.

As compared to the organised gold loan market, the unorganised market has a much stronger presence in India. With 65% of gold-loan market share, the unorganised sector comprises moneylenders, pawnbrokers and unregistered gold loan companies. Some of the attractive features of gold loans from unorganised sector players are high LTVs, requirement of fewer documents, cash-based transactions, easy accessibility to lenders, absence of a maximum loan limit and processing fee, flexible repayment schedules, freedom to use the borrowed amount for any purpose and a strong interpersonal relationship with the lender. However, these must

be weighed against potential downsides like usurious rates of interests and predatory behaviour on the part of the lender.

Overall, the organised gold loan market has substantial room to expand, as it holds only 5% of the total gold owned by Indian Households, in the form of collateral. With technology being a key enabler in expanding the reach of the digital gold loan segment, there is scope for this market to grow and fulfil the liquidity and capital needs of individuals and businesses.

2.2 Market for gold-based savings in India

Similar to the market for gold loans in India, markets for gold-based savings can also be categorised into organised and unorganised segments. The organised gold-based savings market includes various retail products introduced by the central bank such as the sovereign gold bond scheme, gold monetization schemes and the India gold coin. However, these initiatives have received lukewarm reception from the investors due to some inherent drawbacks. There are two main problems with existing gold deposit schemes in India. Firstly, the lock-in period for these schemes is as long as 5.5 years on average long with no option for premature withdrawal. Secondly, the deposit schemes require lump sum payments equivalent to the value of gold. Moreover, gold deposit schemes are offered only by a few financial institutions in India. Consequently, from the perspective of LIHs, these deposit schemes are neither tailored to, nor suitable for, the needs of this segment.

Apart from savings schemes launched by the RBI, registered and unregistered gold jewellers also offer gold-based savings. These schemes are commonly known as jewellery advance purchase schemes and are reasonably popular among the households, as the end product is in the form of gold jewellery (Dhawan, 2019). Schemes like these are scheduled around times when households typically buy gold such as festivals, wedding season or auspicious days. Although marketed as attractive schemes, these unregulated plans are often unsafe and there have been instances of unscrupulous actors mis-selling such schemes (Chakraborty 2019).

Given this context, we argue that the market for retail gold deposit products is in its nascent stage of development and could benefit from greater innovation. There is scope for product innovation at the intersection of investment and savings, serving low- and middle-income

households. In this paper, we aim to analyse the gold investment patterns with regard to one such retail gold-based micro-savings product.

3. Research Objectives

The broad objective of this research is to study the adoption of and investment in a gold-based savings product by rural households while being cognizant of their existing household portfolios and their socio-economic environment. Within this broad theme the study aims to examine households' participation, allocation and persistence towards a gold-based micro-savings product.

Specifically, our research themes and lines of enquiry are as follows:

3.1 Examine participation in and allocation towards a gold-based micro-savings product

- a. Explore the relationship between households' financial cash flow and their participation in and allocation towards gold-based savings product.
- b. Analyse the relationship between households' demographic characteristics and their investment in a gold-based savings product.

3.2 Study the take-up and persistence of a gold-based savings product during the pandemic

- a. Investigate the change in digital gold-based savings patterns before and after the covid-19 related lockdown ("before" covering October 2019-February 2020, and "after" covering March 2020-August 2020)
- b. Examine whether a digital gold-based savings product with a flexible investment option contributes towards customer persistence.

3.3 Examine participation in a gold-based savings product during festive occasions

- a. Assess the perception and take-up of digital gold schemes and products on occasions considered auspicious for buying gold.

4. Data Description, Analysis and Results

In this section, we describe the datasets used for our study as well as present the analysis and results.¹³ For all our analyses, we have used two administrative datasets defined in table 1.

Table 1: Description of datasets used for analysis¹⁴

| Dataset | Data Description | Period of Analysis | Unit of Analysis | Geography | Frequency of Data Collection |
|-----------------------|--|-----------------------------|--|--|--|
| Dvara SmartGold (DSG) | Monthly transaction data including data on purchase related to Akshaya Tiritiya scheme | October 2019 to August 2020 | Transaction data | Tamil Nadu, Karnataka, Chhattisgarh, Jharkhand, Odisha, Uttarakhand | At every point of customer transaction |
| Dvara KGFS (D-KGFS) | Demographic, socioeconomic data, financial assets | 2008 to 2020 | Household level data of KGFS customers | Tamil Nadu, Karnataka, Chhattisgarh, Jharkhand, Odisha, Uttarakhand and a few other states | During customer acquisition and at every point of customer transaction |

We found the latest financial information of DSG customers present in the D-KGFS dataset and merged both to map their transaction data with the demographic and financial profiles of households. This enabled us to draw insights on LIHs' interaction with DSG and how households' characteristics influence their investment decisions.

Our analyses have been divided into five components to address the broad research themes outlined in the previous section. While the first four components are quantitative in nature, the fifth is qualitative, summarising our takeaways from the short one-time primary survey we undertook to validate the insights gained from the quantitative module.

The five components of our analysis are as follows:

¹³ We use different subsets of these datasets for different components of our quantitative analysis. These subsets are specified while elaborating on each component of the analysis

¹⁴ Dvara KGFS is a non-banking financial company; Dvara Smart Gold is a private financial company. Both these organisations operate under their parent organization- Dvara Trust.

1. *Household financial and demographic characteristics of digital gold-based micro-savings customers:* This component of analysis captures descriptive statistics of customer investment in the DSG product and elucidates interesting correlations between investment behaviour of customers and their household characteristics.
2. *Impact of covid-19 pandemic on customer investment in a gold-based micro-savings product:* This component of analysis focuses on examining the ways in which investment behaviour changed after the outbreak of the covid-19 pandemic. We identified DSG customers who enrolled before the lockdown¹⁵ and analysed their investment patterns pre and post the covid-19 lockdown period.
3. *Participation of customers in the digital gold-based micro-savings product during festive occasions:* This component of analysis studies the take-up of DSG's Akshaya Tritiya scheme.¹⁶ The festival coincided with the lockdown period and most households that otherwise bought physical gold could not do so. We examine if and how they took up the alternative scheme offered to them by DSG/D-KGFS.
4. *Determinants of investment into gold-based micro-savings product:* This component of analysis intends to identify the factors that influence a customer/household to invest in DSG-like products. We build a logistic regression model, with investment decision as our binary dependent variable and seven household characteristics as our factor variables, and check if and how they influence customers to invest in the DSG product.
5. *Primary survey of digital gold-based micro-savings customers:* This component of analysis captures insights from a short telephonic survey we undertook among DSG customers based in five districts of Tamil Nadu. We check if these insights validate and explain our results from the earlier components of analysis described under 1-4 above.

¹⁵ Customers who enrolled for DSG before March 2020 and continued to invest after the lockdowns were relaxed, were considered for the analysis

¹⁶ Akshaya Tritiya is a Hindu festival considered an auspicious occasion to buy gold. The scheme ran during the week of Akshaya Tritiya and encouraged DSG/D-KGFS customers to pre-book gold worth ₹500/1,000 and pay later, due to lockdown restrictions

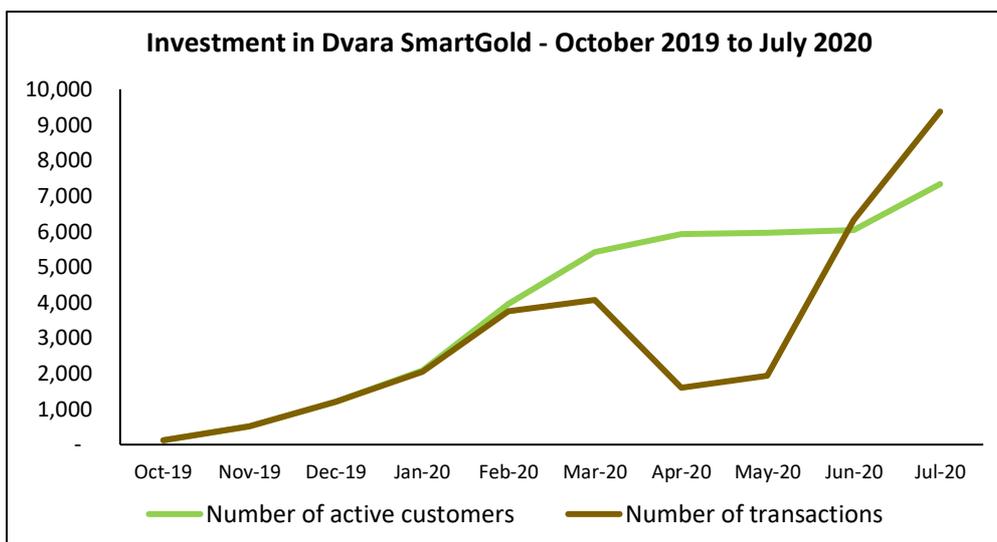
4.1 Household financial and demographic characteristics of digital gold microfinance customers

During October 2019-July 2020, the DSG product was offered to D-KGFS customers and their investment contributions were collected, along with the repayments for their outstanding microloans. Combining these datasets, we mapped 7,300+ DSG customers successfully to their household characteristics. Here, we report the results of our analysis with this merged dataset.

4.1.1 Participation in a gold-based micro-savings product

We examined the month-on-month growth in the number of active customers and transactions. As demonstrated in Graph 1, we found that growth in product take-up has been consistent except during March, April and May 2020, when, in addition to the restriction on mobility due to the lockdown, the RBI's permission to grant moratorium limited the interactions between financial service providers and customers. More than 7,000 customers enrolled into the product and made close to 31,000 transactions during this period, reflecting the quick progress of the product in a span of just ten months.

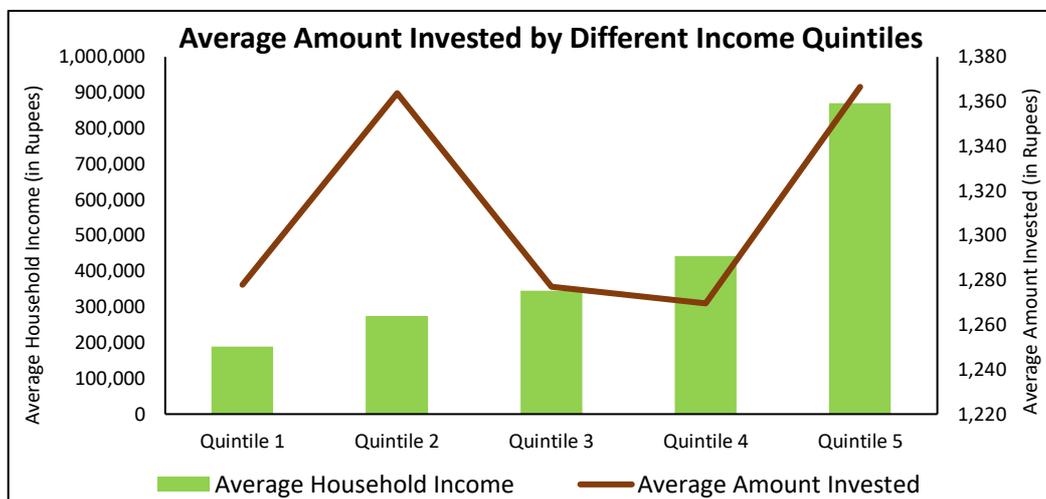
Graph 1: Month-wise number of active customers and transactions



4.1.2 Participation in a gold-based micro-savings product by different income quintiles

Next, we examined the difference in size of investment by households with varying income levels.¹⁷ We can see from Graph 2 that the difference in average amounts invested over 10 months by different income quintiles was marginal. One explanation could be that when the product was launched, the minimum ticket size of investment was ₹250 and most customers might have opted to invest the lowest investable amount and continued with that plan. If this were true, then the figures for poorer quintiles suggest they have also invested multiple number of times in DSG.

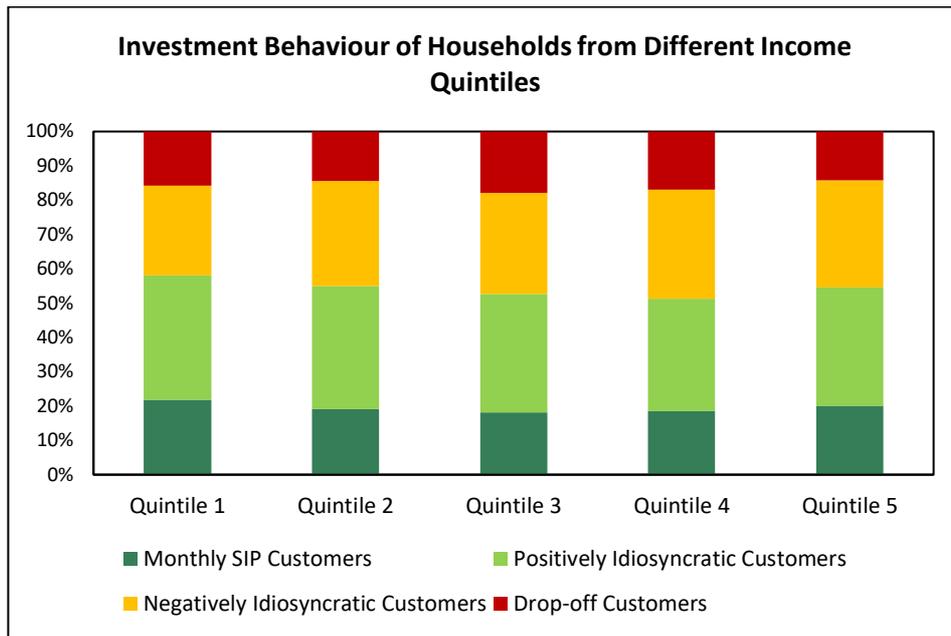
Graph 2: Dvara SmartGold Investment Amount by Income Quintiles



We also found from Graph 3 that a larger share of customers belonging to households from the poorest income quintiles have invested regularly and/or additionally than those belonging to richer quintiles, with the exception of those belonging to households from the richest income quintile. Reading Graphs 2 and 3 together, we can deduce that households from poorer quintiles have not only invested multiple number of times, but a majority of them have also done so regularly and/or additionally.

¹⁷ Households were categorised into different income quintiles by considering their reported annual household incomes, present in the D-KGFS dataset. Income quintile 1 consisted of 1,559 households, quintile 2 - 1,364 households, quintile 3 - 1,469 households, quintile 4 - 1,463 households and quintile 5 - 1,458 households

Graph 3: Investment behaviour of households belonging to different income quintiles¹⁸



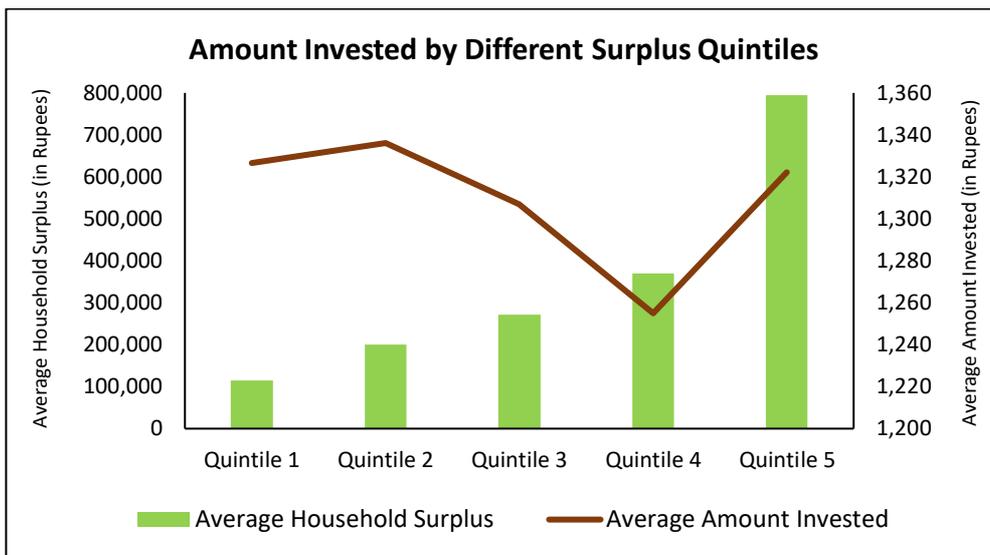
4.1.3 Participation in a gold-based micro-savings product by different surplus quintiles

We proceeded from income to surplus¹⁹ to account for the disposable income left with households to save in formal channels of finance. We calculated surplus by subtracting all expenses from household income and categorised households into different surplus quintiles. Graph 4 shows the average amount invested by households from different surplus quintiles and Graph 5 shows their investment behaviour. They corroborate our findings from Graphs 2 and 3, as customers from households belonging to the poorest two surplus quintiles have invested the highest amount and have the highest share of customers investing regularly and/or additionally in the DSG product.

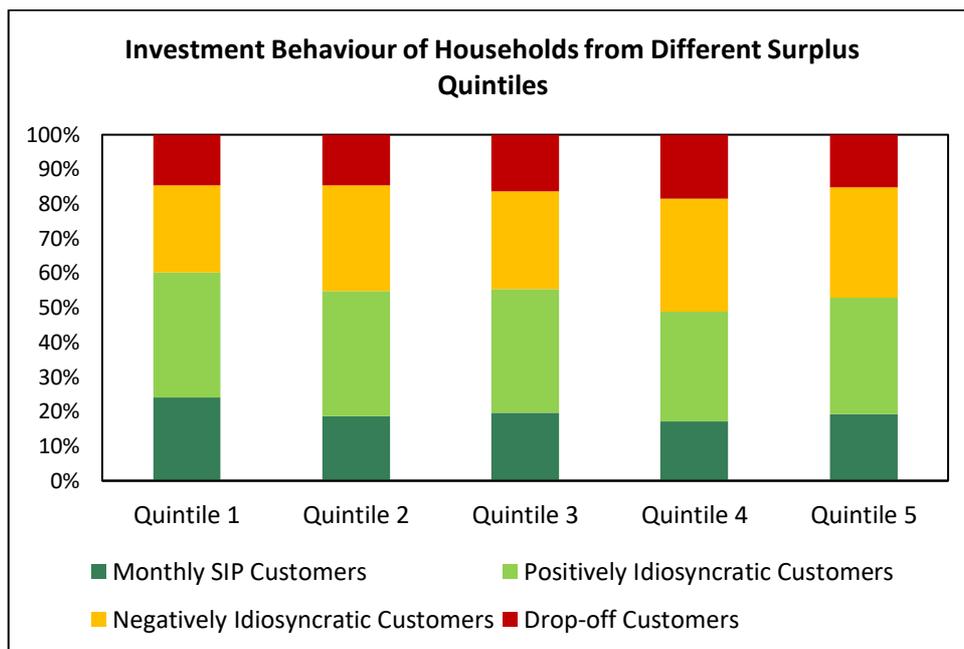
¹⁸ Monthly SIP customers are those who have invested regularly in DSG, positively idiosyncratic customers are those who have invested additionally/made up for missed investments, negatively idiosyncratic customers are those who have failed to invest regularly, and drop-off customers are those who have not invested for the last three months of available data

¹⁹ Households were categorised into different surplus quintiles based on the annual surplus that was calculated using their reported incomes and expenditures. Surplus quintile 1 consisted of 1,472 households, quintile 2 – 1,451 households, quintile 3 – 1,459 households, quintile 4 – 1,504 households, and quintile 5 – 1,417 households

Graph 4: Dvara SmartGold Investment Amount by Surplus Quintile



Graph 5: Investment behaviour of households from different surplus quintiles

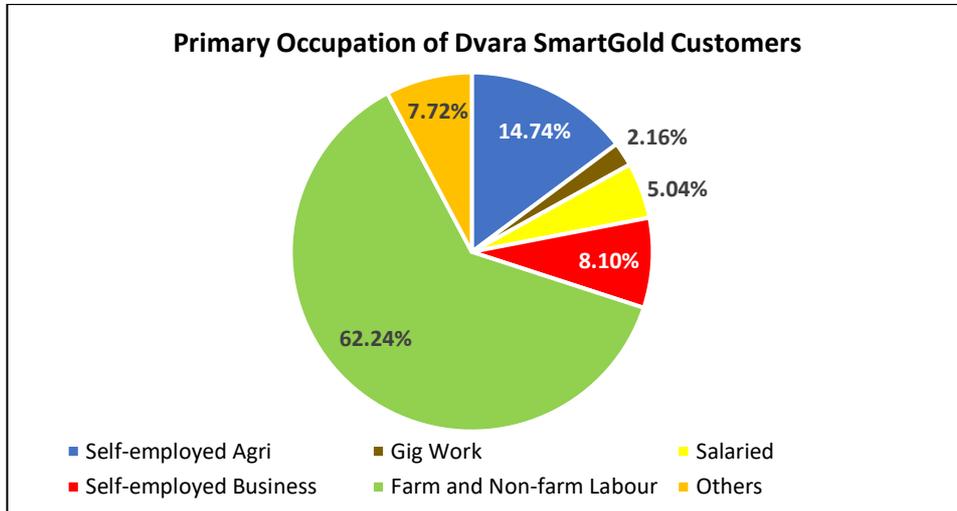


4.1.4 Participation in a gold-based micro-savings product by different occupational categories

We looked at different primary occupations of DSG customers. We found from Graph 4 that a majority of them (62 per cent) reported farm/non-farm labour as their primary occupation, while 23 per cent of them reported being self-employed in agriculture-related (15 per cent) or business (8 per cent) work. Only 5 per cent of customers reported having salaried jobs,

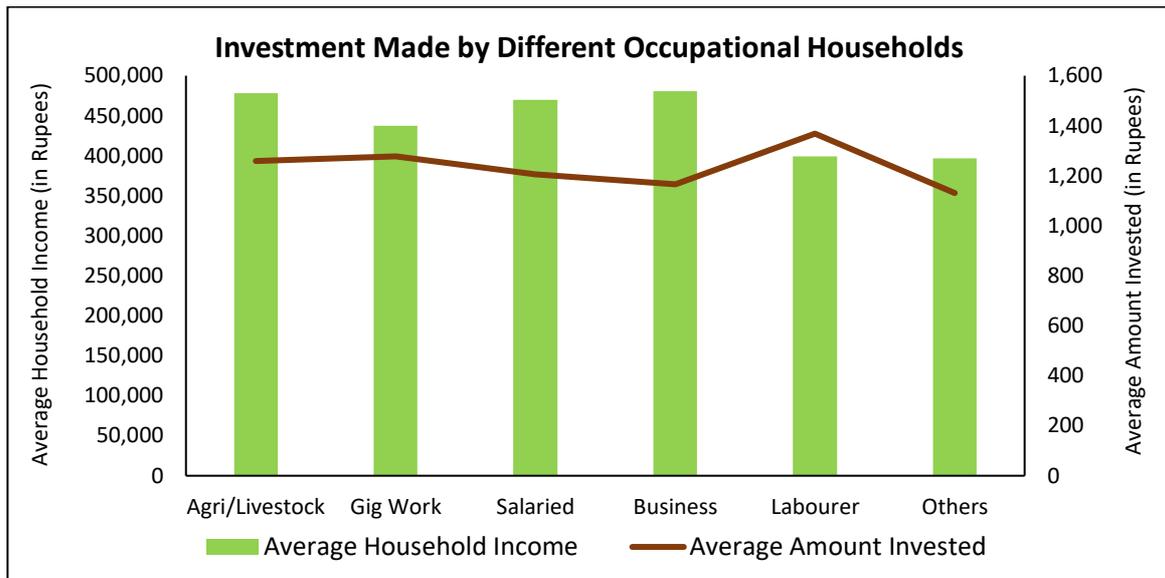
implying that 95 per cent of customers investing in this low-ticket size, micro-savings product have irregular incomes.

Graph 6: Primary household occupations of Dvara SmartGold customers

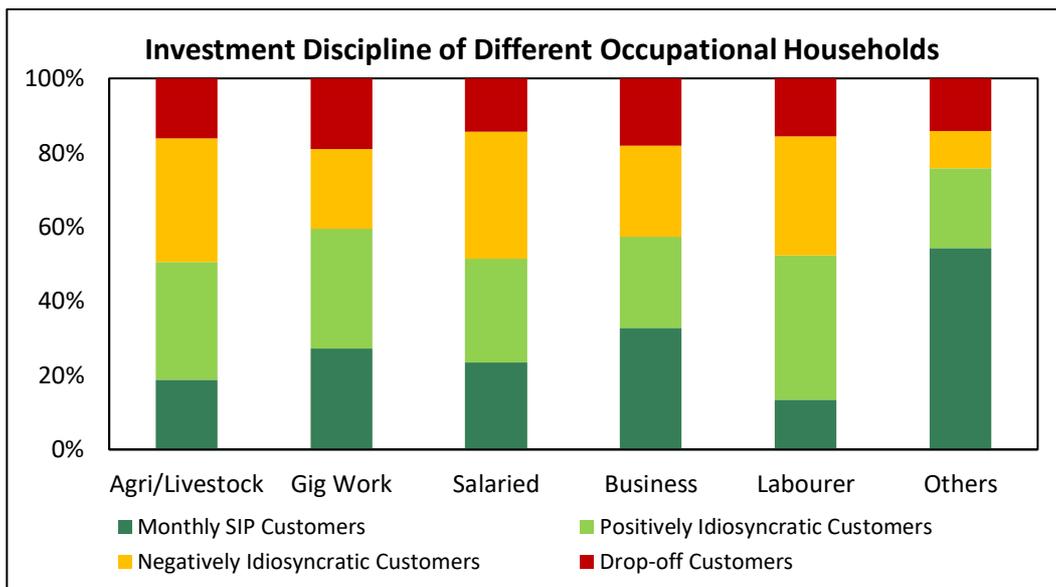


We compared the average annual household incomes of customers reporting different primary occupations against their average investment in DSG. In Graph 6, we see that even though households of customers involved in farm/non-farm labour reported the lowest income, they have invested the most in DSG. However, there is not much difference in amounts invested by customers working in different types of occupations. From Graph 7, the share of customers investing regularly/additionally was the highest for those involved in gig-work and lowest for those employed in salaried jobs.

Graph 7: Dvara SmartGold Investment Amount by different occupational households



Graph 8: Dvara SmartGold Investment Behaviour by different occupational households²⁰



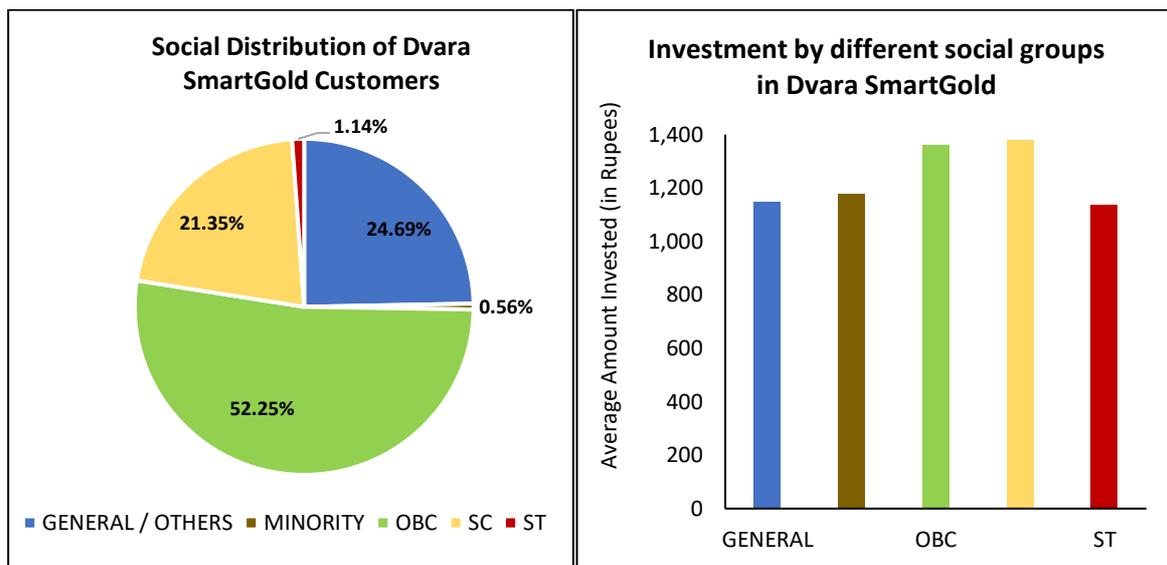
4.1.5 Participation in gold-based micro-savings by different social groups

We also examined the social demography of DSG customers and see from Graph 8 that three fourths of DSG’s customer base come from socially backward communities (Other Backward

²⁰ Monthly SIP customers are those who have invested regularly in DSG, positively idiosyncratic customers are those who have invested additionally/made up for missed investments, negatively idiosyncratic customers are those who have failed to invest regularly, and drop-off customers are those who have not invested for the last three months of available data

Castes (OBC) - 52 per cent, Schedule Castes (SC) - 21 per cent, Schedule Tribes (ST) -1 per cent, and Minorities - 0.5 per cent). This was found to be similar to the overall social demography of D-KGFS customer base. From Graph 9, we also found OBC and SC customers to have invested the most. Socially disadvantaged communities seem to be the predominant customer base of D-KGFS and DSG.

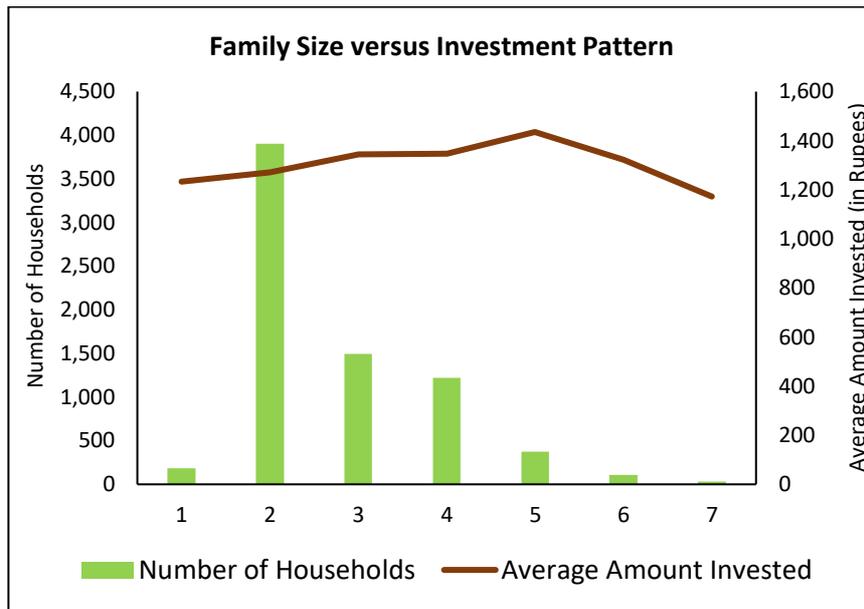
Graph 9: Social composition of Dvara SmartGold customers
 Graph 10: Dvara SmartGold investment amount by different social groups



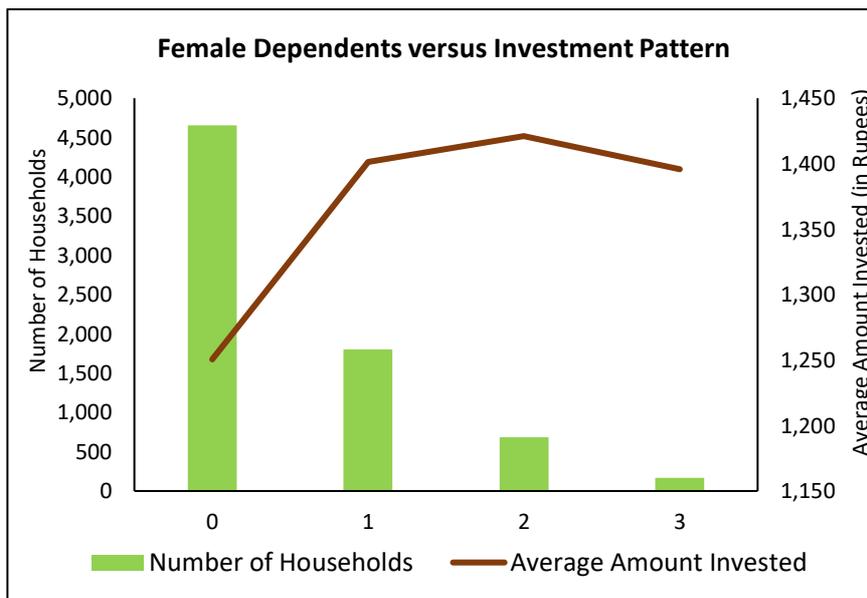
4.1.6 Demographic characteristics of Dvara Smart Gold Households

We concluded this component of analysis by looking at two household characteristics of DSG customers: family size and female dependents. As demonstrated in Graph 10, investment in DSG marginally increased with family size and peaked for households with five members, and reduced thereon. And, as demonstrated in Graph 11, investment increased marginally with the number of female dependents, peaked for households with two female dependents and reduced a little for those with three. However, it is important to note that even those households with no female dependents have invested comparable amounts in DSG. Such findings explain the multiple perceived utilities of gold investment – for marriage, as an instrument for precautionary savings as well as a conveniently collateralisable asset. These findings are in line with research undertaken by Badarinza et al., (2016).

Graph 11: Dvara SmartGold Investment Amount by Family Size



Graph 12: Dvara SmartGold Investment Amount by Number of Female Dependents



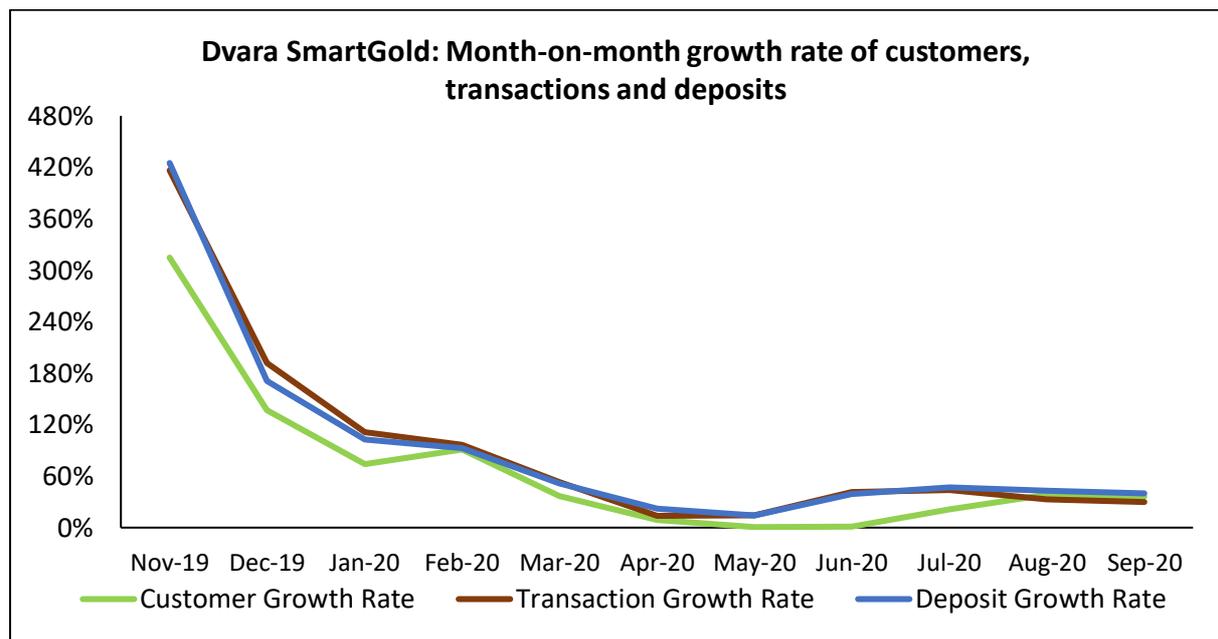
4.2 Analysis of investment pattern in pre and post covid-19 lockdown period

In this section, we assessed the impact of covid-19 lockdown on the investment behaviour of DSG customers. We used DSG transaction data from October 2019 to September 2020 for the initial analysis and restricted our before-and-after-lockdown comparisons only to those customers who enrolled for DSG before March 2020.

4.2.1 Growth rate in customers, transactions and deposits

We first looked at the month-on-month growth rate in customers, transactions and total deposits, as seen in Graph 12. The high growth rates observed across all three metrics in November 2019 is explained by the launching of DSG in only six branches during the last week of October 2019, and therefore, the base was very low while calculating a growth rate for November.

Graph 13: Growth rate of customers, transactions and deposits



From December 2019 onwards till February 2020, we saw continued growth in all three metrics albeit with smaller margins. From March to May,²¹ their growth plummeted. Customer growth, especially, hit zero in May and June. Transactions and total deposits showed revival starting

²¹ This was the most severe phase of covid-19 lockdown

June, while customer growth picked up in July, but growth rates in these three variables are yet to reach pre-March levels.

There may be two reasons for negligible growth during the lockdown period. First, job losses may have adversely affected income flows and left households with barely any cash inflows to fulfil their consumption needs, let alone put aside a surplus for investments. Second, most DSG customers deposit their savings to the D-KGFS personnel at the time of loan repayments on their outstanding loans. Mobility restrictions and loan moratoriums which were in place during the lockdown, therefore, limited the interactions of D-KGFS personnel with their customers. Revival of growth, starting from June, coincides with the revival of collection efficiency of MFIs, of up to 70-75% of pre-covid levels (Crisil 2020).

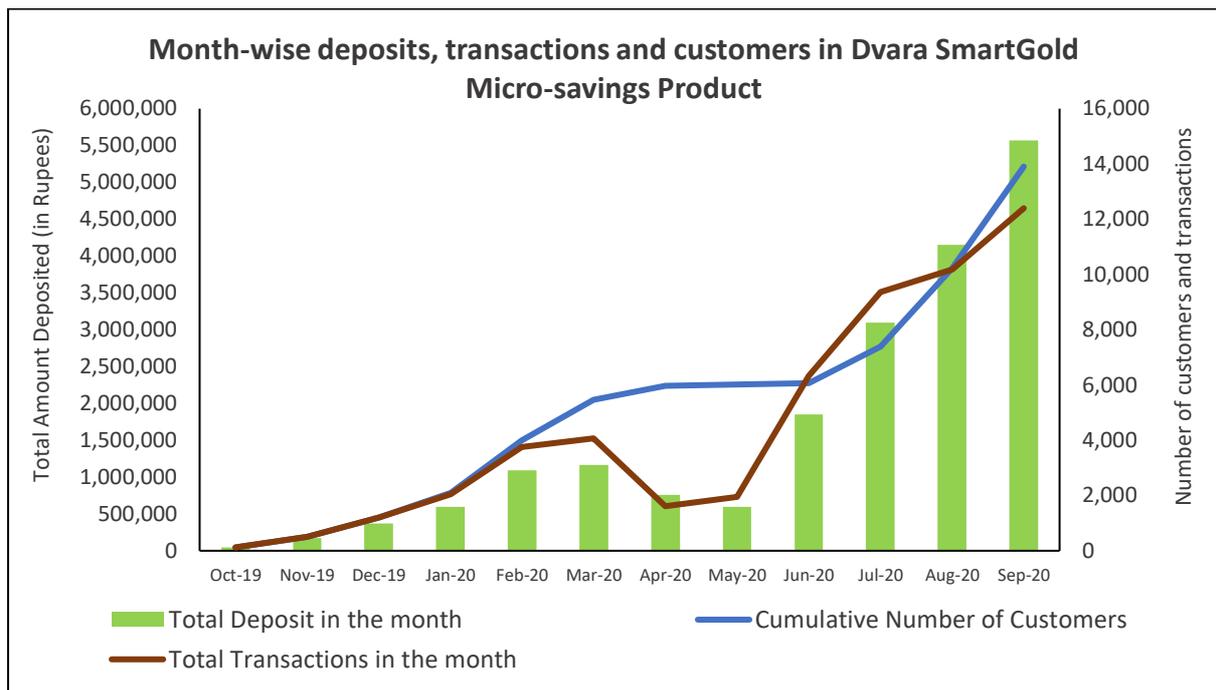
4.2.2 Number of transactions, customers and deposits

Next, we looked at the absolute numbers of transactions, customers and deposits, month-on-month. As demonstrated in Graph 13, we observed near parity between the number of customers and transactions till February (almost all customers invested once a month). However, from March, we noticed a clear gap between the number of customers and transactions. Transactions were the lowest in April, and most of these were also as part of the Akshaya Tritiya scheme.²² In June, we again observed parity between customers and transactions, but the more interesting finding was that transactions exceeded the number of customers in July, indicating that many customers exercised the option to invest over and above the minimum (whether in terms of the quantum they invested or in terms of the number of times they invested) to compensate for missed investments during the lockdown.²³ But we saw dip in transactions again during August and September—even as lockdowns were lifted and economic activities resumed—indicating that customers may still be under financial duress due to multiple reasons like job loss, wage cut, reverse migration, repayment of existing loans and other socio-economic reasons that may have pushed households to prioritise other expenditures over investment in a gold-based saving product.

²² Akshaya Tritiya scheme was offered to customers during the last week of April, 2020. Details and analysis about the scheme can be found in the next component of analysis

²³ D-KGFS personnel were instructed to collect the missed loan instalments and savings investments, as long as the customers were in a financial position to pay them. Otherwise, their loan tenures were extended

Graph 14: Month-wise total amount deposited, number of customers and transactions

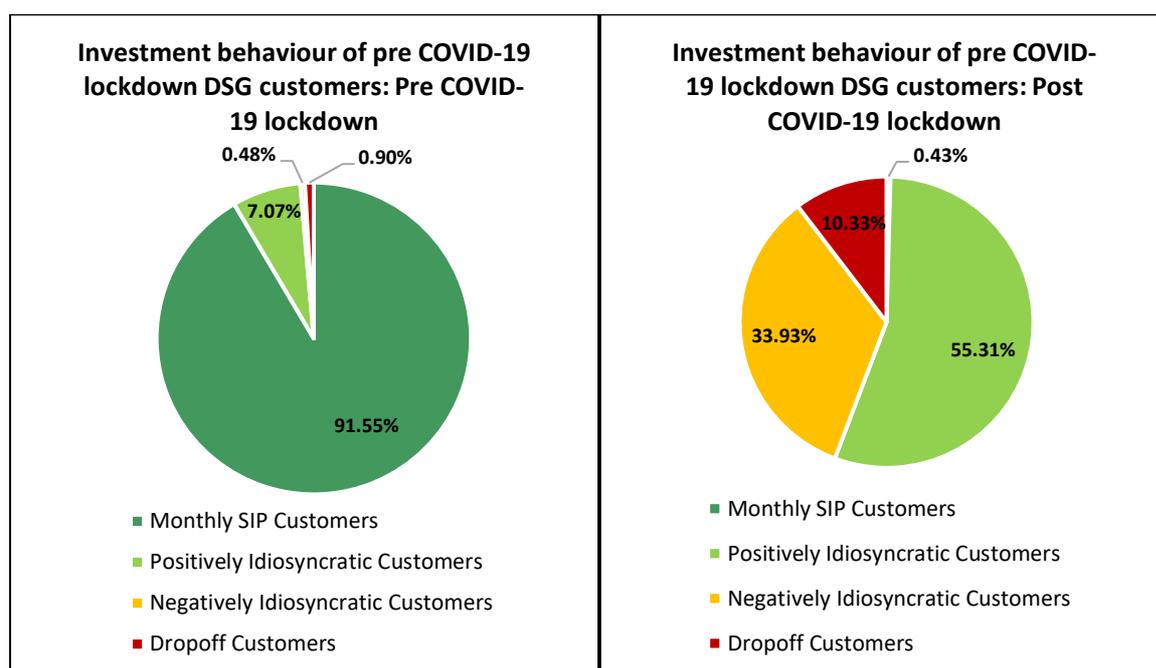


4.2.3 Investment behaviour before and after the outbreak of covid-19

We compared the investment behaviour of pre covid-19 lockdown DSG customers before and after the lockdown period (investment behaviour before March 2020 versus investment behaviour after March 2020), as shown in Graphs 14 and 15.²⁴ We found a radical shift from regular investments (92 per cent before lockdown) to flexible investments (90 per cent) and a 10 per cent increase in customers who have dropped off the product. Among flexible investors, more customers have made up for missed investments during the lockdown, than those who have not.

²⁴ Monthly SIP customers are those who have invested regularly in DSG, positively idiosyncratic customers are those who have invested additionally/made up for missed investments, negatively idiosyncratic customers are those who have failed to invest regularly, and drop-off customers are those who have not invested for the last three months of available data

Graph 15: Pre covid-19 lockdown investment behaviour of pre-lockdown customers
 Graph 16: Post covid-19 lockdown investment behaviour of pre-lockdown customers



4.2.4 Change in investment pattern by occupation category

We also looked at the change in investment behaviour among customers from different primary occupations, as seen in Table 2.^{25 26} The shift from regular to flexible investment behaviour can be seen across all occupational categories.

Table 2: Change in investment behaviour before and after covid-19 lockdown, by occupation

| Behaviour Type | Pre covid-19 Lockdown (in %) | | | | | | Post covid-19 Lockdown (in %) | | | | | |
|--------------------------|------------------------------|------|----------|----------|--------|--------|-------------------------------|------|----------|----------|--------|--------|
| | Agri | Gig | Business | Salaried | Labour | Others | Agri | Gig | Business | Salaried | Labour | Others |
| Monthly SIP | 84.99 | 98.8 | 89.97 | 87.04 | 92.88 | 100 | 0.65 | 0 | 0.33 | 0.62 | 0.41 | 0 |
| Positively Idiosyncratic | 4.57 | 1.2 | 3.34 | 5.56 | 3.51 | 0 | 49.10 | 50.6 | 52.17 | 44.44 | 57.53 | 67.18 |
| Negatively Idiosyncratic | 10.44 | 0 | 6.69 | 7.41 | 3.62 | 0 | 40.78 | 30.1 | 36.12 | 41.98 | 32.10 | 23.44 |
| Dropoff | 0 | 0 | 0 | 0 | 0 | 0 | 9.46 | 19.3 | 11.37 | 12.96 | 9.96 | 9.38 |

²⁵ Monthly SIP customers are those who have invested regularly in DSG, positively idiosyncratic customers are those who have invested additionally/made up for missed investments, negatively idiosyncratic customers are those who have failed to invest regularly, and drop-off customers are those who have not invested for the last three months of available data

²⁶ Agri: self-employed in agriculture and livestock related activities; Gig: employed in various types of gig work such as driving, performance and professional art forms, etc.; Business: self-employed in small and medium-scale enterprise; Salaried: employed in salaried jobs; Labour: engaged in farm or non-farm labour; Others: employed in other work, or dependent on rent, pension, etc., or not employed

Among customers self-employed in agriculture-related activities, there is a near equal distribution between those who have made up (49 per cent) for missed investments and those who have not (41 per cent). The share of customers in this segment who have dropped off (9.5 per cent) is also lesser than the overall drop-off (10.3 per cent) rate. They do not seem to have been as badly hit as those from other occupations. Agriculture was one of the only sectors registering growth in this period, even as India's GDP contracted (Mukherjee 2020). Almost half of the customers involved in gig work have either failed to make up for missed investments or dropped-off the product, with the post lockdown drop-off rate (19.3 per cent) being almost double the overall drop-off (10.3 per cent) rate.

While the changes in investment behaviour among those self-employed in businesses (see the columns titled 'Business' in Table 2) and those involved in either farm or non-farm labour (see the columns titled 'Labour' in Table 2) are similar to the changes in behaviour observed overall, salaried customers seem to have been hit adversely, with almost 13 per cent dropping off the product. There is an equal distribution between customers who have made up for missed investments (44 per cent) and those who have not (42 per cent). CMIE surveys had found millions of salaried jobs affected after the outbreak of the pandemic (Vyas 2020).

Other workers mostly include pensioners, homemakers and those dependent on rental income. 67.2 per cent of them have made up for missed investments, the highest observed share across all occupational categories. Their drop-off rate (9.4 per cent) is also less than the overall drop-off rate (10.3 per cent). However, this may be because of their low numbers as compared to other occupations.

4.3 Participation of customers in the digital gold-based micro-savings product during festive occasions

Many Indians believe that the purchase of gold and other precious metals during the auspicious occasion of Akshaya Tritiya brings good luck. Every year, around 20-25 tonnes of gold, amounting to 4 per cent of India's total annual consumption, are bought on this day (Financial Express 2020). However, the shut-down of all non-essential economic activities due to the covid-19 lockdown made gold inaccessible to most, as the country's gold demand is driven by those in rural areas who mostly buy physical gold from local jewellers. This had to be overcome through innovation, and while jewellers in urban India resorted to online sales, those dealing with rural customers offered them the option of pre-purchasing gold during the occasion and paying on a later date when lockdown restrictions were eased (Financial Express 2020). DSG also followed the latter approach with D-KGFS' help and launched the Akshaya Tritiya scheme in the last week of April.²⁷ Since DSG transaction data also contained transactions made as part of this scheme, we were able to examine its take-up among customers.

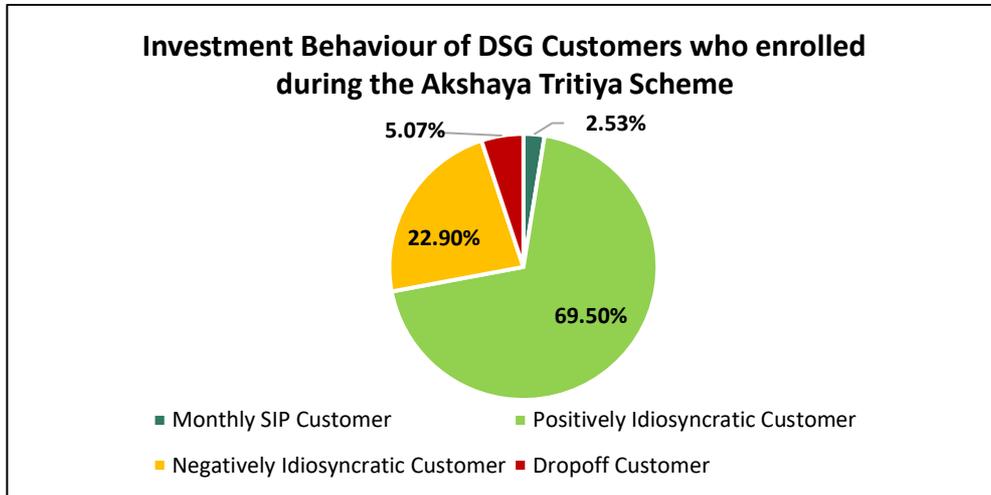
We found that almost a thousand customers purchased digital gold as part of the scheme, out of which the largest single-day transactions happened on the day of Akshaya Tritiya. More than 96 per cent of customers booked gold worth ₹500, while the rest purchased gold worth ₹1,000. In total, more than 110 grams of gold bullion were purchased during the week. All transactions happened in Tamil Nadu (92 per cent), Karnataka (4 per cent) and Chattisgarh (4 per cent).

32 per cent of customers were new customers who enrolled for DSG during the scheme, while the rest made an additional investment for the occasion. Among newly enrolled customers, only 5 per cent have eventually dropped off, while a majority have since invested regularly or additionally (see Graph 16). Instead of the one-time purchase of gold seen during the conventional Akshaya Tritiya schemes, the scheme nudged many households to start systematic, gold-based savings. On an average, their purchase during the occasion accounted for 24 per cent of their total investment so far in DSG. These findings indicate that with

²⁷ D-KGFS personnel were encouraged to call all their customers—those already enrolled for DSG or otherwise—over phone and inform them about the scheme, wherein they could book gold worth ₹500/₹1,000 through verbal confirmation and pay up to a month later.

availability of a suitable savings product, low-income households can and do save through formal channels of finance.

Graph 17: Investment behaviour of customers who availed the Akshaya Tritoia scheme²⁸



²⁸ Monthly SIP customers are those who have invested regularly in DSG, positively idiosyncratic customers are those who have invested additionally/made up for missed investments, negatively idiosyncratic customers are those who have failed to invest regularly, and drop-off customers are those who have not invested for the last three months of available data

4.4 Determinants of investment in gold-based micro-savings product

In this section, we share our insights from the logistic regression we ran using a subset of the DSG and D-KGFS datasets, to determine the factors that may influence customers to invest in a product like DSG. A challenge we faced in this exercise was that neither of the entities recorded information on the customers who were pitched the product but did not invest in it. We corrected for this by limiting our analysis to only a subset of customers from the first ten branches where DSG was introduced. We followed this approach since D-KGFS had organised launch events and invited all the eligible customers from these branches for the product launch. Thereby we make an assumption that all the customers of these branches were pitched the product and those who are not DSG customers chose not to invest in the said product.²⁹

The dataset used for logistic regression modelling consisted of 1,329 DSG customers and 2,399 D-KGFS customers who have not invested in DSG. Since our objective was to find the possible determinants of customers choosing to invest in a product like DSG, our dependent variable was a flag variable, namely DSG Customer, which takes the value of 1 if the customer is a DSG customer, and 0 if it is a D-KGFS customer who has not invested in DSG. We used the following household characteristics captured by the DSG and D-KGFS datasets as our explanatory variables: family size, number of female dependants, grams of jewellery owned, annual household surplus, primary occupation, education level of primary income earner, and social (caste) background.

The regression specification for our logit model was as follows:

$$\text{Logit}(\text{DSG Customer}) = \alpha_i + \beta(X)_i + u_i$$

DSG Customer is the binary dependent variable capturing the decision of the customer of whether or not to invest in DSG, X refers to all the explanatory variables such as family size, number of female dependants, grams of jewellery owned, annual household surplus, primary occupation, education level of primary income earner and social background, and $i=1,2,\dots,n$, where n is the total number of customers ($n=3,728$).

²⁹ The eligibility criterion was having at least a debt servicing capacity of 2

The null hypothesis for our regression was that the predictor variables have no impact on the investment decision of Dvara KGFS customers. Mathematically, it is represented as the following:

$$H_0: \beta = 0$$

$$H_a: \beta \neq 0$$

Table 3: Results of logistic regression

| Logistic regression | | | | | | | |
|--|-------------|----------------|----------------------|----------|-----------|-----------|------------|
| Dependent Variable dsg_customer | Coefficient | Standard Error | t-value | p-value | [95% Conf | Interval] | Odds Ratio |
| Education Level | | | | | | | |
| Cannot read/write | 0 | . | . | . | . | . | . |
| 1 st – 5 th standard | .29 | .126 | 2.30 | .021 ** | .043 | .537 | 1.34 |
| 6 th – 8 th standard | .228 | .146 | 1.56 | .119 | -.059 | .514 | 1.26 |
| 9 th – 10 th standard | .611 | .147 | 4.16 | .000 *** | .323 | .898 | 1.84 |
| 11 th – 12 th standard | .305 | .184 | 1.66 | .096 * | -.055 | .665 | 1.36 |
| Vocational | 1.156 | .428 | 2.70 | .007 *** | .318 | 1.995 | 3.18 |
| Graduate | .401 | .264 | 1.52 | .129 | -.116 | .917 | 1.49 |
| Post-graduate | .198 | .398 | 0.50 | .619 | -.582 | .978 | 1.21 |
| Occupation | | | | | | | |
| Agriculture | 0 | . | . | . | . | . | . |
| Gig Work | -.008 | .312 | -0.03 | .979 | -.62 | .604 | 0.99 |
| Business | -.375 | .213 | -1.76 | .079 * | -.793 | .043 | 0.69 |
| Salaried | .215 | .263 | 0.82 | .414 | -.3 | .73 | 1.24 |
| Labour | -.087 | .12 | -0.73 | .465 | -.322 | .147 | 0.92 |
| Others | -3.276 | .26 | -12.57 | .000 *** | -3.786 | -2.765 | 0.04 |
| Social Group | | | | | | | |
| General/Others | 0 | . | . | . | . | . | . |
| OBC | .136 | .119 | 1.15 | .252 | -.097 | .369 | 1.14 |
| SC | .436 | .131 | 3.32 | .001 *** | .179 | .694 | 1.55 |
| ST | 2.057 | .632 | 3.25 | .001 *** | .817 | 3.297 | 7.82 |
| Minorities | -1.262 | 1.101 | -1.15 | .252 | -3.419 | .895 | 0.28 |
| Family Size | -.355 | .035 | -10.11 | .000 *** | -.423 | -.286 | 0.70 |
| Jewellery (in grams) | -.005 | .001 | -4.91 | .000 *** | -.007 | -.003 | 0.99 |
| Female Dependents | .223 | .05 | 4.46 | .000 *** | .125 | .322 | 1.25 |
| Household Surplus | 0 | 0 | 5.32 | .000 *** | 0 | 0 | 1.01 |
| Constant | .185 | .209 | 0.89 | .376 | -.224 | .593 | 1.21 |
| Mean dependent var | | 0.356 | SD dependent var | | | 0.479 | |
| Pseudo r-squared | | 0.157 | Number of obs | | | 3728.000 | |
| Chi-square | | 761.285 | Prob > chi2 | | | 0.000 | |
| Akaike crit. (AIC) | | 4137.350 | Bayesian crit. (BIC) | | | 4268.046 | |

*** $p < .01$, ** $p < .05$, * $p < .1$

The initial results of regression can be seen in Table 4. All observations were used for modelling, and the likelihood ratio of 761.29 with a p-value of 0.000 tells us that our model fit significantly better than a model in which no predictors were considered.

All continuous explanatory variables in our model – family size, number of female dependants, annual household surplus, and grams of jewellery owned – are statistically significant. The coefficients for these variables, as seen in Table 1, show the change in log odds for each unit increase in these variables. The last column shows their odds ratios.³⁰ The predictive margins for all these variables can be seen in Appendix 2. They show the probability of investing in DSG at different values taken by each explanatory variable, provided all other variables are held at their means. Our regression results indicated that the probability of investment in DSG decreased with increases in family size and grams of jewellery owned, and increased with increases in number of female dependants and household surplus.

Next, we checked the categorical variables– social group, education level and primary occupation – in our model and saw that some of them were statistically significant while others were not (see Table 4). We probed for their overall statistical significance using the Wald test³¹ and found that all three categorical variables showed overall statistical significance. Upon establishing their overall significance, we checked the probability of investment in DSG for each value of these categorical variables. The overall significance tests and predictive margins for these variables can be seen in Appendix 2.

The probability of investment in DSG was found to be the highest for customers who have received vocational training and lowest for those who cannot read or write, all other variables held at their means. One explanation for this could be that through access to vocational training in rural areas, people are able to avail of better paying jobs, enabling them to allocate resources towards gold. We also found that Scheduled Tribes have the highest and minorities have the lowest probabilities of investing in DSG vis-à-vis other social groups, and that customers self-employed in agriculture-related activities have the highest and those involved in Other works have the lowest probabilities of investing in DSG vis-à-vis other occupational categories.

³⁰ Odds ratio represents the constant effect of an explanatory variable on the likelihood that one outcome will occur

³¹ The Wald test is one of the commonly used ways of determining the overall statistical significance of categorical variables in a regression model and to test simple and composite hypotheses. For details, see [here](#).

We carried out the Hosmer-Lemeshow robustness test³² to check if our model was correctly specified and the relatively high p-value on the test showed our model to be correctly specified. The results of the test can be seen in Appendix 2.

As a final step, we checked the predictive power of our model and found that it had an accuracy of 70 per cent.³³ Since our objective behind carrying out logistic regression was more about finding significant determinants of investment in a product like DSG and less about accuracy of prediction, the model satisfactorily answers our hypotheses, showing statistical significance for all the explanatory variables considered, with a modest predictive accuracy. Results of model accuracy can also be seen in Appendix 2.

To summarise the results of logistic modelling, we found that the decision to invest in a product like DSG was significantly affected by multiple factors. On the one hand, households with higher annual surplus and with more female dependent members showed a higher tendency to invest. On the other hand, investment tendency fell as family size increased as well as when households already owned some form of jewellery. Although the impact of education on investment is uncertain, customers who have undergone vocational training showed a higher tendency to invest.

³² The Hosmer-Lemeshow test is a goodness-of-fit test used to check whether a logistic regression model has been correctly specified. It divides the sample into a specified number of groups based on predicted probabilities. The test statistic approximately follows a chi-squared distribution, when the model is correctly specified. If the p-value is very small (0.05), it is indicative of a poor fit. Otherwise, the model can be safely assumed to be correctly specified. For details, see [here](#)

³³ The model accuracy was calculated by comparing the predicted probability of a positive outcome with the actual outcome, keeping 0.5 as the cut-off probability. The model classified 70 per cent of the observations correctly. For details, see [here](#)

4.5 Primary survey of digital gold-based micro-savings customers

In this section, we discuss the findings from a short primary survey we conducted among DSG customers from five districts of Tamil Nadu. The survey was carried out with the following objectives: (i) to understand user-experience with the DSG product (ii) factors that influence the decision to invest and subsequent investment behaviour in DSG's product (iii) impact of covid-19 on the savings behaviour of households, and (iv) to corroborate insights drawn from the quantitative analyses.³⁴ The questionnaire has been attached in Appendix 3.

80 per cent of respondents reported owning gold before investing in DSG. Among them, the average quantity of gold held is 54 grams, similar to our finding from earlier analysis. More than 40 percent of the respondents shared that they purchase 5 grams of gold every year on an average, for various reasons. The most common reason for purchasing gold was to use it for their daughters' weddings. This is in line with our previous finding, where households with more female dependents have a higher tendency to invest in gold-based products like DSG. While the second most common reason was to use it as a pledgeable financial instrument in times of financial crisis, a smaller proportion of respondents also planned to use their savings in the DSG product for their children's education, construction or renovation of home, or for buying productive and durable goods.

A majority (80 per cent) of the respondents plan to redeem their investments as physical gold (jewellery/coins/bar) since these can be easily liquidated or can serve as an accessory/gift for social events. Respondents also shared that they could comfortably take-up and continue to invest in the DSG product as ticket sizes were small and payments flexible. 86 per cent of them mentioned inability to raise capital for a one-time purchase of gold as the reason which influenced their decision to invest in a small-ticket, systematic savings scheme like the DSG product. 83 per cent of the respondents said they decided their investment amount based on their own estimation of monthly surplus and their plans for buying gold, while the rest said they were guided by D-KGFS personnel.

³⁴ The sample for the survey was prepared by choosing a random subset of DSG customers from the initial ten branches where the product was launched since they were more familiar with the product. We had complete information about their investment in DSG and their household characteristics, and customers showing all types of investment behaviours were covered. Our sample size was 35 customers, residing in five districts of Tamil Nadu. They report an average monthly household income of ₹21,530 and are employed in a wide-range of occupations, representing the occupational diversity of the overall DSG customer base.

During the covid-19 lockdown period, most respondents reported facing adversities. In fact, 89 per cent of the respondents reported difficulties in keeping up with their savings commitment. This is in line with our finding in the second component of our analysis, where there is a clear shift from regular investment behaviour to idiosyncratic behaviour. These shifts were caused either by job losses and/or by acute liquidity crunches. As observed before, those self-employed in agriculture-related activities were relatively less affected by the lockdowns and were able and willing to make up for missed investments. When enquired about the coping mechanisms to overcome difficulties such as job loss, liquidity crunch and loss of business, because of the ongoing covid-19 pandemic, respondents said they had to resort to pledging jewelry, borrowing credit from both formal and informal lenders, including relatives, friends and employers. Some of them said they had to exhaust all their savings to smooth consumption.

These findings reiterate the multi-faceted use of gold as an asset, an investment, a security, a pledge-able instrument as well as an adornment.

5. Conclusion

For a country with pronounced preference for gold in various forms and its deep-seated cultural inclination towards this asset, India has a thriving jewellery and gold-based financial market. The strong liking for gold is driven by its multiple uses that perform the role of a liquid financial instrument, an adornment, offering agency to women through ownership of this asset and as a tool to hedge inflation in the long run. Despite these factors, there is an incomplete market for products that offer gold-based micro-savings plan, particularly for low and middle-income households. With products that require lengthy investment tenures and lump sum contribution, low-income households are unable to use these products, given their financial capability and economic status. In this study we partner with a financial services provider called Dvara SmartGold and examine the reasons for and the extent to which rural households in Tamil Nadu, Karnataka, Odisha, Chhattisgarh, Uttarakhand and Jharkhand participate in an innovative gold-based savings scheme that accounts for low-income households' preference and financial circumstances.

Our study finds that rural households across income categories adopted the gold-based micro-savings product and remained committed towards their investments even during shocks like covid-19 lockdowns. In addition, the paper also shows a high demand for gold-based savings product during auspicious days like Akshaya Tritiya, validating the significance of gold in the lives of rural households and the relevance of a DSG-like product that intertwines the cultural and financial preferences of Indian households into a suitable financial instruments. Results of this study highlight the scope for a well-designed savings product that matches with the cash flows of low-income households and encourages them to accumulate savings in a systematic manner. We also find that factors such as household surplus, jewellery holdings, size of family and female dependents can influence investment decisions into innovative savings schemes like the one under consideration.

Overall, we conclude that by tapping into the financial context and constraints that low-income households operate in and given their proclivity towards owning substantial amounts of gold, they can be encouraged to save systematically through formal financial products and services in a safe, reliable and convenient manner. The study presents a use-case in this context that can enable the Government and Regulators in incentivizing the market to create similar gold-based savings products with greater outreach to the last-mile consumer.

This study is also a step forward in imaging the potential of digital products for rural households. Currently, the presence and participation in digital financial services in remote and rural areas remains extremely low and understanding drivers that can break this barrier are important for accelerating savings to achieve financial inclusion.

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Appendix 1: Features of Dvara Smart Gold Product

| Features of the scheme | Benefits of the Scheme | Registration to the Product | Purchasing Gold (Credit to Account) | Selling Gold (Debit from account) | Exchanging with Coins / Jewellery |
|--|--|--|---|--|---|
| <ul style="list-style-type: none"> - Operates like a savings account - Flexibility to invest every month as well make additional deposits on ad-hoc basis - Flexible denomination with the smallest ticket size of Rs. 250 - Any time withdrawal from the account or redemption of balance held into coins / jewellery - Option to avail a loan against the account balance | <ul style="list-style-type: none"> - The customer gets up to 10 per cent extra gold by investing small amounts repeatedly in this savings product, instead of buying at once on festival days from the bank or from any other jeweller. - This is because of price averaging over the time period. | <ul style="list-style-type: none"> - The customer can register for the product by reaching out to the nearest touchpoint - The customer has to submit their ID proof, address proof and mobile number and verify the same with an OTP - The account will be activated soon after the verification | <ul style="list-style-type: none"> - The customer can buy the gold in grams or rupees at the rate suggested by the partner bullion bank - The purchase records of the customer are recorded in the passbook | <ul style="list-style-type: none"> - The customer can sell gold in terms of grams or rupees - The equivalent amount will be credited into the corresponding bank account from which they have made the investment payments | <ul style="list-style-type: none"> - Coins: The customer can ask balance to be converted to coins in multiples of 1 gram. The making and delivery charges can be deducted from the account or transferred separately - Jewellery: The customer can request for a list of jewellers. The customer can give instructions to credit the jeweller's account with the grams of value of gold for which the jewellery will give a credit. |

Table: Predictive margins for grams of jewelery held

Predictive margins Number of obs = 3728
 Model VCE : OIM
 Expression : Pr(dsg_customer), predict()
 1._at : jewel_grams = 0
 2._at : jewel_grams = 5
 3._at : jewel_grams = 10
 4._at : jewel_grams = 15
 5._at : jewel_grams = 20
 6._at : jewel_grams = 25
 7._at : jewel_grams = 30
 8._at : jewel_grams = 35
 9._at : jewel_grams = 40
 10._at : jewel_grams = 45
 11._at : jewel_grams = 50

| Delta-method | | | | | | |
|--------------|--------|----------|--------|----------|-----------|-----------|
| | Margin | Std.Err. | z | P>z | [95%Conf. | Interval] |
| _at | | | | | | |
| 1 | 0.391 | 0.010 | 38.350 | 0.000*** | 0.371 | 0.411 |
| 2 | 0.387 | 0.010 | 40.500 | 0.000*** | 0.368 | 0.405 |
| 3 | 0.382 | 0.009 | 42.690 | 0.000*** | 0.364 | 0.400 |
| 4 | 0.377 | 0.008 | 44.830 | 0.000*** | 0.361 | 0.394 |
| 5 | 0.373 | 0.008 | 46.750 | 0.000*** | 0.357 | 0.388 |
| 6 | 0.368 | 0.008 | 48.290 | 0.000*** | 0.353 | 0.383 |
| 7 | 0.363 | 0.007 | 49.240 | 0.000*** | 0.349 | 0.378 |
| 8 | 0.359 | 0.007 | 49.450 | 0.000*** | 0.344 | 0.373 |
| 9 | 0.354 | 0.007 | 48.830 | 0.000*** | 0.340 | 0.368 |
| 10 | 0.349 | 0.007 | 47.430 | 0.000*** | 0.335 | 0.364 |
| 11 | 0.345 | 0.008 | 45.420 | 0.000*** | 0.330 | 0.360 |

Table: Predictive margins for annual household surplus

Predictive margins Number of obs = 3728
 Model VCE : OIM
 Expression : Pr(dsg_customer), predict()
 1._at : household~us = 0
 2._at : household~us = 20000
 3._at : household~us = 40000
 4._at : household~us = 60000
 5._at : household~us = 80000
 6._at : household~us = 100000

| Delta-method | | | | | | |
|--------------|--------|----------|--------|----------|-----------|-----------|
| | Margin | Std.Err. | z | P>z | [95%Conf. | Interval] |
| _at | | | | | | |
| 1 | 0.304 | 0.012 | 26.400 | 0.000*** | 0.282 | 0.327 |
| 2 | 0.307 | 0.011 | 27.760 | 0.000*** | 0.286 | 0.329 |
| 3 | 0.311 | 0.011 | 29.220 | 0.000*** | 0.290 | 0.332 |
| 4 | 0.314 | 0.010 | 30.760 | 0.000*** | 0.294 | 0.334 |
| 5 | 0.318 | 0.010 | 32.410 | 0.000*** | 0.298 | 0.337 |
| 6 | 0.321 | 0.009 | 34.140 | 0.000*** | 0.302 | 0.339 |

Table: Significance test and predictive margins for education level

(1) [dsg_customer]2.edu_level = 0
 (2) [dsg_customer]3.edu_level = 0
 (3) [dsg_customer]4.edu_level = 0
 (4) [dsg_customer]5.edu_level = 0
 (5) [dsg_customer]6.edu_level = 0
 (6) [dsg_customer]7.edu_level = 0
 (7) [dsg_customer]8.edu_level = 0
 chi2(7) = 23.14
 Prob > chi2 = 0.0016**

Predictive margins Number of obs = 3728
 Model VCE: OIM
 Expression : Pr(dsg_customer), predict()

| | Delta-method | | | | | |
|-------------------|--------------|----------|--------|----------|-----------|-----------|
| | Margin | Std.Err. | z | P>z | [95%Conf. | Interval] |
| edu_level | | | | | | |
| Cannot read/write | 0.299 | 0.020 | 14.650 | 0.000*** | 0.259 | 0.339 |
| 1st - 5th | 0.353 | 0.011 | 32.230 | 0.000*** | 0.331 | 0.374 |
| 6th - 8th | 0.341 | 0.017 | 19.610 | 0.000*** | 0.307 | 0.375 |
| 9th - 10th | 0.415 | 0.018 | 22.880 | 0.000*** | 0.380 | 0.451 |
| 11th - 12th | 0.356 | 0.028 | 12.870 | 0.000*** | 0.301 | 0.410 |
| Vocational Course | 0.521 | 0.078 | 6.720 | 0.000*** | 0.369 | 0.673 |
| Graduate | 0.374 | 0.046 | 8.120 | 0.000*** | 0.284 | 0.464 |
| Post Graduate | 0.335 | 0.072 | 4.660 | 0.000*** | 0.194 | 0.476 |

Table: Significance test and predictive margins for social group

(1) [dsg_customer]2.social_group = 0
 (2) [dsg_customer]3.social_group = 0
 (3) [dsg_customer]4.social_group = 0
 (4) [dsg_customer]5.social_group = 0
 chi2(4) = 25.50
 Prob > chi2 = 0.0000***

Predictive margins Number of obs = 3728
 Model VCE : OIM
 Expression : Pr(dsg_customer), predict()

| | Delta-method | | | | | |
|----------------|--------------|----------|--------|----------|-----------|-----------|
| | Margin | Std.Err. | z | P>z | [95%Conf. | Interval] |
| social_group | | | | | | |
| General/Others | 0.318 | 0.020 | 15.940 | 0.000*** | 0.279 | 0.357 |
| OBC | 0.343 | 0.009 | 37.260 | 0.000*** | 0.325 | 0.361 |
| SC | 0.401 | 0.014 | 27.840 | 0.000*** | 0.373 | 0.429 |
| ST | 0.688 | 0.087 | 7.880 | 0.000*** | 0.517 | 0.859 |
| Minorities | 0.132 | 0.116 | 1.140 | 0.255 | -0.095 | 0.358 |

Table: Significance test and predictive margins for primary occupation

(1) [dsg_customer]2.occu_category = 0
 (2) [dsg_customer]3.occu_category = 0
 (3) [dsg_customer]4.occu_category = 0
 (4) [dsg_customer]5.occu_category = 0
 (5) [dsg_customer]6.occu_category = 0
 chi2(5) = 184.27
 Prob > chi2 = 0.0000***

Predictive margins Number of obs = 3728
 Model VCE : OIM
 Expression : Pr(dsg_customer), predict()

| | Delta-method | | | | | |
|----------------|--------------|----------|--------|----------|-----------|-----------|
| | Margin | Std.Err. | z | P>z | [95%Conf. | Interval] |
| occu_category | | | | | | |
| Agri/Livestock | 0.441 | 0.026 | 17.260 | 0.000*** | 0.391 | 0.491 |
| Gig Work | 0.439 | 0.067 | 6.550 | 0.000*** | 0.308 | 0.571 |
| Business | 0.358 | 0.039 | 9.090 | 0.000*** | 0.280 | 0.435 |
| Salaried | 0.491 | 0.055 | 8.860 | 0.000*** | 0.382 | 0.599 |
| Labour | 0.421 | 0.010 | 42.550 | 0.000*** | 0.402 | 0.441 |
| Others | 0.034 | 0.007 | 4.560 | 0.000*** | 0.019 | 0.048 |

Table: Prediction Accuracy of the Logistic Regression Model

Logistic model for dsg_customer

| Classified | ----- True ----- | | Total |
|------------|------------------|------|-------|
| | D | ~D | |
| + | 533 | 343 | 876 |
| - | 796 | 2056 | 2852 |
| Total | 1329 | 2399 | 3728 |

Classified + if predicted Pr(D) >= .5
 True D defined as dsg_customer != 0

| | | |
|-------------------------------|----------|--------|
| Sensitivity | Pr(+ D) | 40.11% |
| Specificity | Pr(-~D) | 85.70% |
| Positive predictive value | Pr(D +) | 60.84% |
| Negative predictive value | Pr(~D -) | 72.09% |
| False + rate for true ~D | Pr(+~D) | 14.30% |
| False - rate for true D | Pr(- D) | 59.89% |
| False + rate for classified + | Pr(~D +) | 39.16% |
| False - rate for classified - | Pr(D -) | 27.91% |
| Correctly classified | | 69.45% |

Table: Hosmer-Lemeshow goodness of fit test for the logistic model

Logistic model for `dsg_customer`, goodness-of-fit test
(Table collapsed on quantiles of estimated probabilities)

number of observations = 3728

number of groups = 10

Hosmer-Lemeshow $\chi^2(8) = 12.90$

Prob > $\chi^2 = 0.1154$

Appendix 3

Savings in gold by low-income households – Primary Survey of Dvara SmartGold Customers

Survey Questionnaire

Introduction and consent

Hello, I am < > calling from Dvara Research. We got your number from the team of Dvara SmartGold. We are conducting a research to understand how and why households invest in gold and your experience with Dvara SmartGold in the past one year. This interview will take 15-20 mins and we will be recording your responses. These insights will be used for the purpose of our research and in no way will we share or facilitate sharing any specific personal details that can be traced back to you.

Are you comfortable with speaking with us? *(If yes, continue; otherwise drop)*

If yes, can we begin the interview now? If no, could you suggest a suitable time as per your convenience?

Time preference –

Questions related to socio-demographic characteristics

1. Where do you live?
 - b. How many members live with you in your house?
 - c. Are you employed anywhere?
 - i. If yes, could you briefly describe your work?⁹
 - ii How frequently do you receive payment for your work?
 - iii If you are comfortable, can you share with us how much do you earn per month (or any other frequency of payment)?
 - d. If no, where does the main wage earner work? *(to be asked only if the answer is negative for 1.c)*
 - i. How frequently do they receive payment?
 - ii. If you are comfortable, can you share with us how much they earn per month (or any other frequency of payment)?

Questions related to investment in gold

2. How much do you normally save per month (after spending for food and other essential expenses)?
3. Do you own any gold in any form? If yes, can you share with us how gold do you own?
4. Every year, how much do you spend on purchasing gold / How many grams of gold do you buy every year?
5. Why do you prefer to invest in gold?

⁹ To summarize, we can categorize the occupation into 5 fields – daily wage workers, farmer or agri related occupation, shop owner, family business, others.

6. Are you planning to use your current gold holdings for your future life goals? (*Prompts if necessary - Children's education/marriage/emergencies/ education/house repairs/gift*)

Questions about respondent's interaction with Dvara SmartGold

7. How did you know about Dvara SmartGold?

8. While investing in DSG did you have a goal in mind? (Ask)

9. Given the Covid-19 Pandemic situation, have you faced any difficulties in paying any instalments? If yes, could you share with us your difficulties? (options – liquidity crunch, inability to contact staff, others)

9i. (If yes to 8) How have you managed to recover from the missed previous instalments? (options – make extra instalments in the next month, used my savings, borrowed to invest)

10. What are your plans with your investment in Dvara SmartGold. For instance, after your investment tenure is complete would you like to redeem in the form of gold jewellery OR gold coins OR cash OR take a loan against your investment into the product?

11. As a DSG customer, how did you decide your monthly contribution? (Options – wealth manager assisted, own calculation based on cashflows)

12. Does the small ticket size of contribution enable you to stick to your investment plan?

13. In the past few years, TN has faced cyclones. In those times of natural calamities, how has your family coped with the day to day expenses? Were they similar or different from your coping strategies during lockdown due to Covid 19?

We have reached the end of the interview. Thank you so much for your time. In case of any queries, you can contact us on < > number