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# **Effect of financial inclusion on household purchase of precious ornaments Evidence from Indian districts**

**Anumeha Saxena  
IIM Ahmedabad**

**Presented at the 8<sup>th</sup> IGPC-IIMA Annual Gold & Gold Markets Conference 2025  
organized by  
India Gold Policy Centre at IIM Ahmedabad  
March 3-4, 2025  
Venue: Bharat Mandapam, Pragati Maidan, New Delhi**

# Introduction

- Jewellery serves as collateral in developing economies and has social and cultural significance (Harriss-White, 2024).
- Limited financial inclusion correlates with higher jewellery purchases, particularly in households with lower income, rural locations, and limited education (Deodhar, 2023; Mutandwa et al., 2018).
- Jewellery's dual role as collateral for loans and a socio-cultural asset makes it preferred over coins or bars.
- Nearly 30% of rural households rely on informal lending, with jewellery as the most common collateral (Bureau, 2024).
- Gold loans are also extended by formal sources of lending but these sources also make available alternative financing options.

# Introduction

- Theory tested: **Financial inclusion reduces reliance on informal loans, leading to a decline in jewellery demand as collateral (Hua et al., 2023).**
- Context: Initiatives like the Pradhan Mantri Jan-Dhan Yojana (2014) expanded formal financial inclusion, opening 383 million accounts by 2019.
- Analysis uses 2015–2019 **CMIE panel data** and **PCA-derived financial inclusion** index to assess district-level variations.
- Financial inclusion does not reduce jewellery expenditure.
- However, **certain dimensions of financial inclusion reduce such expenditure**, particularly among low-income households, with weaker effects in households which are affluent, based in rural areas and have a high proportion of female members.
- Results support targeted interventions to shift portfolios away from gold, emphasizing increased credit access and focused rural strategies.

# Research Questions

- . Whether financial inclusion influence household expenditure on precious metal jewellery in India?
- . Which dimension of financial inclusion influences household expenditure on precious metal jewellery in India?
- . What household characteristics moderate the impact of financial inclusion on jewellery expenditure?

# Literature Review

- Studies largely examine household-level financial inclusion effects, neglecting the broader impact of financial inclusion in the area of residence and its multidimensional aspects.
- Mostly, studies focus on how financial inclusion improves well-being and reduces poverty
- There are some others which observe whether the extent of financial inclusion in a region impacts household consumption (Li et al., 2020), discretionary spending (Alwahidin et al., 2023), and female entrepreneurship (Yang et al., 2022)
- Our study falls in the second strand mentioned above.
- Early methods focused on single indicators like account ownership (Honohan, 2008). Later studies advocate for multidimensional measurement, encompassing access, usage, and quality (Beck et al., 2007).

# Literature Review

- Sarma's widely used index aggregates dimensions like penetration, availability, and usage,\* inspired by UNDP's multidimensional methods (Sarma, 2008, 2012).
- Factor analysis and PCA are employed to construct indices across dimensions. For example, Camara and Tuesta (2017) applied two-stage PCA to derive subindices for usage, access, and barriers.
- PCA-based indices have been used to study financial inclusion disparities across Indian states (Yadav et al., 2020) and to link financial inclusion with financial development (Lenka, 2021).
- PCA-based indices address concerns over non-parametric aggregation methods, offering robust and flexible frameworks for multidimensional assessment (Tram et al., 2023).

# Household Data

- Panel data from CMIE's Consumer Pyramids Household Survey (CPHS) (April 2015–March 2020), covering monthly household expenditure on precious metal ornaments, income, and socio-economic attributes across 172,365 households in 486 districts\* spanning 26 states and UTs.\*
- The initial sample was reduced due to missing data and inadequate district-level financial inclusion data.
- Household attributes like size, education, gender, and age composition, alongside spatial characteristics (urban/rural, state), are included based on established economic theories, including Engel curves, life cycle hypothesis, and education's role in expenditure patterns.
- The Financial Inclusion Index (FinInclInd) is constructed using annual frequency data. Household-level data is aggregated to align with the fiscal year frequency of financial indicators.

# Scheduled Commercial Bank Data

- Constructed using two-stage PCA for Indian districts (2015–2020), the index captures three dimensions of financial inclusion: penetration, usage, and availability.
- Data for the FinInclInd is sourced primarily from the CMIE States of India database, which compiles RBI-published data on Scheduled Commercial Banks (SCBs) at quarterly and annual frequencies.\*
- All data used in the analysis is aggregated on a fiscal year basis to ensure consistency across dimensions and indicators.
- Only districts with complete data on all constituent variables for the given fiscal year are included in the estimation of the FinInclInd.



# Summary Statistics: Household Data

	(1)	(2)	(3)	(4)	(5)
<b>VARIABLES</b>	<b>No. of Observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Minimum</b>	<b>Maximum</b>
Expense on precious ornaments	478,642	11.87	54.68	0	1,925
Fin. Inc. Ind.	478,642	0.559	1.797	-2.126	11.16
Household income	478,642	19,988	14,898	0	130,650
Household expenditure	478,642	12,320	5,604	2,901	43,757
Age of household head	478,642	50.64	11.85	0.167	110
Age of household head (squared)	478,642	2,705	1,260	0.0278	12,100
Females/Household size	478,642	0.473	0.172	0	1
College educated household head	478,642	0.115	0.301	0	1
Literates/Size	478,642	0.930	0.164	0	1
Female head	478,642	0.123	0.319	0	1
Household size	478,642	4.061	1.563	1	28
Rural	478,642	0.340	0.474	0	1
Financial year	478,642	2017	1.412	2015	2019

# Scheduled Commercial Bank Data & Summary Statistics

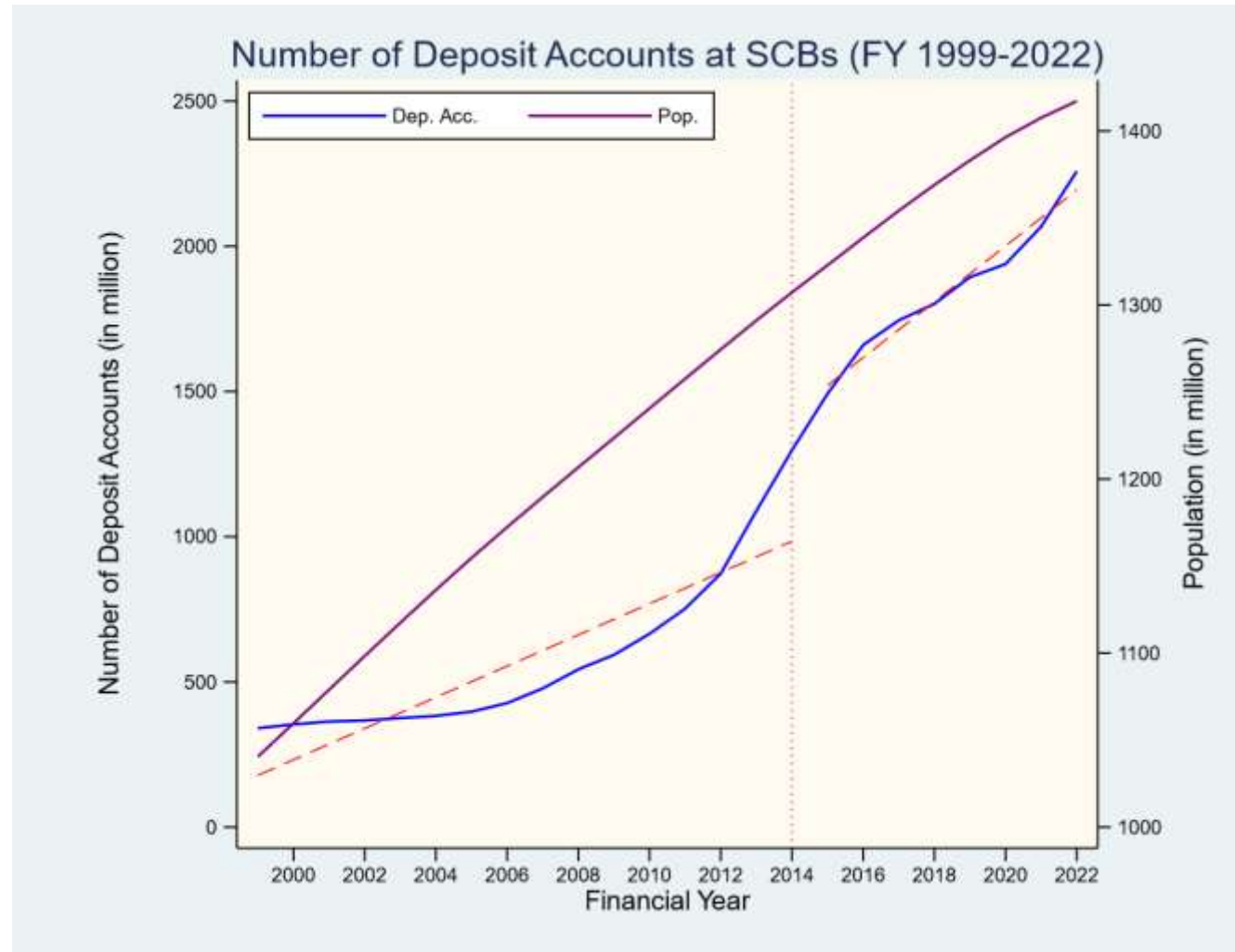
- **Descriptive Statistics for district-wise data during FY 2015-16**

Variable	Obs	Mean	Std. Dev.	Min	Max
Credit Accounts (000 population)	486	117.533	102.558	10.32	912.022
Deposit Accounts (000 population)	486	1216.957	652.533	255.713	5610.682
Credit Amount adjusted for GVA	486	0.267	0.196	0.028	2.052
Deposit Amount adjusted for GVA	486	0.475	0.303	0.093	2.046
Offices (000 population)	486	0.107	0.069	0.024	0.513

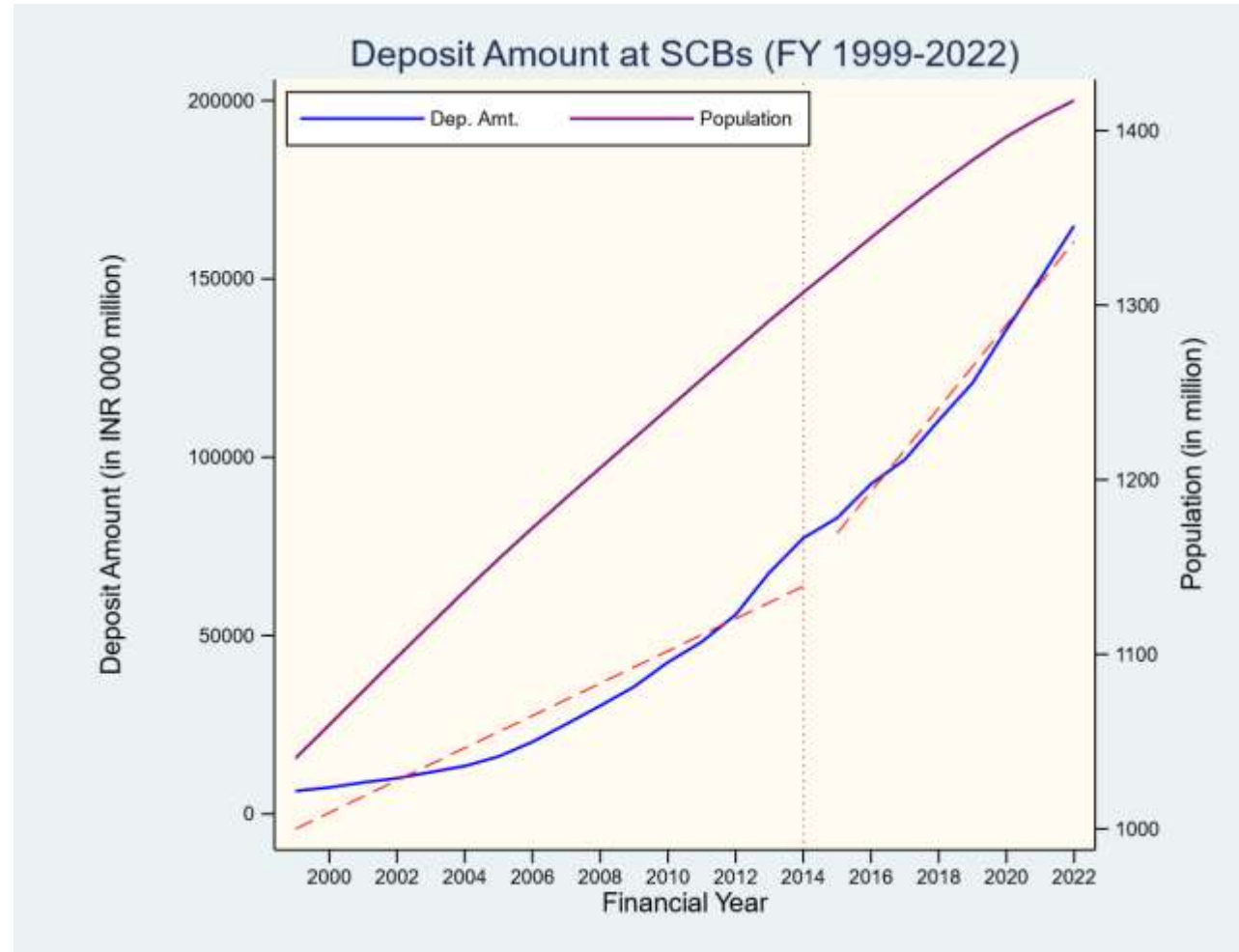
- **Descriptive Statistics for district-wise data during FY 2019-20**

Variable	Obs	Mean	Std. Dev.	Min	Max
Credit Accounts (000 population)	486	182.888	170.297	22.583	1696.201
Deposit Accounts (000 population)	486	1488.265	603.673	313.548	6463.926
Credit Amount adjusted for GVA	486	0.27	0.183	0.044	1.702
Deposit Amount adjusted for GVA	486	0.493	0.298	0.044	1.902
Offices (000 population)	486	0.118	0.07	0.025	0.527

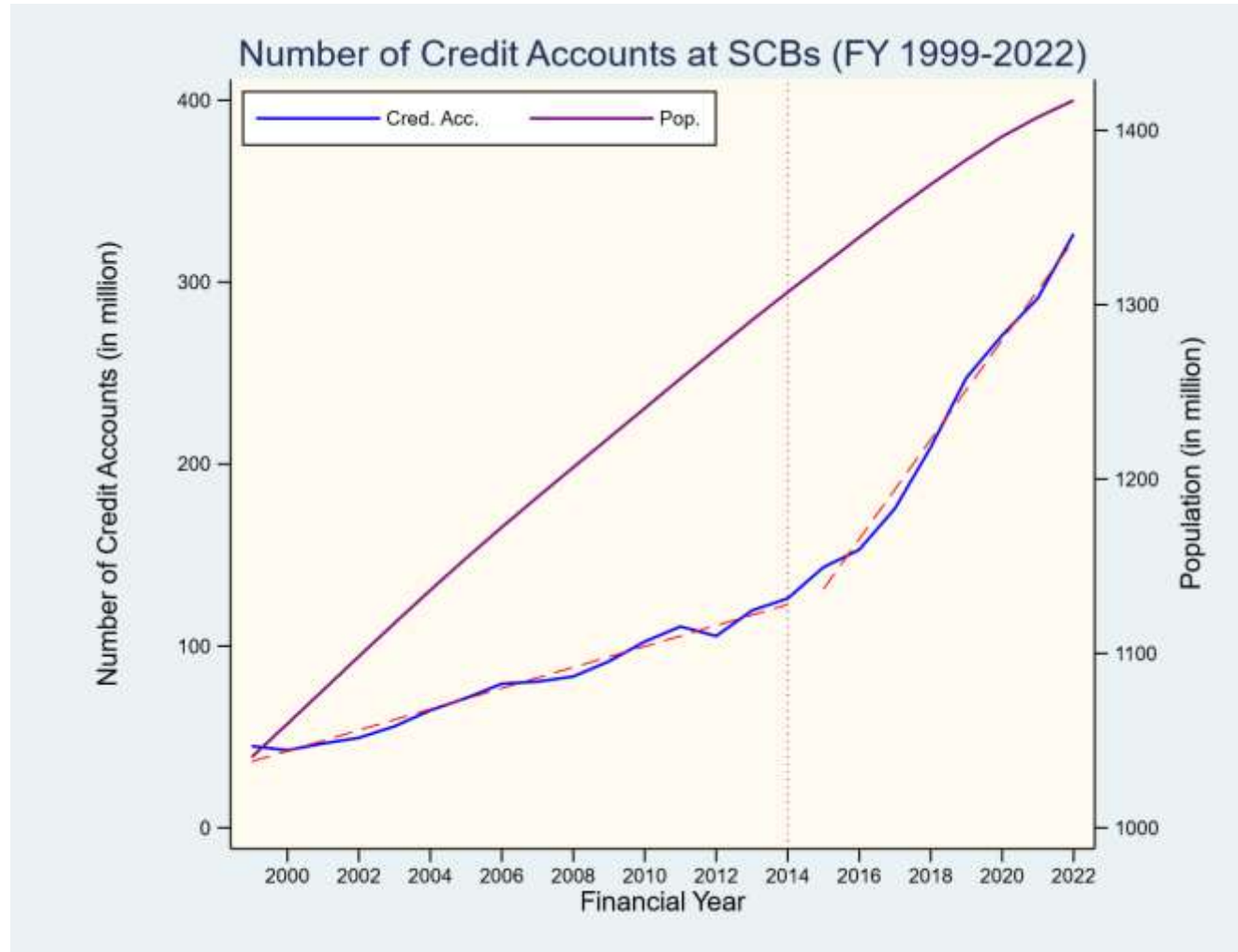
# Scheduled Commercial Bank Data: Trends



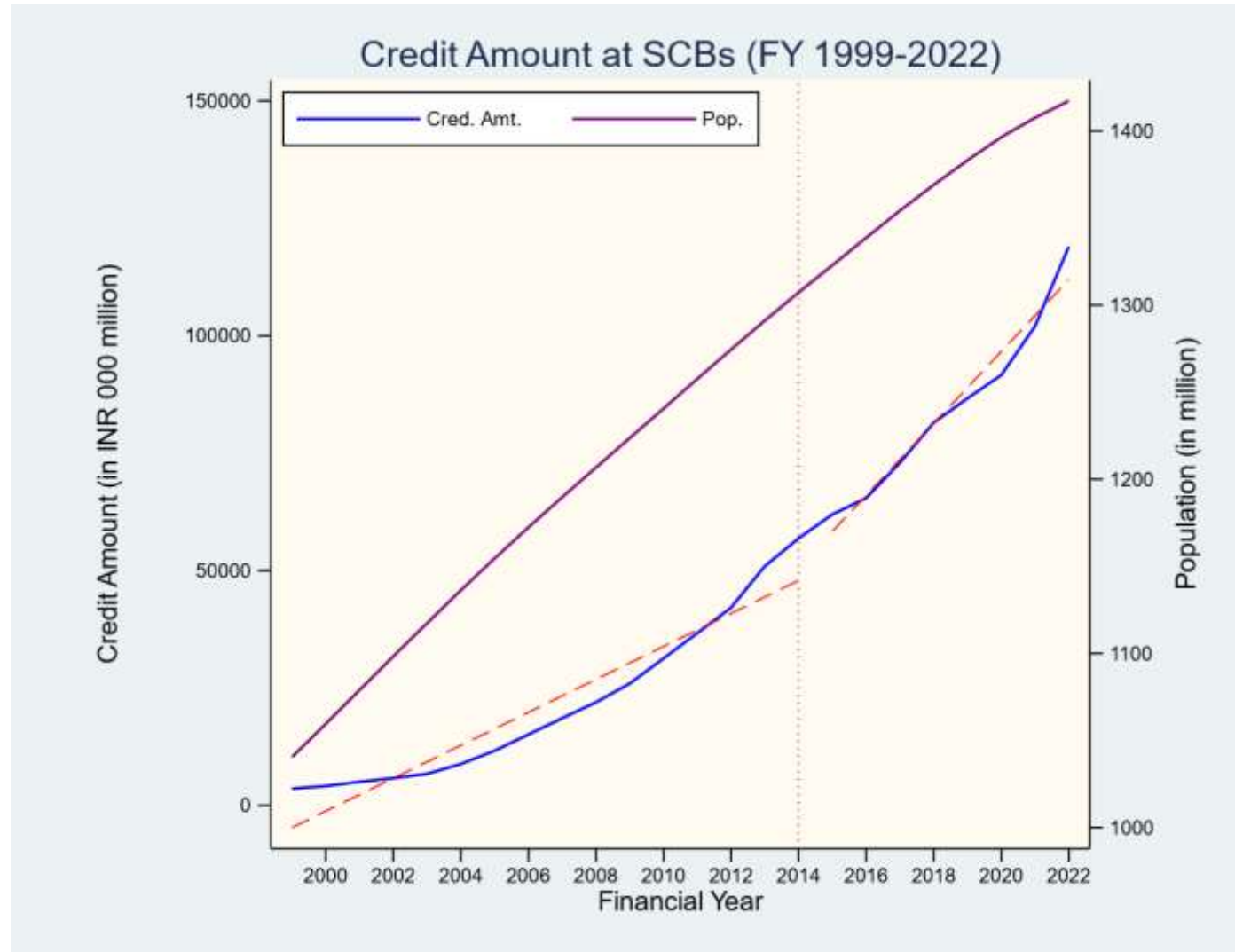
# Scheduled Commercial Bank Data: Trends



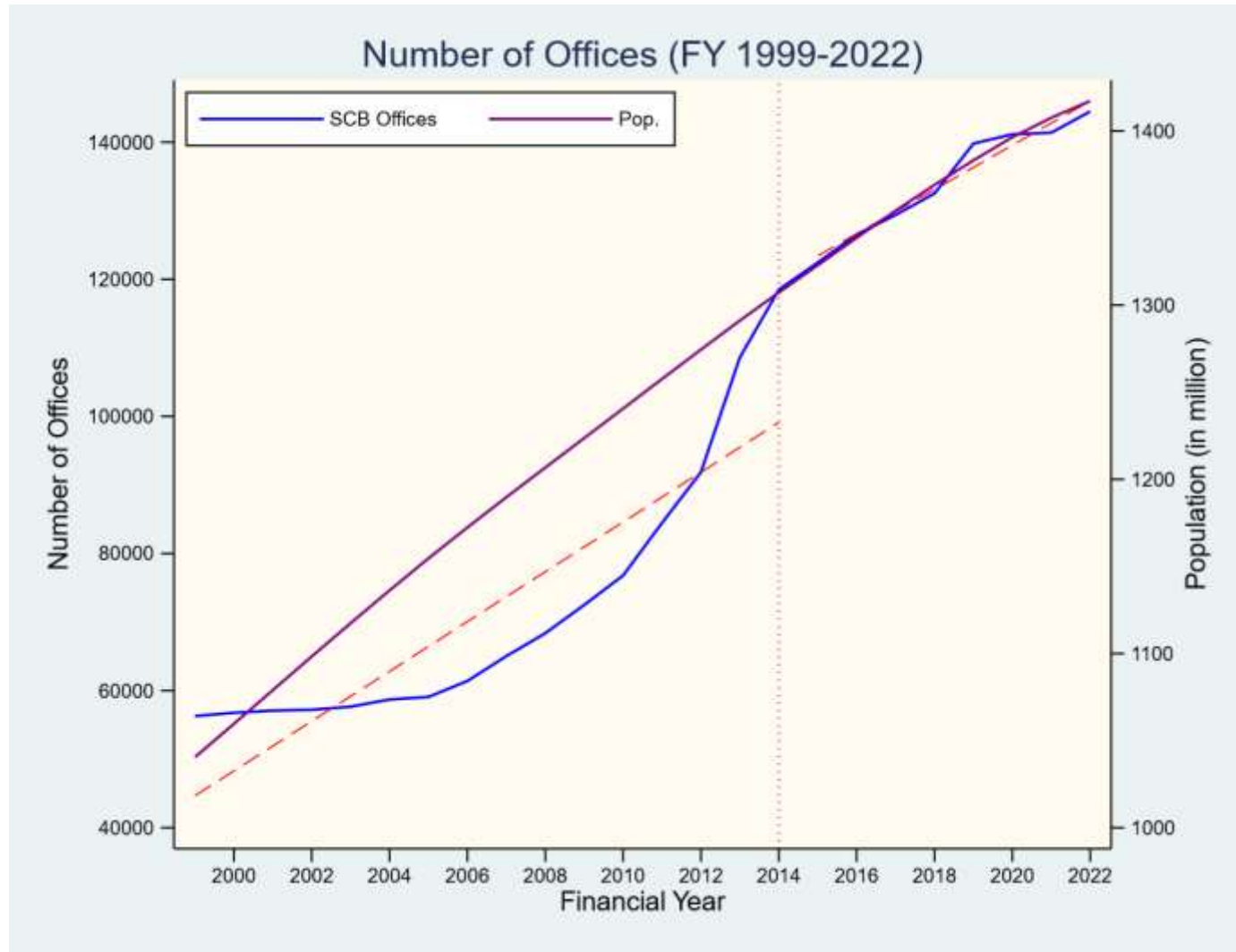
# Scheduled Commercial Bank Data: Trends



# Scheduled Commercial Bank Data: Trends



# Scheduled Commercial Bank Data: Trends



# Construction of the Financial Inclusion Index

- A two-stage PCA is used to create the financial inclusion index (FinInclInd) for Indian districts from 2015-2020, combining penetration (number of accounts), usage (amount associated with accounts), and availability (physical presence of bank) dimensions.

$$FinInclInd_{i,t} = w_1 Y_{i,t,p} + w_2 Y_{i,t,u} + w_3 Y_{i,t,a} + e_{i,t}$$

- FinInclInd is a composite index for a district  $i$  at time  $t$  which is a fiscal year;  $w_1$ ,  $w_2$ , and  $w_3$  are the relative weights of different dimensions of financial inclusion. The variation due to error is denoted by  $e_j$ .
- All indicators are normalized to values between 0 and 1 to standardize scales before PCA implementation.



# Regions with Highest FinIncInd

Region	State	FinIncInd
Kamrup Metropolitan	Assam	5.043
Gautam Buddha Nagar	Uttar Pradesh	5.255
Kancheepuram	Tamil Nadu	5.554
Chennai	Tamil Nadu	5.770
North Goa	Goa	5.841
Kolkata	West Bengal	5.959
Hyderabad	Telangana	5.980
Gurgaon	Haryana	6.068
Chandigarh	Union Territory	7.814
Mumbai & Mumbai (Suburban)	Maharashtra	9.481

# Regions with Lowest FinIncInd

Region	State	FinIncInd
Baksa	Assam	-2.138
Tapi	Gujarat	-2.049
Morena	Madhya Pradesh	-1.814
Alirajpur	Madhya Pradesh	-1.790
Chirang	Assam	-1.770
Dhaulpur	Rajasthan	-1.747
Garhwa	Jharkhand	-1.698
Ganderbal	Jammu and Kashmir	-1.649
Goalpara	Assam	-1.527
Supaul	Bihar	-1.506

# Empirical Strategy

$y_{i,d,t}$  denotes the household expenditure on precious metal ornaments for observation  $i$  in district  $d$  in year  $t$ . Let  $FinInclInd_{d,t}$  denote our measure of financial inclusion coverage in district  $d$  in year  $t$ .

The specification takes the form:

$$y_{i,d,t} = \beta_0 + \beta_1 FinInclInd_{d,t} + \beta_2 X_{i,k,t} + \omega_d + \tau_t + \varepsilon_{i,d,t}$$

where  $\omega_d$  and  $\tau_t$  are state\* and year fixed effects, respectively;

$X_{i,k,t}$  is a vector of household demographic characteristics including household income, age of household head, number of female members and literate members (adjusted for household size) and dummies for (categories) of rural residence, gender of household head, college education of head.

# Results: Baseline Results for Fin Inc Ind

VARIABLE	(1)	(2)
	Without clustering	With clustering
Fin. Inc. Ind.	-0.953*** (0.295)	-0.953 (0.742)
Household income	0.001*** (0.000)	0.001*** (0.000)
Rural	-3.329*** (1.290)	-3.329 (2.426)
College educated household head	8.222*** (1.706)	8.222*** (2.766)
Literates/Size	1.639 (2.402)	1.639 (3.574)
Female head	-0.308 (0.729)	-0.308 (0.738)
Females/Size	4.916*** (1.341)	4.916*** (1.370)
Age of household head	0.182 (0.166)	0.182 (0.191)
Age of household head (squared)	-0.002 (0.002)	-0.002 (0.002)
Constant	-11.040*** (4.043)	-11.040** (5.276)
Observations	147,975	147,975
R-squared	0.047	0.047

# Results: Panel Estimations for Fin Inc Ind

	(1)	(2)
VARIABLES	Without clustering	With clustering
Fin. Inc. Ind.	-0.403*** (0.084)	-0.403 (0.525)
Household income	0.001*** (0.000)	0.000505*** (0.000)
Rural	1.251*** (0.323)	1.251 (1.036)
College educated household head	2.494*** (0.349)	2.494*** (0.618)
Literates/Size	3.483*** (0.271)	3.483*** (0.805)
Female head	-0.894*** (0.236)	-0.894*** (0.320)
Females/Size	4.391*** (0.415)	4.391*** (0.539)
Age of household head	0.132*** (0.040)	0.132** (0.0606)
Age of household head (squared)	-0.002*** (0.000)	-0.00153*** (0.000571)
Constant	-7.130*** (0.976)	-7.130*** (1.816)
Observations	478,642	478,642
R-squared	0.050	0.050
State FE	Yes	Yes
Time FE	Yes	Yes

# Results: Deposit Accounts

	(1)	(2)
VARIABLES	Without clustering	With clustering
No. of Deposit Accounts (per million)	-1.31073*** (0.242)	-1.311 (1.131)
Household income	0.00055*** (0.000)	0.000546*** (0.000)
1 = Rural	1.77454*** (0.481)	1.775 (1.261)
1 = College Educated HOH	4.09821*** (0.540)	4.098*** (0.869)
Literates/Household size	4.46173*** (0.424)	4.462*** (1.082)
1 = Female Head	-0.69427** (0.323)	-0.694* (0.394)
Females/Household size	4.47059*** (0.577)	4.471*** (0.709)
Age of head	0.16394** (0.065)	0.164* (0.0881)
Age of head (squared)	-0.00188*** (0.001)	-0.00188** (0.000825)
Constant	-7.05629*** (1.526)	-7.056** (3.111)
Observations	478,642	478,642
R-squared	0.051	0.051
State FE	Yes	Yes
Time FE	Yes	Yes

# Results: Deposit Amount

VARIABLES	(1)	(2)
	Without clustering	With clustering
Deposit Amount (adjusted for GVA)	-2.04620*** (0.584)	-2.046 (2.585)
Household income	0.00054*** (0.000)	0.000539*** (0.000)
1 = Rural	1.88551*** (0.486)	1.886 (1.224)
1 = College Educated HOH	4.20171*** (0.536)	4.202*** (0.895)
Literates/Household size	4.63348*** (0.418)	4.633*** (1.119)
1 = Female Head	-0.71895** (0.323)	-0.719* (0.393)
Females/Household size	4.43435*** (0.577)	4.434*** (0.711)
Age of head	0.17567*** (0.065)	0.176* (0.0929)
Age of head (squared)	-0.00199*** (0.001)	-0.00199** (0.000867)
Constant	-8.36577*** (1.523)	-8.366*** (2.711)
Observations	478,642	478,642
R-squared	0.051	0.051
State FE	Yes	Yes
Time FE	Yes	Yes

# Results: Credit Accounts

	(1)	(2)
VARIABLES	Without clustering	With clustering
No. of Credit Accounts (per million)	-7.52795*** (1.047)	-7.528* (4.558)
Household income	0.00055*** (0.000)	0.000550*** (0.000)
1 = Rural	1.76996*** (0.459)	1.770 (1.254)
1 = College Educated HOH	4.00150*** (0.539)	4.002*** (0.865)
Literates/Household size	4.36214*** (0.423)	4.362*** (1.093)
1 = Female Head	-0.69660** (0.324)	-0.697* (0.395)
Females/Household size	4.43585*** (0.579)	4.436*** (0.720)
Age of head	0.15450** (0.065)	0.154* (0.0888)
Age of head (squared)	-0.00180*** (0.001)	-0.00180** (0.000832)
Constant	-7.35880*** (1.550)	-7.359** (2.984)
Observations	478,642	478,642
R-squared	0.052	0.052
State FE	Yes	Yes
Time FE	Yes	Yes



# Results: Credit Amount

	(1)	(2)
VARIABLES	Without clustering	With clustering
Credit Amount (adjusted for GVA)	-6.65250*** (0.603)	-6.652** (3.072)
Household income	0.00055*** (0.000)	0.000553*** (0.000)
1 = Rural	1.41239*** (0.471)	1.412 (1.270)
1 = College Educated HOH	4.11105*** (0.535)	4.111*** (0.869)
Literates/Household size	4.55986*** (0.420)	4.560*** (1.088)
1 = Female Head	-0.67583** (0.324)	-0.676* (0.391)
Females/Household size	4.47813*** (0.579)	4.478*** (0.716)
Age of head	0.15483** (0.065)	0.155* (0.0897)
Age of head (squared)	-0.00180*** (0.001)	-0.00180** (0.000842)
Constant	-6.72176*** (1.548)	-6.722** (2.901)
Observations	478,642	478,642
R-squared	0.052	0.052
State FE	Yes	Yes
Time FE	Yes	Yes

# Results: SCB Offices

	(1)	(2)
VARIABLES	Without clustering	With clustering
No. of Offices (per million)	-2,534.34610	-2,534
	(4,084.235)	(11,832)
Household income	0.00053***	0.000533***
	(0.000)	(0.000)
1 = Rural	2.08459***	2.085*
	(0.513)	(1.253)
1 = College Educated HOH	4.23335***	4.233***
	(0.538)	(0.904)
Literates/Household size	4.58699***	4.587***
	(0.420)	(1.106)
1 = Female Head	-0.75200**	-0.752*
	(0.324)	(0.400)
Females/Household size	4.37441***	4.374***
	(0.576)	(0.714)
Age of head	0.18296***	0.183*
	(0.065)	(0.0957)
Age of head (squared)	-0.00207***	-0.00207**
	(0.001)	(0.000893)
Constant	-9.25548***	-9.255***
	(1.517)	(2.842)
Observations	478,642	478,642
R-squared	0.051	0.051
State FE	Yes	Yes
Time FE	Yes	Yes

# Conclusion

- Financial inclusion *per se* does not affect household expenditure on precious ornaments
- Credit related dimensions of financial inclusion are negatively associated with the household expenditure on precious ornaments – supporting the hypothesis that these ornaments serve as collateral for informal lending
- Effect is lower for higher income households, those with higher composition of female members, and heads who have a college education/ higher proportion of literate members

# Conclusion

- Rural residence of the household and the age of its head does not impact the expenditure
- Findings may have relevance for other illiquid assets – such as, cash and real estate; further, government policies should account for the observation that not all initiatives associated with financial inclusion may influence household consumption
- Unreported results also suggest complementary effect between formal lending – as bank credit accounts rise, the likelihood of a household having a borrowing from an NBFC or credit card rises – therefore, any necessary safeguards should be included

# Limitations

**Study Scope:** Covers 2015-2020 due to data availability.

**Data Limitation:** Financial inclusion index uses SCB data, excluding other financial sources.

**Urbanization:** The classification of regions as rural or urban is based on the nation-wide census which was last conducted in India in 2011.

**Proxy for GDP:** GVA is used as a proxy for district-level economic activity, supported by prior research.

**CPHS Survey:** Excludes border states and certain other areas.

**Future Research:** Plans include heterogeneity analysis and robustness checks with alternative indicators.

**Thank You**

# Appendix

# Construction of the Financial Inclusion Index

- A two-stage PCA is used to create the financial inclusion index (FinInclInd) for Indian districts from 2015-2020, combining penetration (number of accounts), usage (amount associated with accounts), and availability (physical presence of bank) dimensions.

$$FinInclInd_{i,t} = w_1 Y_{i,t,p} + w_2 Y_{i,t,u} + w_3 Y_{i,t,a} + e_{i,t}$$

- FinInclInd is a composite index for a district  $i$  at time  $t$  which is a fiscal year;  $w_1$ ,  $w_2$ , and  $w_3$  are the relative weights of different dimensions of financial inclusion. The variation due to error is denoted by  $e_j$ .
- All indicators are normalized to values between 0 and 1 to standardize scales before PCA implementation.



# Results from Stage II of PCA

Principal components/correlation

Number of obs = 2,428

Number of comp. = 3

Trace = 3

Rotation: (unrotated = principal) Rho = 1.0000

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.299	1.808	0.766	0.766
Comp2	0.491	0.282	0.164	0.930
Comp3	0.210	.	0.070	1.000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
penet	0.593	-0.446	0.670	0
usage	0.532	0.842	0.091	0
avail	0.605	-0.303	-0.737	0

# Pairwise correlation between FinIncInd and variables

Variables	(fin_inc_ind)	(norm_cred_acc_pop)	(norm_dep_acc_pop)	(norm_cred_amt_gv)	(norm_dep_amt_gv)	(norm_scb_off_pop)
(fin inc ind)	1					
norm cred acc pop	0.766	1				
norm dep acc pop	0.926	0.772	1			
norm cred amt gv	0.764	0.564	0.578	1		
norm dep amt gv	0.66	0.213	0.482	0.56	1	
norm scb off pop	0.917	0.612	0.87	0.544	0.516	1