Determinants of Real Money Demand in India

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Abstract

The foundation of a nation's monetary policy is determined by the components of its money supply. The advent of technological advancements in the banking industry has led to the development of digital payment methods that serve as substitutes for the currency in circulation. The proliferation of digital payment methods has an impact on real money demand, thereby disturbing the money supply-demand equilibrium of the country. The current study made an effort to evaluate the factors that affect the real money demand in India, taking into account the use of digital payment methods like NEFT, debit cards, and credit cards, as well as macroeconomic variables like GDP, the exchange rate, and price level. The study used secondary time series data from the RBI database for the period from 2005–06 to 2020–21. The linear regression model was used to estimate the real money demand function, and it was found that income, exchange rate, and NEFT transactions positively influenced real money demand. Debit cards had a negative impact on the real money demand, concluding that an increase in the value of debit card transactions caused a decline in the real money demand. The study's findings will help the RBI to enable methods to incorporate digital payment instruments in the components of the money supply, thereby maintaining a stable money demand function.

Keywords : **real money demand, exchange rate, NEFT, debit cards, monetary policy**

JEL Classification Codes : E4, E510, G210

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Money supply forms the fulcrum of interest to researchers and policymakers to estimate sound macroeconomic relationships that surround money supply. In India, the process of monetary policymaking involves understanding the role of money supply and macroeconomic variables via interest rate, price, exchange rate, and income. The introduction of fintech developments in the banking sector has created a wide range of payment instruments that serve as substitutes for cash and promote a "cashless" society. Hence, the components of the money supply need to be revisited to encompass these innovations. Reflecting this tendency, the value of banknotes and coins in circulation as a percentage of GDP (12.04%) is still extremely high in the country compared to other emerging markets, like Brazil, Mexico, and Russia.

This empirical study is set against the background of Friedman's model of demand for real money balances. Friedman considers the demand for money merely as an application of a general theory of demand for capital assets. As demand for real money balances is nominal demand for money divided by the price level, demand for real money balances is written as:

$$Md/P = f(W, h, rm, rb, re, P, \Delta P/P, U) \quad \ldots\ldots\ldots\ldots (1)$$

where, *Md* stands for nominal demand for money and *Md/P* is demand for real money balances, *W* stands for the

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wealth of the individuals, *h* for the proportion of human wealth to the total wealth held by the individuals, *rm* for the rate of return or interest on money, *rb* for the rate of interest on bonds, and *re* for the rate of return on equities, *P* for the price level, $\Delta P/P$ for the change in the price level (i.e., the rate of inflation), and *U* for other institutional factors.

One of the goals of monetary policy in India is price stabilization, and, in this regard, liquidity management holds the key. Currency in circulation constitutes a major component of the money supply in India and is vital to liquidity management. Understanding real money demand that accounts for inflation enables the Monetary Policy Committee (MPC) of the Reserve Bank of India (RBI) to alter its monetary policy instruments. By applying the Friedman theory of real money demand and highlighting the significance of liquidity management in monetary policy, this study aims to model the real money demand (currency in circulation and price) as a function of macro-economic variables and the digital payment instruments in India for the period from 2005 – 06 to 2020 – 21.

Literature Review

The literature adequately provides both theories and empirical estimations of money demand functions in the presence of macroeconomic variables and financial innovations. This section summarizes some of the major works in recent times on money demand analysis. Singh et al. (2021) concentrated on determining if credit cards enabled users to save or incur debt. The findings showed a substantial association between factors such as the payback of a previous bill, the billing amount, and the payment of current bills, and those consumers who did not manage their finances had a high risk of getting trapped in debt. From the vast array of digital payment methods accessible in India, Kakkad and Jadhav (2021) made an effort to conduct a thorough analysis of a few chosen platforms. He recommended going hyper-local to raise awareness of digital payments at the grassroots level, launching a vigorous campaign to encourage their adoption by drawing comparisons to the Swachh Bharat campaign, making some changes to payment systems, and digitizing government-to-government (G2G) and government-to-person (G2P) payments to reduce costs.

Adil et al. (2020) estimated the money demand for India using quarterly data for the period from 1996–2016 using the ARDL approach, and the results indicated the presence of a stable long-run relationship in the real money demand function and the variables of the study. The study concluded that innovations significantly influenced the money demand function and its stability in India. Dunne and Kasekende (2018) investigated the development of financial innovation and its impact on money demand in the region using panel data estimation techniques for 34 countries between 1980 and 2013. The results indicated a negative relationship between financial innovation and money demand. This implied that financial innovation played a crucial role in explaining money demand in sub-Saharan Africa, and given innovations such as mobile money in the region, this can have important implications for future policy design.

Shukla (2017), by using the discriminant analysis method, asserted that people up to 45 years old had fewer handling issues with debit cards and were more likely to utilize m-wallets following India's demonetization. Bedarkar et al. (2016) investigated the twin deficit hypothesis and the impact of inflation and money supply using the IS-LM framework. He proposed that inflation may be the mediating variable that explains why a bigger budget deficit may worsen the current account balance. In eight West African countries, Ajide (2016) examined how financial innovation and bank rivalry affected sustainable development. Data from the years 2000 – 2013 was taken from World Bank development indices. According to the findings, competition has increased banking efficiency, and financial innovation would boost economic growth and development.

Sircar and Goel (2015) examined the RBI's current monetary policy in terms of its emphasis on the goal of price stability and its effects on the Indian economy via the credit channel of the monetary transmission mechanism. Patil (2014) examined the payment habits of individuals through the use of a questionnaire and 100

respondents in Mumbai in 2013. The reasons that led to the substitution of plastic money for cash and paper money were determined, demonstrating that consumers preferred plastic cards to cash and paper money. Using the Johansen co-integration and vector error correction model, Saxena and Bhadauriya (2013) estimated a more precise link between inflation and its drivers in India between April 2001 and March 2011 (VECM). The Johansen co-integration test applied to chosen data identified four long-run equilibrium relationships for inflation and their causes. The VECM results showed a strong interdependence between the money supply, crude oil prices, and inflation in India, as well as a positive link between GDP and CPI.

According to Patel and Amin (2012), plastic money has become a necessary component of today's transactions, making life easier and paving the way for the improvement and efficiency of the nation's financial system. According to the report, the rise of plastic money will aid in the prevention of money laundering and enable the efficient use of the financial system, which will be beneficial for tax law. Rauf and Khan (2012) evaluated the significance of developments in Pakistan's payment system from 2003 to 2012. The survey found that between 2003 and 2012, Pakistan's share of transactions conducted on paper decreased, and the majority of retail payments in Pakistan were conducted on paper. According to co-integration test figures based on quarterly data, cash withdrawal demand climbed for the two most popular electronic financial operations, but demand for online bank branches decreased. Additionally, it was discovered that poor financial inclusion and the deposit rate hurt the demand for cash payments.

Using robust time series approaches, Hye (2009) looked into the connection between money demand and financial innovation in Pakistan from 1995–2007. An empirical study suggested a long-term relationship between money demand, interest rates, economic activity, inflation, financial innovation, and exchange rates. The key finding is that financial innovation had a beneficial impact on money demand both in the short and long terms, but the short-term elasticity was greater than the long-term elasticity. In India, there has been abundant research on the demand for money and the role of financial innovations in banking and electronic payments over the past few years. Most studies have analyzed the above contexts individually for the Indian economy. In this scenario, the present study is unique in that it is an attempt to empirically analyze the trend in financial innovations in India and the impact of the same on the real money supply *(m/p)* in the country during the period from 2005–06 to 2020–21. The onset of financial innovations along with the economic reforms produced a pronounced influence on the money demand function in India, which is supported by the studies of Adil et al. (2018), Bharadwaj and Pandit (2010), Padhan (2011), Aggarwal (2016), Inoue and Hamori (2009), and Singh and Pandey (2010).

Research Problem

Friedman's Model of real money demand is based on the transaction motive of holding money by individuals, which is impacted by the opportunity cost of holding it. Recently, financial innovations have reduced the opportunity cost of holding money and are considered substitutes for currency in circulation. The empirical literature provides adequate support for studies that analyze the stability of the money demand function (broad money or narrow money) as a function of price, interest, and income, but few studies in India have analyzed the extent of the influence of digital payment instruments on the real money demand. Understanding the real money demand helps policymakers create efficient liquidity management parameters in India. Hence, the present study realizes the potential to estimate the real money demand for India as a function of income, exchange rate, and digital payment instruments via the value of debit cards and NEFT transactions.

Methodology

The study is macro-level research for India, and secondary data were used for the analysis. Data were taken from

the RBI database on "Statistics of the Indian Economy," "Time Series Publication of Statistical Tables Relating to Banks in India," and "Payment System Indicators" for the period from 2005–06 to 2020–21. The variables used in the study include currency in circulation, wholesale price index (WPI) as a measure of price, gross domestic product (GDP) as a measure of income, exchange rate of the Indian rupee against the US dollar, the value of debit card, and National Electronic Fund Transfer (NEFT) transactions.

Real money, as described by Friedman, is denoted as *M/P,* which in this paper is given as:

$$M/P = Currency\ in\ circulation/WPI \quad \ldots\ldots\ldots\ldots (2)$$

The real money demand function estimated in the study is :

$$M/P_t = \beta_0 + \beta_1 Y_t + \beta_2 EXC_t + \beta_3 DC_t + \beta_4 NEFT_t + e \quad \ldots\ldots\ldots\ldots (3)$$

where,

M = Currency in circulation,

P_t = WPI at market prices (2005–12 at base year 2004–05 ; 2012–18 at base year 2011–12),

Y_t = GDP at market prices (2005–08 at base year 2004–05 ; 2008–18 at base year 2011–12),

EXC_t = Exchange rate of the Indian rupee against the US dollar,

DC_t = Value of debit card transactions,

$NEFT_t$ = Value of NEFT transactions,

e = Stochastic error term,

t = Time period.

All the variables used in the estimation are in their logarithmic forms. The trend in the growth of digital payment instruments was calculated using the compound annual growth rate (CAGR), and the real money demand function was estimated using the linear regression model with the help of the software package SPSS Version 21.

Hypotheses

- **H_{01} :** No significant relationship exists between GDP, exchange rate, and real money demand.

$$\beta_1 = \beta_2 = 0 \quad \ldots\ldots\ldots\ldots (4)$$

- **H_{01}:** There is no significant relationship between the value of debit card, NEFT transactions, and real money demand.

$$\beta_3 = \beta_4 = 0 \quad \ldots\ldots\ldots\ldots (5)$$

Analysis and Results

The Trend in the Growth of Digital Payment Innovations in India

The emergence of financial innovations has changed the phase of financial transactions across the world, and India is no exception. Universal banking and globalization have led to the introduction and adoption of various innovations in payment mechanisms across countries today. In India, the RBI is today walking on the roadmap of

Table 1. ***Growth of Financial Innovations in Payment Mechanisms in India from 2005 – 06 to 2020 – 21***

Year	RTGS		EFT/NEFT		Credit Cards		Debit Cards	
	Volume (Lakhs)	Value (Crores)	Volume (Lakhs)	Value (Crores)	Volume (Lakhs)	Value (Crores)	Volume (Lakhs)	Value (Crores)
2020–21	202.35	12982215	3481.39	3046329	1887.27	72319	3763.05	67386
2019–20	118.95	12047221	2623.70	2283665	1638.57	50574	3608.13	48209
2018–19	202.35	12982215	2423.89	2547001	1632.74	58062	12989.89	342010
2017–18	124.46	1467431.99	1946.36	172228.50	1412.97	4,626.33	11945.65	33,588.31
2016–17	107.86	1253652.08	1622.10	120039.70	1093.51	3,312.21	10962.36	26,901.79
2015–16	98.34	1035551.64	1252.88	83273.11	791.67	2,437.02	9247.00	26,960.63
2014–15	92.78	929333.09	927.55	59803.83	619.41	1,922.63	7804.57	23,492.65
2013–14	81.11	904968.04	661.01	43785.52	512.03	1556.72	6707.10	20602.86
2012–13	68.52	1026350.05	394.13	29022.42	399.23	1244.268	5775.25	17426.39
2011–12	55.05	1079790.60	226.1	17903.49	322.16	978.72	5409.45	14532.04
2010–11	49.28	941039.33	132.33	9391.49	265.16	755.16	237.06	386.91
2009–10	33.27	1011699.3	66.34	4095.09	234.25	618.23	170.17	264.18
2008–09	13.38	611399.12	32.17	2519.56	259.63	653.54	127.65	185.47
2007–08	5.86	482945.59	73.26	6263.14	228.21	579.85	155.49	240.80
2006–07	3.88	246191.83	93.65	6460.17	169.55	413.62	182.74	295.74
2005–06	1.77	115408.36	3.07	612.86	156.09	338.86	45.69	58.97

Source : Payment System Indicators, RBI 2022.

Table 2. ***Compound Annual Growth of Financial Innovations Adopted in India***

Financial Innovations	Estimated CAGR
RTGS	34.34
EFT/NEFT	70.23
Credit Cards	39.82
Debit Cards	55.28

Source : Estimates based on Data from Table 1.

the cashless economy, with all its monetary and financial policies targeting the same. The present study has observed a steady increase in the growth of the various digital payment mechanisms adopted for transactions, especially in the banking sector, which forms the gateway of financial transactions in the country. The leading innovative payment mechanisms in the banking sector include RTGS, EFT/NEFT, debit cards, credit cards, internet banking, and mobile banking. Table 1 shows the growth in the major innovative digital payment mechanisms adopted in India from 2005–06 to 2020–21.

Table 1 indicates that there has been a continuous increase in the electronic payment mechanisms adopted in the financial sector of the country from 2005–6 to 2020–21. From the table, the compound annual growth rates (CAGR) were estimated and are depicted in Table 2.

The CAGR estimates indicate that the growth rates of debit cards (55%) and EFT/NEFT transactions (70%) were higher, indicating the increased acceptance of debit cards and NEFT for transactions and payments during

Table 3. ***Regression Coefficients from the Least Square Method***

Independent Variables	Coefficient	R^2 value	ANOVA Significant *F*	Durbin – Watson Statistic
Constant	–2.693	0.97	121.179	2.214
Log *GDP*	0.438		0.00**	
Log *Exchange Rate*	0.107			
Log *Debit Card*	–0.018			
Log *EFT/NEFT*	0.050			

**Significant at the 5% level.

Source : Estimates based on secondary data from 2005–06 to 2020–21.

the study period. The study has therefore selected debit cards and EFT/NEFT from among the digital payment modes in the payment mechanism to analyze the impact of the same on the demand for real money supply in India.

Determinants of Real Money Demand

The estimated regression coefficients obtained are given in Table 3. The coefficient of GDP and exchange rate (β_1 and β_2 is 0.438 and 0.107, respectively, indicating their positive influence on real money demand. The coefficient of the value of debit card transactions (β_3) is –0.018, implying that a 1% increase in debit card transactions causes a 1.8% decline in real money demand. Meanwhile, the coefficient of NEFT transactions (β_4) is found to be positively significant (0.050). These results are found to be similar to the findings of Shukla (2017), Saxena and Bhadauriya (2013), and Hye (2009). Therefore, hypotheses H01 and H02 are rejected. Hence, it is observed that there is a significant relationship between GDP, exchange rate, value of debit card and NEFT transactions, and real money demand.

The estimated coefficients of the equation obtained are found to be statistically significant, with an R^2 value of 0.97. The predictor variables explain about 97% of the change in the demand for real money balances in India. The *F*-statistic of the regression model tests the goodness of fit, and in this study, the *F*-statistic (121.179) is found to be significant at the 5% level, indicating the goodness of fit of the model. The Durbin – Watson statistic for the model estimated is 2.214, which is in the threshold limit of 0–4 (Chen, 2016); hence, the model is free from autocorrelation.

Conclusion and Policy Implications

The present study examines the determinants of real money demand in India, considering the macroeconomic variables of income and exchange rate and the digital innovation variables of NEFT and debit card transactions, representing opportunity cost variables. The regression model is derived to examine the determinants of real money demand using GDP, exchange rate, debit card transactions, and NEFT as the predictor variables. It is found that the increased adoption of debit cards cause a decline in real money demand; whereas, the macroeconomic parameters of income and exchange rate increase the real money supply in India during the study period. It can be concluded that debit cards are the digital payment instrument that significantly influence the real money demand in India.

Digital payment instruments and electronic money operations have occupied a central role in the monetary system by acting as substitutes for currency in circulation. Hence, the Reserve Bank of India needs to integrate

digital payment instruments while measuring the components of the money supply to estimate the stable money demand function.

Authors' Contribution

Dr. K. P. Radhika initiated the idea to analyze the real money demand and trace the influence of the recent development in digital payment instruments on the demand for money. Dr. Bhuvaneshwari D. studied the literature available for the study and arrived at the research gap and objectives based on filtering them for India and the digital payment instruments. Dr. K. P. Radhika ran the regression model, analyzed the data, and wrote the manuscript. Dr.Bhuvaneshwari D. finally edited the document for grammatical errors and formatted the article per the journal's requirements.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

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