A Study on Currency and Coinage Circulation in India

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***Abstract*—In India, currency forms a significant part of money supply. Money supply is generally viewed in two senses. Money supply in the conventional sense includes notes and coins in circulation (nominally claims against the central bank and / or the government of the country) plus those deposits with banks which are repayable on demand. This is also referred to as the narrow definition of money supply and is widely known as M_1. When time deposits with banks are added to M_1, the definition of money supply becomes broader and is in India known as M_3. However, this research study focuses only on the aspect of banknotes and coins, which is a part of M_1, but plays a vital role in currency management.**

***Index Terms*—Coinage, currency, dinamination, circulation.**

I. Introduction

The study of coins and related objects is called Numismatics and that of banknotes is called Notaphily. A coin is a piece of metal or other material bearing distinctive marking to authorize its use as money and a banknote is a promissory bill. At the infancy of human civilization, people had to produce or procure their necessities by dint of their own labour. In course of time, the practice of barter came into vogue[1]. In the primitive barter system there was the problem of finding "two persons whose dispossessable possessions mutually suited each others' wants. There may be many persons wanting and possessing those things wanted, but to allow an act of barter, there must be a double co-incidence, which will rarely happen" [2]. In convenient standard, different metals were used in the field. Thus, the lump of gold, silver, copper and exchange from the earliest times in India. And in course of the issuing authorities.

The evolution of money has passed through the following stages depending upon the progress of human civilization at different times and places. They are commodity money (system of barter), metallic money (evolution of coinage), paper money (evolution of banknotes), and credit money (cheques), near money (bills of exchange, bonds etc.), plastic money (payments system through cards) and polymer banknotes (plastic currency).

II. Review Stage

Lakshmi (2009) [3] has written an article on the availability of the country's first bi-metal coin in the denomination of RS.10 and has stated that the aim of RBI is to increase the shelf life of RS.10 that of notes made of cotton rag paper lasting only upto 10 years while that of coins would be up to 20 years.

The same author (2009) [4] has spoken of the new 5-rupee coin launched in Chennai city, made of nickel and brass. The introduction of this new coin was in light of complaints about difficulties in differentiating between the coins in the denomination of five rupees and 50 paise.

The Hindu, (2011) [5] has come out with the article of RBI's meeting with press persons and the former's announcement of legally invalidating the circulation of coins in the denomination of 25 paise and below from June 30, 2011. There was no direct answer from the RBI personnel when asked whether 50 paise coins will also be dealt the same way in due course of time. However, it was confirmed that RS.10 coins are in short supply. This shows the gradual eradication of smaller denominations from circulation. This review has helped the researcher in understanding the difficulties faced by the poor due to such gradual phasing out of smaller denominations from circulation, while framing the objective and hypothesis.

III. Economic Theories

The research study has its foundation on certain economic theories of famous economists and concepts based on these theories. The following are the economic theories that have been applied during primary data collection and analyses.

Coase Theorem: Though not actually a theorem in the strictest sense of the term, a view put forth by Ronald Coase is that externalities or economic inefficiencies will under certain conditions be corrected by bargaining between the affected parties. Such an economic inefficiency was actually undergone by Government of India and RBI when it had to come out with a new type of RS.5 coin with shining brass finish since the one minted earlier resembled 50 paise coin and caused hardship to the public.

Post hoc fallacy: From the Latin post hoc, ergo propter hoc, which translates as "after this, therefore because of this", this concept means that if an event B follows an event A, it results in B being caused by A. In order to avoid such fallacy, this opinion survey is highly important. To quote an example, RS.10 coins with ferro copper combination were circulated by the Government of India through RBI. However, it was felt that for the sake of metallic content it was hoarded by the people, putting Gresham's law into action (soiled RS.10 banknotes were in circulation but not RS.10 coins – "bad money driving away good money out of circulation").

IV. Methodology

This section explains the methodology employed to analyze the factors in determining the respondent's choice of new currency. Let Y_i take two values, either 1 or 0. That

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is, Y_i takes value 1 if the respondent i's answer is "yes" to the question that "Will you welcome the new (polymer) structure of currency?" and 0 otherwise. Obviously, it is a dichotomous or binary choice variable and shows the observed preference of the respondent. Given the dichotomous nature of the variable Y_i, the task is to develop a method for estimating P, where P is the probability that the respondent will choose the new type of currency.

Let Y^* be the unobserved latent variable which indicates the utility of the ith individual to embrace one of the possible outcomes (accepting new currency or not). For any individual i=1,2,….n where n is the number of individuals. Let us assume a regression model for Y^*_i so that:

$$Y^*_i = \beta_0 + \beta' X + e_i$$

where X is a k-dimensional column vector of observed explanatory variables, β_0 is the intercept, β is a vector of unknown parameters and e is the disturbance term in the model with zero mean and constant variance.

M_l = vector of monetary variables including

Five dummy indicators for denomination highly used (each represents denominations- RS.10, RS.50, RS. 100, RS. 500 and RS. 1000; the reference case is RS.20);

V. Objectives

To analyse the issues and circulation of coins and currency in India.

To analyse the respondents attitude towards on the circulation of coins and currency in the study area.

VI. Hypothesis

There is no difference in the type of denomination used among the different categories of respondents and the welcoming of new (polymer) currency.

VII. Result and Discussion

This section deals with the attitude of the people on welcoming polymer currency in the study area. Polymer currency is yet to be introduced and circulated in our country. People are yet to get the feel of the currency and knowledge about the same, to differentiate between paper banknotes and polymer banknotes. Since all these aspects are behavioral patterns that could either be accepted or rejected by the general public, the welcoming feature of polymer currency takes the probability of either being accepted or rejected. Hence, this involves Qualitative Regression Model and to arrive at the decision on this exploratory study, Logistic Regression Model (simply called the logit model) has been applied, the results of the same being as follows. Since this analysis pertains to the views and reaction of the general public who are heterogeneous in character, 400 samples consisting of the two income groups has been considered.

Coins have been playing an important role in the management of currency system in India. Notes in the denomination of RS.1, RS.2 and RS.5 were found to constitute about 57 percent of the total notes in circulation but accounted only for about 7 percent of the value of all the notes in circulation; also the average life of these notes ranged from 6-7 months (for RS.1 note) to 2 years (for RS.5 note) [6]. Meeting the replacement requirement of such a large percentage of notes in circulation at short intervals of 6 months to 2 years and their servicing had greatly added to the workload and costs at the note printing presses, the RBI and currency chests. The Committee on Currency Management suggested coinisation of RS.1, RS.2 and RS.5 notes and the same came into effect from 1996 [7]. Hence the study of coins also becomes inevitable to have a broader perspective of this research. Table I shows the volume of coins in circulation from 2004 to 2009 and table II shows the value of coins in circulation for the period 2005-2009 respectively.

TABLE I : Volume of Coins in Circulation

(Million Pieces)

Denomination	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Small coins	54,102 (62.9)	54,051 (64.6)	54,115 (63.8)	54,277 (60.1)	54,735 (57.3)	54,736 (54.7)
RS.1 coin	20,565 (23.9)	17,896 (21.4)	18,730 (22.1)	22,878 (25.3)	24,721 (25.9)	26,957 (26.9)
RS.2 coin	6,275 (7.3)	6,449 (7.7)	6,684 (7.9)	7,441 (8.2)	9,535 (10.0)	11,179 (11.2)
RS.5 coin	5,071 (5.9)	5,238 (6.3)	5,289 (6.2)	5,761 (6.4)	6500 (6.8)	7,141 (7.1)
Total	**86,013 (100.00)**	**83,,631 (100.00)**	**84,818 (100.00)**	**90,357 (100.00)**	**95491 (100.00)**	**1,00,013 (100.00)**

Source : Various RBI Annual Reports @Excluding 1p, 2p, 3p and anna-pie coins valued at RS.112 crore; Values in parentheses shows the corresponding share percentage of volume of banknotes in circulation.

There has been a significant increase in the circulation of RS.1, RS.2 and RS.5 coins which had almost doubled in the last four years. Tables I and II indicate the role of coins and the extent of coinisation, gradually withdrawing the corresponding banknotes in India during the recent past.

TABLE II : Value of Coins in Circulation

(In Rupees Crore)

Denomination	**2005**	**2006**	**2007**	**2008**	**2009**
Small coins	1,353 (19.2)	1,357 (18.8)	1,364 (17.0)	1,455 (16.0)	1,455 (14.6)
RS.1 coin	1,790 (25.4)	1,873 (26.0)	2,288 (28.5)	2,472 (27.2)	2,696 (27.1)
RS.2 coin	1,290 (18.3)	1,337 (18.5)	1,488 (18.6)	1,907 (21.0)	2,236 (22.5)
RS.5 coin	2,619 (37.1)	2,645 (26.7)	2,881 (35.9)	3,250 (35.8)	3,570 (35.9)
Total	**7,052 (100.00)**	**7,212 (100.00)**	**8,021 (100.00)**	**9,084 (100.00)**	**9,957 (100.00)**

Source: Various RBI Annual Reports

Table I shows that the total value of coins in circulation which declined by about 2percent as against an increase of 3.8 percent in 2003-04, is mainly due to fall in demand for small coins. The demand for RS.5 coins recorded a subdued growth due to the parallel issue of banknotes of RS.5 denomination. During 2005-06, the total value of coins, including small coins in circulation increased by 2.3 percent during this period.

On an average, small coins show a downward trend while other coins or denominations RS.1, RS.2 and RS.5 are almost stable with the slightest variation. Amongst coins,

while RS.1 coins had the largest share in terms of volume with 25.9 percent, RS.5 coins had the largest share in value terms with 35.8 percent by 2009 end. In volume terms RS.1, RS.2 and RS.5 coins increased by 8.1 percent, 28.1 percent and 12.8 percent respectively.

During this period, there was a spurt in the indent placed by the Reserve Bank on the mints to meet the increased demand for coins. The stock of cupro-nickel coins with the mints was also lifted with the concurrence of the Government. The demand was also met by issue of 127 million pieces of 50 paise coins. For the first time, in 2009, new bi-metallic RS.10 coins were introduced. A total of 80 million pieces of the same were minted and issued through public counters of RBI / banks.

TABLE III : VOLUME OF BANKNOTES INDENTED

	2003-04	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2010**
Denomi	**I**	**I**	**I**	**I**	**I**	**I**	**I**
RS.5	1500	160	-	-	-	250	1000
RS.10	3500	4700	3300	3500	4200	5000	5000
RS.20	1000	1000	1200	500	600	500	800
RS.50	3000	2040	2700	1400	1200	1000	1000
RS.100	5000	5030	5550	4000	4200	4200	4000
RS.500	1500	1625	1800	1500	1800	3500	4000
RS.1000	300	300	450	600	700	800	1000
Total	**15800**	**14855**	**15000**	**11500**	**12700**	**15250**	**16800**

Source : RBI Annual Report, various years; I = Indent

In 2000-01, the Reserve Bank had initiated various measures to continue its effort to even out demand supply mismatches, trying to dispose notes in an eco-friendly way and in efficient handling of increasing volumes of cash demand across geographical areas.

Tables III and IV show the picture of banknotes indented and supplied from 2003-04 to 2009-2010 in terms of volume and value. Table III and IV shows the picture of banknotes indented and supplied from 2003-04 to 2009-2010 in terms of volume.

The supply of banknotes which shows just a little above half of its demand until 2005-06 gradually increased to three-fourths the demand in 2006-07, and in 2009-10, met almost the full demand in certain denominations (RS.20, RS.500 and RS.1000) and surpassed the demand requirement in some other (RS.10 and RS.100).

This Table VI shows the frequently used coins by 800 respondents and based on the frequencies, their rankings. While the two income groups and the merchants columns show the opinions of the respondents, bank respondents column show the frequency in terms of customers approaching the banks asking for coins in exchange for banknotes. While lower denominations of 50 paise (27 percent), RS.1 (25.50 percent), RS.2 coin (24 percent) and RS.5 coins (23.50 percent) are used in the same order of ranking by the low income group, the picture stands reversed for high income group. They use RS.5 coins more extensively with 56 percent, followed by RS.2 coin at 30 percent and RS. 1 coin at 11 percent. Not many use 50 paise coins. Both the income groups hardly frequent RS.10 coins during their transactions and hence this denomination is not much in circulation as expected. Probably people prefer RS.10 banknote to coins. As far as the merchants are concerned, they need to handle different types of people without any discrimination and hence their usage of all types of coins becomes necessary. Customers approach banks for coins in exchange of banknotes mostly for RS.5 coins (73 percent) followed by lower percentages for RS.1 and RS.2 coins at 14.50 and 12.50 percent respectively.

TABLE IV: VOLUME OF BANKNOTES INDENTED SUPPLY

	2003-04	**2004-05**	**2005-06**	**2006-07**	**2008-09**	**2010**
Denomina	**S**	**S**	**S**	**S**	**S**	**S**
RS.5	1470	179	50	50	-	250
RS.10	3070	4332	1183	3480	4193	5030
RS.20	959	755	706	438	636	500
RS.50	2129	1862	1063	1458	1213	1008
RS.100	4161	3956	3208	4034	4199	4215
RS.500	1168	1252	661	1473	1805	3459
RS.1000	209	257	130	589	699	763
Total	**13166**	**12593**	**7001**	**11522**	**12745**	**15225**

Source : RBI Annual Report, various years; S = Supply

TABLE V: DESCRIPTIVE STATISTICS

Variables	**Mean**	**S.D.**
1. Dependent Variable: Y- Perception of welcoming new banknote structure (d.v.) (1=if welcomes and 0 otherwise)	0.82	0.384
2. Independent variables: *2.3. Monetary Variables:* (vi) Revenue Loss due to accidental holding of forged banknote by the respondent	0.415	0.493
(vii) Denomination 10 banknote very frequently used by the respondent	0.675	0.251
(viii) Denomination RS.20 banknote very frequently used	0.06	0.237
(ix) Denomination RS.50 banknote very frequently used by the respondent	0.525	0.223
(x) Denomination RS.100 banknote very frequently used by the respondent	0.456	0.499
(xi) Denomination RS.500 banknote very frequently used by the respondent	0.155	0.362
(xi) Denomination RS.1000 banknote very frequently used by the respondent	0.20	0.400

TABLE VI: DISTRIBUTION OF RESPONDENTS USING COINS FREQUENTLY

Coin highly used	Low income	Rank	High income	Rank	Merchants	Rank	Banks	Rank
50 paise	54 (27.00)	1	6 (3.00)	4	37 (18.50)	1	-	-
RS. 1	51 (25.50)	2	22 (11.00)	3	50 (25.00)	2	29 (14.50)	2
RS.2	48 (24.00)	3	60 (30.00)	2	51 (25.50)	3	25 (12.50)	3
RS.5	47 (23.50)	4	112 (56.00)	1	54 (27.00)	4	146 (73.00)	1
RS.10	-	5	-	5	8 (4.00)	5	-	-
Total	200 (100)		200 100)		200 (100)		200 (100)	

Source: Computed by the researcher through primary data collection and figures in () denote column percentage

Next Table (Table VII) shows the degree of usage of different denomination of banknotes by 800 respondents. As far as the frequency of bank are concerned, customers approaching the banks for denominations, while withdrawing amount from the bank is taken into consideration. While low income group frequents with lower denominations with 28 percent of `10, 22 percent of RS.20, 21 percent of RS.50 and 20 percent of RS.100 and 5 percent of RS. 1000, the high income group frequents more with the higher denomination of RS.500 at 25 percent, RS.100 with 22.50 percent and RS.1000 with 15.50 percent. Thus, it can be observed that as per the income levels, people tend to prefer tendering or preferring denomination in banknotes.

Merchants, on the other hand highly transact with RS.100 and RS.10 with 29.50 percent and 24 percent respectively thus showing that they have to fulfill the exchange needs of people of both income types. However, instead of other two denominations of RS. 20 and RS. 50, it is RS.500 which holds the third place for them as a highly frequented banknote with 21.50 percent. While considering the banker's opinion, it can be stated that people accept RS.500, RS.1000 and RS.100 banknotes in the same line of ranking while withdrawing cash from banks with 50 percent, 16 percent and 14 percent respectively.

It is opined by the bankers that RS.10 banknotes are put to circulation effectively by RBI and people do not find difficulty in obtaining it

TABLE VII: DISTRIBUTION OF RESPONDENTS USING BANKNOTES FREQUENTLY

Bank note highly used	Low income	Rank	High income	Rank	Merchants	Rank	Banks	Rank
RS.10	56 (28.00)	**1**	28 (14.00)	**4**	48 (24.00)	**2**	10 (5.00)	**6**
RS.20	44 (22.00)	**2**	10 (5.00)	**6**	13 (6.50)	**6**	10 (5.00)	**5**
RS.50	42 (21.00)	**3**	36 (18.50)	**5**	19 (9.50)	**4**	20 (10.00)	**4**
RS.100	40 (20.00)	**4**	45 (22.50)	**2**	59 (29.50)	**1**	28 (14.00)	**3**
RS.500	10 (5.00)	**5**	50 (25.00)	**1**	43 (21.50)	**3**	100 (50.00)	**1**
RS.1000	8 (4.00)	**6**	31 (15.50)	**3**	18 (9.00)	**5**	32 (16.00)	**2**
Total	**200 (100.00)**		**200 (100.00)**		**200 (100.00)**		**200 (100.00)**	

Source: Computed by the researcher through primary data collection and figures in () denote column percentage

However, 20 and RS.50 are comparatively less frequented denomination of banknotes in circulation, in general. There has been an increase in the value and volume of banknotes in circulation consisting of all denominations.

H_0: There is no association between the type of denomination used among the different categories of respondents and the welcoming of new (polymer) currency.

TABLE VIII: MONETARY VARIABLES - MODEL

Number of obs. = 400

LR chi2(8) = 222.93

Prob> chi2 = 0.0000

Log likelihood = -77.093751 Pseudo R^2 = 0.5911

Welcoming new (polymer) currency	Coefficient	z	P>|z|	δP/δX
Denomination highly used for transaction Rs20b (ref. cat.)				
Rs10b	5.254131	4.38	0.000	0 .0804904
Rs50b	0.2666735	0.18	0.861	0.0131689
Rs100b	6.211149	5.56	0.000	0.5237615
Rs500b	9.094187	6.43	0.000	0.2018561
Rs1000b	8.111782	6.08	0.000	0.2382465
Constant	- 7.0454	- 5.67	0.000	

Source: Computed by the researcher from the primary data collected.

Table VIII indicates that the coefficients of all denominations are positive. Except for RS.50, all denominations show a high level of significance at 1 percent level. While the probability of preferring RS.100, RS.1000 and RS.500 is higher in the same order, when compared to the base group of respondents who frequent RS.20, that of RS.10 and RS.50 is lower. Hence there is a difference in the preference of denominations by the respondents during their transactions. It can thus be concluded that the null hypothesis is rejected accepting the alternate hypothesis that there is a difference in the type of denominations being used by the respondents among the different categories of people.

VIII. CONCLUSION

People find coins difficult to handle due to varied reasons like identification of different denominations, size of the coin, weight of the coins, etc. This has led a majority of the people to choose banknotes to coins to hold or transact with. However, the respondents have dissatisfaction in the current currency in circulation too like, transacting with soiled / mutilated banknotes, torn or stuck banknotes etc. The ratio of currency in circulation to GDP in India is around 13 percent [8] while the ratio of education to GDP is 6 percent [9], infrastructure to GDP is 6.4 percent [9] and that of health to GDP ratio is 0.12 percent [10]. Thus the share of currency with the public has a higher proportion when compared to other developmental activities. Cash as a percentage of money supply in India is about 18-20 percent against 5-6 in developed countries and 8-10 percent in developing countries such as Thailand, Malaysia and the Philippines [11]. While coins are minted by the Government

of India based on the advice of the RBI (and forms its liability), printing of banknotes is done by RBI with the consensus of the Government of India. Thus currency components plays a vital role in India by way of minting and printing costs such as manufacturing and issue cost, wear costs, opportunity cost of capital, cost of transport, and cost of acceptance. Hence people and government should think about the next best alternative policy and plan for issuing polymer currency in India.

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