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Consumption Functions of India: Pre and Post Covid-19

Alivelu Kasturi[1], Keshab Bhattarai[2], Asha Prasuna[3] and S.N.V. Siva Kumar[4]

[1]Associate Professor, & Dean, Division for Graduate Studies, Centre for Economic and Social Studies, NO Campus, Begumpet, Hyderabad, Telangana, India. E-mail: galivelu@cess.ac.in
[2]Senior Lecturer in Economics, University of Hull, HU6 7RX, UK, E-mail: K.R.Bhattarai@hull.ac.uk
[3]Professor- International Finance & Economics, Department of Economics, K J Somaiya Institute of Management, Somaiya Vidyavihar University (SVU), Vidyavihar (E) Mumbai 400077, India. E-mail Address: ashasivakumar@somaiya.edu
[4]Professor & Area Chairperson, Department of Economics, K J Somaiya Institute of Management, Somaiya Vidyavihar University (SVU), Vidyavihar (E) Mumbai 400077, India. E-mail: sivakumar@somaiya.edu

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Abstract: Consumption is essential for living for every individual. Better consumption is the most important economic goal of every individual from rich or poor households whether they are located in urban or rural areas. There is huge theoretical and empirical literature in the micro and macroeconomics discussing important factors that determine, level, growth, distribution of consumption in a particular time or over the years. COVID-19 global pandemic had seriously affected consumption of individuals in every part of the world. Focus of this paper is on estimation of consumption functions of rich and poor households located in rural and urban areas in India and its twenty-eight states. Major findings of this study are that the marginal propensity to consume is 49.8 percent in India from macro time series for 1990-2020. At micro-Household level data still shows positive and significant impact of income on consumption but the MPC is a lot lower than at the macro level. Urban areas have higher consumption than that in rural area. Also, huge differences across states were also observed.

Keywords: Consumption functions, MPC, India

JEL Classification: D12, E21, H31

Introduction

Consumption is essential for living for every individual. Better consumption is the most important economic goal of every individual from rich or poor households

whether they are located in urban or rural areas. There is huge theoretical and empirical literature in the micro and macroeconomics discussing important factors that determine, level, growth, distribution of consumption in a particular time or over the years. COVID-19 global pandemic had seriously affected consumption of individuals in every part of the world. Focus of this paper is on estimation of consumption functions of rich and poor households located in rural and urban areas in India and its twenty-eight states.

Major theories of consumption that are applicable to explain pattern of consumption functions select review of studies is presented in section two. Data sources and variables are discussed and defined in section three. Cross section regression estimations for pre-Covid-19 time (August 2019), peak of COVID-19 time (August 2020) and after recovery phase of COVID-19 (August 2021) are discussed with reference to theories outlined earlier in section three followed by conclusions of study in section four.

Section 2: Literature review

Literature on consumption analysis had increased substantial after the COVI-19 pandemic. Deaton (2021) looks into Covid-19 and income inequality globally; Banerjee, Duflo and Sharma (2021) examine the long-term effects of the targeting the ultra-poor program in the context of pandemic; Hall, Jones and Klenow 2020 assess trading off consumption and covid-19 deaths. Similarly, Hoke and Känzig. and Surico (2020) consumption in the time of Covid-19 using evidence from UK transaction data. In the context of studies such as Mishra, Gupta and Bhardwaj (2022) look into permanent inequality versus earnings instability and transmission of income shocks to consumption expenditure in India. Earlier Sen and Das (20180 had decomposition analysis of the sources of consumer expenditure inequality in India.

Angus Deaton has been investigating the micro and macro aspects of consumption and inequality over 50 years. For instance, Deaton (1972) examined Wealth Effects on Consumption in a Modified Life-Cycle Model. Campbell and Deaton (1989) investigated why is Consumption So Smooth. The Deaton and Kozel (2005) looked into the data and dogma in the great Indian poverty debate. Then Deaton (2008) consumption was linked to health issues in and for explaining the distribution of adult height, health, and inequality in India."). Cotton, Garga and Rohan (2021) studies issues of consumption spending and inequality during the Covid-19 pandemic.

Literature on consumption is huge from the theory of saving and investment of Abel and Blanchard (1983), to the context of dynamic general analysis of life cycle optimisation and concussion of Auerbach and Kotlikoff (1987) or to income uncertainty and consumption growth (Banks, Blundell and Brugiavini (1995)) or risk pooling, precautionary saving and consumption growth (Banks, Blundell and Stoker (1995)).

Some studies look into how the private saving and public policy (Bernheim and Scholtz (1992)) and others focus on consumption inequality and income uncertainty (Blundell and Preston (1996)) or earning uncertainty and aggregate wealth accumulation (Caballero(1991)). Similarly non-expected utility preferences in a temporal framework is applied to explain consumption-savings behavior by Chew and Epstein (1990) and social security and the retirement decision had featured in Crawford and Lelien (1981). Davies (1981) connect uncertain lifetime to consumption, and dissaving in retirement. Goodman and Webb (1994) studies on impacts of relative wage inequality on consumption. Many studies explain the growth in UK income and consumption inequality (.Jonson and Webb (1993), Jenkins (1996)). Consumption in related to a life cycle analysis of social security (Imrohoroglu, Imrohoroglu and Joines (1995)). Consumption and precautionary saving in the small and in the large (Kimball (1990) and precautionary saving and timing of taxes Kimball and Mankiw (1989)) and intergenerational transfers and savings or the Effect of annuity insurance on savings and inequality (Kotlikoff (1988) and Kotlikoff, Shoven and Spivak (1986)).

Section 3: Definition of data sources and variables

Empirical analysis is based on macro time series of consumption and income from World Economic Outlook database of the IMF and the household level data on total expenditure, total income , government transfer for 174,405 household in India from the Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE (https://www.cmie.com/) database . Consumer Pyramids Household Survey provides anonymized record-level data at the level of individual households and members of households.

First observe the consumption time series as given in the following Figure

Micro consumption functions of Indian households

Objective of this study is to estimate parameters of micro consumption functions of India using data on around 178,677 households from the "Consumer Pyramids

Household Survey" during the peak period of Covid-19 in August 2020 as well as pre- covid-19 August 2017, 2018 2019 and post-COVID-19 for year August 2021. By comparing the results across these years, we hope to find out how consumption behaviour changed during the covid-19 pandemic in comparison to pre and post COVID-19 periods. Household level data was taken through the CMIE. We do this analysis using descriptive statistics, cross-section regressions, quantile regressions parameters of those consumption functions. More specifically we focus on estimated values of propensity to consume during the peak COVID-19 peak pandemic compared to other pre- and post-Covid-19 years and to measure the propensity of consumption government transfers.

Pandemic had resulted in loss of employment especially in unorganized sector across India. This led to fall in income and consumption expenditure, and a sharp decline in GDP (Gupta et al. 2021). Consumption expenditure being the largest component of India's GDP, any fall in consumption expenditure leads to a decline in GDP. Indian government took immediate steps to provide relief to poor and vulnerable sections with free ration and also income transfers to support and sustain a subsistence level of consumption during the recession.

Table 1: Summary of Data for Consumption Function of India, August 2021

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
	All India	*India Rural*	*India Urban*	*5St_Rural*	*5St_Urban*
VARIABLES	(sd)	(sd)	(sd)	(sd)	(sd)
TOTAL_EXP	12,311	11,128	12,840	10,280	11,746
	(6,265)	(4,952)	(6,702)	(3,612)	(5,237)
TOTAL_INCOME	22,286	17,481	24,433	15,703	23,214
	(19,838)	(20,462)	(19,168)	(19,508)	(17,239)
GOV_TRANSFER	251.7	376.1	196.2	299.1	91.20
	(797.8)	(953.1)	(710.5)	(773.3)	(332.8)
Observations	134,436	41,520	92,916	14,258	27,792

Note : Rupees per month; standard deviations in ()s indicate dispersion around the mean. Five states for columns (4) and (5) are Maharashtra, Madhya Pradesh, Bihar, West Bengal and Karnataka (MMBBK).

Figures in Table 1 clearly show that level of average income and consumption is significantly higher in urban than rural areas whereas variance of these is higher in rural areas than in urban areas. Therefore, the government transfers seem much

higher in rural areas than in the urban areas. Also note that the sample size is much larger for urban than rural areas. Banerjee, Duflo and Sharma (2021) have argued that effects of such transfer becomes visible after seven to ten years … *" big-push" program providing a large asset transfer to the poorest Indian households. In a randomized controlled trial that follows these households over ten years, we find positive effects on consumption (0.6 SD), food security (0.1 SD), income (0.3 SD), and health (0.2 SD). These effects grow for the first seven years following the transfer and persist until year ten. One main channel for persistence is that treated households take better advantage of opportunities to diversify into more lucrative wage employment, especially through migration..."*

Similarly Sen and Das (2018) observed *".. that the inequality in consumer expenditure has increased in both the rural and the urban parts of India during the post-reform period. Non-food expenditure is more unevenly distributed, and it has been found to be more pro-rich in nature. Expenditure on cereals and pulses still exhibits higher inequality-reducing effect in rural and urban India. Education and health-care expenses have been inequality-increasing in the country. Contribution of expenditure on miscellaneous consumer services, durable goods, education and health care to the overall expenditure inequality is significantly higher."*

Table 2: Micro Consumption Function of India in Covid-19 pandemic, August 2020

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
VARIABLES	*India_all*	*India_rural*	*India_urban*	*5State_rural*	*5State__urban*
TOTAL_INCOME	0.170***	0.0776***	0.214***	0.0432***	0.162***
	(0.000725)	(0.00113)	(0.000908)	(0.00151)	(0.00155)
GOV_TRANSFER	-0.327***	-0.0534**	-0.265***	-0.195***	-0.0911
	(0.0180)	(0.0242)	(0.0245)	(0.0381)	(0.0801)
Constant	8,606***	9,791***	7,668***	9,660***	7,991***
	(22.19)	(31.17)	(28.86)	(39.10)	(45.78)
Observations	134,436	41,520	92,916	14,258	27,792
R-squared	0.293	0.102	0.377	0.055	0.285

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

We ran cross section OLS regressions to estimate MPC from the micro level data. In general, signs of the MPC coefficients with respect to income are as expected and

they are significant for all India as well as rural and urban areas across the states and the country as a whole. In contrast, government transfers had negative coefficients on consumption in contrary to our expectations during the Covid-19 panic period. Such things happen only when households raise pre-cautionary saving or are under the Ricardian equivalence illusion. They are saving more for precautionary causes from government transfer in anticipation of uncertainty of future income or in anticipation of increase in taxes. It seems during the peak period of COVID-19 pandemic and the lock-down associated with it, this was a natural reaction from households in depressed mood. There was significant amount of excess capacity of production both in public and private sectors due to various phases of lock-down. In order to ascertain such behaviour of pre-cautionary saving in India during Covid-19 period, we estimate the marginal propensity to consume from the public spending for post and pre covid-19 years 2021, 2019, 2018 , 2017 and 2022 as shown in Tables 4.4, 4.5 and 4.6, where the marginal effect on consumption out of the public transfer received from the government were found to be positive and significant. Lastly in Table 4.3 the estimated value of the constant term in these regressions indicating the value of autonomous consumption were reasonably close to each other at the national level (column 1) across rural and urban areas of all India (columns 2 and 3) or across rural and urban area of five MMBBK states (columns 4 and 5).

Table 3 : Micro Consumption Function of India, Pre and Post Covid-19 August 2019 and 2021

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
VARIABLES	2019M1	2019M2	2019M3	2021M1	2021M2	2021M3
TOTAL_INCOME	0.248***		0.247***	0.262***		0.261***
	(0.000717)		(0.000717)	(0.000672)		(0.000672)
GOV_TRANSFER		0.790***	0.426***		1.184***	0.608***
		(0.0263)	(0.0203)		(0.0253)	(0.0187)
Constant	6,288***	10,980***	6,226***	4,845***	9,043***	4,774***
	(20.97)	(20.77)	(21.15)	(17.39)	(18.42)	(17.47)
Observations	174,405	174,405	174,405	178,677	178,677	178,677
R-squared	0.406	0.005	0.408	0.461	0.012	0.464

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4 : Micro Consumption Function of India, Pre-Covid-19 August 2017-18

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
VARIABLES	2018M1	2018M2	2018M3	2017M1	2017M2	2017M3
TOTAL_INCOME	0.228***		0.227***	0.288***		0.286***
	(0.000761)		(0.000762)	(0.000822)		(0.000821)
GOV_TRANSFER		0.502***	0.155***		2.024***	1.141***
		(0.0219)	(0.0178)		(0.0419)	(0.0321)
Constant	6,550***	10,959***	6,533***	4,939***	9,266***	4,893***
	(23.52)	(22.57)	(23.60)	(19.85)	(20.07)	(19.81)
Observations	173,181	173,181	173,181	168,165	168,165	168,165
R-squared	0.341	0.003	0.341	0.422	0.014	0.426

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

There is significant heterogeneity average consumption levels among 28 provinces in India as shown by the coefficients to state in Table 4. States such as Delhi, Goa, Himachal Pradesh Jammu & Kashmir, Jharkhand and Uttar Pradesh in general had higher average consumption levels compared to the base state Andra Pradesh. In contrast Bihar, Chhattisgarh, Madhya Pradesh, Puducherry and Tripura had lower level of consumption than of Andhra Pradesh. Many other states had average level of consumption lower in some years and higher in other years. Therefore level of consumption significantly differs across states of India because differences in income, public transfers and state specific factors. Convergence in

Table 5: Micro Consumption Function of India, Post-Covid-19 July 2022

	(1)	*(2)*	*(3)*
VARIABLES	2022M1	2022M2	2022M3
TOTAL_INCOME	0.311***		0.308***
	(0.000734)		(0.000735)
GOV_TRANSFER		2.126***	0.971***
		(0.0389)	(0.0278)
Constant	4,362***	8,997***	4,306***
	(19.41)	(22.34)	(19.41)
Observations	178,677	178,677	178,677
R-squared	0.501	0.016	0.504

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

level of income and consumption across states requires policies that bring uniformity in various socio-economic factors which seems very difficult in case of India. These finding are similar to those that focus on determinant of saving (Athukorala and Sen (2004)) or inequality and deprivation (Mallick (2008)).

We further investigate whether the consumption patterns vary across income quantiles of the households in India and present the results in Table 4.8. We observe that the MPC steadily increases by quantile groups. MPC was 0.21 for top quantile against 0.033 for the bottom quantile. Normal expectation would have been just opposite but the result shows the precautionary savings must be higher in lower quantiles than in the upper quantiles.

Table 6: Micro Consumption Functions across states of India from 2017 to 2021

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
VARIABLES	2021M	2020M	2019M	2018M	2017M
TOTAL_INCOME	0.143***	0.252***	0.226***	0.208***	0.268***
	(0.000678)	(0.000691)	(0.000747)	(0.000770)	(0.000821)
GOV_TRANSFER	-0.452***	0.125***	0.508***	0.144***	1.177***
	(0.0168)	(0.00983)	(0.0201)	(0.0173)	(0.0313)
Assam	-1,496***	-371.0***	-1,895***	-619.4***	4.777
Bihar	(148.5)	(122.5)	(165.9)	(200.3)	(167.9)
Chandigarh	-1,248***	1,528***	749.4***	-585.2***	-620.1***
Chhattisgarh	(79.34)	(71.30)	(95.88)	(110.4)	(91.12)
Delhi	8,517***	852.7***	6,257***	8,913***	3,418***
Goa	(232.8)	(224.3)	(303.6)	(351.5)	(309.4)
Gujarat	1,373***	978.2***	1,026***	395.6***	-1,208***
Haryana	(95.02)	(84.98)	(115.0)	(132.5)	(109.6)
Himachal Pradesh	7,888***	3,524***	3,889***	3,826***	1,985***
Jammu & Kashmir	(145.4)	(136.0)	(186.2)	(214.8)	(176.9)
Jharkhand	2,135***	1,245***	4,670***	7,577***	7,241***
Karnataka	(204.4)	(151.4)	(205.3)	(237.5)	(195.6)
Kerala	2,326***	1,202***	3,032***	1,746***	1,367***
Madhya Pradesh	(80.08)	(71.70)	(96.93)	(111.4)	(92.62)
Maharashtra	4,503***	2,616***	3,251***	3,434***	1,814***
Meghalaya	(87.25)	(82.05)	(111.9)	(128.2)	(105.4)
Odisha	-92.38	4,360***	4,832***	3,142***	6,390***
Puducherry	(164.9)	(140.0)	(190.1)	(219.6)	(182.0)
Punjab	3,146***	-848.9***	-3,257***	4,140***	3,630***
Rajasthan	(147.0)	(105.3)	(142.6)	(164.9)	(135.9)
Sikkim	447.3***	1,927***	1,303***	507.4***	628.9***

Tamil Nadu	(98.16)	(85.63)	(115.7)	(133.3)	(110.5)
Telangana	-2,072***	-284.8***	488.2***	-1,151***	774.8***
Tripura	(83.37)	(70.67)	(95.25)	(109.6)	(90.59)
Uttar Pradesh	2,669***	3,586***	3,562***	1,499***	4,082***
Uttarakhand	(95.05)	(84.63)	(115.1)	(132.7)	(109.2)
West Bengal	1,650***	2,399***	584.3***	-631.7***	-789.7***
Assam	(79.75)	(71.41)	(96.42)	(112.1)	(93.01)
Bihar	343.7***	919.9***	2,177***	1,504***	876.4***
Chandigarh	(70.50)	(62.22)	(83.91)	(96.38)	(80.17)
Chhattisgarh	5,147***	-58.49	4,082***	3,676***	-2,034***
Delhi	(203.5)	(153.3)	(208.6)	(239.7)	(99.00)
Goa	-131.9	-425.7***	1,179***	-1,131***	-2,228***
Gujarat	(94.87)	(77.17)	(104.1)	(119.9)	(189.3)
Haryana	4,347***	3,577***	3,850***	-1,852***	4,736***
Himachal Pradesh	(143.4)	(146.6)	(199.3)	(230.1)	(99.68)
Jammu & Kashmir	5,103***	5,650***	5,739***	6,599***	837.7***
Jharkhand	(84.56)	(77.78)	(104.9)	(120.8)	(88.58)
Karnataka	2,159***	3,605***	3,318***	1,887***	-721.3***
Kerala	(77.09)	(69.22)	(93.27)	(107.6)	(89.23)
Madhya Pradesh	72.27	-695.7***	-1,126***	-3,386***	-1,734***
Maharashtra	(463.3)	(170.5)	(231.3)	(267.1)	(103.6)
Meghalaya	-437.7***	642.1***	1,638***	-537.4***	-2,013***
Odisha	(78.15)	(68.89)	(92.79)	(107.2)	(189.3)
Puducherry	77.31	1,018***	-474.6***	-812.5***	-539.3***
Punjab	(90.18)	(79.88)	(108.2)	(125.0)	(78.09)
Rajasthan	1,250***	2,568***	2,454***	5,920***	2,256***
Sikkim	(161.6)	(143.9)	(195.2)	(225.6)	(148.5)
Tamil Nadu	-2,113***	1,114***	459.9***	-820.3***	-1,027***
Telangana	(67.52)	(61.26)	(82.21)	(94.28)	(89.58)
Tripura	12,074***	6,469***	6,671***	4,506***	
Uttar Pradesh	(128.2)	(115.5)	(156.6)	(180.4)	
Uttarakhand	66.53	-1,269***	706.3***	328.0***	
	(84.06)	(69.63)	(93.63)	(108.4)	
Urban	621.2***	961.6***	677.4***		
	(28.25)	(23.89)	(32.18)		
Constant	8,056***	2,293***	4,565***	6,150***	4,769***
	(65.23)	(54.95)	(73.89)	(81.57)	(67.59)
Observations	134,436	174,405	174,405	173,181	168,165
R-squared	0.452	0.558	0.448	0.387	0.471

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7 : Consumption Function of India by income quantiles, August 2020

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
VARIABLES	QSt_Rural	QSt_Rural	QSt_Rural	QSt_Urban	QSt_Urban	QSt_Urban
TOTAL_INCOME	0.0325***	0.0392***	0.0528***	0.114***	0.153***	0.212***
	(0.00171)	(0.00246)	(0.00314)	(0.00224)	(0.00271)	(0.00349)
GOV_TRANSFER	-0.00264	-0.135***	-0.251***	-0.332***	0.200**	0.579***
	(0.0407)	(0.0313)	(0.0883)	(0.0852)	(0.0930)	(0.116)
Maharashtra	1,361***	1,734***	2,457***	1,805***	2,277***	2,966***
	(85.14)	(76.96)	(147.7)	(53.45)	(68.69)	(89.79)
Mpradesh	2,250***	3,028***	4,035***	2,763***	3,318***	3,746***
	(84.67)	(93.40)	(133.7)	(60.08)	(72.59)	(105.2)
Bihar	918.9***	380.0***	-200.4**	1,580***	1,252***	929.9***
	(55.23)	(66.88)	(90.03)	(46.29)	(61.53)	(80.45)
WBengal	650.6***	854.7***	1,567***	1,986***	2,047***	2,254***
	(96.94)	(95.97)	(149.6)	(62.01)	(72.54)	(103.8)
o.Karnataka	-	-	-	-	-	-
Constant	6,530***	7,884***	9,408***	5,017***	5,675***	6,451***
	(58.10)	(75.81)	(109.7)	(66.45)	(76.42)	(94.28)
Observations	14,258	14,258	14,258	27,792	27,792	27,792

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

We observe heterogeneity in consumption across states as shown both in quantile regression in Table 6 or state dummy regression in Table 7.

Conclusions

Consumption is essential for living for every individual. Better consumption is the most important economic goal of every individual from rich or poor households whether they are located in urban or rural areas. There is a huge body of theoretical and empirical literature in the micro and macroeconomics discussing important factors that determine level, growth, distribution of consumption in cross sections or over the years. COVID-19 global pandemic had seriously dampened consumption of individuals in every part of the world. Focus of this paper is to find how MPC differed in Covid-19 pandemic compared to normal years before or after the Covid-19 pandemic. Cross sections of consumption functions for rich and poor households located in rural and urban areas in India and its twenty-eight

states were estimated for every year from 2017 to 2021. Households allocated most of public transfers for pre-cautionary savings and MPCs were lower at the peak of the pandemic across all cross sections.

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